RF DECK MECHANICAL ASPECTS

When cleaning the radio - (Lee Nolan treatise)

First, you do not have to remove the front panel or to disassemble the gear train unless there is something physically damaged or otherwise mechanically wrong with it. Second, cleaning is not something you are going to accomplish in an evening or even in a couple of weeks of evenings. make sure you have a clean place where you can let the radio sit for a period of time without being disturbed. Third, I personally do not use chemical cleaners, as they tend to be needed only in extreme cases and are dangerous to use (they are normally very flammable and can damage other components such as phenolic if they get onto it).

I often clean gear trains in old Philco consoles or other radio mechanisms, and only once have I had to resort to chemical cleaning - after a radio was in a flood and sat in silt for a few weeks - then the owner tried to operate the mechanism before cleaning it, driving grit deep into the mechanism - a very bad move!

I currently have my latest 390A out on the workbench (a '54 Motorola). The gear train is clogged with dried lubriplate, old waxy 'stuff' and who knows what else. I bought this particular one because it was complete, fully operational, and in very good cosmetic shape otherwise. The dirty appearance kept the price reasonable. It had apparently been stored in a very hot place upside down. The lubricant had run 'down' toward the top of the receiver, clogging the counter digit windows, clinging to the inside of the front panel, etc. The radio also has a thin black carbon-looking greasy coating on the top right rear of the chassis and thick smelly cigarette residue on the front panel. The radio reportedly came from Oklahoma, and my guess is that it lived in a transportable RTTY communications shelter where it was exposed to diesel exhaust and operator pollution regularly.

Keep in mind that the R-390A gear mechanism was intended to be serviced by military technicians, most of whom are not impressed by fine electro-mechanical mechanisms. As a result, the gearbox on the R-390A is pretty sturdy and can hold up well under conditions that 'swiss watches' would find unbearable.

A friend, who spent years in the Navy working on R-390A's, said they used to disassemble the gears and put them in a coffee can of cleaner to soak. Then, they would use compressed air to blow them off and reassemble them. But, unless you're real familiar with the gearing mechanism, he does not advise taking it apart unless there is absolutely no other way to get the radio to work properly. They only disassembled the gear

assemblies when they had physical damage to a gear, shaft or bushing or they mechanically would not operate after a good cleaning. Otherwise, they just cleaned them with a volatile cleaner (outdoors!!) and lubed them. If they got the cleaner on another sensitive part of the RF deck and the part wouldn't work right, they just trashed the RF deck and got another one off of the shelf. I don't have that luxury, myself, so I take a gentler approach.

Get a very good light that can illuminate the gearbox well. I use my 'magnifier' fluorescent lamp - it has a nice gymbal on the end to adjust it just where I want it.

Work slowly and deliberately as you clean. I spend no more than a couple of hours at a time to prevent fatigue.

A safety note - the oil and grease you're removing could spontaneously combust if left to accumulate in the garbage on rags, etc. I use thin plastic shopping bags to collect an evening's 'cleanings' and place them outside after every cleaning session to go to the curb on garbage pickup day. An all-metal can could also be used for storage. The key point is - you don't want this stuff 'flaming up' and ruining your day or worse! No need to get paranoid about it - just use common sense.

For 'tools', I use 1/4" wide metal handled 'varnish' brushes, a big box of cotton swabs ('Q-tips'), some craft sticks (popsicle sticks), a couple of long tweezers (6-8"+), a roll of paper towels, a couple of old cotton t-shirts, some toothpicks, an old toothbrush or two and a couple of long hemostats.

Please do not use any type of metal instrument in and around the gears. Some of the gears and bushings are brass or bronze that is much softer than the dental picks, tiny screwdrivers, etc. that some folks think expedites things. Such things leave burrs on gears, scratch surfaces, sometimes draw blood, and generally are not very useful in restoring the gear mechanism to original operating condition. I have seen some R-390A's RF decks that were ruined by folks using Dremel tools, gritty polishing compounds, etc. You find these shiny basket cases at hamfests - beware!

Initially, I use the paper towels to clean everything I can reach on the surfaces and gears. I cut one of the small brushes down to a 1/8" bristle length so it is fairly stiff in operation and then 'scrub' the gear teeth one by one, wiping the accumulated grease onto a paper towel. I have to go over the gears more than once, as they transfer gunk from one to another as I work, redepositing it on to clean spots. You will get real familiar with the gearing mechanism as a result - a real troubleshooting benefit later.

As you turn the MC and KC mechanisms, you will notice that 90% of the gears are easily available from either the top or bottom of the unit. I use the wooden sticks, wrap a piece of t-shirt material over and slide it in beside the gears gently to remove any grease in the narrow places. The really tight spots can be reached with hemostats (particularly the 'curved' variety). The metal handled brushes have hollow handles that accept 3/16" dowels to make them 'longer'.

I use the cotton swabs on a hemostat to reach way down inside to get to various bushings, nooks, and crannies. As the cotton swabs get dirty, I toss them into the plastic shopping bag. They will leave small cotton 'hairs' on the gears, but those can be removed easily with the long tweezers - the important thing is to get the 'gunk' out of there and leave the gear train as clean as possible.

You may notice that the 'split gears' have lube between the 'layers' and in the spring wells. Don't panic - it usually does not indicate a problem. As you clean otherwise, whatever is loose will work its way to the edge where you can remove it.

As you work, you will begin to notice that the various bushings, clamps, etc have lube in them that will not come out with this technique - don't worry - as long as the bushings are not binding or gummed up real bad - it does not matter much at this point.

Once I have the gears and bearings as clean as possible, I add a little light sewing machine type oil to each bearing and onto the gears to soften any remaining residue. I let the oil sit for a day or so and then I then re-clean each gear and bushing. I work the mechanisms back and forth from 000-999 KC and 0-31 MC to make sure that everything gets well exercised. Typically, 'black oil' will appear from bushings, between gears, and on shafts. This is just the light oil 'washing out' the accumulated gunk inside the bearings, etc. There usually is some stubborn 'varnish' remaining that also loosens up with this technique. I find that three or four passes are necessary unless the radio has led a very sheltered life.

When the mechanism is really clean, it should operate easily, with little resistance. I find that as you get the 'gunk' out of it, it progressively gets easier to operate. Also, you may want to loosen the front panel bushings on the MC and KC shafts, operate the mechanism back and forth a little to make sure they are centered on the shaft, and then very carefully re-tighten them (finger-tight is good enough). These bushings often are the main source of resistance in the mechanism. If they are mis-aligned, it can make a very big difference.

For lubrication, there are as many opinions as there are folks doing it. I

use a combination of things myself - as I do not feel that one lubricant can do it all. Only my opinion follows - others have their own particular lubrication dogma that they follow.

First - lubrication tools - I use a set of 'epoxy injectors' - plastic syringes with long plastic 'needles'. I buy them from a boating supplier, like West marine (2/$2.65). I also have a couple of pen oilers that sort of look like hypodermic needles.

For lubricants - I use:

1) Synthetic 10W30 oil - like Mobil1 - it will not gum up as much over time like some gear oils will. It costs about four bucks a quart, but a quart does more radios than I have worked on in the last five years!

2) Marvel Mystery Oil - penetrates like crazy. I mix it with the synthetic oil to get into those tight places. Its good stuff and comes in a can that looks nice on the 'old radio tools' shelf. At two bucks a pint, it will last through many, many, many radios. I don't know of another product that does what it does. It does a wonderful job of loosening dirt and old oil from inside bushings, rollers, etc.

3) a very good light teflon lubricant. I look for this in gun/fishing/ bicycle shops and try to get the liquid kind, not the aerosol spray. An aerosol type can be 'sprayed' into a small bottle cap and brushed on from there when needed. It ought to cost around three dollars for a small bottle (I use Tri-Lube or 'White Lightning' from a bicycle shop - both come with 3-4" applicator tubes).

4) a light white lithium grease (that contains teflon, if possible). My one dollar tube is way over 15 years old and still half full. This stuff attracts dirt like crazy and eventually gets pretty sticky and gunky so use it sparingly and only where you have to.

Other products could replace the ones I mentioned above, I'm sure. Your local auto parts store should have most of it. The key characteristics needed are low operating friction and a lack of long-term gelling, waxing or 'gunking' which increases friction.

For those 20 or so tiny roller bearings that slide up and down with the tuning mechanism on the RF deck, I use a tiny pen oiler and Marvel Mystery Oil mixed with the synthetic oil. I lube the slots that they slide in by wiping a very thin layer of oil into the slots with a cotton swab, wiping off any excess 'drips'.

For the bearings where shafts go through panels and points where gears

rotate, I use Marvel Mystery Oil mixed with the synthetic oil or the teflon lubricant.

Lastly, For the gears in the RF deck tuning mechanism, I use plain synthetic oil. Be sure to reach back in and get all of the 'gears within gears' coated well. Work the mechanism thoroughly from end to end (000-999 KC and 0-31MC) for a while and pay close attention for any spots where the mechanism makes sudden jumps or is unusually looser or tighter than average over the entire range. Erratic behavior indicates a problem to be located and fixed.

I put paper towels under the mechanism and make sure that all surfaces are coated. The paper towels soak up any drips. Let the radio sit in place for at least a day to ensure any excess drips off before replacing the covers. Replace the paper towel each day at least. You are not looking for a sloppy looking mechanism that drips oil constantly, but rather one that is well lubricated and non-messy.

I re-lubricate my R-390A receivers every year or so, cleaning them as necessary whenever they get gunky-looking or fail to operate as well as they used to.

The tuning mechanisms on my receivers operate smoothly with one finger over their entire range when they are properly aligned and lubricated. By 'one finger' tuning, I mean you can turn it easily with one finger held down into a notch on the KC knob. It is not so loose that you can ordinarily turn it with one finger from the front edge of the knob. Some folks report that theirs adjust to where they can actually tune the radio with their little finger, but I have yet to see one of these myself. The MC knob detents should be crisp and the mechanism should be smooth and free of variations in torque required to turn it.

While you're at it, clean all of the rotary switches on the front panel with De-Oxit5 or a similar good contact cleaner and lubricate their actuators. For the tiny little bearings in the rotary switches, I use teflon lube in a hypodermic type applicator. Lubricating the switches makes a big difference in their operating feel. Don't worry about those switches inside of the subassemblies unless you are actively working on one and have it removed where you can get to them easily.

I find that the mil-spec enamel on the front panel is very durable and cleans up well with 'goop' water less hand cleaner (the kind WITHOUT pumice) or WD-40 to help the cigarette stains off of it. The white silk screened lettering is also enamel, so it is pretty durable as well. Watch any orange signal corps markings that may be there - they come off easier, as they are ink stamped - be gentler around them.

Just think, when you get all this done, you can honestly say that you 'changed the oil in your radio' to your friends and sit back and enjoy their expressions - especially if they wouldn't recognize a radio without a seven segment display!

Lee Nolan

Date: Tue, 14 Oct 1997 08:57:04 -0700
From: Doug <doug@SUNRISE.ALPINET.NET>
Subject: Re: Help Needed on R390A

Hi Dave.....sounds like you've been given a dandy rig. I used to repair the 390/390A series for the Navy's Security Group, so I'll try to be of help. I think we had 300 of 'em to keep us busy.

* The band switch is driven by a cam system that locks the RF tuning coil racks with the HF oscillator, and tunes the IF's. To access the wafers themselves, remove the RF deck by releasing the green headed screws and the power plug (turn the lock ring to turn it loose). Gently remove the deck and turn it over....underneath are the actual switches and wiring. Clean those well with some contact cleaner/lube.

* Most tuning troubles with these rigs are due to poor mechanical alignment, resulting in things being out of sync and not tuning properly. So...take a look at the cams on the front and back of the RF/IF unit.

* First off, tune the indicator to 7000+00, take a good look inside at the front of the RF assembly, find the index marks on the cams. Each one should be aligned with it's cooresponding mark on the front plate of the assembly. If not, you'll need an alignment tool....just a spline wrench brazed into the end of a 10 or 12 inch piece of tubing and fitted with a handle or some such equivalent. Now, loosen the gear clamps and align the marks on All of the cams....retightening the clamps just snug, not real tight so you dont break the clamps. Now, firmly push down on the coil racks to see if any of them move down. If not, you're in good shape. If they move, ya might have a busted clamp, which are available from Fair Radio Supply for a few bux. When you finish....all the cams and gears should rotate smoothly, and have NO binds or crunching sounds coming from the mechanism or dial. You can use a LITTLE light oil on the cam surfaces, but keep it off of the shafts in the gear clamp areas. Lube there will require the clamps to be set tighter than they should and therefore bust 'em.

* I see you've tested the bottles, so you're off and running now. You can pick up a maintenance from Fair Radio.....I think they're $25 or so, but worth the money.

* You'll need to do RF/IF alignment according to the chart in the book, but if you need info, write me and I'll try to get all of it together for you. A good quality sig gen is really necessary, along with a VOM to monitor the AGC voltage and the Diode Load strap on the back of the rcvr.

* As far as price goes, I'd say it'd be worth $300-400 as is, assuming it's all complete. I picked one up a while back minus meters for parts at $300 plus shipping. But, since yours has meters and covers, it'd go for a bit more. A really cherry R390A would be worth $500-600, plus shipping.

* Most R390's were used in racks, requiring the covers to be pulled to allow better cooling. So, the covers are scarce. Fortunately, both of mine have covers. Since the little buggers are a touch on the heavy side, most Matmen were pretty big guys.....they kept 'em around just to install and pull the 390's!

From: "Chuck Rippel" <crippel@...>
Date: Wed Jan 14, 1998 9:29 pm
Subject: [R-390] Solution- Freq changes when bands are changed

I have seen several posts is which the complaint is the receiver frequency mechanically changes when the MEGACYCLE CHANGE control is rotated. This is annoying but is solved with a simple fix: Looking from the RIGHT HAND side of the RF chassis, there are 3 stainless steel shafts with brass cams on them. The 3rd one to the left engages the second from the left.

When rotating the MEGACYCLE CHANGE control, you will most likely see that the face of those gears are touching which is causing the frequency to change. The fix is easy and does not require removal of the RF deck or dropping the front panel.

Loosen the bristol-spline cap screw holding the 3rd gear in place and gently move that gear back on the shaft about 1/32". Be careful not to move it so far that it disengages the gear driving it. That will result in the anti-backlash springs in the gear becomming unloaded. Correcting that can be a frustrating and time consuming job. That should fix the problem.

From: "Chuck Rippel" <crippel@...>
Date: Mon Jan 19, 1998 10:20 am
Subject: [R-390] Clamps

My 1968 Dittmore-Friemuth R390A had a bizzare problem causing it to receive on only 2 frequencies. I had been letting it set until I felt like figuring that one out. Found the problem this past weekend. Turns out that the non-slip clamp which holds the gear driving the rotary switch that

selects the coil banks broke. This cause everything to move save of that switch.

Result: Real deaf radio.

The bad part is that even though I knew >exactly< what was wrong, it took 6 hours to re-time the switch correctly. Seems that I would loose operation of either the .5 to 1 mHz band on one "end" of the switch or the 17.6 - 32 mHz band on the other "end" of the switch.

The positioning of the switch is very critical and confirming that it is correct on a deaf radio was very difficult.

Moral:
Go through your receiver and check the torque on the clamps. Most are grossly over tightned causing the clamps to snap and the receiver to lose mechanical alignment. Being full circle clamps with plenty of purchase on the shaft, the clamp screws need not be all that tight. I bring them up just snug then tighten about ~1/8 turn. I would love to find a torque spec for these.

Date: Wed, 21 Jan 1998 09:13:23 -0500 (EST)
From: Brien Pepperdine <pepperb@govonca.gov.on.ca>
Subject: [R-390] Removal/replacement of RF deck

Hi. I was fortunate to have my brother in law transport a 390A RF deck I required up from Indiana to me when he visted me recently from the U.S. I required the deck for a 390A that is dead from 0 - 7999 kc for reasons unknown for about 2 years now (so I gave up and tracked down a replacment deck so the thing would work on the frequencies that do triple conversion). Anyhow, I think due to time listening but no executing measures, and 'urban myths', I seem to have some conflicting info I wish to resolve. MY reading of the manuals is that the deck should be turned to below 000 and 000 fully (counter-clockwise) on the KC and MC knobs respectively. Is that correct? This is based on the info directing one how to remove the front panel (has to occur first) stating KC is at 963 (approx) and MC at 000. Somehow I have it in my mind from a couple places that the knobs should be at 7000 kc or 7.9999 or 6.99999.... confusion reigns. (maybe alignment direction info is creeping that has no relevance to this matter). Anyhow, a quick note from any one who has yanked and put in a deck would be nice.. also any explanation as to WHY it is supposed to be wherever it is supposed to be would be useful technical info. I think the disengagement of the VFO/PTO Oldham coupler maybe has something to do with it. I know I can trust the manual, but I think in some cases tweaks in procedures have developed, so if ideas had changed, I was curious, and also unwilling to see some part sail into the next county due to something

I might have prevented with enlightened procedures. Otherwise a simple follow the manual, ignore all others! warning will be fine. BTW, the replacment deck (which of course makes me curious all over again) was pulled such that IT is currently at 7997 (according to the Veeder-Root indicator)! Does that matter, or do I have to put a knob on the deck and put it where the old deck was when pulled? (namely. - 963 and 0000) So where it should be is also of interest. (any other related info welcome, as to suggestions on modern available lubricants to put on, and where, during reassembly, much appreciated). Brien pepperb@gov.on.ca

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From: trinit69@... (Tom Marcotte N5OFF)
Date: Wed Jan 21, 1998 4:25 pm
Subject: Re: [R-390] Removal/replacement of RF deck

You can pull the deck at any frequency as long as you know where to set the PTO when you put it back. Don't let the XYL or the 8 year old help with this one :-) I generally set the PTO to 000 when doing this. If you don't know where the PTO is, measure it with a freq counter, and set it to 3455 kcs. This can also be done by listening for it on another radio set at 3455.

Once the RF deck is out, you can accomplish all sorts of good cleaning and aligning.

The cam alignment must be done at 7+000 Kcs (7 999 + 1). Be sure to set 35 kcs of slop on either end of the range, lock to lock, and then don't diddle with the counter/RF deck gear alignment again. The counter and gear set wll forever be joined at the hip.

Align the PTO freq to the siamese twins with the PTO coupler.

From: Morris Odell <morriso@...>
Date: Wed Jan 28, 1998 1:41 pm
Subject: [R-390] R390A Mechanical mayhem

I want to ask for some advice from the gurus here before beginning surgery. It seems there's no way I can avoid removing the RF deck so the opportunity is there for a lube job & mechanical going-over.

The symptoms:

1. After working well for 10 years, my EAC 390-A has recently developed deafness on certain of the higher bands (28, 22 and occasionally 14). Cause traced to non functioning 2nd crystal oscillator. The oscillator works OK on the lower bands but on certain higher bands it shuts down. I assume the crystals are OK as they all seem to work on their lower bands. Is this a problem of dirt or misalignment of the crystal osc bandswitch??

2. This is potentially a big job. The detents on the megacycle selector have become quite worn and are sloppy. A previous owner tightened the detent, presumably because of "mechanical feedback" from the kilocycle shaft to the megacycle shaft, and over the years the slotted brass detent wheel has become worn and the megacycle indexing increasingly imprecise. I have a junker Motorola RF deck which has a pretty good gear train and I would like some advice on the feasibility of a transplant while the patient is disembowelled on the table. I have a full manual with instructions for a complete strip of the gear train but it looks like a pretty formidable procedure. Are any special tools required?

Any advice would be most welcome.

From: "Mark Glusker" <glusk@...>
Date: Fri Jan 30, 1998 9:10 am
Subject: Re: [R-390] R390A Mechanical mayhem

(I sent these comments directly to Morris Odell)
(but I thought they might be of some interest to the whole group)

The tricky part about the RF deck gear train is that nothing prevents you from putting gears on the wrong shaft, or even at the wrong position on the proper shaft. You are fortunate in that you have two RF decks - my strong advice to you is to make sure that you keep one intact so you can use it for reference. This is a bit tricky if neither RF deck gear train works and you need to cannabalize one to restore the other - in that case, I may be able to help with some sketches or descriptions that I can fax or mail to you (or scan and send as e-mail attachments). Please don't hesitate to ask if I can be of some help. Pay attention to the position of the gears on their shafts (i.e. distance from the metal plate that the shafts go through) and you should be OK.

As far as special tools are concerned, the clamps all have Bristol spline set screws, as I'm sure you know. The only other special tool is a long (about 8"?) Philips head screwdriver for removing some of the green-headed screws at the very rear of the RF deck.

The following is something I posted to the boatanchors list several years ago. It pertains only to getting the RF deck out of the radio:

-- Begin quoted text --

- It helps to support the radio chassis about 2" above the tabletop to allow the front panel to fold down onto the table without stressing the wiring harness too much.

- You'll need a Bristol spline wrench and a *long* (~8") Phillips head screwdriver.

- In my opinion, the best first step if you are removing the RF module is to remove the VFO. First of all, turn the KC knob until "+000" shows on the counter. From the top of the radio, undo the connector on the RF module for the VFO and feed the cable and connector through the hole in the chassis. Turn the radio over and remove the spring on the coupler at the front of the VFO shaft (may be missing - if so, don't worry). Remove the two frontmost green headed screws holding in the VFO. Instead of removing the single green headed screw at the back of the VFO, remove the two normal screws holding the VFO bracket to the chassis itself (you'll see what I mean when you get there). These screws are not captive, so be sure to catch them when they are fully unscrewed. Now you can slide the VFO directly towards the back of the radio without losing the synchronization with the RF module. The center disk of the shaft coupler will be loose at this point - be sure not to lose it! Don't turn the VFO shaft more than about 1/8 turn. If you leave it unturned, it will slide back in again when you are done without needing any special synchronization (except tuning the RF module to +000 on the counter). If you do turn the shaft, you can always reset it if you have a frequency counter. The +000 setting corresponds to a VFO frequency of 2455 kc.

- Remove the front panel - the manual shows which screws to remove (eight large, five small, the MC, KC and ANT TRIM knobs and their panel bushings)

- Undo all the RF module green-headed screws (three on right outside face of chassis, two on vertical chassis divider just in front of the audio module, one (two?) on the front faceplate of the RF module, two in the very back of the RF module and finally two in the back of the Crystal Oscillator subchassis). Don't remove the green screws that separate the RF module from the Xtal Oscillator subchassis. The RF module (along with the Xtal Osc subchassis) lifts directly upward to remove - make sure you are pulling on something solid, not one of the slug racks!

- To reinstall, reverse the procedure. Be careful not to damage the spring fingers on the chassis under the RF module. Reinstall the VFO with the counter on the RF module reading "+000", don't forget the Oldham coupler disk.

- When reinstalling the front panel, don't forget to install the panel bushings on the KC, MC and ANT TRIM shafts first. Make sure the ZERO ADJ mechanism is fully unscrewed (turn knob fully CCW)! Also, watch out for the position of the DIAL LOCK mechanism as you are positioning the

panel. You may opt to loosen this mechanism and reposition it while installing the panel, if so, make sure you position it correctly again before tightening any of the front panel screws. Tighten all the screws, then tighten the panel bushings. I didn't tighten the bushings too much, since they tend to "walk" around the hole as you tighten them, putting sideways loading on the shafts. I made them finger tight + a *tiny* bit extra.

- You might want to double check that none of the wiring is interfering with the counter. This is a sure way to screw up the painted numbers on the counter wheels. This is a particular problem if you remove just the black surround to the counter window - the wires need to be carefully tucked back into place as you reassemble the surround to the front panel.

- One source of tuning roughness can be the counter mechanism. On one R390A I disassembled, the small bevel gear at the right side of the counter was rubbing against the counter housing. Loosening the gear clamp and sliding it away from the housing a tiny amount made a big improvement in the smoothness of the kilocycle tuning.

From: k5fte@... ({{{ EARL }}})
Date: Tue Feb 10, 1998 1:27 pm
Subject: [R-390] Color coded Slugs

When I first got my 390A, I found that I could not get the 17-30mhz slug rack to peak without nearly running out of thread on the antenna slug. Close inspection revealed that the antenna slug did not have the "Green" paint dot on top the way the others did.It had no color code marks. I went to my junker and removed a slug with a green dot and the radio came alive. I have never read or heard about color coded slugs. I`m not sure I understand any of this but I thought I`d throw it out for the group to discuss.

From: Steve Stutman <sstut@...>
Date: Tue Feb 10, 1998 3:50 pm
Subject: Re: [R-390] Color coded Slugs

Different ferrites have different permeabilities; I don't know what the scheme for color code is in 390s, but not all ferrites are created equal.

Date: Wed, 3 Jun 1998 10:13:54 -0400
From: "Chuck Rippel" <crippel@exis.net>
Subject: Re: [R-390] Tuning core totality

Thanks for the kudos but actually, its a method that goes back to the 2nd World War. I'd re-think that. (Lubriplate) White grease can get hard, especially with the heat that builds up in the RF deck. I'd stay clear of that.

Were the grease to harden, that'd be death to the deck. Chuck Rippel, WA4HHG

Date: Wed, 03 Jun 1998 09:17:21 -0500
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] Tuning core totality

I thought I was specific about the white grease, LUBRIPLATE, not just any old white grease. The batch I have made to Teletype specifications seems to be going the opposite, softening with age instead of hardening. All greases can fail by hardening. What is a better grease? Probably the receiver needs to be cleaned and relubricated every couple years anyway to get rid of the dust and dirt collected by the grease and oil. More often if driven under dusty and dirty conditions.

Date: Wed, 3 Jun 1998 12:10:11 -0400
From: "Chuck Rippel" <crippel@exis.net>
Subject: Re: [R-390] Tuning core totality

Yes. I use Redline Synthetic hi-pressure bearing grease. Unlike dino-based lubricants, it simply will not harden.

However, lets consider where the grease is going. If you are greasing the slug racks anywhere, don't use grease. Better to use a synthetic 90W gear (rear end) lube like Mobil-1.

Are we still talking about sticking slugs in the RF deck?

That is most likely NOT a lubrication problem. The slugs bind from physical misalignment in the coil forms causing the racks to hang. You can grease the rack slides until you are blue in the face and perhaps still not fix it.

First, check to see if there is hard grease on the slug rack sides or guide areas, take all that off with some WD 40. When you have nice clean metal, about 5 drops of Mobil-1 gear oil (NOT GREASE) between the side of the RF deck and movable slide will insure its free movement.

If the above does not correct the problem, here is how to proceed and fix the slug binding: Locate which slug is sticking. Using the tuning and band change controls, cause that slug rack supporting to drop and insert the slug as far into the coil form that it will go. Take a #1 Phillips screwdriver and carefully loosen the two screws holding the slug bracket to the slug rack and let the slug/spring center the bracket so the slug is free in the coil form. Tighten the bracket screws being careful NOT to allow the bracket to move on the slug rack.

Again, using the tuning and/or band change controls, cause the offending rack to move and see if it still binds. Repeat the above as necessary on that or other racks which might be binding up.

DO NOT under ANY circumstances lubricate the actual powdered iron core with anything but a dry lubricant such as talcum powder. Depending on the slug coating/binder, the oil in the grease can leach into the core and change its density, attack the coil form, etc..... As soon as the receiver gets more dirt into it (And it will, ever see a totally clean R390(A) RF deck??) it will stick to the grease and the binding in the form will be back, this time in a whole new dimension.

It also makes an incredible MESS.

With regard to GREASE, I end up using just a very tiny amount on any R390A restoration and only on slow moving parts like the antenna trimmer worm gear. Most lubricating is done with 90W oil.

Date: Wed, 3 Jun 1998 10:58:00 -0700
From: Reid Wheeler <reid@olywa.net>
Subject: [R-390] R-390A cleaning/lubrication

In a recent posting to this net from Nolan Lee, he mentions a rather lengthy (10+ pages or so) posting he received detailing the cleaning and lubricating of the R-390A. I would also be interested in receiving this posting from whomever wrote it.

Date: 03 Jun 98 11:44:16 -0700
From: "Don Metcalfe" <DMETCALF@us.oracle.com>
Subject: Re: [R-390] Tuning core totality

I believe I would re-think the talcum powder. That stuff is hydrophilic,which means it loves moisture and will absorb it from the air...you may have quite a mess on your hands before too long. I am sticking with a small amount of powdered graphite applied carefully.... However, lets consider where the grease is going. If you are greasing the slug racks anywhere, don't use grease. Better to use a synthetic 90W gear (rear end) lube like Mobil-1. Are we still talking about sticking slugs in the RF deck?

Date: Fri, 04 Jul 1997 22:37:29 +0000
To: lblaske@pclink.com
From: WAOHQQ <tirevold@atl.mindspring.com>
Subject: Re: My $400 Fair Radio R-390A

Lee, DON'T use WD-40 for lubricating! it eventually picks up all kinds of lint, etc as it dries and gets real sticky. A while back, I wrote a treatise somewhere on my experiences cleaning and 'changing the oil' in a R-390. I dug it out and included it below - you may find it of interest. Meanwhile - I lube mine with a mixture of Marvel Mystery oil and synthetic motor oil, renewing it about once a year. If you get the gear train really clean (without using harsh chemicals) - it will work like a champ! I apply the oil with one of those plastic syringes used to apply epoxy - they reach real well down into the tight places! Sounds like you really lucked out! I have a '62 Amelco that Mish did up -and a 54 Motorola that I did - both are performance champs!

Date: Sat, 22 May 1999 14:46:15 -0500
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] R-390A Overhaul steps...

I've had a couple of requests for the list of items I did when I went thru my EAC last year so I'm reposting my original message on it to the list. The EAC has been running 24/7 since October of last year and I have no complaints. I've been wanting to pull it out of the rack and do a "visual" of it and check the tubes and the alignment but haven't had the time. Maybe this Fall. Your mileage may vary... nolan

<editor: just the RF section>

...Whew! The last one, the RF deck: After removing it, the first step was to take it apart. I removed all of the tubes and tested them, the crystal oven and tested it, all of slug racks and springs, four of which (for the variable IF slug racks) were really weak, so I installed NOS ones in that location when I put everything back together. The geometry for those 4 springs suck, they're stretched a lot more than any other location. I removed all of the RF coil assemblies and measured the resistance of all of the windings and checked what capacitors I could. The bridge wouldn't work on some, so I kept track of those in case I had some weird assed problem when I tried to align it later.

I disassembled the gear train and tossed all of the parts, except for the counter, in a coffee can and sprayed a mess of gunk in there and let them brew. They weren't really dirty, but the original lube had mostly evaporated and what was left was stiff as hell and I don't really find the gear train much of a mechanical challenge so I ripped it apart. About the only thing I didn't take apart was the 6 camshafts and the antenna trimmer can. I worked a few drops of penetrant into the bearings of the cam shafts and kept lubing and wiping them until only clean oil would come out. Oh, I used 10W30 Mobil 1 synthetic oil for the RF deck except the detent where I used Penzoil wheel bearing grease. Two of the cams

appear to have been stamped, I guess, with cracked dies, leaving a couple of sharp burrs on the surface that the rollers ride on. I stoned these down while maintaining the original cam profile. :-)

When you take the split gears apart, tie them together, with a bit of soft wire in the orientation that they were originally assembled with. I suspect that the halves were matched.

While all of the stuff soaked, I replace the three paper capacitors, with Orange Drops, and replaced close to ten resistors that were out of spec, checked all of the other capacitors and found a cracked .005 1KV ceramic disc. And yes, I measured the resistance of all of the wiring and of the band switch. ;-) I found an odd thing. One of the tube sockets only had one screw holding it to the chassis. When I attempted to install a screw there, it turned out that the little "C" shaped piece of metal that curves all of the way around one side of the socket had an unthreaded hole in it for the screw. I'm surprised that an inspector didn't catch this at the factory. I tapped the hole and moved on. Most of the gear clamps were either viably cracked or showed cracks when dye checked. I guess that they must have been over tightened when it was built. I replaced all of them with NOS clamps to be safe.

I found that several of the roller retainers had been over staked on on a couple of the slug racks. This prevented the rollers from turning. In addition, a few of then ends were not square and had to be straightened. Burrs and gouges on the end surfaces had to be stoned down and polished. The fit and finish of mechanical portion of this EAC RF deck didn't impress me at all. The old Collins decks were much more finely finished mechanically.

I wiped each of the RF cores out with a pair of damp Q-tips, wiped the slugs off, and eye balled them. The Collins part numbers on all of the RF slugs are all the same EXCEPT the six variable IF slugs. They are different from the RF slugs. So, they aren't interchangeable.

I assembled the RF deck and mechanically aligned it and put the receiver back together. For what it's worth, the repeatability of the RF slug racks averages about .001, the repeatability of the variable IF slug racks averages .004 on one and .005 on the other. I suspect that this could be improved upon by relocating the location of the attachment point on the chassis of those four springs. This would require either shorter springs or possible just creating spring "wells" that extent slightly below the chassis so that standard RF deck rack springs could be used.

I fired it up and let it cook a while in Standby mode, at 7+000. None of the magic smoke escaped so I switched over and set the PTO to 2455 KHz and

tightened the clamp. I stuck a VTVM lead into the unbalanced antenna connector and cranked it down to WWL on 870 and let it run more than a day before I did the first alignment. I always like to align a receiver twice. I go thru it and then when I'm finished, I start all over again.

I've been playing with it for about a day and a half since the alignment. This is the most sensitive receiver I've ever owned. It kicks ass. I did a few sensitivity tests using my URM-25F. I questioned the results so I dug out the URM-25D and tried them again. REAL close. I started with a receiver that hadn't been abused and tried to do the best job that I could going thru it. I wanted something that I didn't have to screw around with every few weeks. Something that wouldn't wake me up at night with a burst of light like a Romulan disrupter (I've had R390A's do that before). Something that would sit there and run for month after month and need nothing but tube and dial lamps like my R-1051B's. Hopefully, this will do that. Many of the of the steps that I took, were "over kill", but I had fun doing it and learned a few more things. Nolan Lee.....

Date: Sun, 14 Jun 1998 08:37:05 -0400
From: "Chuck Rippel" <crippel@exis.net>
Subject: Re: [R-390] bristol wrench

Actually, you are better off without the "covers" certainly the top one. There was a government directive to remove and discard them some years ago. I will have to search through my Navships manual and try and find it.

Apparently, the covers (really RF shields) caused a higher than acceptable heat build up in the receiver. Their only function is to provide some RF shielding when the receivers were stacked one on top of another in 6' relay racks. If you were to get one of Macs CY-whatever real R390A cabinets, the radio will not fit in it with either cover on. Mine are in my attic being held down with old paint cans and dust.

Date: Thu, 24 Sep 1998 12:27:04 -0400
From: "Chuck Rippel" <crippel@exis.net>
Subject: Re: [R-390] Stuck cores

Shoot a little WD-40 into it is the coil form is NOT cardboard and let it sit overnight. That works on R390A's quite well.

If it is a stuck sliding core, as in the RF deck. Pull it out and clean both the sleeve interior and slug with a "Q-Tip" and alchohol. Put some talcum powder on the slug and reinstall it.

Run the slug rack so that the slugs are inserted as far as possible. Then,

break the two screws loose on each of the plug brackets and allow them to self-align and center in the coil sleeves. It ought to work just fine after that.

Date: Fri, 9 Oct 1998 09:19:38 +0530
From: "Percy Mistry" <Percy_Mistry@ril.com>
Subject: [R-390] Removing an adamant KC knob

I've never been able to remove my front panel and consequently the RF and Xtal Osc subchassis , because I can't remove the KC and MC knobs. The one and only screw which is on these knobs have their grooves flatened so the key doesnt get griped properly, it slips. So how would anyone of you remove such a nasty knob Chuck, what would you do if you get such a receiver for repair ?

Date: Fri, 9 Oct 1998 01:05:35 -0400 (Eastern Daylight Time)
From: Norman Ryan <nryan@acpub.duke.edu>
Subject: [R-390] Removing an adamant KC knob

Getting the Bristol wrench in there is a bit counterintuitive in that you don't aim the tool toward the shaft, but off to the side a bit. This is because the screw isn't your usual set screw. Instead, it's part of clamp around a collar inside the knob. Look inside the receiver at the clamp on the BFO PITCH or BANDWITH shafts and you'll see what I mean. I hope this helps in case the KC and MC screws really aren't boogered up. Also you should check that the Bristol wrench's business end is in extra good shape. Grind the end down to fresh material if need be.

Date: Wed, 14 Oct 1998 07:14:15 -0700
From: Bob Bennett <rjb@lynden.com>
Subject: Re: [Fwd: [R-390] Status of the 1st of two R390A's]

Inspired by Nolan's efforts, i am laying plans to refurbish 3 RF decks, once the new house is finished (about t'giving if we fire the framer's a-soon). I am flush with DeOxit D5, Mobil 1, WD-40 and am ordering the angelic Orange Drops today. That just leaves the silver solder.
I have three questions which i have not seen addressed on this list (sorry if they have been covered before)

1 - is DeOxit D5 suitable for the RF bandswitches??? my units appear to have ceramic wafers.

2 - is DeOxit D5 suitable for cleaning cruddy connector plugs and sockets??? If not how best to clean these up??

3 - one of my RF decks looks like an escapee from Julian's Creek. It works,

but the ceramic trimmers in the RF coils and those on the crystal oscillator deck are in some cases noisy, and in other cases just plain stuck. Has anyone had trimmer trubs before?? What is the fix? Pls dont say "shoot em".

Date: Wed, 14 Oct 1998 09:34:23 -0600
From: "Eustaquio, Cal J" <cal.j.eustaquio@lmco.com>
Subject: RE: [Fwd: [R-390] Status of the 1st of two R390A's]

Are you kiddin'? As was previously stated in some post long ago, "Deoxit is the exilir of life." In this case, just about any application you mentioned is all Deoxit territory. Cal. P.S. Keep us apprised of your efforts. Any awe inspiring story is the "libido" that keeps us restoring our rigs.

Date: Thu, 15 Oct 1998 12:58:49 -0500
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] R-390A ad in Ham Radio mag

A Geneva Drive is a mechanical mechanism that uses a pin in a slotted wheel to move a slow speed shaft in small steps for each rotation of the driving shaft. Generally the driving shaft has a cam opposite the pin that fits a recess in the outside of the slotted geneva wheel to lock the drinen shaft into its position. I think in the 390 that's used to convert each turn of the Mhz knob to small increments of motion of the bandswitch shaft. I think the 10 Hz applies to an external filter. It is possible without a DSP to create audio bandwidths that narrow.

Date: Thu, 15 Oct 1998 21:25:32 -0500 (CDT)
From: Bill Hawkins <bill@iaxs.net>
Subject: [R-390] Geneva mechanisms

The 390 manual lists a Geneva mechanism driving the 6 position band switch. The 390A manual calls it an intermittent gear, in the same general location. The precise positioning of the MC Change knob is done by a separate detent mechanism. Geneva mechanisms have a pin that engages a slot in the driven wheel. As the drive wheel rotates, the pin enters the slot and turns the driven wheel some fraction of its rotation. Both wheels are specially machined to provide clearance for this to happen. Once the driving pin leaves the slot, the driven wheel is held in place by the smooth part of the diameter of the driving wheel. Big Geneva mechanisms are used to precisely rotate assembly machine turntables, so that each work station is held in position for the machining that occurs there. .. <snip>

Date: Tue, 12 Jan 1999 06:51:30 -0800
From: Bob Bennett <rjb@lynden.com>

Subject: Re: [R-390] RF Deck question... more...

Thanks to the list for your assistance on how to remove the RF coils from the 390a RF deck. It is now in a bazllion shiny pieces. Some more questions for your wisdom...

1) i cleaned the gold pins on the coils and alos freed up some stuck trimmers, all with Deoxit. Does it matter if some of this stuff gets on the coil forms or on the little dealybop that holds the trimmer??? (Please say NO, as i am asking this after the fact.)

2) i see that some of the RF slug units appear identical. I can not read the Collins part#'s on the slugs themselves as the letters are too worn, so i wonder if those that appear identical really ARE identical. Can anyone confirm this??

3) I now need to clean years of ugly crud from the clockwork mechanism. I do NOT want to disassemble this, so need to know the best way to get this stuff out. I have read on this list about Castrol "Super Clean". Also this morning someone mentioned the dreaded "Green Bath". I think Dave Medley has used WD40 then flushed with gobs of distilled water. What is the best "non-disassembly" technology here?

Date: Tue, 12 Jan 1999 07:30:13 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] RF Deck question... more...

Since you already have the RF deck out could you up-end it into a shallow tray of parts cleaner and let it soak for a few days. What's the list say on this one?

Date: Tue, 12 Jan 1999 10:36:20 -0500
From: "Roy S. Morgan" <roy.morgan@nist.gov>
Subject: RE: [R-390] Query... help.

1) Get Caig Pro-Gold. 2) Apply very carefully to the switch.

Date: Tue, 12 Jan 1999 10:35:39 -0600
From: "A. B. Bonds" <ab@vuse.vanderbilt.edu>
Subject: [R-390] On taking down the R-390 gear train

RF Gear Train Surgery for the R390
A. B. Bonds, Nashville, TN, 1/11/99

In units as old as most R-390's, there has been ample opportunity for the lubricants to turn into peanut butter, or even concrete. Hardened grease is

not easily removed, and because the gear train is so closely integrated with the RF module, providing adequate delivery of solvents can be tricky. This ultimately leads to the chilling prospect of disassembling the gear train for thorough cleaning. Having just accomplished this task, I will describe the experience and offer a few tips. Though not for the complete fumble-fingers, it is not impossible if you have a reasonably steady hand, a clean workspace and some common sense.

Up front: Ya gotta have the manual. I used TO 31R1-2URR-412, pp 77-91 plus other random figures. Don't try this without. Also, plan on the whole process taking on the order of 6 hours, not counting resynchronization. Have a large clean table to work on, with a clean, hard floor for a few feet around. It can get very ugly trying to find little parts in carpet. Get a box of baggies. Marking is important. At least have a Sharpie pen; I used a Dremel engraving tool (it doesn't get wiped off with the solvent). In addition to the usual tools, you will need a very fine pair of snap ring pliers and some small pin punches to drift out roll and taper pins. You also will need a REAL Phillips head screwdriver of high quality and some solvent, such as carb cleaner or acetone. Note also that the process can mess up things like the BFO and Antenna Trim settings unless you are very careful, so a number of adjustments have to be done after putting things back together.

Step the first: Remove the front panel. To do so, take off the knobs that are attached to shafts that go through the panel. This includes Bandwidth, BFO pitch, KC and MC change, Antenna Trim, dial lock and zero adjust. The KC and MC change knobs are held on by internal clamps whose screws are NOT centered. The access holes are slightly offset--use this as a guide to find the socket for your Bristol wrench. Loosen the dial lock nut until the whole lock can be rotated out of the way of the tuning disk. Remove the handles and the four Philips screws holding the front on. Lift the front of the receiver and prop it up on something. I used a couple of small chunks of 2 x 4. This is important, since the cabling attached to the front panel is short, and the lower edge of the panel must go under the receiver in order to lay it down flat. Gently pull the panel forward over the shafts. The Antenna Trim shaft is plastic or phenolic that can be deformed by the pressure from the knob screw. It can hang up in its bushing. Don't force this, simply remove the bushing from the panel, and leave it on the shaft. Now the panel can be brought free and laid down.

The next step is removal of the RF module. The book describes this pretty well. Basically it involves removing the lid, unplugging a mess of cables and loosening three Phillips anchor screws. Note also that the shaft that drives the crystal oscillator must be disconnected. When you do this, the Oldham coupler falls loose. This is a good use for your first Baggie.

The entire assembly then lifts out. Note that it can't easily be set down right side up due to the gears sticking out the bottom--get used to laying it down upside-down. Also note clearly that by removing the RF unit, the anti-backlash gears on the two main tuning shafts are relieved. This means that their springs can escape ..... and go walkabout. Mine were held pretty tightly, but I put some masking tape around them just in case.

This first disassembly step is to remove the eight slug racks. This has to be done with the unit right side up, so find a guest towel or other suitable padding to set the unit on. Unhook the springs of each rack and pull it straight out. NUMBER THE RACKS. You can't get messed up regarding which end you started on since the ends are different, but do number them 1-8 or by the band they serve. NOTE THAT the 0.5-1MHz band is not on the end, rather the 1-2 MHz band occupies that space. You can read the band on the side of the coil cans. The springs should be completely removed. If not, they will fall out and you'll lose them. Time for baggie # 2, and count the springs as you put them in for assurance.

Now set the RF unit on your bench. You will first remove the clutch.

Remove the Phillips screw holding the clutch shaft to the front plate and loosen the pot nut, which permits you to lift the clutch assembly out. You do NOT have to disassemble the clutch, and I don't recommend it, since it is a bear to get back together due to the strong springs inside. You can take off the friction bar and wash the clutch out pretty thoroughly, just don't undo the snap rings. Take off the counter, but there seems little point in removing the bevel gears from the counter. In general, the counters are in pretty good shape, though they can use delicate lubing with fine oil on the mainshaft and the transfer shaft. The bevel drive gears can then be drawn off the front plate and you can clean the shafts. Remove the green (offset) gear by taking out the Phillips screw. At this point I started labelling the gears with the engraver, using the code numbers from Fig. 73.

The other brass gear on the front panel can now be removed by pulling its E-ring. Baggie time. Removing another E-ring and a small spring pin lets you slide out the shaft/brass gear assembly (Baggie, etc). Now the front plate can be removed by taking off the obvious screws.

At this point I will defer to the book, which is reasonably clear. However, a few other comments are in order.

(1) It is NOT necessary and downright inadvisable to disassemble the differential gear assembly. It has lots of little pieces, but they are all accessible for cleaning. If you soak it in a solvent for a couple of hours, that's much easier than chasing invisible parts for a similar period.

(2) Step #30 blithely says, "Remove the three 4-40 Phillips head screws to remove the steel split gear assembly." The green goop on the heads of these screws is Thermonuclear LocTite. BE SURE to have a Phillips head screwdriver that fits these screws snugly and properly, and don't let it slip. If it slips, the only way to remove these screws is to machine the sides flat with a Dremel tool and grab 'em with pliers. (Is this the voice of experience talking??)

(3) Just when you think you are off the hook, you get to instruction #31: "Remove the No. 6/0 taper pin from the first variable if rear cam." Now, the theory behind taper pins is, once they are stuck, they don't get unstuck, and you can count on it. First, MAKE SURE you know which end is the small end. They don't come out if you mash on the big end. Second, find a pin punch that is just a tad smaller than the small end. Use a quality tool, a nail doesn't hack it here. A small hammer helps resist the delivery of impatient force, but a big hammer might be necessary in the end. Unless you are a glutton for punishment, this is the ONLY taper pin you need to attack. The remaining cams can be left on their shafts, unless you have a real rustbag of a unit.

(4) Instruction # 34 describes the removal of the Geneva system. This gizmo magically advances the bandswitch the right amount at the right time. There is a loose 3/16" ball in the mechanism, don't lose it. Another baggy. You may want to do step #35 to clear the remaining gears from the rear plate.

This is about the last thing you really need to do unless you want to pull the Oldham coupler shaft. At this point, all that is left on the RF unit is the set of cams and shafts. It can be wiped down with solvent and the bearings can be cleared. I used a spray can of carb cleaner (mostly acetone and other light hydrocarbons) to blast out the old crud from the bearings, then relubed with a needle-point oil injector.

You can now get to work doing the detailed cleaning on the removed gears. I have an automotive parts washer in the basement which proved very handy, dropped them into a screen can and let them soak overnight. You will still have to attack stubborn impacted deposits with a soft wire brush or toothbrush. After removing the washer solvent and drying, I checked the rotational looseness of the split gears. Some were a bit stiff, so I sprayed carb cleaner into the gap between the gears until they broke free. A bit of fine oil was then applied. Don't forget to clean the rollers on the slug racks, the cam edges and the inside edges of the slots for the racks on the RF deck. The lube to use on the gear and sliding surfaces has been discussed previously in this group, with a host of suggestions.

Reassembly, as they say is the reverse of disassembly. If you did not remove the camshafts, you can start around instruction # 15. One very nasty bit is proper installation of the Geneva mechanism. Instruction #17

warns "The alignment must be precise so that the assembly will function properly". What they mean is that it is hard to get the system to stay properly assembled when threading the shaft into the hole in the plate. The front plate of the mechanism (#129, Fig. 73) has a keyway that aligns it on the shaft to prevent it from turning. The problem is keeping the plate aligned with the keyway on the shaft while offering the shaft to its anchor hole at an angle, which is required by the position of the mechanism.

One way I found to do this was to remove the small gear that is adjacent to the mechanism (undo the E-ring and slide the gear off), which reduces the angle with which the mechanism must be brought in. When the mechanism is installed, all of the parts should align in parallel and there should be very little lateral slop. If the brass part slides back and forth on the shaft, it is improperly installed.

The remainder of the reassembly goes without incident if you don't mind chasing around for those pesky snap rings that sproing off now and then. Step # 49 involves synchronization of the Geneva mechanism. When 49(c) says "clockwise" it would seem that this is meant as viewed from the rear, and similarly for 49(e). These settings are only approximate. The ultimate adjustment of the gears involved in this adjustment will depend upon the bandswitch positioning.

The bandswitch rotors have two contacts about 90 degrees apart from one another. To set the bandswitch, you want to start with the two contacts facing "up" like a V as the RF unit sits on your bench upside down. While most of the wafers will do for observation, I found it convenient to adjust by watching the fourth from the rear as viewed from the front of the RF assembly. In step 50, one rotates the bandswitch so that the RIGHT rotor contact is under the stationary contact that is next to (just above) the bottom one on the right when the counter registers 00 MHz (the bottom contact being the main wiper, always engaged). Then by rotating the rear portion of the gear 63, one can see the switch rotor move to the next contact (up) for one notch of advance (to 01), then the next contact (up) for two notches of advance. The counter should now read 03. On the next notch, the switch shifts to the left set of contacts for 04-07, 08-15 and 16-31. Note that the switch probably won't be properly aligned for all of these settings. You have to use common sense here. Go back to the original clamps that were adjusted in instruction #49 and mess with them. After a while, the pattern will emerge. I don't think you can get perfect alignment for all positions, but it is not terribly hard to make reasonable contact. Note that sometimes the Geneva mechanism does not advance fully for a given "notch" of gear advance, but if you overshoot slightly it will kick the mechanism into correct position. The goal of the game is to minimize this motion on overshoot for all positions, running both forward and backward.

The remainder of the synchronization is pretty straightforward, using the photograph of Fig. 44 (page 91) as a guide. The physical position of the crystal oscillator Oldham coupler is immaterial, that will be adjusted when you replace the RF unit. Unless you have been careful not to move any shafts, you will also have to reposition the Antenna Trim and BFO controls.
Good luck, and happy listening!

Date: Thu, 29 Jan 1998 08:41:26 +1100
From: Morris Odell <morriso@vifp.monash.edu.au>
Subject: [R-390] R390A Mechanical mayhem

I want to ask for some advice from the gurus here before beginning surgery. It seems there's no way I can avoid removing the RF deck so the opportunity is there for a lube job & mechanical going-over.

The symptoms:

1. After working well for 10 years, my EAC 390-A has recently developed deafness on certain of the higher bands (28, 22 and occasionally 14). Cause traced to non functioning 2nd crystal oscillator. The oscillator works OK on the lower bands but on certain higher bands it shuts down. I assume the crystals are OK as they all seem to work on their lower bands. Is this a problem of dirt or misalignment of the crystal osc bandswitch??

2. This is potentially a big job. The detents on the megacycle selector have become quite worn and are sloppy. A previous owner tightened the detent, presumably because of mechanical feedback" from the kilocycle shaft to the megacycle shaft, and over the years the slotted brass detent wheel has become worn and the megacycle indexing increasingly imprecise. I have a junker Motorola RF deck which has a pretty good gear train and I would like some advice on the feasibility of a transplant while the patient is disembowelled on the table. I have a full manual with instructions for a complete strip of the gear train but it looks like a pretty formidable procedure. Are any special tools required?

Date: Wed, 03 Nov 1999 15:48:11 -0800
From: dma@islandnet.com
Subject: Re:[R-390] RF Deck: racks, slugs and lubrication

But something that may not be obvious at first glance: the slugs in the RF racks and the IF racks are different and can't be interchanged. The IF/RF slugs that I've seen from several different manufacturers are a different colour - the RF ones are the usual ferrite gray; the IF ones are more a greeny olive drab colour. When aligning the radio, if a transformer won't

peak properly no matter what you do, one thing to check is that slugs haven't gotten mixed up.

I've had several radios that had this (usually an RF slug in an IF slot) which made the radio a bit deaf. Putting the correct slug in helped a lot. Of course, the other thing to check when you can't peak is the mica caps inside the can. Altho usually fine, I've found the odd one that was faulty. I notice Fair Radio doesn't (or at least didn't) differentiate in the slugs they sell, so a radio from them (most of mine have been from them) might have this problem if in a hurry to replace obvious broken pieces, a wrong slug is use

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Date: Thu, 05 Nov 1998 22:55:37 -0500
From: Glenn Finerman <glennfin@mjet.com>
Subject: [R-390] Jan's Article

For those who asked, the article I mentioned in my post, by Jan Skirrow VE7DJX, "The R-390A RF Module... A New Approach" was in the September 1998 issue of Electric Radio. #113. Electric Radio for those who don't know, is that wonderful monthly publication dealing with our beloved Boatanchors and related topics. I highly recommend it!

Date: Sun, 06 Dec 1998 14:58:47 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] a rebuild tip....

For what it's worth, here's a tip on "tightening up" the RF racks on the original design RF decks with racks built on the lines of the Collins receivers. These are the early design racks that used fixed non-rotating guides rather than some of the later ones that used roller guides like the 1967 contract EAC's.

After extensive use, some of these non-rotating guides start to show a lot of wear in the form of flattened surfaces where they contact the sides of the guide slots that they travel up and down in. Some of these flat spots are more than a 1/16 of an inch wide. This results in a greater than normal amount of side to side play in the racks. Looking at the slots that they ride in on the two sitting here, it appears that the greater majority of the wear in on the stainless steel guides and not the aluminum slots that they ride it.

I haven't made a study of the effects on the tracking of the slugs that an extra .020 or so in side to side play in the racks has, but common sense tells me that excess play here could alter the timing of the slugs in each of their coils at different points along their range of travel, due to the rack rollers riding slightly lower on the cams at certain points in their travel

when the load on the guides shifts from one side of the guide slot to the other.

I'd suspect that this is a small amount, maybe only the equivalent of a eighth of a turn on the slugs adjustments, and only at certain points of the tuning range. Still, it's little things like this that add up and affect the overall performance of the receiver.

The guides are secured to the racks on both of the Collins RF decks that I have with a rolled crimp like a grommet. The fix I used was to remove the racks and grasp the guides with a piece of brass shim stock and a small pair of pliers and simply rotate the fixed guides ninety degrees while taking care to not distort the racks. Now, the guides are "as new". None of mine were loose after doing this but if it would have, it would have been a really simple matter to tighten the crimps.

This "fix" should also make the receiver a little easier to tune by reducing friction. You're replacing the flat areas that have large rough bearing surfaces with a new smooth surfaces with a very small bearing areas.

Date: Fri, 1 Jan 1999 15:43:23 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: [R-390] The R-390A's Mechanical Wonder

Lately I've been working on a '62 Amelco R-390A and since my '67 EAC is in good running order, I can take extra time on the Amelco to see how far its performance can be improved. The object is to let each receiver go head to head and see if the improvement in one receiver can be equaled or exceeded in the other over time. Presently I'm working on the RF deck. Recently, while waiting for parts - -- resistors, caps, etc.-- I turned to the gear train assembly. It had a lot of dried grease, some corrosion on the brass, and seemed a likely candidate for a good cleaning and lubricating that would make it turn more smoothly.

I detached the RF chassis, removed the counter, and gave the gear train a good scrubbing in solvent. The gears looked better but turned with little discernible improvement. Not altogether satisfied, I contemplated taking it completely apart. After studying the manual, reading encouraging posts from the R-390 group, and surfing the BA web sites, I took the plunge and removed the front plate hoping to have the good sense to stop if I got in over my head. A sensible plan at the outset appeared to be to watch out for any pieces that might fall out initially, make note of them, and watch for shim washers and spacers that might get lost or misplaced. This went as expected in that one or two gears and their shims could be lifted out and thus were set aside safely. Unclamping gears one at a time, cleaning and replacing them in turn, all went smoothly and confidence rose. With each

operation admiration for the R-390A as mechanical marvel grew. One can't help but wonder how this maze was devised and you have to give full and equal credit to Art Collins' mechanical design team. In hindsight and without realizing it, I went about doing as thorough a job as possible more out of respect than as a worthwhile investment of time. You haven't fully experienced the R-390A unless you've confronted this amazing mechanism!

Here are several observations from along the way: It is not recommended to drive out any of the taper pins. Leave the cams, etc., on their respective shafts.

The planetary gears of the final differential gear assembly are most challenging. There is no exploded view in the manual for this part. Careful disassembly is recommended to ensure the planetary gears go back to their original locations including replacing the large stainless steel gear over the same three posts. Three anti-backlash gears need to be pre-loaded simultaneously on reassembly. I used a magic marker on the tips of several teeth of the anti-backlash gears to verify correct preloading. Check the subassembly for smooth operation and move the gears around if needed until success is achieved.

The locked clutch gear subassembly (21) also has no exploded view in the manual. Be careful to keep the clutch plates completely grease free on reassembly.

While reassembling the anti-backlash gears you will notice the two pieces tend to catch on one another due to burrs on the teeth. Take something like an 8" mill bastard file and with utmost care dress only the sides of the teeth on the side of the gear that mates with the other. Observe each stroke of the file and do not round over the edge. Keep firm steady pressure on the side of the gear and go tangentially around, being especially careful with the brass gears. Test the mated pair for smooth turning. As a result the gears can be pre-loaded more lightly. I believe this procedure to be crucial for making the gear train operate more smoothly with decreased wear on the mechanism.

Do not coat the mating surfaces of the anti-backlash gears with any lubricant. Only the teeth require a light lube after assembly.

Be sure the top gear on gear assembly number four (index number 134) is centered visually on its shaft.

Take careful note of how the switch gear assembly (87) goes together and don't lose the ball bearing.

The brass gears and cams got cleaned of their corrosion with Wright's Copper Polish. It's suitable for brass, comes in odor free paste form, rinses readily in soapy water, and is available cheap at the supermarket. When the shiny stainless steel gears lose their grunge and the brass is polished, the gear train sparkles!

The gear train operates incredibly smoothly and quietly with no backlash. A thirty-seven year accumulation of crud is gone, replaced with a light lubrication of high quality synthetic. The gear train can last a century or more, a tribute to those fellows of half a century ago.

Date: Tue, 12 Jan 1999 13:24:03 -0400
From: "Chuck Rippel" <crippel@erols.com>
Subject: Re: [R-390] RF Deck question... more...

> 3) I now need to clean years of ugly crud from the clockwork mechanism. I
> do NOT want to disassemble this, so need to know the best way to get this
> stuff out. I have read on this list about Castrol "Super Clean". Also this
> morning someone mentioned the dreaded "Green Bath". I think Dave Medley has used WD40 then flushed with gobs of distilled water. What is the best "non-disassembly" technology here?

Sorry, the deck HAS to come apart. If you don't do that, you are wasting your time. Soak the gears in carburator cleaner (available in 1 gallon cans complete with parts basket) making sure you work the anti-backlash with them soaking so that old, dries grease comes out. Then, wash them off in hot water, blow out with compressed air then bake them for a couple hours at 300 degrees.

It's not really that bad an ordeal. Chuck Rippel, WA4HHG

Date: Wed, 17 Feb 1999 18:59:46 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] Re: SJC 390a

Definitely should separate mechanical assembly from the electronics before doing serious gear train cleanup. Jan Skirrow's excellent article also can be seen at his website:

www.islandnet.com/~dma/Boatanchors/

Click onto the R-390A page and you'll find it. It's a heckuva good procedure and not difficult. Makes recapping and reresistoring easier as well.

Date: Wed, 17 Feb 1999 11:48:23 EST
From: JCStott@aol.com
Subject: Re: [R-390] Re: SJC 390

Anyone who is working on, or intending to work on cleaning up the R-390A RF module gear train should get their hands on the #113, Sept 98 issue of ER. The trick being that the mechanical assembly can be completely separated from the RF electronics. That way any cleaning effort will not effect the electronics.

Date: Mon, 22 Feb 1999 07:29:07 -0800
From: "Gene G. Beckwith" <jtone@sssnet.com>
Subject: Re: [R-390] **RF Deck reassembly...**

I can't answer ur question directly, but from ur discripton, I wonder if you are running up against the ten turn stop? I have just gone through a weird puzzle with my pet ST.JC 'Blue Striper' where several of the shaft/gear clamps were either broke or missing... So, here are a few things to check. Maybe it'll help get u on track with the sequence of events in the gears...

1. both ten turn counters have to be indexed to stop full counter clock wise position.

2. look a the veeder root freq counter output and it must read basically 00.000 at full counter clock wise of the ten turn counter stops...(note, manual allows for fine tuning the freq read out, but get the basic sync first, then go back for some fine tuning...this involves loosening the left and right hand gear clamps at either end of the veederroot, and setting digets to correct position when u r at full counter clockwise, then double checking read out at 07.000 vs cam position marks once ur in the full travel ball park.)

3. next, the variable RF deck band switch must be sync'd in this full left hand position...the band switch is a six postion switch as I'm sure u already know, but it must be full counter clock wise when the whole system is at 00.000, and can be accomplished by loosening gear clamp on the small gear that drives the "six turn dive gear" that ultimately drives the band switch.. With some serious and prolonged beard scratching, and a mug and a half of coffee, I figured out how to do that with the front panel on, once I understood how that dad-gummed six turn gizmo worked...so far, so good?

4. PTO must also sync vs its own ten turn limit counter on the KHz knob shaft...suggest u put the turns counter into full counter clock wise position

with pto disconnected or shaft clamp loose, then reconnect the Oldham (or assemble Oldham and just rotate PTO input shaft full counter-clock wise with Oldham shaft clamp loose until whole system is full counter-clock wise... then tighen clamp.

This should get u close, then check for full travel...and don't be fooled by the veeder root counter...the whold system must go the full travel, and if the veeder root is out of sync from having the system apart, re set the veeder root at the counter clock wise end point. When u get full travel of the gearing and cams...(if full travel is ok, then look at the xtal deck settings and index it at the 07.000 mark per manual.

It took about an hour of playing to figure out that my Mhz travel was being limited by the travel on the six position rf band swithch...I suspect u are seeing something similar with the PTO unless u have a pure mechanical bind from a rubbing or scraping clamp in the PTO drive train.. (by the way, don't forget the cam mark settings, once u get travel, but that's another story and one that sounds like u already have under control)

Hope this helps to trace through the system...Keep at it, u'll find it...

Oh, and by the way, I didn't take the vari rf deck out yet...will do so, as part of the later stages of rehab, when I get to the stage of removing the front panel...will try to combine those steps to avoid extra work and exercising of harness, hardware and introducing more scratches and mayhem on this slowly reviving Blue Striper...

Date: Mon, 22 Feb 1999 07:36:15 -0800
From: "Gene G. Beckwith" <jtone@sssnet.com>
Subject: Re: [R-390] RF Deck reassembly...

Seems I might have missunderstood ur question re the PTO situation...I found that I could reduce the binding by taking just a small amount of slack in the forward pressure on the oldham...didn't seem to introduce any backlash, even with a conscious attempt to relieve and pressure on the coupling...Ive also used a thin pice of flashing to ensure there is some spacing in the oldham while tightening mounting screws...

(Turns out he had rotated the shaft away from 7.000 on removal)

Date: Mon, 22 Feb 1999 18:27:40 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: [R-390] **Oldham Coupler Alignment**

This Oldham Coupler device is similar in function to couplers used on much larger machines where a motor is coupled to a blower or compressor placed in line with the motor shaft. In order to get the longest life of the coupling the motor and the driven equipment must be aligned as closely as possible in all planes, the shafts have to be parallel and centered, and the coupling segments have to have space between them, they can't be tight together. It would cause a type of binding where the shafts push against each other.

This alignment requires dial guages, feeler guages, shim stock to raise the motor or driven equipment and patience, it takes time.

The PTO on my R-390 A was loose when I got it and I suspect it had to do with an alignment problem that no one had time to deal with properly, it wouldn't be easy to shim the PTO in that tight area or to measure the space in the coupler. The looseness could also be from the PTO being pushed around by the misaligned Oldham coupler as I'm sure that the Kc change knob shaft is bent slightly. Extra space between the coupler segments could be a help here.

Date: Tue, 23 Feb 1999 23:16:00 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] Oldham Coupler Alignment

The Oldham coupler faces can be aligned by loosening and shifting around the PTO mounting hardware and resetting to suit. Ordinarily the PTO should be snugly held in place by the bracket mounting screws. Add a thin coat of Lubriplate to the Oldham disk and faces. Adjust so the Oldham disc wiggles freely in between the two faces. When done correctly, the Oldham coupler spring should have an easy time keeping the backlash minimized. All this assumes the KC shaft isn't bent. Dunno what to say there about straightening it, but if it helps to loosen the bushing just behind the KC knob for smoother turning, then try it.

Date: Tue, 10 Feb 1998 14:27:13 -0700
From: k5fte@webtv.net ({{{ EARL }}})
Subject: [R-390] Color coded Slugs

When I first got my 390A, I found that I could not get the 17-30mhz slug rack to peak without nearly running out of thread on the antenna slug. Close inspection revealed that the antenna slug did not have the "Green" paint dot on top the way the others did.It had no color code marks. I went to my junker and removed a slug with a green dot and the radio came alive. I have never read or heard about color coded slugs. I`m not sure I understand any of this but I thought I`d throw it out for the group to discuss.

Date: Tue, 10 Feb 1998 18:50:35 -0500 (EST)
From: Steve Stutman <sstut@world.std.com>
Subject: Re: [R-390] Color coded Slugs

Different ferrites have different permeabilities; I don't know what the scheme for color code is in 390s, but not all ferrites are created equal.

Date: Tue, 20 Apr 1999 09:29:16 -0500
From: "A. B. Bonds" <ab@vuse.vanderbilt.edu>
Subject: [R-390] More on 390 slugs

The final engineering report on the R-389 and R-390 recently posted to the 390FAQ is a fascinating document, and all associated with the effort are to be complimented highly. On page 59, it addresses directly the issue of R-390 slugs that reared its ugly head a week or so back. In sum, three types of iron core, mfd by the Stockpole (sic?) Carbon Company, were finally selected for use. A primary concern here was Q control.

0.5-1, 1-2 and 2-4 MC rf coils used S-51 type.
4-8 MC rf coils and the 3-2 vbl IF used the S-62 type
8-16, 16-32 rf coils and the 9-18 vbl IF used the S-100A type.

Naturally, this is a bit at odds with my observation of a variety of color dots that exceeded three. But it's a bit of progress. Does anyone have any slug data from Stockpole (I think they mean Stackpole)?

Date: Wed, 21 Apr 1999 12:51:06 -0500
From: "A. B. Bonds" <ab@vuse.vanderbilt.edu>
Subject: Re: [R-390] More on 390 slugs

Great! Authoritative info instead of guesses...

> First, the three different cores are made of the same material. The only real difference is the length of the spring. This is according to the original sets of drawings.

There does not seem to be any differential in spring length externally. Do you mean that the springs are inserted into the cores to different depths? According to the engineering report, the cores were meant to have both different permeabilities and different Q's. I am not an e-mag expert (by far), but I'd like to understand how spring length would address permeability and Q.

Date: Tue, 20 Apr 1999 13:50:08 -0500
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>

Subject: Re: [R-390] More on 390 slugs

The whole of the slug affects the inductance, even when just partly inserted, because the slug having a much higher permeability than air concentrates the magnetic field in the slug. Length would be significant even when just entering the coil. Could be that colors are from selecting for Q or permeability since to track there's a definite need for matching permeability. If spring length was to vary more than screw length, then not amount of alignment could compensate for a wrong spring length...

I have downloaded the report, but with work, housebuilding, farming, tractor fixing and a bit of hamming (president of the radio club), I've not had time to sit and read the whole thing. I did notice the report concluded that oscillator tube heater regulation was a good thing even though it wasn't proven absolutely necessary unless it was good for tube life. But with no limit on price the ballast was included.

April 1999 17:40:25 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] More on 390 slugs

If slugs were supposed to be matched (and it is apparently so), is there any reference in any of the non-A TM's to this in replacing broken slugs? At a minimum there should have been a caution to keeping the slugs with the same coils when doing other repairs to the RF deck. I haven't noticed anything in my R-391 manual which has the same RF deck as the non-A. Just got a non-A copy, but haven't had a chance to check it. The absence of slug type detail in the manuals might explain some of what we've seen in the way of inconsistent color codes. Based on my spare deck there are at least four -- not 3 types -- if the color dots signify density/type. A. B. had even more than that. The only broadly relevant material in the TM I have says to replace parts with the exact type in the same position as found -- but I took that to mean resistors, caps, etc. No specific mention is made of slugs -- or checking for broken slugs, which can disable a substantial range of these things. The troubleshooting section of the one I have has nothing about this.

Date: Mon, 1 Jun 1998 20:05:13 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: [R-390] Tuning coil cores

Now that you got me started on this. How should I lubricate the cores of the tuning coils, I've found two of them hanging. I used a small amount of Johnson's Paste Wax, more to clean them than anything else, it works for now but it doesn't seem like that will last for long.

Date: Mon, 01 Jun 1998 22:52:27 -0500
From: Nolan Lee <nlee@communique.net>
Subject: [R-390] Well now, that's interesting!

You need to get in the habit, if you need to pull one of the racks up, of unhooking the springs from the rack. I've broke several slugs when something slipped. I use a smooth jawed hemostat to disconnect the springs from the rack.

Then, I bend up some paperclips to secure the spring with enough tension so that the bottom end of it doesn't come loose. I've never broke a slug since. This works good with the two springs that retain the octal crystal oven. You haven't lived until the bottom of those springs get loose. Bummer.....

Date: Tue, 2 Jun 1998 00:53:55 -0400 (EDT)
From: Steve Stutman <sstut@world.std.com>
Subject: Re: [R-390] Tuning coil cores

Hi Joe,Have used a "dry teflon" lube spray in cores in other rx; not tried in 390s. It is advertised as lubing everything from bike chains to window slides. It worked well for sticky slugs.

Date: Tue, 2 Jun 1998 03:15:41 -0400 (Eastern Daylight Time)
From: Norman Ryan <nryan@acpub.duke.edu>
Subject: Re: [R-390] Tuning coil cores

My R-390A's slugs had slight friction problems including squeaking. Also some racks were rubbing along the front or rear frames. Here is a procedure to free them. Use extra care so as not to change alignment.

1. Unhook the rack springs, retaining them with paper clips bent to suit. Do this to no more than two racks at a time.

2. Working one at a time, remove the slug rack, examine the slugs' springy coils, and if needed VERY carefully straighten them. Do not turn the alignment screw nor stretch the coils. I recommend NO lubrication of the slugs or cores. Just look them over for nicks or scratches. Blow dust out of the cores.

3. See that the flange at each end of the rack is at a 90 degree angle. Check the little rollers for free turning, using sparingly the lube of your choice.

4. Lower the rack back in place and loosen the three (no, two) screws on each of the three little plates attached to the rack. Gently coax the little

plates until the slugs and rack feel centered. Lightly snug up the three screws on each plate.

5. Rack should be centered from front to back and fall freely into the cores. Repeat step 4 if needed. Tighten the screws. Rehook retaining springs and proceed to the next rack.

Date: Wed, 3 Jun 1998 12:10:11 -0400
From: "Chuck Rippel" <crippel@exis.net>
Subject: Re: [R-390] Tuning core totality

Yes. I use Redline Synthetic hi-pressure bearing grease. Unlike dino-based lubricants, it simply will not harden. However, lets consider where the grease is going. If you are greasing the slug racks anywhere, don't use grease. Better to use a synthetic 90W gear (rear end) lube like Mobil-1. Are we still talking about sticking slugs in the RF deck? That is most likely NOT a lubrication problem. The slugs bind from physical misalignment in the coil forms causing the racks to hang. You can grease the rack slides until you are blue in the face and perhaps still not fix it.

First, check to see if there is hard grease on the slug rack sides or guide areas, take all that off with some WD 40. When you have nice clean metal, about 5 drops of Mobil-1 gear oil (NOT GREASE) between the side of the RF deck and movable slide will insure its free movement.

If the above does not correct the problem, here is how to proceed and fix the slug binding:

Locate which slug is sticking. Using the tuning and band change controls, cause that slug rack supporting to drop and insert the slug as far into the coil form that it will go. Take a #1 Phillips screwdriver and carefully loosen the two screws holding the slug bracket to the slug rack and let the slug/spring center the bracket so the slug is free in the coil form. Tighten the bracket screws being careful NOT to allow the bracket to move on the slug rack.

Again, using the tuning and/or band change controls, cause the offending rack to move and see if it still binds. Repeat the above as necessary on that or other racks which might be binding up.

DO NOT under ANY circumstances lubricate the actual powdered iron core with anything but a dry lubricant such as talcum powder. Depending on the slug coating/binder, the oil in the grease can leach into the core and change its density, attack the coil form, etc..... As soon as the receiver gets more dirt into it (And it will, ever see a totally clean R390(A) RF deck??) it will stick to the grease and the binding in the form will be back,

this time in a whole new dimension.

It also makes an incredible MESS.

With regard to GREASE, I end up using just a very tiny amount on any R390A restoration and only on slow moving parts like the antenna trimmer worm gear. Most lubricating is done with 90W oil.

Date: 03 Jun 98 11:44:16 -0700
From: "Don Metcalfe" <DMETCALF@us.oracle.com>
Subject: Re: [R-390] Tuning core totality

I believe I would re-think the talcum powder. That stuff is hydrophilic,which means it loves moisture and will absorb it from the air...you may have quite a mess on your hands before too long. I am sticking with a small amount of powdered graphite applied carefully.... However, lets consider where the grease is going. If you are greasing the slug racks anywhere, don't use grease. Better to use a synthetic 90W gear (rear end) lube like Mobil-1. Are we still talking about sticking slugs in the RF deck?

Date: Mon, 14 Sep 1998 13:29:24 -0400 (Eastern Daylight Time)
From: Norman Ryan <nryan@acpub.duke.edu>
Subject: [R-390] Re: Dial Drag???

1. Check the bushing on the panel behind the tuning knob to see that it isn't binding on the shaft by loosening it and centering it, then tighten it lightly. While there, check for runout or a bent shaft, and finally put a drop or two of oil in there.

2. Check that there is a very slight front and rear play in the Oldham coupler. The center disc requires a tiny bit of wiggle room. The PTO assembly should be perfectly aligned along the shaft axis.

3. Check that the slug racks do not bind on either the front or back plates. Then in turn lower each slug rack fully by turning the bandswitch and KC change knobs to suit and detach the two springs. Lift the slug rack and let it drop to see that it freely and evenly falls. Take care that the springs don't detach at the chassis or that they don't go flying across the room. Reattach the two springs before moving on to the next slug rack.

4. If it hangs up and you have time and patience, while the slug rack is bottomed, gently lift it out to see if the ferrite cores are vertically aligned. If the little springy things that connect them to the alignment screws are bent, very carefully unbend them without stretching them. Never, NEVER, add lubricant to the ferrite slugs. (Light dusting of talc is OK as a

dessicant and to silence squeaks.) Finally, loosen the two Phillips retaining screws to reposition the three retainer plates on top of the slug rack, center them, and snug up the screws. I don't recommend this step if you believe the set is in good alignment electronically or if you are the least bit klutzy for at this point any extra smoothness perceived in dial turning may be in your head and not worth the candle.

Date: Thu, 24 Sep 1998 12:27:04 -0400
From: "Chuck Rippel" <crippel@exis.net>
Subject: Re: [R-390] Stuck cores

Shoot a little WD-40 into it is the coil form is NOT cardboard and let it sit overnight. That works on R390A's quite well. If it is a stuck sliding core, as in the RF deck. Pul it out and clean both the sleeve interior and slug with a "Q-Tip" and alchohol. Put some talcom powder on the slug and reinstall it.

Run the slug rack so that the slugs are inserted as far as possible. Then, break the two screws loose on each of the clug brackets and allow them to self-align and center in the coil sleeves. ought to work just fine after that.

Date: Mon, 26 Oct 1998 23:39:35 -0500 (Eastern Standard Time)
From: Norman Ryan <nryan@acpub.duke.edu>
Subject: Re: [R-390] Update on '67 EAC

Recently aligned the RF deck on my EAC during which I found a wonky ceramic trimmer cap on T201. I pulled the coil and took the trimmer apart and wiped it off gently. Didn't see anything out of the ordinary, reassembled can, and alignment went well. After putting tools away I saw a little star lockwasher on the bench that I couldn't account for. Hmmm, was that the cause of my problem? Possibly it had fallen into the can and when I took it apart it fell unnoticed onto the bench.This may not be the problem in your case, but here's what you can do. The cans come out readily since they are plug-in units. To get to the problem can:

1) Detach the springs from the slug rack and lift out.

2) Take a #1 Phillips screwdriver to the bottom of the coil's core and undo the screw. Lift out the can and dump out the screw. It will have a captive lockwasher.

3) Unclip the can from the coil assembly: while gently pushing in on the retaining tangs, slide the can off.

4) Inspect the ceramic trimmer for cracks or anything unusual. If you think you need to go further, take small long nosed pliers and slide the

little clip under the trimmer aside to release the ceramic disc. You will need to bend the terminal slightly. Inspect and wipe the faces with a dry lint free cloth. If you like, clean the ceramic part with a little Windex sprayed onto the cloth.

5) Check that no wiring can touch the can interior. Reassemble, wipe contacts, snap can back on, plug in, screw down. Reassemble slug rack.

Chuck may still have replacement ceramic caps or coils should you need them.

Date: Mon, 26 Oct 1998 23:40:32 -0500
From: John <jbharvie@erols.com>
Subject: Re: [R-390] Update on '67 EAC

Hello everybody, Nice story Bill...I am coming up to this issue myself also. Here is my saga... I also purchased another EAC R390A receiver with an EAC RF deck recently. On the rear right of the RF subchassis is marked Contract Number: DAAB95-67-C0155, Serial Number 6473. The receiver had been exposed to some water over a period of time, a little corrosion on non-anodized Aluminum but most of the the receivers interior components were out of the water line (yea). The two cable management clamps in the front of the radio were mostly dissolved and the RF finger strip was also badly corroded where it had been contacting the Aluminum frame. The Biggest problem is that sand, fine grains, grit and quartz powder was everywhere on everything. (Where was this thing stored?)

I have removed all the RF gears, the two IF end cams, the springs and slug racks, the tubes, the 100 kc crystal can (HR202), the Veeder-Root Inc. counter, the RF subchassis front middle and rear CAM bearing panels, all of the plug in coils (there is one phillips screw located down the center of the slug tube). Unit looks like it never had been run...or run only a wee-little-bit judging from the wear marks. Went over every inch of every last little part removing
grime, grit and the like, cleaning, tagging and bagging and learning how this differs from the Imperial unit I have. Those gears and coils are fun! What a mechanical design JOB on gear #39! Lets see you try that with a slide rule...:) Anyhow I did find some interesting items out

(1) the interior of the coil housings were mostly in good shape the top had largely protected the interior against the dust, sand and grit..but not the tube.

(2) some of the can capacitor trimmers were stuck and did not rotate. Folks don't just use a larger screwdriver!! These are very easy to get going again!..remove the can from the radio by unscrewing the center phillips

screw...remember not to dump the screw on the ground..remove the cover from the can..using an exact-o knife blade gently insert the blade under one of the three (the rear) small tabs of the bottom metal retainer clip which holds the rotating capacitor down. Once you get the tip of the exacto blade in position gently wedge/push the clip up and away from the bottom pin of the top capacitor body. Continue by gently pushing the capacitor body straight up from the rear. I used deoxit on a cotton tip swab to wipe the metal (silver plated?) retainer clip and the capacitor face/body once separated. There is another mechanical contact where the silver plated mounting clip touches the underside of the bottom ceramic plate (there is a hole through the thin rubber washer. Once reassembled I apply a small amount of the deoxit to the pin and retaining clip and rotate the capacitor a couple of times then soak up the excess of the deoxit with a fresh cotton applicator swab.

(3) the American trans. and Coil units and the EAC's all appear to have gold plated pins..which fit into gold plated sockets. When out looking keep this in mind. While the EAC receiver I have has a full set of the RF coils three "no-name specials" units do not have the gold plate pins (T203 2-4mHz), T204 48 MHz and Z201-2 0.5-1mHz if there is anybody out there who wants to swap me some parts...I believe it is well worth it to go through and clean all of the pins and sockets with a good contact cleaner. Even on the gold plated pins I found a considerable film buildup which was nicely removed. An an added benefit the Coils once out can be open up and inspected for near shorts...I found a few of these...and also the top exterior of the paper slug tube can be inspected for cracks..I found quite a few of these which I plan to put a bit of epoxy on the exterior as a fillet.

(4) Found a real nice performing "non-residue" cleaning product in an automotive parts store (Track Auto for the East coat readers) for about $3 it is called Brakleen manufactured by CRC, red can 539 grams, part number 85089. I used two cans on the component side of the RF deck and spray flushed all of the sand, grit and dust away! Whew, the stuff dries fast, is effective and is not good for ones health or the environment (contents are Tetrachloroethylene, Petroleum Distillate, Toluene and Carbon Dioxide (propellant) but I was real impressed at the performance.

(5) I also replaced a yellow RF coax wire with some Black Belden 8216 RG-174/U 90903 cable I had around. The RF connector was a right angle one (P207) which was an interesting experience in removing the soldered connector end plate cap as well as observing how the plastic coax ground shield wire clamp works. The most interesting thing was that the yellow cables inner wire resistance for the same distance measured ~0.1 ohm higher in resistance even though it was silver plated vs. copper in the Belden (it was a thinner cross section). The reason I changed the coax was the Yellow cable had been very sharply over bent on the exit corner

and it did not "feel" right.

(6) Lastly I have an interesting mechanical assembly issue for the group to consider.

What if any aspect of the mechanical assembly and integration of the cam-shaft end-mounting-plates to the RF sub chassis is sensitive to maintaining a precise parallel alignment distance from the RF coils to the center of a cam shaft? What are the precision alignment issues?

The reason I asked that is that the 1/8" Aluminum deck face of the RF deck subchassis was downward deformed (bent) in locations where the end corners of the 0.160 inch thick Aluminum CAM mounting end plates had been at some time smashed into them, smashed so hard it also bent the sheet metal ribs below. The surface was depressed by about 0.12 inches around the holes where the cams fall below the surface. After 3 days of hard work the deck is now reasonably flat, square and true but I would like to know what you all think. (If you are interested in how I "unbent" the deck ask me)

There does not appear to be much in the way of Mechanical alignment information in the 5 TM manuals (I now have) to outline or describe the manufacturing mechanical tolerances necessary to integrate the larger mechanical assemblies of the receiver. If anybody is aware of the tooling or guides used for such work I would appreciate it. If not I will use the other R390A radio I have as a starting point.

Has anybody out there a DITTMORE-FREIMUTH Corp. R390A receiver?

Date: Tue, 27 Oct 1998 11:09:29 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] Update on '67 EAC

My experiences with failures of the Erie type variable capacitor have always pointed at the center of the three legged clip where the shaft slides. Though the top end of the shaft where it sits on the metalization of the ceramic rotor could also be a problem. With even poorer experiences of the more recent designs of trimmer capacitors that also depend on pressure connections and small sliding areas, the next radio I build will use only fixed capacitor and slug tuned coils. No trimmer capacitors unless I use compression mica trimmers.

Date: Tue, 03 Nov 1998 07:27:58 -0400
From: laffitte@prtc.net (laffitte)
Subject: [R-390] R390A/R390 Observations

I have observed several differences between the R390A and 390 that tells me of a higher quality of construction in the nonA than the A. The cable connectors look stronger and are bigger. The subchassis interconnecting cables are of a bigger size in the nonA. If you take a look at the RF coil forms and slugs, they also look better made and sturdier. In fact even the phenolic in the coil forms looks thicker. The slugs themselves shine with a dry coating that seems to prevent sticking of the slugs and coils. Neither of my nonAs has suffered from sticking slugs while both As have. I have not seen if the electronic components also reflect the differences above. Would the power supply in the nonA be sturdier than the one in the A? Are there better quality components in the nonA? It will be interesting to see what the list thinks about this.

Date: Tue, 10 Nov 1998 20:45:21 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] R-390A IF transformer cores stuck!

But polyurethane varnish is practically unmovable by anything but sturdy mechanical abrasion (e.g. laser, grinder...) and you want to maintain threads in the coil form for the slug to move in. Urethane varnish may be stronger than the coil form and so a tap recutting threads may move more coil form than varnish.

Broken slugs generally come from using steel allen wrenches to move the slugs instead of softer plastic alignment tools. And as you've noticed once shattered in place they won't move with anything but destruction which is hard on the coil. If a plastic alignment tool won't move a slug
its time to warm the coil or apply a solvent to reduce the grip of the coil form on the slug, never use a steel allen wrench unless you want to find a replacement slug.

Date: Tue, 10 Nov 1998 21:02:07 -0600
From: Tom Norris <badger@telalink.net>
Subject: [R-390] Re: R-390A IF transformer cores stuck!

I have used teflon pipe thread tape for some time on various slugs in various batwing-logo'ed commercial gear. Seems to work well. Stay away for shellac, it is evil and insidious, at least on transformer cores that you intend to ever move again.

Date: Sun, 06 Dec 1998 14:58:47 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: [R-390] a rebuild tip....

For what it's worth, here's a tip on "tightening up" the RF racks on the original design RF decks with racks built on the lines of the Collins

receivers. These are the early design racks that used fixed non-rotating guides rather than some of the later ones that used roller guides like the 1967 contract EAC's.

After extensive use, some of these non-rotating guides start to show a lot of wear in the form of flattened surfaces where they contact the sides of the guide slots that they travel up and down in. Some of these flat spots are more than a 1/16 of an inch wide. This results in a greater than normal amount of side to side play in the racks. Looking at the slots that they ride in on the two
sitting here, it appears that the greater majority of the wear in on the stainless steel guides and not the aluminum slots that they ride it.

I haven't made a study of the effects on the tracking of the slugs that an extra .020 or so in side to side play in the racks has, but common sense tells me that excess play here could alter the timing of the slugs in each of their coils at different points along their range of travel, due to the rack rollers riding slightly lower on the cams at certain points in their travel when the load on the guides shifts from one side of the guide slot to the other.

I'd suspect that this is a small amount, maybe only the equivalent of a eighth of a turn on the slugs adjustments, and only at certain points of the tuning range. Still, it's little things like this that add up and affect the overall performance of the receiver.

The guides are secured to the racks on both of the Collins RF decks that I have with a rolled crimp like a grommet. The fix I used was to remove the racks and grasp the guides with a piece of brass shim stock and a small pair of pliers and simply rotate the fixed guides ninety degrees while taking care to not distort the racks. Now, the guides are "as new". None of mine were loose after doing this but if it would have, it would have been a really simple matter to tighten the crimps.

This "fix" should also make the receiver a little easier to tune by reducing friction. You're replacing the flat areas that have large rough bearing surfaces with a new smooth surfaces with a very small bearing areas.

Date: Fri, 18 Dec 1998 17:28:54 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] Rosin It Ain't

If I had that squeeking problem, I'd consider smoothing the inside of the coil forms. Find a dowel rod a bit smaller than the slug, split the end of it (cross grain) and wrap it with some 400 or 600 grit wet or dry sandpaper, grit out.

Use that assembly to polish the inside of the form. Remove only roughness not a significant amount of material. Adjust the thickness by the number of wraps around the dowel. Probably use mostly a rotary motion (in the direction to tighten the paper's wrap around the dowel). Then I'd polish the outside of the slug with the same very fine paper.

The dust left over from these processes will supply and stick lubrication for a long time.

Super glue only sets when inside away from air. Probably a drop of epoxy on the outside of the spring/slug connection would be more effective. Maybe the thin form of loctite that's made for application after assembly, its another stickum that only cures in the absence of air.

Farmers use a graphite paint for sloping grain hoppers called slip-plate. It comes in spray cans from IH dealers and farm supply stores. Its hard to spray a thin coat, but a thick coat is what IH planters need anyway.

You'd have to spray from a long distance with a lot of overspray to get a thin enough coat on a slug. Don't get it on the floor, it really is SLICK!

Date: Fri, 18 Dec 1998 20:58:15 -0500 (EST)
From: Norman Ryan <nryan@acpub.duke.edu>
Subject: Re: [R-390] Rosin It Ain't

It's best not to agressively treat the slugs. If there is crud, GENTLY clean with soft cloth dampened with something like Windex. You may notice some slugs come with a matte surface and others have a high gloss. Gently swab out cores with Q-tips dampened with Windex. Keep contact with moisture to a minimum.

Lubrication generally isn't required. Dredge the slugs in talc and blow off excess if desired. Similarly, with a dry Q-tip, swab the cores with talc if you like. Use of graphite, Molykote, etc., can alter ferrite characteristics.

Look over the slugs and note that the thin connection between the adjusting screw and slug is a phosphor bronze spring that can easily be irreversibly damaged. Very carefully tweak the spring without stretching it if the slug and adjusting screw are skewed. If you remove a slug, be careful not to lose the "C" shaped spring underneath the rack. It keeps the screw from freely turning and possibly going out of adjustment over time.

Clean the slug racks and ensure the bearings turn freely and are lightly lubed. Examine the flanges and make sure they are at a true ninety degree angle. Install the slugs, minding the "C" shaped springs. Install slug racks

without yet installing the retaining springs. Dial the racks to their lowest level in turn. Loosen the two Phillips screws on each of the slug retainer plates and let slugs seek their centers. Snug up Phillips screws. Raise the rack and see if it will drop freely. If binding remains despite centering, look over the coil cores for nicks, unravelling, etc., and correct as needed. Move on to the remaining racks and adjust similarly. Reattach retaining springs. Note that some slugs are off center to their adjusting screws. If you do an electrical alignment, these slugs may need recentering if squeaking recurs.

Date: Sun, 14 Mar 1999 02:18:37 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Gear train and coils!

I remove the coils from whatever I'm working one and insert them into a stripped and gutted RF deck chassis that I use as a holder. It makes it prevent swapping them around and the resulting fire. (I'm joking about the fire). Naturally swapping any of the items listed below will require and alignment to correct.

Z213-1, Z213-2, and Z213-3 (1st variable IF) are all interchangeable among themselves.

Z216-1, Z216-2, and Z216-3 (2nd variable IF) are all interchangeable among themselves.

L224-1 and L224-2 (.5-1 MHz) are interchangeable
L225-1 and L225-2 (1 to 2 MHz) are interchangeable
L226-1 and L226-2 (2 to 4 MHz) are interchangeable
L227-1 and L227-2 (4 to 8 MHz) are interchangeable
L228-1 and L228-2 (8 to 16 MHz) are interchangeable
L229-1 and L229-2 (16 to 32 MHz) are interchangeable

All of the RF coil slugs from L213 thru L229-2 are interchangeable among themselves, BUT not with the variable IF slugs. And, all of the variable IF slugs from Z213-1 thru Z216-3 are interchangeable among themselves BUT not with the RF coil slugs..... Nolan Lee

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Date: Mon, 5 Apr 1999 08:33:08 -0400
From: "Jim Walker" <jwalker@atus.com>
Subject: [R-390] R-390a RF Deck Slug Compatibility

I have two broken slugs on a Motorola RF deck I'm repairing. It made me wonder how universal the permeability of the slug are. Can anyone please tell me what is and is not compatible for interchanging slugs within the RF deck?

Are the slugs interchangeable within frequency bands (i.e. .5 - 1 MC) and within IF ranges?

Are the single capacitor RF transformers identical and interchangeable? The cans have the same part number.

Within a frequency range, will the single capacitor transformer slugs replace the dual capacitor transformer slug?

Why do some slugs have color dots on the top?

Date: Mon, 05 Apr 1999 06:07:09 -0700
From: Craig McCartney <craigmc@pacbell.net>
Subject: RE: [R-390] R-390a RF Deck Slug Compatibility

Here is what I remember: The RF slugs are all the same and are interchangeable. The variable IF slugs are all the same and are interchangeable. The RF slugs are different from the variable IF slugs, do not swap them. The color dots are to tell the RF from the IF slugs. The coils in the RF section are may or may not be interchangeable, hopefully someone with more knowledge will answer that.. The part number you see may be for the cover, not the coil inside.

Date: Tue, 06 Apr 1999 20:25:04 -0700
From: David Ross <ross@hypertools.com>
Subject: [R-390] R-390 - problems with matching slugs

There's been some mention of matching R-390 slugs & coils, like: One of the innovations Collins came up with in late WWII was the technique of winding coils in such a way that a given change in slug position would yield a linear frequency change (assuming a fixed capacitor in parallel with the inductor). Take a look inside an R-390 RF can or a PTO - you'll see a coil wound with a variable pitch. Collins came up with coil winding machinery which would put wire on a coil form in such a way that the coils had this property - linear resonant frequency for given slug motion, assuming a fixed tuning capacitor. This linear frequency change with respect to slug motion was necessary in order to use an inductor as the variable tuning element in a front end like that in the R-39X radios. If exactly one turn of the tuning shaft yields 1.600 MCs of tuning range, then exactly three turns must yield exactly 4.800 MCs of tuning range, etc.

What's the recipe for large-scale manufacturing of this linear tuning scheme?

- correctly machined actuator cams
- correctly wound inductors
- uniform slugs

The "correctly machined cams" requirement was likely the easiest one to accomodate - a pretty simple machining task. Notice that I said 'simple' and not 'inexpensive'. (In the R-648/ARR-41, slug motion was accomplished with a rack & pinion arrangement, which is about as linear as you get...) The "correctly wound inductors" was likely a bit more difficult - probably some custom-made additions to standard coils winders. My guess is that the "uniform slugs" requirement was the toughest of the three, and probably was the last requirement to be adequately met. Imagine the fits the Collins engineers had when all the mechanical requirements were met and the inductor still wouldn't track properly. Once they satisfied themselves that the cams were done right and also that the coils were wound OK, they probably were looking into things like:

- uniformity of the slug's magnetic characteristics from one end of the slug to the other.
- possible slant in the machining of the bottom surface of the slug.
- possible chips or imperfections in the lower 'edge' of the slug, where the slug side meets the bottom.

Hand-trimming the slugs?

- Shortening the slugs would of course have the same effect as just backing off the adjustment a bit.
- Trimming them by flattening a side would likely make tracking worse overall, since that newly created flat spot on the side would at times be adjacent to a coil wire and at times be between coil wires - hence would have a greated or lesser effect on resonant frequency depending on slug position (and rotation due to 'final alignment' adjustment) in the coil. However, it could be that a uniform bevel on the bottom circular edge would smooth out the response a bit, so that imperfections in slug composition would not affect the slug-position-to-frequency curve quite so much.

My solution to the 'slug matching problem' - "damned if I know". Please let us all know if you come up with anything concrete... One thing I am sure of - my hat's off to the persistent and hard-working designers who came up with all this good-looking Collins clockwork.

Date: Thu, 27 May 1999 16:26:11 -0500
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Gears

>1. I have the gear train separated from the RF unit for cleaning/lubricating. I
>notice that when the points of the lobes of the cams are at their alignment
>location markers, the planetary gear's indentation ring is not located at a
>notch, but somewhere between. One of these cams is pinned, so I cannot
>change its orientation.

The geartrain is out of alignment. You'll need to re-time it. When you assemble the gear train, the "non adjustable" cam shaft is adjusted by loosening the clamp on the gear on the shaft to the right of it. That one clamp is used for adjusting both the shaft that it's onand the shaft you're talking about.

>Is this orientation with the notch correct? If I understand this correctly, when
>the cams are on their alignment marks, this should represent 7.000MC
>If this is true, this should correspond to the 8th click on the megacycle
>indentation plate. Right/Wrong?

Eight clicks should be 7 Mhz, yes. The correct range of travel for the Mhz control/indicator should be 1/2 of a click below 00 and 1/2 of a click above 31. The amount of over travel at each end of the 0-31 MHz range should be exactly the same. Also, while you have the RF deck out, you can precisely time the bandswitch on the underside of the deck. Make sure that you totally clean the wafters of that switch while you have it out and carefully inspect each wafer of the switch for carbon tracking to the shaft. Also, make sure that both switch sections of the big switch on the Crystal Osc module are in time with each other and that the adjustments are centered with the various MHz tuning detent positions.

>2. Inside the crystal "cabinet" on the first oscillator module, is the insulating
>material asbestos? I get nervous when I open it up. Is this a hazard?

It looks like fiberglass. Asbestos is usually white. There may be some asbestos in the wire form between the two crystals in oven on the RF deck. Maybe one of the guys with the engineering drawings CD can check.

Date: Thu, 27 May 1999 18:25:58 +0000
From: Thomas Marcotte <marcotte@iamerica.net>
Subject: Re: [R-390] Gears

What Bonds said. But in addition, you should start alignment of the cams at the 2nd rack from the left. Do this one first, then those constraining pins won't be a problem. The book doesn't say this.

Date: Thu, 03 Jun 1999 13:03:21 -0500
From: "A. B. Bonds" <ab@vuse.vanderbilt.edu>
Subject: [R-390] Dirty but not so quick total setup

Seriously, it's not that hard, just requires common sense and patience..... and the book. First, make sure your RF deck is behaving well mechanically. This means insuring mechanical synchronization. The two important issues are

(1)making sure that the cams zero properly and

(2) making sure the bandswitch behaves. The cams should all line up with the alignment marks when the counter reads at the alignment frequency. For a 390A, the alignment marks are on the front of the second gearbox plate (near the front of the receiver) and the alignment frequency is 7 +000. This means set the MC to 7 and the KC to +000 (the red + marker should be visible, this is the TOP of the band, not the bottom). For a 390 it is different. The alignment marks are on the back of the rear gear panel and the alignment freq is ...er... 2 000 I think. Or something like that.

The best way to achieve cam adjustment is to set the cams where they belong and then set the counter to the alignment frequency. This may require some hunting. There is usually no need to adjust the cam positions unless you have messed with the gears. The cams can be slightly off the alignment points without any trouble, the system is linear. Note that once the counter is set, the KC tuning range should run between -970 and +030 or so, with maybe 5 kc slop. If not, you have to twiddle mechanical adjustments until it does.

You then need to make sure that the bandswitch is aligned. There are 6 positions, for 0, 1, 2-3, 4-7, 8-15 and 16-32 MC. Note that the switch usually does not move quiiiiite far enough to align the contacts perfectly, so you have to start out with the contacts barely touching (wiper towards the center of movement) at each end. Run the MC change knob through the bands several times to make sure that the contacts work at each band setting.

Now the receiver can be assembled.

Next logical step is to check the IF alignment. I've never seen a 390A require more than the slightest tweak, but anything can happen. 390's are another matter. For both the band center must be dead bang on 455 KHz or the crystal filter won't work right. Use a counter to make sure your generator is adjusted properly. Best of my knowledge, ALL 390's and SOME (early) 390A's do NOT use stagger tuning (now I'm gonna get yelled

at...) and all IF's are adjusted at 455 kc. Later (and don't ask me where the break is) units DO use stagger tuning, as per the book instructions. Successful IF tuning is essential for the remainder of the adjustments.

Fortunately, the IF adjustments use direct signal injection and do not depend at all on the PTO and RF stage adjustments.

Next I'd get the PTO in the ball park. Set the dial adjust at the middle of its range (important). Double check the tuning range (-970 to +030 or so). Set the counter on 000 and check the PTO frequency. It should be 3.455. If not, loosen the Oldham coupler and move the shaft until it is. Now run the tuning up to +000 and check for 2.455. At this point, close is good enough.

Now you need to do your RF alignment. Gee, I wish ya hadn't pulled the slugs out, but...stick them all in with something like 1/8" sticking out the top of the rack. Proceed with the RF alignment as shown in the book. I'd get the slugs right first before messing with the trimmers. The time-consuming part (in my experience) is nailing the slugs/trimmer combination, requires a lot of slogging back and forth from one frequency to another. Note that the caps have high voltage on them, use an insulated screwdriver. I have never bothered with the balancing adjustments since I don't have a balanced antenna. Most any time along the way you can do the oscillator adjustment. This deals with the farm of trimmers either on the back panel (390) or on top of the oscillator module (390A). Note that this adjustment maximizes output but does not change the frequency.

NOTE!!!! The trimmer caps (either in the RF deck or the oscillator) are VERY FRAGILE. There is a thin ceramic disk with some metallization as part of the sandwich. Oftentimes the rotating part (top) of the trimmer gets stuck onto this thin disk. If you try to horse it loose, you will break the thin disk. This can result in disaster, as many of these caps are attached to B+ and will short out to ground. WITH THE POWER OFF, before adjusting the ceramic trimmers, take a screwdriver that fits well and gently work every cap loose by rotating from side to side. Once it pops loose, leave it for proper adjustment. If one breaks, see to its repair before powering up. Last setup steps involve finessing the PTO and the BFO. For the latter, I tune in something like WWV on 1 kHz bandwidth as near to the middle as possible and then just set the BFO knob to 0 for a zero beat. Works for me.

Date: Tue, 2 Nov 1999 19:48:55 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] RF Deck: racks, slugs and lubrication

Responses weaved into your text: Mark Mohrmann wrote:

> I'm in the middle of checking out the RF Subchassis. A couple of questions
> about the mechanical end of things.
>
> 1. All the slug racks have left wear marks on the chassis from movement. It's not clear to me that there are any adjustments to take care of this. Do we
> just smear some lubriplate on the sides and live with it?

Not sure if you're referring to wear marks in the slots or along the frame sides. Some sets have little wheelie (ball?) bearings on the slug racks, some don't. WD-40 will help the bearings turn freely. A touch of Lubriplate on the slots completes the lube.

The slug racks perform best if the bent over ends are set at a perfect ninety degree angle. Take them out and confirm this; while they're out, check that the phosphor bronze springy bit on each of the slugs isn't bent or kinked over. Remember that they are springs; don't tug on them, OK? They should never be stretched.

If you remove a slug from its rack, remember to avoid losing the teeny little "C" shaped spring. It keeps the slug from being too easily turned and thereby going out of adjustment during operation.

Insert the slug racks into the coils and loosen the triangular plates to center the slugs. (Yes, that's what they're for-- good guess!) See to it that the ends of the racks don't press one way or the other against the frame. Do this adjustment with the slug rack bottomed into the coils.

You shouldn't lubricate the slugs themselves, except to dust them with talcum powder. This is electromagnetically friendly and prevents heat rash. (Just kidding about the rash.)

Test the slug rack freefall by letting the rack drop into the coils without benefit of the retainer springs being hooked on just yet.

> This is the first time I've really studied the mechanical end of this rig.
> What an engineering marvel. When my 7 year old daughter saw all the gears and cams moving the other night she got all excited and spent the next half hour helping me move through all the gears to get them lubricated.

Marvel it is, and you can't start the kids on boat anchors too early. Girls get double coupons.

Date: Tue, 02 Nov 1999 13:54 -0800 (PST)
From: rlruszkowski@west.raytheon.com
Subject: Re:[R-390] RF Deck: racks, slugs and lubrication

Good job. you are doing ok.

Stiff knobs and sticking slide rack is not related. You have two problems to work on.

Check the detent plate on MC change shaft. The shaft has a ring plate with three detent stop notches in it. A little plate with a "detent" in it fits the notch and holds the MC shaft still and keeps it set in the right place as the KC change shaft moves the gears in the planet gear assembly. These things get set to tight. The plate is movable by looseing the mounting screws for it. Some times the detent on the plate gets worn. Then it will not hold the MC shaft in place. Take the detent plate off and make a shime for it. This will move the detent plate forward and give it a new spot to rub against. You may want to take a small round file and stroke the notches in the MC shaft ring plate to get a better stop point with less friction.

Keep cleaning the gears. USE CARE. Give them a good bath using fuel oil or lamp oil. Blow air through them if you can. Keep the gears and cams down the electric stuff up, and try not to run the oil / solvent through the electric stuff. Long term it is bad to get the solvent into the electric stuff. We used a lubriplate white grease on the slide racks and 10W oil on the grear train.

If you think one of the springs is not getting it, swap a couple around as needed to get the stiffer ones where you need them.

Look into the rack and slides very carefully. We have found racks that did bind and needed to be filed to clear better. We have found bent racks that needed a bit of easy tweeking. Look for a bent roller shaft on one end that may be shifting a rack to one side.

You may want to lift the slugs and swap a rack pair to get better fit and less drag. Drop the slugs to the bottom of the travel range when you retighten the
adjustment plate screws. Slugs that bind in the tubes may be the results of the
solvents from the past catching up with time. Sanding and fileing a slug for fit is ok. You are not going to take that much material off of it. Are you? Look for a warped slug. Look for a repaired slug that has had the spring resoldered or re-glued and not well aligned. Look for a kink in the spring that is pushing the slug off center.

When the rack is not following the cam it is most often in the rack and slide fit. Slugs and springs do not usually cause the problem. You can run the racks
with no springs. One spring will cause the rack to jam because it is not loading the rack equally.

Date: Thu, 11 Nov 1999 20:31:26 -0800
From: "Gene G. Beckwith" <jtone@sssnet.com>
Subject: Re: [R-390] Problem with Cramolin contact cleaner

Concerning these cleaning techniques and eventual need for lubricant...I've seen ref to "lubriplate" ...is this an appropriate lub for switch contacts, where electrical conductivity is mandatory...or, is it simply an excellent lub for stuff like the tuning racks in the '390's?

Date: Thu, 11 Nov 1999 20:21:25 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] Problem with Cramolin contact cleaner

Lubriplate is a superb lubricant for mechanical parts. Standard equipment for teletypes for half a century (even had a teletype part number). It makes a strong lubricant film, which would prevent electrical contact. Keep it OFF contacts, I think. 73, Jerry, K0CQ

Date: Thu, 11 Nov 1999 22:06:06 EST
From: SBJohnston@aol.com
Subject: Re: [R-390] Problem with Cramolin contact cleaner

Lubriplate is a good lubricant for mechanical applications rather than electrical - seems to be particularly good for flat surfaces sliding on one another. It might be good on the mechanical innards of a switch, but I would use a contact cleaner/lubricant on the electrical contacts themselves.

Date: Thu, 11 Nov 1999 21:51:11 -1000
From: petesr@juno.com
Subject: Re: [R-390] Problem with Cramolin contact cleaner

Back many moons ago I used to work in a TV repair shop. TVs back then had those rotary type tuners where the contacts were fixed and tuned circuits for each channel were 'rotated', each channel with some 6 to 10 contacts. A very common repair we made was to fix erratic or touchy channel selection. This was just a case of dirty contacts needing cleaning. After cleaning the contacts with a suitable solvent, had we sent the set out just doing this it would be back for sure in no time flat. A final step

consisted of applying a clear, gel type lubricant with a q-tip onto the contacts to prevent them reoxidizing. This lubricant was mfg by GC Electronics and can't think of its name here at home. I have an old Newark catalog at work and I'm sure it's in the chemical section. The stuff had the property of not affecting or detuning critical RF circuits. Sounds like that's the stuff needed here if it's still available. Will check the catalog tomorrow if there's any interest.

Date: Fri, 12 Nov 1999 02:51:06 -0700
From: Bill <klerosb@frii.com>
Subject: [R-390] Contact Cleaners

In a nutshell, here's a personal recommendation.

Any good contact cleaner is appropriate for removing dirt, grease and whatever else that may be causing electrical problems with the switches or other electrical connections in the R-390.

If, however, the problem is one that the switch or electrical contacts are worn, then cleaning in itself will have only limited or no beneficial effect.

If this is the case, I've found one product that is of real benefit. I've used it for a decade and have found it very useful. It's called Stabilant 22 electrical contact enhancer and lubricant. It's a slippery, clear compound that resembles light silicone oil. It has the property that an extremely thin film in the micron range is electrically conductive. Thicker amounts are not. For example, one could immerse a computer board in a bucket of the stuff with no adverse effect, but applied to it's edge connector inserted into a socket would aid it's connection. I have applied it to cruddy old switches and have measured their resistance virtually vanish. One can also use it on variable resistance elements such as wirewound and carbon pots. I want to emphasize that while it works great, it cannot 'repair' damaged or utterly shot contacts, however, it will completely get rid of contact noise and intermittent operation where there is mild wear present. Like anything else applied to a switch contact, it will eventually wear away, but in my experience lasts several years. It will not work on contacts where power is switched as the sparks or arcs present just blow it away. It works well on fixed electrical contacts like plugs, jacks and other connectors where it remains indefinitely.

Does it "really", honestly work? Once, I applied it to the dot contacts of a vibroplex bug that were set extremely close together. No more dots! Just a 'solid' closure. The .0005" or so spacing I had set wasn't enough to disconnect the circuit with the Stabilant applied.

It should be used diluted roughly 1:4 in alcohol, and is available both in

the dilute form or concentrate. You apply it very sparingly with a hypodermic syringe or wooden toothpick. "More" is not better. It is not available in a spray can, only in small bottles. The stuff has been approved and recommended by a number of organizations from GM to the military, where it apparently now has a national stock number [NSN].

Enough from me. For info sheets and pricing contact
D.W. Electrochemicals, 97 Newkirk Rd. North, Unit #3,
Richmond Hill, ON, Canada L4C 3G4. Hope they're still there; it's been five years since my last purchase. Warning: It's not inexpensive stuff!

Yes...It worked fine on the contacts of a tuner in a 1951 Zenith TV I own.....

Date: Fri, 12 Nov 1999 08:19:37 -0500
From: "Warren, W. Thomas" <wtw@rti.org>
Subject: [R-390] Date: Fri, 12 Nov 1999 08:18:59 -0500

I did a quick web search on Stabilant 22 this a.m., and found the following URLs (among many others)

http://www.stabilant.com/bccomp.htm home page for
D.W.Electrochemicals
http://home.earthlink.net/~ralaudio/stbtn009.html for Material Safety Data
Sheet http://home.earthlink.net/~ralaudio/stbrv017.html for application of
Stabilant 22L

Date: Fri, 12 Nov 1999 08:22:44 -1000
From: petesr@juno.com
Subject: Problem with Cramolin contact cleaner

Actually found half a tube I still had. It's called TUNERLUBE, High Frequency Lubricant, Cat no. 26-01 by GC Electronics. Says it's for use on TV tuners and switch contacts.

Date: Fri, 12 Nov 1999 13:05:36 MST
From: "Kenneth Crips" <w7itc@hotmail.com>
Subject: [R-390] lubrication

My favorite lube' for detent balls on gang switches and other such things is gun lube' called Gun Slick. It is a petroleum based lube' with graphite. It's used in tiny amounts and because of the graphite it doesn't dry out. I would not however get this stuff any where near a printed circuit board,

boatanchors only.

Date: Fri, 12 Nov 1999 19:50:08 -0500
From: "JAMES T BRANNIGAN" <JTBRANNIGAN@prodigy.net>
Subject: Re: [R-390] Date: Fri, 12 Nov 1999 08:18:59 -0500

I have use Stabilant 22 on computer cards for many years and it is great.... but a he_l of a lot more expensive than Deoxit

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Date: Fri, 12 Nov 1999 23:34:29 -0600
From: "Jon & Valerie Oldenburg"
<jonandvalerieoldenburg@worldnet.att.net>
Subject: Re: [R-390] lubrication

I'd be real careful here, gunslick is very high in graphite which is a conductant. Great stuff though on mechanical assembles, thick bodied and the graphite is a real plus..

Date: Mon, 27 Dec 1999 15:09:41 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] Lankford AGC mods, ST. Julians finally finished

> Having finally buttoned up a St Julians creek disaster after almost a year
> of piddling away and some help from this group, I would like to say the
> hours weren't worth it but the "experience" was everything! I really learned
> a lot.

Ah, yes, all across America R-390* mavens are taking advantage of the Christmas holidays for some BA quality time-- including yours truly. For some time have wanted to take the plunge and activate an Amelco RF deck I've had in restoration for quite some time. Deferred putting it back in while trying to remember where all the final assembly screws go as it had been a long time since they were placed in their ziplock bags, plus I'd been dreading whether the thing would work at all. Turns out my fears were unjustified.

The deck had gotten a very thorough going over-- new resistors where needed, new Orange Drops in place of the paper caps, replacement of a broken ceramic trimmer cap, and a thorough clean of the chassis. Gearbox had been disassembled right down to the planetary gear assembly, cleaned of grease, etc., and I even polished up the brass cams and gears. Only one piece left over!! It was a shim washer that isn't worth taking the gearbox apart for as the slack in the affected gear isn't excessive.

Action is incredibly smooth as I even took the split gears apart and gently deburred their opposing surfaces so they would slip past each other readily and then lightly preloaded them. Wow, what a difference.

Won't go into much further detail, but will say the RF deck passed the smoke test and works extremely well considering it hasn't been aligned yet-- just tweaked a bit by ear for now. Alignment will come after a nominal burn-in.

Jan Skirrow's website is a good confidence builder for learning how to separate the RF electronics from the gearbox. Gearbox restoration is not for the faint hearted-- depot manual is essential and a nearby working R-390* is a big help. Have not seen Chuck's video dedicated to the RF deck, but I'll bet that would help more than anything. (His earlier tapes are very useful.) Most important "tool?" Can you say .... patience?

Date: Thu, 23 Dec 1999 17:12:14 EST
From: DCrespy@aol.com
Subject: Re: [R-390] An issue that's probably on a FAQ somewhere...

I have had both of the problems you describe on my 390A's:

> "You still have 30 to work with, what's the problem?" :-). I suspect
> that there is a common problem that affects both since I see a set of
> tunable caps that are numbered and 3-21 are on the same one.

The trimmer is for a specific crystal. I'd look at three things. - -First, just check the crystal (remove the cover behind the tunable caps). Be sure it is in tight. I'd also pull it and spray some Deoxit (available at Antique Electronic Supply in Tempe Arizona) on the pins and in the socket. - -If this does not work, check the crystal to be sure it is OK, because the last option is a lot of work.

- -Finally, if the crystal is OK and the contacts are clean, you'll have to pull the RF deck, to Deoxit the switch contacts and the trimmer caps. This is a big job, not complicated, just time consuming . You DEFINITELY NEED THE MANUAL FOR THIS. There is a "secret screw" to remove to successfully pull the front panel. If you get this far, let me know and I'll send a description.

> The second problem is bizarre 'cuz I've never seen this happen before.
> A number of years ago, my youngest son managed to remove the zero
> adjust knob that locks the dial for calibration. I don't know how he did it
> but he managed to remove the ENTIRE screw assembly. There is now a
> threaded hole where the know used to be. Is it possible to get a new
> assembly and does it require a degree in mechanical engineering to fix

> it?

My first R-390A had this problem. Screwing the shaft out the front of the radio breaks off the rivet that holds the adjustment plate to the shaft. The plate (looks like a big washer, with a very small hole in the middle) is probably in the cabinet (if you had one) or on the floor somewhere. You'll need a new assembly. Fair Radio should have one. The front panel will have to be pulled/dropped to replace the assembly, as with the washer/plate prevents installation from the front. This will make sense when you get the new part. (Again, you should get the manual for this). Your youngest son can probably break the new one too.. so you might want to just buy the part and put it in when he gets a little older!

Date: Mon, 27 Dec 1999 16:52:58 EST
From: Sekndbass@aol.com
Subject: [R-390] Disconnected tuning slugs

THanks for the advice, everybody. I like the RTV suggestion-it should hold but have some give, and I have an idea the slugs are good candidates for fracturing if given half a chance.
BTW, I bought a couple of cans (couple of lifetimes' supply) of Caig DeOxit spray the other day; ordered it over the Web from Arcade Electronics in Alexandria, VA (http://www.arcade-electronics.com/). Cost $8.95/can and $6 for shipping but I ordered it Wednesday and it arrived Thursday UPS--and I didn't have to drive all the way down there. All I need now (until I need something else) is one of those spline wrenches--but so far a hex key has worked all the set screws I've tried . . .

Date: Mon, 27 Dec 1999 16:57:26 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Disconnected tuning slugs

I wouldn't go with super glue or Krazy glue. The only benefit is quick setting -- when it works. Cyanoacrylates were originally developed for use as a surgical adhesive, which is why it will glue your fingers together so well, but it's intended to degrade. It doesn't work well on porous or powdery surfaces. I've used the stuff to reattach the handle on a decorative mug, let it set & dry fully, put the mug on a shelf and then a week later discovered the handle laying on the shelf. Sometimes it just gives out even on non-porous surfaces.

I've used epoxy to reattach the springy-thingies to the slugs and the set screws. (I don't know the technical term either) A very small amount of the quick set, two part epoxy works well. Sets up quickly and cures fully after a day or so. Even ol' Duco cement is probably a better choice than super glue.

Date: Mon, 27 Dec 1999 15:57:24 -0800
From: "Larry Shorthill" <rfssi-shorthill@mindspring.com>
Subject: Re: [R-390] Disconnected tuning slugs

I have a small disagreement with you on the use of Cyanoacrylate (CA) glues. The airplane modelers use these all the time time on both balsa (porous) and plastic pieces with a high degree of success and with a long life in mind. These are excellent glues to use in a high vibration, high stress environment, etc. etc. The secret is to use fresh, good quality glues, not the small packages of "super glue" that you get at the checkout counter of your favorite supermarket. The modelers CA glues are all pretty good, and far superior to any other quickset glue for these kind of applications. Quick set epoxies are good too, if you again use the brands and kinds from the hobby shop and not the grocery store. Modelers are putting up planes worth far in excess of a single R390, and they depend on these glues to hold their precious models together. For a real good discussion on purity and how it impacts the effectiveness of CA, I think you can find a good article on the Balsa USA web site.

Date: Fri, 14 Jan 2000 19:21:35 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] kilocycle knob tightening

> .....slips because I can not get the retaining ring tight.....

We're talking about a clamp INSIDE the set, right? Yes, there is risk of breaking the screw or the clamp. Try putting a tiny bit of oil under the screw head and into the nut. This will permit the screw to turn easier while clamping harder. Hope this helps.

Date: Fri, 14 Jan 2000 19:55:20 EST
From: DCrespy@aol.com
Subject: Re: [R-390] kilocycle knob tightening

One of mine too. Turns out that one of the four tabs cast into the knob (that the clamp pushes against the shaft) was cracked/ broken. (I could not figure out how to fix it..). You might just try switching the Kc and Mc knobs, as it does not have to transfer as much torque when used on the Kc shaft. Harry KG5LO, Saline MI

Date: Wed, 26 Jan 2000 01:59:09 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] RF deck restoration

Thanks for the advice on running the TV-7*. Didn't know the 83 has

mercury inside that needs to vaporize fully before B+ is applied. Will warm the set up as you suggest before testing.

Great list this-- always something to learn.

Just got a '67 EAC back together after thorough restoration of its RF deck. IF deck was done a while back. Took the assembly completely apart down to the last "C" clip and cleaned the gear train. Works incredibly well. Here are a few hints for extra smooth action:

GEAR TRAIN

1. Separate gear train from chassis, using Jan's procedure. Makes it a heckuva lot easier to handle.

2. Carefully dismantle gear train-- keep careful notes, and have a manual and a spare gear train handy. Take as little apart as you go to minimize confusion.

3. With a file, gently deburr adjoining sides of split gears so they slide past each other without binding.

4. Take extra pains with the planetary gear assembly so it goes together with uniform preloading and ensure that it turns smoothly. This can be a real chore to accomplish. Wrap #20 or #22 bare wire around the three split gears to facilitate preloading. Mark the pieces with magic marker to get them back in their original locations.

5. Light preloading everywhere means gears will feel silkier. Since we're being really fussy, no need for any more tension than necessary for zero backlash. Lube everything lightly with Mobil-1 synthetic gear oil.

6. Make sure the intermittent gear works exactly as intended. After installation, observe as you work it through the changes.

RF DECK

1. Recap as needed with Orange Drops or equivalent.

2. Replace out of spec resistors. Only found one this time!

3. Deoxit contacts.

4. Take coils out and inspect visually. If you're feeling lucky, take adjustable caps apart, clean, inspect, and replace broken pieces as needed. Watch out you don't break any coil leads as those with Litz wire are just

about impossible to fix. Deoxit adjustable cap contacts as well as the coil pins.

5. See that coil cores are clear and clean. Dredge ferrite cores in talcum powder before inserting. Align them so the slug racks drop to bottom without benefit of springs. Replace springs.

6. Test tubes and use your best NOS as needed.

Clearly this is overkill, but I was curious to see how far I could go. The thing turns so smoothly, one can feel the springs pulling on the slug racks. The PTO acts as a brake!

When I first fired up the set, it was all but deaf. I heard a very strong local AM station only very faintly with the help of the BFO. "Oh Gawd," I thought, "what did I do?" Even though I didn't disturb the slugs, it turns out that cleaning and replacing broken adjustable caps, thereby putting them out of alignment, had a profound effect on performance. During alignment it was a pleasure to watch the meter needle climb ever higher with each go-round. Those little adjustable caps are incredibly "peaky."

At a hamfest the other weekend, I found a crank knob similar in style to the original skirted vernier knob (but without the skirt and a bit larger) on the URM-25D. Makes changing frequencies much, much easier. No more "URM-25D wrist!"

Result of my labors is the best performing RF deck to date. Makes me want to go over my '62 Amelco and see where I could improve the earlier work there. A St Julien's Creek survivor '67 EAC is next. This will be a true test of titans: getting the most out each set. May the best rig win!

Date: Thu, 27 Jan 2000 13:32:54 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] 0A2 testing

..... gently deburr adjoining sides of split gears so they.....

A stone will give a smoother finish. :-)

>4. Take extra pains with the planetary gear assembly .....

Now that's clever as hell. I wish that I had thought of that. I just used my hands. I'll use your method with the wire on the next one.

>4. .....take adjustable caps apart, clean, inspect, and replace .....

It's well worth checking the capacitors and measuring for coil leakage while you have them apart.

>At a hamfest the other weekend, I found a crank knob similar in style to >the original skirted vernier knob (but without the skirt and a bit larger) >on the URM-25D. Makes changing frequencies much, much easier. No >more "URM-25D wrist!"

Or R-1051 wrist. <grin> You know, I never really thought about it before, but I'd guess that a spin tuning knob for the KHz control would be handier than a third thumb. The ten turn stops seem pretty sturdy, I wonder why. I wonder why I've never seen an R-390A with one? It'd seem like they'd have at least been used at the spy agencies.

Date: Tue, 1 Feb 2000 19:39:32 -0600
From: "Richard Biddle" <theprof@texoma.net>
Subject: Re: [R-390] lube

I used Hoppe's Number 9 gun oil and gun grease on the R-390 I cleaned and lubed two+ years ago. I rolled it out of the cabinet just now and everything is still as I expected. Gun grease isn't 100% for ever, but it doesn't gum up and the next time you drag the thing out to clean it (good PM anyway) if comes off with gun cleaning solvent. Can't beat the smell of Hoppe's Number 9 Nitro Powder Solvent for bringing back the memories. The ladies should put a drop behind one ear and a drop of gasoline and oil mix behind the other:)

Date: Tue, 01 Feb 2000 21:57:44 -0800
From: Dick Carroll <dixie@townsqr.com>
Subject: Re: [R-390] Mobil 1 Synthetic is a bargain...

I suppose that somewhere out there is a control pot that Caig's Deoxit won't rescue, but so far I haven't found it. And I've used Deoxit on a number of them in the past few years, some that I was convinced there was just no way. And so far I haven't disassembled a single one, just used the small tube on the can to shoot a short blast into any opening in the control, Most are open somewhere, usually around the wire terminals.

A pal recently said that he'd tried Radio Shack control cleaner on his TS520 controls, and it didn't help. Still scratchy. I suggested he pitch the Rat Shack stuff and get a can of Deoxit. He did, the old 520 is back to normal, and Caig's has another True Believer. Whatever it is, it works. I'm inclined to believe a lot of their hype. Sure would liked to have had that stuff when I was working. I know I changed a lot of pots that would still be working.

Date: Wed, 02 Feb 2000 08:06:31 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Let's have MORE oil posts!

>1. I like Mobil-1 75W-90 synthetic gear lubricant. (It also works on REAL gears.) :-)

It's designed for hypoid cut gears where the pressures on the gear faces are extremely serious and the gear surfaces are much harder than a file. It's also thick. Motor oil is used for spur gears, like the oil pump in your engine, and helical gears, like the camshaft drive gear and the distributor driven gear. Some engines, diesel and gasoline use helical gears to drive the camshaft. In addition, some automotive and light truck manual transmissions and transaxles use motor oil as the manufacturers recommended lubricant. If you get right down to it, synthetic motor oil is probably overkill for the R390A. If anyone wants to look them up, the original 1956 R390A tech manual listed the following specs for lubricants for the R390A. MIL-L-7870 for the oil to be used on the rollers, shafts and bearings, etc. and MIL-G-7421 for the grease for the guide slots and gears.

>It's easily applied by wire, paper clip, or toothpick .....

I would guess that the rate of evaporation is really low. The only time I've ever seen it thicken or coke is if the oil level in something was run real low, as in almost empty, and the heat goes thru the ceiling. Usually the bearings turn blue, gear teeth break off, etc. Very very hot.

>Thin oil like Marvel Mystery Oil is too runny. .....

I don't use WD-40 period and the MMO is very thin.

>I like the suggestion of using MMO as a cutting oil .....

I like tap magic, kerosene, and paraffin, depending on what I'm tapping.

>2. Dab Lubriplate or a graphite based grease (Ballistrol?) on the little.....

I used disc brake rated automotive wheel bearing grease for this and the MHz detent. If the R390A gets hot enough to make it run, is only because it's on fire.

>3. Caig De-Oxit 5 is good on wafer switch contacts, ...

No experience with their products at all. Too expensive for me. ;-) I use

whatever cheapest contact cleaner the local electrical supply house happens to be carrying at the time. <grin>

>4. Use Caig MCL spray on the pots.

Again, no experience with their products. ;-)

>5. Finally, if the slugs squeak, dust them with talcum powder.

I'm running mine bone dry. I carefully cleaned each of the slugs and the bores that they run in an centered the coils in the bores. Only very very rarely do I get a squeak. I used oil and rifle grease for twenty years on my old 1955 Collins. About every 6 months it was time for a lube job. Which was in line with the recommended lube interval in the manual. Also, it developed noticeable wear of the bushings, the roller guide slots, and the gear teeth over the last 25 years. Probably the most wear was on the brass MHz detent wheel, which I've replaced. I intend to rebush the RF deck before I go back together with it. I've already accumulated some NOS gears to replace the ones that I didn't like the looks of and most of the bronze bushings.

When I reassembled the EAC back in late 1998, after we hashed it out in the list for a while, I decided to go with the Mobil 1 10W30. It's been running out here in the shop for 24 hours a day and 7 days a week ever since. The shop is a closed in concrete block building without heat or air-conditioning. I do have a dehumidifier that I run when the ambient temperature is high enough to not allow it to ice up. The dehumidifier really adds to the heat load out here during the Summer though. ;-) During the Winter it'll get down into the high 20's or low 30's in here. I's in the mid 30's as I type this. :-) During the Summer, it's hit well over 100 degrees out here. My thermometer's sensor is mounted about four feet off of the floor. I've seen it hit a 110 degrees in here even with 12 foot ceilings. ;-(

I use the R390A almost daily. It's as easy to tune today as it was some 14 or 15 months ago when I lubed it. Actually, it's probably a little smoother. I pulled the EAC down a little while back to check and replace some of the tubes. While I had it out of the rack and on the bench, I inspected the geartrain and cams, etc. All of the aluminum finish is still on the inside surfaces of the roller guide tracks and there is only now just beginning to be a little brightness beginning to show on the high points of the machine marks on the drive surface of some of the brass gears. There's still nothing that I'd call a wear pattern there yet.

You guys can use whatever you want for lube for the R390A, but I intend to stick with the Mobil 1 10W30 motor oil. If it's worked that well out here

with the radio cooking 24 hours a day, I can't help but wonder how long it would last if the wife would let me bring the radios back inside the house.

Date: Wed, 02 Feb 2000 12:42:40 -0600
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>
Subject: Re: [R-390] Let's have MORE oil posts!

What was good lubrication in 1955 for 6 month cleaning and relube intervals is probably not the optimum lubrication for the same equipment today. Part of the maintenance requirement was based on a need to remove sand and gravel accumulated from operation in any handy desert. When operated in the benign domestic hamshack, lubricants that don't gum in 6 months make for handier operation since the sand and gravel don't build up so much.

Back in the 50s and 60s the standard instructions for lubricating TTY was nondetergent engine oil. And it turned to gum in 6 or 9 months requiring soaking, cleaning and relubricating at the typical planned 6 month intervals. The domestic use of lubriplates seemed to have drastically extended that interval because in commercial wire service TTY maintenance was far less frequent.

Modern synthetics should do better at avoiding gumming and evaporating.

Turbine oil is listed in the new McMaster-Carr catalog.

Date: Wed, 02 Feb 2000 17:27 -0800 (PST)
From: rlruszkowski@west.raytheon.com
Subject: [R-390] KC knob torque

I do not really understand this stiff R390 shaft thread. Some where in school I was tough how to deal with gear trains. I spent years cleaning them and getting them to operate very nicely. I do not have any weights in my KC knob.

Yet when I spin it I can get an easy 100 150 Khz roll up or down the dial. I will roll over against the stops. I have not done anything not stock to the dial lash springs. (I do use a minimum to keep the wear down on the brass.) The MC change is smooth and easy. (I have unloaded the detent plate for minimum force.) I have never lubed a slug or slug tube. Sticky one do get cleaned. But now I wonder what I have growing in the tubes I swabbed out with alcohol. Squeaking slugs use to mean there were not stroking well and needed adjustment via the plate atop the rack.

Today is could be different. Who knows what time and people have done to

the slugs and tubes so they may not be clean and at full bore size. Could be some wrong parts in there also. In my past life we did file out some front panel bushing holes at the shafts. If your receiver has been drop shipped once of more in its life it could need some clearance relief. It does not take much to get a shaft loaded until its hard to turn. The Antenna tune, BFO Pitch and Band width switch shafts also need attention for easy operation. Just the order in which the front panel screws are torque down can change the whole feel of the knobs.

Oil ain't the whole answer to these problems.

Date: Wed, 2 Feb 2000 23:51:45 -0500
From: km1h@juno.com
Subject: Re: [R-390] lube

You and I seem to be the only ones that like Hoppe's Richard. I just fail to understand the never ending discussion on how to lube a gear train that lives in a nice comfortable surburban or similar home and gets no real use as compared to its original owners. I have used Hoppe's oil and grease on various late 1930's to 1960's auto radios that have used some of the most Rube Goldberg electromechanical contraptions that I have ever seen. Many of those overhauls are still operational after 20+ years and an automotive enviroment is far from friendly. I am sole source to several top class restoration shops for their auto radio rebuilds so can speak with some conviction. I even mentioned Hoppe's at the beginning of the Great Oil Can Discussion but was ignored by the usual clique (until I tweaked a few) that appear to set the rules and order of discussion. Just gonna mellow out and offer help when I can; the numerous private thank you's make it worthwhile. Heck, its even possible that one or two of the clique might learn something...(: Ive certainly learned a tremendous amount about overhauling my 390A.

Date: Tue, 15 Feb 2000 11:44 -0800 (PST)
From: rlruszkowski@west.raytheon.com
Subject: [R-390] Slug springs

These slug springs are not really springs. They are a flexible shaft between the adjustment bolt and the slug. You do not want them to change in length as that messes up the tuning. In day of old (68-75) a broken spring receives a bit of glue on the end to reattach it to the slug. A bit of solder and good acid flux would bond a spring back to gather or back to the bolt. Short springs would some time get extended with a solder link.

We would remove the slug and parts from the adjuster plate and work it over on the typewriter repair bench. Those guys were ready to solder little letter stamp heads on to key arms. They had stuff that would let you solder

through all kinds of oil and grime. After that we would give the part a good bath in solvent to de flux it.

Redoing all the slugs in a RF deck today could get very expensive. Barry is right, just DeOxit the springs and leave them. The springs are a brass alloy. Most of the stuff is just weathered copper and tin oxide. After a cleaning to keep the crud from collecting in the slug tubes, if the springs are intact then just keep using them. If a spring breaks do a repair.

Today on a mid spring break, I would go for some heat shrink on the spring. For top ends I would resolder. For spring slug separation I would super glue.

These receivers never were for show. We some times over do this cleaning and restoration. They never looked that good out of the crate new.

Date: Tue, 15 Feb 2000 21:44:01 -0000
From: "Phil Atchley" <ko6bb@elite.net>
Subject: Re: [R-390] Slug springs

Barry mis-understood what I meant by "Slug Rack Springs". I meant the coil springs that hold the entire rack down (16 of them I believe). And when the springs go "soft" they allow the rack to ride up and down "out of kilter" so that they bind, not tuning properly. When I worked on this set for the previous owner one of the problems it had was the racks "hanging up".

Date: Tue, 15 Feb 2000 15:46 -0800 (PST)
From: rlruszkowski@west.raytheon.com
Subject: [R-390] Rack springs

Right on, when the rack springs go over the hill,they just get replaced. Sorry to add confusion here.

Date: Sat, 18 Mar 2000 19:21:03 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] simple question

The little numbered wheel is part of the crystal oscillator deck. It's connected to a selector switch that engages the appropriate crystal when you change bands. It is also an aid for synchronizing the oscillator deck selector to the gear train. To check sychronization, verify that the wheel's number agrees with the frequency readouts MC figure. Then, with the set operating, slowly rock the MC CHANGE knob back and forth and note where the signal clicks off. Adjusting the clamp on the shaft to the

oscillator deck takes care of this. If the set works OK on all bands, you probably should ignore this procedure. It's offered here merely as an FYI. If you mess around inside the set, you ought to have the depot manual handy. It's indispensible, believe me.

Date: Sun, 19 Mar 2000 16:45:29 -0000
From: "Bill Coleman" <n2bc@stny.rr.com>
Subject: Re: [R-390] RF Deck cleaned....

After a successful trial run with a spare IF chassis, I ran everything thru the dishwasher except the RF & Osc chassis. Even removed the wiring harness and broke the main chassis down to it's pieces then ran them thru too (pots, switches, everything). I separated the mechanics from the RF chassis and took the mechanics (minus the Veeder Root) to the do-it-yourself carwash and used degreaser (Gunk) and lots of soapy spray & rinse (skip the wax). I placed masking tape over the top and bottom of the IF cans before the DW ride, otherwise no special precautions (the trial run IF chassis got total dunking and it's still working FB). All the DW cleaning was done with whatever the boss had in stock for detergent - I suspect it's pretty nasty stuff - followed by an immediate extra no-detergent cycle. For drying, I used the stationary rack in our dryer (hangs on the door - for shoes maybe?).- everything looks good as new, all markings survived, amazing difference in the wiring harness - can even read all the color codes on the wires! Of course, the meters may not like the DW & I cleaned the antenna relay ass'y and PTO by hand. It's also necessary to carefully re-lube everything that moves (pots & switches too if you 'do' them), De-ox-it on all the toob socket pins, switches and connectors, etc etc. Only fallout from this abuse was the AC microswitch which failed about week after reassembly and alignment. Carl, I think you mentioned having trouble with yours. I was able to open it up and clean it. Don't recall if it was riveted or screwed together, but it was easy to fix. My unit (an R-1247/GRC-129) had obviously spent a few zillion hours in the vicinity of cigar / cigarette smokers - the goo in the gear train was incredible and the shaft of the PTO was covered with 1/2" of yech. I initially thought the terrible feel of the drive train was all the goo in the gears, turned out to be the PTO! The Veeder-Root counter cleaned up well with '409' and a few hundred Q-tips. Add a repainted front panel (the original with it's character 'eyebrow' is in storage) and it's like a new RX. If I ever have to remove the RF & Osc chassis I plan to remove the mechanics and the transformers and give it a ride in the DW too. That's my story and I'm stickin' to it.

Date: Sun, 19 Mar 2000 18:48:11 -0800 (PST)
From: Tom Marcotte <courir26@yahoo.com>
Subject: [R-390] Dr. Chuck's Snake Oil

I was over at Les Locklear's today enjoying a beverage, and he showed me his new Rippel 390A. Looked great and tuned smooth, too smooth. Hah, old Chuck must have neglected to connect up the RF section to the KC's dial, cuz this thing tuned like a SP-600. What a screw up that would be. But guess what? Everything was in fact connected. This illusion was really happening. The only clue that this was a 390A was the clickity click of the VRC.

It can be done (just that I haven't been able to pull this off). OK Chuck, how much for a fifth (that is our standard unit of measure) of the snake oil?

Date: Sun, 19 Mar 2000 22:30:00 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] Dr. Chuck's Snake Oil

It's possible to get the KC CHANGE to work so smoothly one can feel the cams raising and lowering the slug racks. I did it by taking the gear train completely apart and cleaning everything, then oiling lightly during assembly. The down side is you have to release the knob carefully after tuning in your target as it's easy to brush the knob off frequency. One gets the
hang of it quickly though and, yes, it is fun to hear the VRC softly clicking. Just another facet of the R-390* mystique. :-)

Date: Sun, 19 Mar 2000 23:41:04 -0400
From: "charles w. morehouse" <cwmorehouse@worldnet.att.net>
Subject: Re: [R-390] Dr. Chuck's Snake Oil

Have restored my R390-A to new condition. The snake oil that I used was Lubriplate and ATF for oil. Works great.

Date: Thu, 30 Mar 2000 15:45:46 -0600
From: "Anderson, Craig - Ext. 1365" <CAnderso@stp.tec.mn.us>
Subject: [R-390] RF Deck Cams

Having noticed the vast difference in the ease of tuning between three of my R-390As ('67 EAC, '62 AMELCO and '55 Collins) I compared all of the cam profiles and bearings for freedom. I recently went through all of them and completely depot stripped the RF decks in all three, de-greased, cleaned and re-lubed them. The difference in smoothness had to be in the gears or in the cams themselves. In previous postings, others have used soapstone or other fine abrasives to smooth up the cams. I have a Dremel tool and it has various buffing attachments and small vials of polishing rouge with varying degrees of abrasiveness. I thought I would try it on the AMELCO which seemed to have the roughest cam surfaces. In my

younger days, I had done a fair amount of porting and polishing Corvette engines so it made sense to me to try the same with the RF deck. I polished the cam bearing surfaces as well as the vertical slots the small roller bearings ride in. After about an hours work, the results were very positive. There is a direct correlation to the smoothness of the cam surfaces and bearing guides to the ease of tuning. Perhaps that is why most of us who have had a Collins 390A notice how much more smoothly it turns. I think it is a matter of final finish on the cams and gears. I suspect they [Collins] went the extra mile to ensure the bearing surfaces were smooth and deburred whereas in later production, where cost and delivery was more the issue, these steps just were not done or called for in the contract.

Date: Thu, 30 Mar 2000 20:14:42 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] RF Deck Cams

As an alternative or additional touch, burnishing the rubbing surfaces of the cams and the ends of the slug racks with moly lubricant can also help. You then use a bit of oil on top of that. I have some stuff that I posted on before called "Metal Assembly Paste" made by Dow Corning that cost me about $20 for a tube. But I was in Pep Boys recently and saw some moly lube in a 2 or 3 oz. tube for a couple of bucks that seemed similar. Basically it has molybdenum and graphite in it which fills the pits in the metal. You apply it as if you're simonizing -- buff it out with a rag and leave little on the surface which takes on a sheen. What you're doing is filling in voids rather than grinding off the high spots. The combination of this with a light film of Mobil One oil can be more slick than oil alone or grease. Obviously, it won't take care of burrs or very rough surfaces that are the result of stamped edges being left fairly raw.

When you depot stripped the deck and reassembled it, did you tweak up the slug alignment? That involves both the adjustment and straightening out the slug springy thingy's. You should be able to drop the slug rack down with slugs aligning in the cores with a minimum of finessing. The drag of the slugs inside the coil forms can sum to a noticeable amount.

Date: Wed, 24 May 2000 17:28:15 -0500
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Humidity and R390s

Since the switch wafers are either ceramic or micarta, I would suspect that they might have some type of film or other residue type coating on them. It could be related to a film problem on any or all of the fixed and or variable IF and RF coils. I've played with RF and variable IF coils that came out of a St.J receiver that has such a coating. I could breath normally on them and

watch the leakage go thru the ceiling before I cleaned them. It might prove interesting for you to measure between the switch segments with a good sensitive ohm meter, breath on them, and see if the leakage changes. If so, you've got a "film problem". What ever the stuff is, it appears to be hygroscopic as hell. Cleaning the contacts of the switches themselves doesn't do anything for the wafers. No one ever thinks of the wafers. It's a conspiracy. Clean them with a good soap and rinse the hell out of them with distilled water. Blow them off with compressed air and let them dry a few days. Keep the water out of the coils.

While you have the RF deck out, pull the racks and pull a few of the coils out and compare the resistance readings to the manual, especially the ones between elements of the coils that normally aren't connected. You may want to clean them too. DO NOT use soap and water on them. I cleaned the ones around here with Q-tips and denatured alcohol. DO NOT clean the coil itself. Clean the bakelite insulators and the insulated bodies of the feeddthru pins on the bottom. The wafers of the band switch under the RF deck chassis are known for a chronic problem with flashover if they're dirty. You might want to pull the RF deck and closely inspect each of the wafers for carbon tracking. The greater majority of the time they arc to the switch shaft and blow the B+ fuse. But, not always... Especially with the early model receivers that don't have B+ fuses and if the leakage isn't high.

It's 92 degrees here in the shop right now but the humidity is only at 72 percent, so it's a "dry heat" today... <grin>

Date: Sun, 28 May 2000 12:28:23 -0400 (EDT)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] non-A question

The green gear is used to keep the gear train works from going out of mechanical synchronization when you detach it from the RF deck. If you find another way to "freeze" the mechanism in place, you can do without the green gear, but it is a very convenient device when you need it. If I were you, before undertaking serious repair on the receiver, I would first dig out the field and depot maintenance manual and have it close to hand. The non-A R-390 geartrain is a bit more difficult to synchronize. In fact, it is more complicated than the R-390A in general. (Still a wonderful receiver.)

Date: Fri, 28 Jul 2000 11:54:37 -0400
From: Kim Mackey <mackeyka@muohio.edu>
Subject: [R-390] The front panel is off!

Hooray!!! The front panel is off. It was late again last night when I got to

it so all I did was remove the front panel and take some pictures. The pictures did not come out very good. I'm going to take some more this weekend, as well as remove the RF section and get some pictures of it. Here is the link: http://homepage.mac.com/mackeyka/PhotoAlbum2.html
I took a closer look at the tuning racks in the RF and discovered that one of the slugs is broken and three more were missing. Fair Radio supplied me with 4 slugs so they were aware of this. This means some pretty extensive adjustments to the tuning racks is in order. It probably also explains some of the missing bands. They also supplied me with the correct BFO knob (plus the shaft and clamp) and the line meter wafer switch which I discovered is broken, and the dial
locking knob and all of its parts.

Date: Fri, 28 Jul 2000 14:01:01 -0400
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] The front panel is off!

Suggest you do two things. First, save the pieces of the broken slugs. Some have glued these together with success, and it might be good to have spares, even for temporary use. Second, on the broken ones -- measure the distance from the bottom of the rack to the top of the ferrite as a guide to the initial position of the new ones. Should make alignment a bit easier. You might also piece the halves together to compare length -- make sure they're the same. Probably are. I think there are 2 types used on the A. The non-A has color coded slugs matched to the coils.

Date: Sun, 27 Aug 2000 23:22:12 -0500
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Re: r-390-digest V1 #795

>Also, I need about a dozen of the little bearings which ride the cams.....

I've never seen them for sale. They'd be simple to turn out on a small lathe. If you don't have access to that, you can still "fix" them if they are constructed like the ones in the early design R390A's, simply rotate them 90 degrees using some brass shim stock and a pair of pliers. This will give you a new surface on each side that contacts the guide slots. It'll take some of the slack out and make the set easier to tune. I discovered this a few years ago while going thru the RF deck on my old Collins R390A model. In the unlikely event that they loosen when you rotate them, you should be able to restake them with a small ball bearing and a "C" clamp. nolan

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Date: Mon, 28 Aug 2000 20:43:14 -0500
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] RF deck rollers

The original design of the RF deck used fixed ones that did not rotate. The Collins and Motorola were like this and also the SW ones if I remember right. If it's the later design decks that use the ball bearing design rollers and they have flat spots, it must have a couple of zillion miles on it. I have never seen flat spots on the rollers of that type.

>have been stuck in one position, something's wrong.. Like no lubrication.....

I just pulled a couple of spare '67 EAC decks that I went thru and bagged up last year and attempted to scratch the rollers on several slug racks with a file. Those rollers (outer bearing races) are harder than a file. It's hard to imagine enough travel over those brass cam lobes and up and down in those aluminum guide slots to wear flat spots on hardened steel bearing races. If it HAS done that, I'd be very suspicious of the what's left of the cam profiles and those aluminum guide slots.

Date: Wed, 30 Aug 2000 08:32:54 -0400
From: Kim Mackey <mackeyka@muohio.edu>
Subject: [R-390] Still cleaning the gears

I haven't written anything to the list for a while so I thought I just drop a quick line. I am still cleaning the gears. Man that's a lot of work, and I'm just not getting more than a few hours a week to focus on it. I think I'm about half way there. I have some pictures but I have not had the chance to put them on the web yet.

During the cleaning I ran into a problem with the gears binding and made a horrible discovery. It appears that someone has at least partially taken the gear train apart. A couple of the gears have numbers written on them and the worst part was that one of the clamps was loose. This was on the shaft that holds the gears that tie to the MHz counter and the intermittent gear.

What was happening was this shaft could move back and forth and sometimes engage the MHz counter gears and not be in contact with the intermittent gear. Well out came the Y2K manual (thank you guys for putting it together).

I was able first to determine what the purpose of the gear was and how it controls the bandswitching. And then there was the diagram showing how to align it, so I think I have that on right now.

The cams all seem to line up pretty well. Jan Skirrow has a nice article that describes how to align them, so I will tidy that up a little before I put it all back together. The area I'm expecting the greatest difficulty is with

lineing up the PTO with the RF Deck through the Oldham coupler.

(Jan, by the way, turning the RF Deck upside down and shaking neatly dropped out those two broken slugs.)

Date: Mon, 18 Sep 2000 17:19:38 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Perplexed about Mechanical Synchronization

If this radio looks like its been beaten, check the KC CHANGE knob shaft. With the KC knob in the middle of the front panel its a target for a hit to the side, its too far away from the handles to get much protection. If the knob is bent it MAY cause some problems, I don't know if it would do what you see though.

This also may aggravate a misalignment at the Oldham coupler, too. That's another place to check for alignment problems. The Oldham coupler works like a universal joint on a car, but it has to have some room between the plates to move. Again, I don't think this has anything to do with your problem, but its something to check while you're in there.

The "Dial Lock" mechanism also causes problems. If the disc, or the shaft, is bent it makes an irritating scraping noise.

Maybe you can narrow it down by running the counter to the point where it stops then disengaging the ZERO ADJ. clutch and trying to run past the stopage. If that doesn't work, unhook the drive train at different points, the Oldham coupler, a gear clamp, the counter, etc. Check each gear in the counter to make sure there are no broken teeth.

Date: Mon, 25 Dec 2000 20:06:13 -0500
From: jlogin@mindspring.com
Subject: [R-390] R390A zero adjust problem

Hi...happy holidays...working on a R390A whose zero adjust control will not engage no matter how I adjust it and tighten it. It will push the pins in but the KHz control still will turn with effort and immediately engages the Veeder counter. Would appreciate some advice.

Date: Mon, 25 Dec 2000 17:56:43 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] R390A zero adjust problem

Could the plates be rusty? Or maybe bent/burred?

Date: Mon, 25 Dec 2000 17:56:59 -0800 (PST)

From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] R390A zero adjust problem

Two comments:

a: Do you have all of the screws in the front panel? Screwing the knob in causes two things to happen, to push in the clutch and to deflect the front panel outward. If you don't have all the screws in, the panel will deflect outward excessively and not mash the clutch in enough.

2: The clutch plates need to slip to enable the adjustment. If your cluthc is too errr, "humble", then there will be no slipping. Try lubing the clutch.

Date: Mon, 25 Dec 2000 20:40:29 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] R390A zero adjust problem

The clutch assembly probably needs to be taken apart and cleaned and lubed. There are no instructions for this in any of the manuals. When you take it apart, you need to either have a photographic memory or draw it out and mark the index pins with the holes in the copper washers so that you can put it back together right. In addition, don't alter the position of any of the individual disks in the stack. Use no grease in it, only a very light coating of 10W30 synthetic motor oil. Any burrs should be stoned down. Don't decrease the thickness of the copper disks though. When it's clean, lubed and adjusted properly, it should only take about a half a turn with the zero knob after contact with the three arms of the pressure plate (3 pins) for the clutch to fully release. nolan

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Date: Wed, 03 Jan 2001 15:06:47 -0600
From: plmills@attglobal.net
Subject: [R-390] R390A rf deck help needed

I've been working on a '67 EAC for some time now as time permitted. As luck would have it, the possible cause of its problems surfaced when I found a gear, broken clamp still attached, laying on the floor where I had last placed the unit. Anyway, this gear is the one that mounts on the bandswitch shaft. Can someone tell me how to get the bandswitch set to the proper position relative to the current position of the rest of the megacycle gears....it is currently set to 5 mc.

Also, in spite of the current capacitor discussion, I plan to replace the 2 brown beauty tubular caps in the calibration oscillator since they are either split or have a very pronounced mold line. Are there any other components in the RF, xtal cal, or xtal osc deck I should check or replace while it is out?

Date: Wed, 3 Jan 2001 16:11:36 -0600
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] R390A rf deck help needed

Be prepared for a cramped operation if you plan to use ODs there. I did and I think those two might have been the most difficult to replace in the entire radio due to the ground location as I recall. I recall thinking that if any of the components "under" the new caps ever needs replacing, these will have to come out first. I'm not sure if axial lead caps would make that job easier, but it might be worth investigating. I think I used 600V ODs and that may be overkill there -- don't know off hand. Perhaps 400V would suffice making the job a bit easier.

Date: Wed, 3 Jan 2001 19:45:42 -0500
From: "Walter Wilson" <wewilson@knology.net>
Subject: Re: [R-390] R390A rf deck help needed

The alignment instructions for the mechanical gear train is in most of the manuals, and it shows the gear at the 7+000 KC position (page 6-8 in the Y2K manual). You'll need to make sure the intermittent gear is oriented properly (the four teeth pointing downward) when the bandswitch gear goes back on, and make sure the RF wafer switches are all lined up to switch in the 4-8 MC coils. I don't know how easy it will be to do without some disassembly, as I usually am doing this when the gear train is pretty much disassembled.

> Also, in spite of the current capacitor discussion, I plan
> to replace the 2 brown beauty tubular caps in the calibration
> oscillator since they are either split or have a very pronounced
> mold line. Are there any other components in the RF, xtal cal,
> or xtal osc deck I should check or replace while it is out?

Replace all the paper capacitors (especially if the brown molded type), and I usually replace C327 also. Chuck refers to this one on his website, and I have found two of them bad, so I replace it while I'm there. I also check all the resistors while I'm there, and replace any that are 10% or more out-of-spec.

Date: Fri, 5 Jan 2001 10:33:29 -0600
From: "Steve Goode" <goode@tribeam.com>
Subject: [R-390] Goo Gone report/gear springs?

Before the holidays I asked the list if anyone has used "Goo Gone" to clean the R-390 gear trains. I received several responses ranging from "I have used it in my shop and it is great stuff" to "never use anything but diesel

fuel, etc.". Some people asked that if I try it that I report my results. No disrespect intended to those that said I should only use real solvents such as diesel fuel or other methods such as the dish washer, but I did try it on an Imperial R-390A gear train. Before cleaning the gear train was covered with a mix of grease and grit. I sprayed the gears with Goo Gone and washed them with a tooth brush. I found that it did clean up the gear train very well and my wife and kids did not run me out of the house into the unheated garage! The only problem that I started to have toward the end of the cleaning process was that the Goo Gone was starting to take off the paint on the gear train manufacturer and serial number. Once I saw that I was more careful where I sprayed the Goo Gone and was able to save the serial number/manufacturer.

So the Goo Gone summary is that I would recommend it to anyone that is looking for an alternative to WD-40 or the other smelly alternatives. I now have 5W-30 Mobile 1 on the gears and it is tuning very nicely. I hope that the 5W-30 weight range is acceptable as this is what I use in my car and have only seen 10W-40 listed here.

I had hoped that cleaning the gear train would fix the backlash I see when tuning down in freq. After cleaning the backlash is still there. Tuning up there is no backlash but tuning down has about a 1 kHz backlash. After cleaning I see that the gear loading springs are missing from the large gear driving the 0.5- 1 Mc cam. I am hoping this is the backlash problem. Anyone know where to obtain the gear loading springs?

Date: Fri, 5 Jan 2001 11:35:54 EST
From: Llgpt@aol.com
Subject: Re: [R-390] Goo Gone report/gear springs?

The 5W-30 will tend to run off after awhile, far better to use Mobil 1 synthetic gear lube, it tends to cling to gears much better. Just my .02 cents worth.

>Anyone know where to obtain the gear loading springs?

Fair Radio Sales....this should cure your backlash problem.

Date: Sun, 14 Jan 2001 01:05:37 -0500
From: "Jim Miller" <jmille77@bellsouth.net>
Subject: [R-390] Victory over the RF Deck! (I think)

Having a case of newbie enthusiasm, I have to share a little success (finally) with my RF deck woes. After cleaning and lube it suddenly quit. Went thru all the circuit tracing etc. with no obvious faults. Finally, I saw in the book that the Crystal Oscillator band change switch needs to be

aligned to the band selected using the little sighting window on top of the oscillator module, which displays the band number.

Somehow in the process of removing and cleaning the RF deck, the shaft coupling clamp on the oscillator had loosened just enough to allow the oscillator rotary band switch to get "out of sync" with the band selected. How this happened I don't know, but that was apparently the problem. I could in fact turn the osc shaft by hand.

It should have hit me sooner when I used the counter to read the xtal osc frequency when I was tuned to 7 mhz. I was getting 19 Mhz from the oscillator! Duh.... A quick resync of the osc shaft and an extra tightening of the clamp seems to have resolved this one. Morals of the story: (1) Don't overlook the obvious..and (2) The 390A is probably 50% mechanical and 50% electronic. Don't forget the mechanical.

Date: Tue, 13 Feb 2001 10:55:25 -0800
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: Re: [R-390] Gear tightness

Those little gear springs in the anti lash gears.

1 go for good clean gears with the correct lube (what a way to slide back down that slippery slope)

2. adjust the front panel bushing for the two main tuning shafts.

3. do not lube the coil slugs. Keep those clean and dry. Do not add any solvent (water is also a solvent)

4. Do clean up the slug racks and check their little slide bearings

5. now that every thing is moving with minimum friction check the anti lash
springs in the gears.

6. Use the minimum spring extension reasonable.
    6.a - loosen the gear clamp and slide it in or out as needed to let only one side of the gear free.
    6.b - release the spring tension.
    6.c - rotate one gear against the other to just take the slack out of both springs. (there is a bit of difference between any two springs)
    6.d - rotate the gear a bit more until the teeth on both of the split gears line up again and engage both sections of the split gear back into its

mating gears.

7. with the split gear reloaded. reset the alignment of the gear train and tighten the clamp.

One down and some to go. Use minimum force. If the springs are not overly stretched and are loaded enough to take the free play out of both springs then the loading is likely about as good as it gets for that gear, those springs and that assembly. Going for more than minimum will just cause the gears to wear them selves out and induce more friction in the gear train
than needed.

Do the gears at the alignment point (7+000). at that setting all the clamps in the gear train should be set so you can get your spline wrench into the clamp bolts. If this is not true, then when you do get a clamp loose reposition it so you can get to it when you set your gear train up to the alignment point.

Date: Tue, 13 Feb 2001 16:32:24 -0500
From: "Warren, W. Thomas" <wtw@rti.org>
Subject: RE: [R-390] Gear tightness

Thanks for publishing your hints for the anti-backlash springs.

In Step 6d, it sounds like you're not dogmatic about "two-teeth beyond taking the slack out" as the TMs seem to be. Maybe I'm reading in more than you mean, but I'm inferring that whether it's one tooth or two teeth more than slack removal isn't important, that in fact one tooth works better than the direction published in the TMs.

This topic came up (maybe Normam Ryan made a comment about very minimum tension on the anti-backlash springs didn't lead to extra backlash in the entire tuning mechanism) some time ago, but I haven't seen it treated since.

By the way (and you've probably run across this yourself or done it yourself) Norman says that he has his gear trains so slicked up that he can feel the cams rising and falling under the tension of the spring loaded coil slugs. He even took apart his planetary gears and cleaned, re-lubed them. I've done the rest of the gear set on my "sacrifice" RF unit, but haven't taken the big gulp of taking apart the planetary gear set. Maybe some day!!

My EAC67 gives me a fair bit of "wrist fatigue." I've just recently bought a 14-PH-56 and it has the original lubriplate (now turned to plaster) still

there, so it tunes like a S** of a B****. Any more hints on the gear train?

Date: Tue, 13 Feb 2001 16:55:56 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] Gear tightness

Remember the backlash was set in the TM to withstand the shock from firing multiple 16" guns on the same deck as well as tooling down any road and at any speed a 6x6 could travel without there being a fade from the slug rack moving with at least one standard maintenance period accumulation of sand, grit, and mud in the gears and on the slugs.

And the operator was required to participate in daily calisthenics to keep in shape. So in the domesticated situation the preload tension need not be as great. But if the radio needs to meet specifications while operating under military conditions...

Date: Tue, 13 Feb 2001 15:43:05 -0800
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: RE: [R-390] Gear tightness

Whether it's one tooth or two teeth more than slack removal isn't important, that in fact one tooth works better than the direction published in the TMs. "True"

Norman says that he has his gear trains so slicked up that he can feel the cams rising and falling under the tension of the spring loaded coil slugs. "Again true, Mine too and yours should be too"

But haven't taken the big gulp of taking apart the planetary gear set. Maybe some day!! "I have never taken apart a gear set or seen one taken apart more than necessary to get at a broken clamp, replace a gear chewed up from to much spring loading or to replace a spring that broke."

"Take the deck to the auto shop and hang it off the end of a table and go to work on it. You can wash it out with solvent and compressed air."

However I have never done a blue striper and real tear down may be in order.
Your R390 of any flavor should not be giving you "wrist fatigue".

Problems
1 front panel bushings.
2 cam rack drag
3 PTO drag
4 dirty gear drag

5 over loaded anti lash spring drag.

What your receiver suffers from may not be in this order or YMMV.
I think we better go over the lube procedures again.

Date: Tue, 13 Feb 2001 19:07:56 -0500
From: "Walter Wilson" <wewilson@knology.net>
Subject: Re: [R-390] Gear tightness

> 6.c - rotate one gear against the other to just take the slack out of both springs.
(there is a bit of difference between any two springs)
> 6.d - rotate the gear a bit more until the teeth on both of the split gears line up
again and engage both sections of the split gear back into its mating gears.

<snip>

Roger: In your steps 6c & 6d, I remove the slack and then move at least one tooth but never more than two from that point to set the proper tension. That's one gear tooth more tension that what you seem to recommend. The purpose of the split gears is to remove "backlash" (lost motion when the direction of rotation is reversed). The split gears allow the teeth from the split gear to "expand" within the teeth of the solid gear it mates against. I believe a spring tension greater than a "minimum" amount is needed in order to prevent backlash.

One additional step worthy of mention is the alignment of the slugs within the RF and VIF cans. There are two small phillip-head screws holding each slug adjustment in place. For each band, I loosen these two screws on each slug and rotate the MC/KC knobs as needed to lower the slug rack as far as possible into the cans. This fully engages the slugs within the can. Then
I carefully tighten the two phillips-head screws again. I make this adjustment after removing the slug racks, cleaning the slug bearings and bearing guides, reinserting the slug racks, but BEFORE reinstalling the slug rack springs. My "test" is that the slug racks should move freely up and down by gravity alone as the MC/KC knobs are rotated. If they stick, I find and fix the problem. Then I reattach the slug rack springs.

Date: Tue, 13 Feb 2001 17:06:50 -0800
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: Re: [R-390] Gear tightness

One additional step worthy of mention is the alignment of the slugs within the RF and VIF cans. There are two small phillip-head screws holding each slug adjustment in place. For each band, I loosen these two screws on

each slug and rotate the MC/KC knobs as needed to lower the slug rack as far as possible into the cans. This fully engages the slugs within the can. Then
I carefully tighten the two phillips-head screws again. I make this adjustment after removing the slug racks, cleaning the slug bearings and bearing guides, reinserting the slug racks, but BEFORE reinstalling the slug rack springs. My "test" is that the slug racks should move freely up and down by gravity alone as the MC/KC knobs are rotated. If they stick, I find and fix the problem. Then I reattach the slug rack springs.

Walter Wilson
Yes. you got it.

I believe a spring tension greater than a "minimum" amount is needed in order to prevent backlash. (see Jerry's mail) If you have your gear train clean and smooth and lubed right a "minimum" will do and more will just add friction. Watch those gears and see how little lash there really is. As you do a small roll across a SSB to drag it in.

Date: Wed, 14 Feb 2001 20:21:39 -0800 (PST)
From: Ottis Anderson <ka0ofp@yahoo.com>
Subject: [R-390] R-390/A Problem

Hello to all on the R-390 Reflector. I am new to the group and this is my first time on the reflector. I have two R-390/A receivers. One of them is paired up with my 32V2 on 29.000. It is a EAC-67 SN 3448. it is one of my favorite receivers to use for AM reception. I have a SP-600 JX-26 that at times seems to produce as good if not better audio at times.

The second R-390/A is a Stewart Warner 59 SN 1301. I have had this receiver for a long time and have never used it. I tried it when I first got it and did not seem to work. I put it on the bench about a week ago and it does light up. I hear static on the receiver but when I hook up an antenna it does not pick up anything. I am not able to hear a thing on the broadcast band. I am able to receive signals on the 15 mc setting. They are not as strong as they should be. I tried ten meters in the AM window and was not able to hear a thing. Does this sound like a common problem with this receiver? I have the RF deck out of the receiver now and am checking caps. I will be replacing C-327. Is there anything anyone would suggest that I check before I get deep into this thing. If not I will get into the IF sages and start checking them out.

Thanks for your time in this matter.

Date: Thu, 15 Feb 2001 10:28:12 -0500
From: "Jim Miller" <jmiller@iu.net>

Subject: Re: [R-390] R-390/A Problem

One thing to check is the alignment of the 2nd oscillator gear and shaft. If it is not synchronized with the rest of the gear train, the 2nd oscillator will be running on one frequency and everything else on another. The receiver will sound dead. It happened to me often if the retaining clamp on the oscillator switch shaft was not secured tightly enough. There is a window on top of the 2nd osc module you can look at and see what band the oscillator thinks it's set to. Mine would always slip due to oil on the shaft.

Date: Thu, 15 Feb 2001 12:21:08 -0500
From: tbigelow@pop.state.vt.us (Todd Bigelow - PS)
Subject: Re: [R-390] R-390/A Problem

I've experienced a similar problem with my Teledyne A model, except mine hears *only* the BC band (bottom to top limit on band 1, then a bit on band 2). Other than that, it is deaf except for picking up Bc images around 10 or 11 Mcs. I posted to the list about a year ago with this problem and got some good answers. Some suggested checking the bandswitching set up for corrosion/crud, some suggested bad or dirty crystals. and alignment was also suggested. Although my rig looks almost new, when I removed the calibrator crystals in the back, the pins were all bluish green in color. I still haven'd taken the time to wade into the crystal deck, but it wouldn't surprise me to find fuzzy greenstuff there as well. This 390A was stored in a dry barn, but outside with changing temps.

I can say that just doing some minor spraying and cleaning, as well as working the Mc change knob seems to have worked at least a little - I now have some reception above 1 Mc, although not a lot. BC band comes in great, though.

So, I'd suggest starting there if most all of your bands seem dead. If it were only a band or two, then it might be a bum crystal.

Date: Tue, 06 Mar 2001 16:05:30 -0500
From: Tom Nicholson <gunsrus@optonline.net>
Subject: [R-390] Lubrication (OIL)

The thread on oil etc. has got me thinking that I was going to post a reply upteen moons ago to the list that I remembered back when I was in the field repairing Friden mechanical calculators, you know back when men were men and the sheep were scared, we used an oil by Texaco they just called "Machine Oil" on the 5 gal. pails that we used to pour of but it never dried out and turned to varnish in the years that I worked on them (1959 to 1979).

As to how to get WD-40 etc. out of these units. I don't know the feasibility on 390's etc. but I'll throw out what we did on calculators. Get an old square tub that the item will fit in. Make an interconnected grid on the bottom with 3/4" copper pipe. Drill a bilgillion holes in the top them. Fill tub half full with a good grade degreaser/cleaner. Put "item" in tub supported about 3" above tubes and feed the tubes with the output from and old vacuum cleaner and the bubbling action and time will clean it. The vacuum cleaner was a poor man's regulated air supply.

Date: Tue, 6 Mar 2001 18:44:56 -0600
From: "Jim Zellmer" <zellmer@raccoon.com>
Subject: [R-390] Re: r-390-digest V1 #1009 ES vintage lubricants

Some one on the list asked what was in Marvel Mystery Oil. It is a mystery, but the prime lubricant is peppermint oil. . I was going to try some out as a tap lubricant at work to replace the old Rapi-Tap lubricant we used to use.

The new version of Rapi-Tap does work as well as the old one did.The EPA took out the Tri-chlorethelene. Turned out I could not use the Marvel Mystery oil in our production parts either. The Material Safety Data Sheet indicated that Marvel Mystery oil has a little bit of Sulfur in it. Sulfur is a no-no on many aerospace applications.

The Marvel Mystery oil did do a good job as a tap lubricant though, I keep a can in my shop for that purpose. Peppermint oil is interesting in that it has a pretty shear strength. It is not a good long term lubricant in that it oxidizes quickly under high temperature conditions.

Second commment on vintage lubricants. Some one mentioned MOPAR Sperm oil. Whale oil was a prime ingredient in automatic transmission fluid until 1970 or so. It is a very good lubricant and there has not be a good replacement for it until recently when someone finally figured out how to synthesize a close replacement. That is why all of our new mini van transmissions go out at 80,000 miles and Dad's old 68 Impala 350 hydromatic went 150,000 plus.

Love my R390 A Collins SN 210 Order No. 8719-P55

Date: Tue, 6 Mar 2001 22:26:50 EST
From: DuffyF56@aol.com
Subject: [R-390] Possible alternative lubricant to be used????

From my engineering backgoround I am aware of the great strides made in lubrication technology since the R-390 Series Radio were designed. Also

from my military background I am aware of how difficult once something was written down and made a requirment it was to get changed (Kinda like trying to push a rope if you get my drift) In my job now we use a lubricant called Poxylube 420 made by Sandstroms Products of Byron IL (if memory serves).

This is a dry film lubricant made from an alcohol base or carrier and it uses Molybdenium Disulfate as its major constituant. It is used in applications where a long lasting non contaiminating type lubricant is required. It is applied by dipping the part and allowing it to dry for 24 hours. It can also be force dried by placing in an oven at 250 degrees for 30 minutes. If properly applied to parts which are cleaned well to start with it tighly adheres to the part and cannot be removed unless hit with a solvent. I believe this may have some application in the gear train of our radios if used during a major disassembly and/ or restoration effort.

Date: Tue, 06 Mar 2001 23:13:23 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] Possible alternative lubricant to be used????

> From my engineering backgoround I am aware of the great strides made in
>lubrication technology since the R-390 Series Radio were designed.

Yes, substantial strides.

>Also from my military background ..... In my job now we use a lubricant called Poxylube 420 made by Sandstroms Products of Byron IL This is a dry film lubricant made from an alcohol base or carrier and it uses Molybdenium Disulfate as its major constituant.

After owning and screwing around with R-390A's for 25 years, I'm very happy with what has given me the best service so far in the lubrication department. It's my current lube of choice. When I put my EAC together I gave it a lube job. It then ran powered up 24/7 for a shade more than two years in a non temperature controlled environment. Sub-freezing temperatures in the Winter and well over a hundred degrees in the Summer with humidity levels from the high 90% range down to probably 25%. All of this is while in an open rack with just the original receiver dust covers in my shop. The lube you ask? Mobil 1 synthetic 10W30 motor oil. A five dollar quart of it would lube hundreds of receivers. It doesn't seem to attract dust nearly as bad as conventional dinosaur based oils either.

I've experimented with dry lubricants in the past with firearms with mixed results. One thing that you'll want to investigate before using any of the dry film lubes in a piece of electronic gear is the conductivity of the

lubrication film. It it's conductive, I'd have reservations about using it for pot shafts, etc. or anywhere that an accidental spillage or over flow could contaminate rough surface texture parts like trimmer caps, etc. I'd be interested in hearing any results of using dry film lubes in the R-390A. I suppose that a really trick thing to do would be to remove the camshafts and similar items and have them coated with the green teflon film like GM started using on the throttle shafts of their carburetors and TBI units about twenty years ago. It's slicker than owl snot lasts a long time. Naturally, the bushings would have to opened up a bit to compensate for the increase in diameter but...

Date: Sat, 31 Mar 2001 08:25:23 -0800 (PST)
From: <jlap1939@yahoo.com>
Subject: [R-390] r-390 again...

Good morning. Thanks so much to all for quality answers about the 16k filter!! I have something else, however, that has come up. I hope you will forgive me for the long explanation..

I just got everything going again, after getting the IF re-capped and the 603 & 606 done, and I went w/re-algn. All seems to be fine, and the improvement is considerable. However, upon listening and tuning and warming up, I find 8 to 16 is weak. A quick "press or lift" on that slug rack shows it is out of alignment. Line it up again. Again after a while, it is slightly out.. It is enough to cut sen. by about a third to half, I think. It is as if it were a mech prob. but I don't see how it could be...IF sections are aligned correctly, by the way.. The other bands seem ok.... Nothing has been done to RF, however the mech tuning is fine as far as I can see, and smooth. Have no idea about the osc, but all bands very strong when it is lined up. (I have mil. ex. w/level of sets in reg. mil use. This set compares favorably..) Whats going on??????? It is a blue stripe unit...

Date: Sat, 31 Mar 2001 08:35:37 -0800 (PST)
From: <jlap1939@yahoo.com>
Subject: [R-390] Standby

Forgot this question/comment when I was last on.. Lost a ballast tube when a micro-switch went.. stayed on, (and that would be in the standby position, I believe), while we went out of town for 36 hrs. Then found the rf amp had gone 'way downhill, as well. Have had other units w/standby, usually I believe concerning only 1 or 2 tubes. Seems the plan/eng dsgn. for this unit may have failed here. (Saw it happen several times in mil.)

Date: Sat, 31 Mar 2001 10:12:45 -0500
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] r-390 again...

Can't be sure of course, but could it be that slug rack is hanging up a bit on the downswing? Sometimes this is difficult to spot. Can't happen on vertical movement because the cams are tight against the cam followers on the slug rack. Another, more devilish problem -- a floating coil form. The glue may have given out at the base and top of the form, allowing it to move with the slug, but not far enough to break the fine wires. Eyeball that rack very closely as it moves up and down, including the tops of the coil forms. Might be a long shot, but I've seen both situations.

Date: Sat, 31 Mar 2001 12:33:05 -0500
From: Jim Miller <jmiller@iu.net>
Subject: Re: [R-390] r-390 again...

I have found that sometimes the slugs or the slug rack itself will stick as you tune or change bands. So the coils dont always physically return to the same position each time. Have you cleaned and lubed the rack slides? Also if it looks like a slug is sticking or out of line with a coil there is a way to adjust that out by loosening the screws that hold the core to the rack and then retightening them after the slug reseats itself.

Date: Sat, 31 Mar 2001 16:16:18 -0500
From: "AI2Q Alex" <ai2q@adelphia.net>
Subject: RE: [R-390] r-390 again...

Slug-rack sticking on the down-slide is what I once experienced with my R-390A too. It leads to exactly the type of problem you describe John I removed the springs on the rack in question, and carefully withdrew the entire offending slug assembly. A close inspection under a magnifier revealed an almost invisible burr on the side of the rack. A touch with some crocus cloth to polish it out and--bingo! No more sticking. I also lubed the slugs in my 390A with a dab of talcum powder. Did that when I used to service these sets in the Signal Corps, and it's a trick that's still applicable.

Date: Sat, 31 Mar 2001 16:44:44 -0600
From: Dennis Clemenson <dclemenson@stellarnet.com>
Subject: RE: [R-390] r-390 again...

I had a similar problem recently with my R-390A. It turned out that the spring that goes up into an adjusting screw assembly on the slug rack had broken free and was able to move up and down inside the adjusting screw just a little bit. On the band you are having trouble with, gently try to pull down on the spring for each slug. They should not move. One of mine did, so I disassembled it, inverted it, and carefully fastened it together with some epoxy. No more loss of alignment.

- -----Original Message-----<snip> However, upon listening and tuning and warming up, I find 8 to 16 is weak. A quick "press or lift" on that slug rack shows it is out of alignment. Line it up again. Again after a while, it is slightly out.. It is enough to cut sen. by about a third to half, I think.

It is as if it were a mech prob. but I don't see how it could be...IF sections are aligned correctly, by the way.. The other bands seem ok.... Nothing has been done to RF, however the mech tuning is fine as far as I can see, and smooth. Have no idea about the osc, but all bands very strong when it is lined up. (I have mil. ex. w/level of sets in reg. mil use. This set compares favorably..) Whats going on??????? It is a blue stripe unit.. John

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Date: Sat, 31 Mar 2001 16:59:08 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] r-390 again...

Don't forget to make sure the rollers are able to spin and that there are no flat spots on them. Check the spring tension and that there are no burrs or worn spots on the cams. It could also be some dirt or crud stuck to the cam or follower/roller.

On that note, maybe there is a rough spot inside the coil form. I think we covered distorted/tight coil forms about 5 or 6 years ago. Nolan has a good routine for stoning the cams, there also was mention of a cracked cam.

Oh, ... what other horses have we beaten in this particular herd? Check the guides that the rack runs in maybe there is dirt or burrs in there. Look for flat or worn spots, anyting that will keep it from moving smoothly or that will allow it to hesitate in one spot.

If nothing obvious is found, then its time to look for the real small nit picking stuff.

Time to break out a new case of dead-horse-beating sticks.

Date: Mon, 2 Apr 2001 16:02:28 -0400 (EDT)
From: Norman Ryan <nryan@duke.edu>
Subject: RE: [R-390] hey, we found it..

> I've found one slippage failure not yet mentioned: a simply gear broke
> free of its weld to its hub, and was slipping slowly. That explained why
> the deck was thrown away young (no wear).

Same thing happened to me once during an R-390A geartrain teardown.

Weld broke while trying to get the "C" ring off the hub. Gak!! What now?? I tried plain old solder and darned if it didn't work. Gear went back in and geartrain has never failed. I thought for sure I'd done myself in, but the original weld must be solder or something close to it.

Date: Tue, 3 Apr 2001 07:10:47 -0700 (PDT)
From: <jlap1939@yahoo.com>
Subject: [R-390] Lost Alignment...lost in space?

I must first apologize for telling the list I had solved my 8-16 alignment prob.. In truth, the weak detent was PART of it, but there must be an electrical aspect as well. ??? Upon listening last evening, a time came when the central heat came on. As is sometimes the case, the radio responded w/pops....but... thereafter, it was at some 60 or more % loss of vol/sen..... Then, ... when I moved the rack, again I found the alignment out, but in the other direction....?!? Too much for me. Would appr. any comments, but I think I am going to have to eventually send it to someone for additional work.

Thanks so much for your kind suggestions!! At least no one has told me where I could put the radio, even though I must be boring you by now...

Date: Tue, 3 Apr 2001 12:41:23 -0400
From: "Walter Wilson" <wewilson@knology.net>
Subject: Re: [R-390] Lost Alignment...lost in space?

A number of simple things could be the cause of your problems. I've listed them from easiest to hardest. The fact that the problem is isolated to the 8-16 MC range rules out a lot of potential problems. (Just be sure it is indeed isolated to just those bands)

1) Misaligned RF bandswitch (underneath the RF deck):

Does it make any difference approach the 8.000 to 15.999 MC range from the 16 MC side or the 7 MC side? If so, the RF bandswitch alignment could be the culprit.

2) Gears have slipped somewhere, causing misalignment:

If you spin the MC and KC dials to 7+000, do all the cams line up with the black alignment marks? Check especially the 8-16 MC cam.

3) Loose connections:

Are the three RF transformer cans for the 8-16 MC range all firmly seated?

If any is loose, they can be tightened with a phillips screwdriver through the top after removing the slug rack. If you tap on the top of the RF cans with the tip of a screwdriver, does
this help the signal strength recover AFTER it has shown a drop in signal strength?

5) Bad RF transformer coils or caps:

If none of these found the problem quickly, I'd be removing each RF can in the 8-16 MC range and remove the cover from the can (especially T205) to inspect for any apparent damage. I recently replaced one that had a burned coil, probably a result of a near-lightning strike in it's past history.

- - After these simpler checks, I'd probably be pulling the RF deck for further checks.

Date: Mon, 09 Apr 2001 22:39:29 -0400
From: Al Solway <beral@videotron.ca>
Subject: Re: [R-390] New findings , 8-16 mhz on 390a

I have been watching your 8 - 16 Mhz problem unfold. There seems to be something that is intermittent. I had a similar problem back in Dec with my Bluestripper on the 4 - 8 Mhz band. I posted the problem and got responses from Walter Wilson, Denis Clemenson and Chuck Rippel. I tried all three ideas. Chucks advice put me on the right track. Which was the **Six-position RF Band Switch** adjustment. I followed the procedure in the Y2K Manual, Page 6-9. It did work but occasionally the problem would reappear. The RF Chassis was removed. I used a magnifier to inspect the operation of the RF Band Switch (S201 thru S208) as the MHz Change was rotated through it's six positions. What I noticed was that there was quite a bit of backlash in the switch rotor contact positions. On S208 one segment would only make good contact when approaching from one direction. From the opposite diction the contact would be erratic. The solution was to adjust the band switch shaft by an amount that would average it's rest position for approach from either direction. This solved the problem. Sensitivity is less than 0.2 uV on all bands except the 7 Mgz band. BTW make sure you inspect each segment of each switch for proper engagement when approached from either direction.

This is my first R-390A so please accept my apology if this does not work and I have caused all that work for nothing. One thing, doing all this exposes you to the workings of the R-390A tuning mechanism. What great piece of American engineering.

Date: Tue, 10 Apr 2001 10:19:22 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>

Subject: RE: [R-390] I seize finality...

You don't have to worry about gears when pulling the RF deck. The deck along with all the gears come out as a single unit. Unless you just want to separate them, you don't have to. It's *slightly* more difficult than pulling the other decks (pay attention to the Oldham coupler and it spring), but not that bad.

Date: Tue, 17 Apr 2001 23:06:59 -0400
From: "Kevin Kibbe" <kkibbe@golden.net>
Subject: [R-390] RF gears

I'm my effort to clean years of muck and sand from the inside of my RF gear train I've jumped in with both feet and I have removed the front plate from the gear assembly. (after separating the gear assy. from the rf deck) While doing this I am keeping everything in place while I clean one gear/shaft at a time.

The reason I'm writing is to find out what the trick is in removing the large gear assy that has the 3 "planetary" gears. This is the one that has a screw through the back plate into the shaft of this whole planetary gear assy. In the Y2K book the main gear in this is #39. All together on one shaft is about 13 gears. I think I should just be able to unscrew the one screw in the back and remove everything together but the shaft that the screw is in keeps turning... Am I missing something? Do I just have to some how clamp the shaft from the front?

Thanks for any help.

BTW I broke one of the retaining clips are they standard size?

Date: Wed, 18 Apr 2001 07:53:53 -0400
From: "Kevin Kibbe" <kkibbe@golden.net>
Subject: [R-390] rf gears.... doh.

Thanks to Walter Wilson's web page of pictures of the gear assy I was able to see what I had to do... pull. I thought the shaft came with the gears not stayed behind. Thanks for the web page Walter, a very nice job.
http://www.knology.net/~wewilson/gear_train_rebuild.htm

I'm sure one of the design goals of this radio was that if your jeep broke down you could borrow a gear from the 390 and drive home. Or... if you were home and your radio broke...

Date: Wed, 18 Apr 2001 09:04:59 -0400
From: Al Solway <beral@videotron.ca>

Subject: Re: [R-390] RF gears

Hi Kevin, Try this site: http://www.knology.net/~wewilson/

Follow the "Restoration Resources " link to some great info. Walter's site, along with Chuck Rippel's site are two of the best sites for the R390A restorer. Check out these two site in detail and follow the links to other good sites. These two sites, along with the Y2K Manual will provide all the info you will need to restore an R-390A.

Chuck Rippel's site. http://www.avslvb.com/R390A/index.html

Date: Mon, 23 Apr 2001 11:54:51 -0400
From: "Chuck Rippel" <avsl@erols.com>
Subject: Re: [R-390] gear #21

I think your problem lies in the fact you put it back together slightly wrong. The brass plates with the slots and pin holes are the key issue. They go back together in an alternating pattern. Then, its a fight to get the "C" clip back on. Do you have another to look at?

That is worth the effort to take apart and clean but a real trial to put back together if you did reverse-document your steps.

Date: Tue, 01 May 2001 22:33:20 -0400
From: Bob Camp <bob@cq.nu>
Subject: [R-390] Simple Question - roll pins

I'm in the middle of trying to pull a cam shaft from the RF deck on an R-390A. The deck more or less was hit several times by a truck so major surgery seems the only real answer. All of the little roll pins have come out ok except for two. Unfortunately they are both on the same shaft. I've nuked a pin punch on one of them and it won't budge. The other one has not had as much attention, but it's not going anywhere quick. If we rule out megawatt CO2 lasers, sitting and waiting for it to fall out, and sending it out for somebody else to bother with ... what's a good way to get the darn thing out ? The roll pin seems to be pretty hard so I'm not sure it'll drill out very easy. It's driven through a brass cam and I'd kinda like to save the cam. Drilling seems to be an almost sure way to open up the cam hole a bit to much. Is there something other than a 1/16 inch punch you use to take these out? The one I had seemed to work fine on the other pins.

Date: Tue, 01 May 2001 20:52:47 -0700
From: Buzz <buzz@softcom.net>
Subject: Re: [R-390] Simple Question - roll pins

I once tried to drive a roll pin out of a windshield wiper motor and like you, I used penetrating oil and wasted a small pin punch all to no avail. So I decided to drill it out. The pin wasn't very hard and after I drilled a bit I saw solid metal! To make a long story short, the pin had sheared so I was wailing away trying to drive the pin through a solid part of the shaft. FWIW,

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Date: Tue, 1 May 2001 22:26:14 -0700
From: "Brian Bj" <k7ais@qsl.net>
Subject: Re: [R-390] Simple Question - roll pins

Tough problem.....I've found a solution but not an inexpensive one. A couple of years ago I picked up a high-speed handpiece very similar to a dental handpiece. Runs on air and turns up horrendus rpms, makes a dremel look like a hand drill. This rig with either diamond or carbide burrs will make really short work of broken taps, roll pins, etc. How close are you to Portland, OR?? Have any friends who are dentists? My dentist was an AF R-390A tech in the '60's, went to school after his hitch with Uncle Sam. Makes going to the dentist almost pleasant. Also, there is a device called a pin press which is designed to gently but firmly press roll pins out of shafts, couplings, etc. It uses a "V" cradle which is placed over the shaft, then threaded punches are screwed down to press out the pin. Don't know where to get one, I was issued mine when I first started with Mother Xerox some 30+ years ago. Maybe specialised tool suppliers.....

Date: Wed, 23 May 2001 00:01:33 -0500
From: "Tanker" <bloper5@home.com>
Subject: [R-390] Removal of RF coils

Are the coils on the RF deck "plug in" and how are they removed

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Date: Wed, 23 May 2001 10:53:17 -0700 (PDT)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] Yes, Removal of RF coils

Yes, the RF coils and transformers are removable. What you need to do is unhook the rack return springs and lift the racks right out. Then if you look into the slug hole, at the bottom there will be (or supposed to be) a phillips screw holding the gadget down. Unscrew the screw and the gadget will pot right up when pulled. Each plugs onto the chassis with a gold plated pin/socket arrangment. What I do is remove all of these when cleaning a deck. I then clean each coil and rack individually prior to reinstallation. Since I've never met a R-390A that did not need alignment, you should count on doing a RF alignment after completing the task.

Date: Wed, 23 May 2001 13:51:31 -0500

From: "Tanker" <bloper5@home.com>
Subject: Re: [R-390] Removal of RF coils

I appreciate the replies. I exercised some patience before I started tugging on them and I removed the first three today . My RF deck is a mess, but it is cleaning up almost like new... Thanks

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Date: Wed, 23 May 2001 15:02:06 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Removal of RF coils

By pressing on the flat pins that protrude on each side of the transformer cases and push the "guts" out of the shell. You can then safely wash the shells. You can inspect the transformers as well. Just a thought.

Date: Wed, 23 May 2001 21:51:23 -0500
From: "Tanker" <bloper5@home.com>
Subject: Re: [R-390] Removal of RF coils

I used a citrus cleaner and then rinsed it with the hose, it looks brand new. I used alcohol clean the grease from the slides and then an ultrasonic cleaner. The whole thing looks brand new. I did use kerosene to lube the gear train

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Date: Mon, 4 Jun 2001 09:58:20 -0700
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: Re: [R-390] six position RF band switch alignment

There is a procedure in the TM to do the band switch alignment with a meter from the top side. As a guy who did for almost 8 years, do not even waste the time to set up the equipment.

Pull the RF deck, turn it up on end and do the alignment by eye.
Check the switch contacts going both up the band and down the band.
Check the setting at every band switch position.
Check every wafer segment at every position.
Roll the MC knob up and back and down and back and look at the slop.

There will be a setting where every things works on every band going both up and down. You can find the sweet spot from the top side if you mark the shaft and gear and work very carefully. Even with the cycle time to pull and reset the deck, A better alignment is achieved by eye balling the whole switch assembly. Once you get it set for your receiver you likely will never do it again. If you ever pull the deck again, always give an eyeball to the band switch alignment before you do the reinstall. As long as you have it open take the time to do a look see and adjust if needed.

Date: Mon, 4 Jun 2001 14:51:03 -0700
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: Re: [R-390] six position RF band switch alignment

>Is it possible for the deck to work if it is misaligned? I got open in both the 000+ >and 8 000+ positions although the radio works and receives on all bands

The band switch only moves on the MHZ change knob. Rolling KHZ knob from one end to the other will not change the band switch. As you switch from 00-01, 01-02, 03-04, 07-08, 15-16 or back down across these points The band switch should change, to switch the RF slug rack transformer set in use (and other things) Slop in the mechanical will come into play. It can work. Likely does work. Misalignment will show up as you go up or down across a band and the first MHZ across the switch boundary does not work. The next MHZ will work. And if you go back one more MHz then that MHz way now work. IE it will work going but not coming or work the other way round. With large mis-match some Mhz will be missing (00 [down] or 00-01[up or
down] or 16 [up] or 15 [down]) With small mis-match then all the MHZ will work if not the first time on the MHZ then when you roll over one more and then back. With no mis-match every MHZ band works every time rolling up or rolling down. If your receiver works on every band every time your good as it gets. remember you will only find problems as you roll over the band boundaries list above (if I got them correct).

Date: Mon, 4 Jun 2001 19:12:23 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] six position RF band switch alignment

Hmm,..... that may not be exactly true, if the detent on the MHz knob is worn out or broken/missing turning the KC change knob may cause the MHz shaft to turn.

Date: Thu, 05 Jul 2001 17:50:34 -0400
From: Glenn Little <glittle@awod.com>
Subject: [R-390] R390A Gears

Before I attempt to document the gears in the R390A, does this documentation exist where we can get to it? By document, I mean list the gear diameter, its thickness, number of teeth, mounting methode, etc and reference this data back to an item number in the Y2K manual. I recently took apart a geartrain to get a gear out to help another person. I now have a box of gears that would take some research to know which is which. Shame on me for not marking them as I took them off.

Date: Thu, 5 Jul 2001 19:41:20 -0400
From: "Walter Wilson" <wewilson@knology.net>
Subject: Re: [R-390] R390A Gears

I have some pictures of the gear train during disassembly on my website, if it helps any with gear placement.
http://www.knology.net/~wewilson/gear_train_rebuild.htm

Date: Fri, 06 Jul 2001 10:12:37 -0400
From: Bob Camp <bob@cq.nu>
Subject: Re: [R-390] R390A Gears

If you are looking for opinions I think it's a good idea. Something to show "here's what it is and it goes here" would be a useful addition to what we now have. It would certainly take some of the confusion and uncertainty out of doing a gear re-assembly for the first time. I would keep it very simple and one gear at a time. That makes for a *lot* of pictures and a very large file. I have the room to put it up on my site. Right now I'm to busy playing with radios to sit down and do all the pictures and text. Not a small project. The only gears that really get me are the ones right up against the cams. They are the last layer you pull off. On a couple of them it's not at all clear which one is which once you get them off and throw them in a pile. The rest of the gears are pretty distinctive and generally you can more or less sort them out. I have been numbering the final layer of gears and find that helps a lot. Not much to you right now, sorry about that :(After doing a bit of measuring on the gears it's not to obvious which one is which in all cases from measurements. I was thinking about doing a series of pictures, one of each gear. That would help with the easy to recognize gears. I'm not sure it would help with the ones that as far as I can see are identical. Of course if they are identical that makes things a little easier. I have seen a TM that lists diameters and teeth counts for gears but I *think* it was for the not an A. (I know score another one for the not an A :). Once you got the gears done then adding the rest of the hardware would be fairly easy. A lot of the stuff is available from people like McMaster-Carr. You could cross reference the part numbers at the same time. It would make mail ordering up a box of the *right* parts (82 degree or 105 degree heads hmmm ....) a lot easier. Most of the stuff is pretty cheap but there are a few items like stainless steel lock rings that get darn expensive .... So when can we all see the finished result :)

Date: Mon, 16 Jul 2001 14:50:20 -0700
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: [R-390] Restoration Bulletin 2: Gear Train Yes vote

I think you have this under control. Now go and consume large amounts of

beverage and see if you still have it together. These little things here you speak of make the difference between "ultra" gear trains and those source of tunnel carpo so many of are acquiring. Go with the file and do it.

Date: Mon, 16 Jul 2001 14:56:06 -0700
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: Re: [R-390] Restoration Bulletin 2: Gear Train again

Most of the KC friction is the PTO. Since it doesn't turn rough, do you think I should leave it alone or rush in where the angels don't? Those of you who've removed shims, did you notice any repeatability degradation? Dave, Again a bit of file here, less than I shim thick. makes the difference between OK it works and award winning.

Date: Mon, 16 Jul 2001 15:34:06 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Restoration Bulletin 2: Gear Train again

But, Dave, are you sure that the friction isn't in the three bushings on the KC CHANGE knob shaft? This is the more likely place for binding to occur. The frontmost bushing only has to be snug, not tight. Loosen it and see if that helps. Any sideways shot to the KC knob will cause it to bind. Also, like on mine, you may find that the KC knob doesn't run true because of a slightly bent shaft. Even so, mine tunes easily just by running my thumb around the face of the knob, it has a big silver ring there now. I know, that's too loose for some of you but it stays where I put it so it works for me.

Date: Mon, 16 Jul 2001 18:36:15 -0400
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] Restoration Bulletin 2: Gear Train

We're talking R-390A, right? One can take the differential gear completely apart to clean it and all. Getting it back together is tricky, but not impossible. Get something like #22 bare (or enameled) copper wire and use it to tie the three split gears into position for correct preloading. Test the motion of this sub-assembly before putting it back in and verify that it turns smoothly.
If it binds at all it means you have to reposition the little split gears. This may require repeated tries until you get it right. This is the most challenging part of gear train work. Before tearing this assembly down it helps to mark everything with magic marker to aid reassembly. Gear 86 is adjustable as you suggest. Position it snugly and test it for slop or binding. You can get the whole geartrain to work silky smooth without backlash if you're careful. You shouldn't have to file or modify anything to obtain these results. An exception is to gently file (or honestone) the burrs off the

opposing faces of the split gears while they're out so that they slide past each other smoothly when sprung. Be careful to remove the least necessary to achieve this. Preload the gears with the least tension needed for taking up backlash. Test each gear to see that its springs are taking up the backlash correctly. Heavy preload adds wear, drag, and noise. Lubricate sparingly when assembled. <snip>

Date: Tue, 17 Jul 2001 09:16:58 -0700
From: David Wise <David_Wise@phoenix.com>
Subject: RE: [R-390] Restoration Bulletin 2: Gear Train

Great S/N, Norman :-) The wire trick works. Marking is good advice that I didn't follow. Mark EVERYTHING. I wouldn't have believed it if I hadn't seen it, but the three planet gears are not interchangeable, at least not on mine. When I put it back together it had a bind. Interchanged two planets -- no bind. No other changes. I preloaded the planets to their original two teeth; one-tooth was almost completely slack. I found that Sun-2 was already at two teeth, but the sole reason I took apart the differential is that I saw it overload, so I increased it to three. Since I eliminated a bind in cam 3*, this might not be necessary, but I want it tight for some baseline backlash measurements. This gear carries more torque than any other. It drives cams 3 through 6 (and the first VIF), through a step-up. The cam 3 springs make a lot of resistance, especially when high up the back side of the profile. Once I've taken measurements I'll go back to two and
see if it holds.

I don't have numbers here, but most of the backlash was in the differential. Next-most seemed to be the cam 4 split gear, which was loaded to one tooth and overloading. Then the cam followers.

* This was odd. I tried (and failed) to remove the pin, but the bind is gone. Must have been the hammering.

> Gear 86 is adjustable as you suggest. Position it snugly and test it
> for slop or binding.

I had hoped so. Guess what: the manual doesn't say. [snip]

> Rebuilding a gear train successfully is a very satisfying
> accomplishment-- it instills respect for the ingenuity that went into
> its design like no other. Have fun!

So far, so good. And it's true -- I keep noticing things and saying, "gee, they really thought this through."

Date: Tue, 17 Jul 2001 09:24:51 -0700
From: David Wise <David_Wise@phoenix.com>
Subject: RE: [R-390] Restoration Bulletin 2: Gear Train again

And I reply to both: Certain. I have the radio all apart. Metaphorically speaking, I have the PTO in my hands as I write this. It takes a lot of torque to turn it, but it's smooth and uniform, no gritty spots or bumps. Like the bearings are ok but just super-tight. Roger's got the idea, but I was fishing for advice on getting the unit apart and back together. My neighbor has a press. I'm looking for tips like What size EMT (or whatever) makes the perfect jig?

Date: Wed, 18 Jul 2001 20:19:01 -0500
From: "Richard Biddle" <theprof@texoma.net>
Subject: RE: [R-390] Restoration Bulletin 2: Gear Train again

Before the internet made R-390A information readily accessible to the masses, conventional wisdom was to not mess with the gears. To quote "The gears were put together by elves. And all the elves are dead." Well my dream radio since I was 16 and got my first Fair Radio catalog (1975) was an R-390A. Back then they were a $600 tinkertoy complete with covers and meters. When I bought my used-unchecked radio from Fair about five years ago, the UPS man delivered a nice Dittmore-Freimuth. There was this really nasty problem involving synchronizing the gear train. The pictures in the photocopy manual was almost useless. So I bought a used RF deck (complete less tubes and counter) from Fair to play with to figure out how things work. Best investment I made since it gave me a template to fix the RF deck and now I have a nice set of spare goodies. There are some to be had cheap. American Trans-Coil has a stripped down deck (no coils or tubes but with a counter) for $25.00. Fair has the thing for $40.00 with no tubes or counter, but all the coils and racks. A better deal if you want to get a set of spares. YMMV.

Now all I need is a '68 EAC contract IF deck and power supply and all the modules will match and I can put in on EPAY as **RARE** and sell for enough to buy a new pick-up :) On second thought, probably not as this is about the only dream I had as a 16 year old that came true so far. (Never did marry Ann-Margret.)

Date: Mon, 23 Jul 2001 12:17:24 -0700
From: David Wise <David_Wise@phoenix.com>
Subject: [R-390] Restoration Bulletin 3: More Gear Train

('54 MOT R-390A, currently undergoing backlash hunt) Summary: Found and corrected a design error, diagnosed main remaining source of backlash (cam 203 front bushing), but couldn't drift out the pins. Arrgh!

Last time I discovered a lot of backlash (up to around 15kHz!) between the VR counter and Cam 206 (16-32MHz). Since then, I have measured the worst-case torque at Cam 203 (2-4MHz).

On my radio, it is around 40 inch-ounces. This occurs when Cam 203 is rotated CCW, approximately 2-3/4 turns CCW from 2.000 . Cams 203, 206, and 213 are all rising on their steep "backside" profile. This is about double the worst case CW torque, which led me to check the spring direction on the split gears.

It appears that <heresy> Collins blundered! </heresy> . Cams 204, 205, and 206 are correct, but cam 203 is sprung backwards, such that the worst-case system torque wants to stretch the spring. This wasn't the worst. Sun Gear 2, the output gear of the differential, is also backwards. This gear carries more torque than any other, and at worst-case its spring tension is easily overcome. On my receiver this is contributing around 4kHz of backlash. When I found that even a bone-cracking four teeth of preload wasn't enough, I decided to reverse the springs. I took apart the differential again, removed the floating half of Sun-2, and drilled new spring holes at ends opposite of original. I also had to reshape the slots with a Dremel to make room for the springs in their new positions.

While I was at it, I soaked all the pieces in solvent. This was good except it took off my markings! As I think I said before, the three planet gears are not quite interchangeable, and I had a merry time finding a combination that didn't bind. Any of you who are going to do this, I think you should engrave them.

I consider this part of the work a success. At worst-case torque, Sun-2 is now torqued in the "solid" direction instead of the "springy" direction, and the required preload will only be half of what it would have been. If I do the same to cam 203, cam 203 will only need one tooth of preload and Sun-2 will probably get by with 2. I've been measuring backlash with a universal indicator on the teeth of cam 206. When I idly put the indicator on shaft 203, I found that its front bushing is worn out. The shaft "walks" side to side about .005" when I rock the KC knob. (The other shafts are .001 to .002 .) I miked the shaft at .2484, and ordered some .250+/-.001 bushings, which is the closest I could find. I separated the mechanical assembly from the RF deck (thanks Jan!), got a 1/16" pin punch, made a v-block out of .125x.500 bar stock welded to a big counterweight, and went at front cam 203. I identified the small end, and gave it a tap. Nothing. A bigger tap. Nothing. More. Nothing. More. Nothing. More. Bent the punch :-< . Straightened the punch and tried a few more times, restraightening it each time it bent. Absolutely NO GO. Just for the heck of it I tried front cam 205 (which isn't secure on its shaft so I have to go

there anyway). Came right out. At this point I am blocked. I'm ready to ask for a loose shaft, cams, and pins, and hacksaw out the original. Suggestions? Aside from "get another RF deck" :-)

Date: Mon, 23 Jul 2001 15:48:31 -0400
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Restoration Bulletin 3: More Gear Train

> At this point I am blocked. I'm ready to ask for a loose shaft,
> cams, and pins, and hacksaw out the original.
> Suggestions? Aside from "get another RF deck" :-)

Is it possible the cam collar is somewhat mashed over on the big end of the pin? Did you try heating the collar with a mini-torch, or even maybe a high wattage soldering gun? Sometimes, it take repeated heating and cooling to break the "dissimilar metals" fusion that can occur with this stuff. Doubful that something like liquid wrench would work. Could it be that the pin/collar is banged up in such a way that the small end looks like the big one? Long shot. You might have to explore both ends of the pin with a Dremel, or just excavate the big end with it slightly first and see what happens.

Date: Mon, 23 Jul 2001 13:28:37 -0700
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: [R-390] Restoration Bulletin 3: More Gear Train ??

Apply file to both ends of pin on gear collar. you may be going the wrong way and just can not see it. Ends may be "riveted" over and a bit of file may clear it up. After file and re punch you make need to drill the pin. I would never hack saw it. I do not have the book at hand. Can the gears that are loading against the spring be turned over? The repair guys never worried about this level of detail. Where are the Ops? When you fellows rolled up on a freq, did you worry if you were spinning the knob in a direction that was pushing the cams up. Did you guys roll over a freq and then spin back knowing the lash in the gear train would get you a better signal spinning the know one way as opposed to the other.

This will be different on different bands. 1-2 3-4 may not be much but the 17 - 31 could be a big factor between the IF cams and the RF cam. 4 - 8 could also get you with the double conversion. From the search Ops view, did you guys notice any real difference in the head set or are we pondering the artistic aspect of the art here?

Sure its there, but can you hear it?

Date: Mon, 23 Jul 2001 13:51:32 -0700

From: David Wise <David_Wise@phoenix.com>
Subject: [R-390] RE: Restoration Bulletin 3: More Gear Train

Several people responded very quickly with suggestions for

1. Heat/cold
2. Drilling
3. Harder punch
4. "Hold the thing tighter than a v-block"
5. Penetrating oil

I would like to thank all of you who either said these things or were getting ready to say them. I did not try this stuff yesterday, but believe me I will soon. I'm having trouble visualizing Roy Morgan's #4 suggestion (abridged here), but the gist was to eliminate shaft rotation. I can probably do that somehow. I'll keep you posted. Oh, and one person wondered if the backwards Sun-2 springing was the result of a previous misadventure. I don't see how. The "solid" gear is pressed onto the output shaft. The "floating" gear can only fit one way; one face is different from the other. My best guess is, this is an early unit and they corrected it later. If anyone can peer into their differential, I'd be very curious as to the direction of the springs. I may have this backwards today, but I _think_ the original visual appearance will be (to someone looking in from above the axis) a spring attached closer to you at the right and farther away on the left. The "closer" gear is the floater, so clockwise torque on it will stretch the spring. Now I have to go home and look at it :-) You can also check cam 203 if you feel like it, it's easier to tell. I'd like to know which way yours is: is backlash possible with clockwise torque, or with counterclockwise? And don't forget, I'm doing this in order to replace a bushing. If anyone has any .249 bushings, I'd like to hear it.

Date: Tue, 24 Jul 2001 07:54:08 -0700
From: David Wise <David_Wise@phoenix.com>
Subject: RE: [R-390] RE: Restoration Bulletin 3: More Gear Train

I don't like to invent terminology where such already exists, but I had the RF deck in my lap and no place to put the manual. I refer to the cams by the coils they control, so the cam for T201 and Z201-* is "cam 201" and so on. If anyone would rather I use the callouts from Y2K Figure 6-36, say so and I will do it that way from now on, but frankly, I'd have to look it up every time!

Date: Tue, 24 Jul 2001 10:58:32 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Restoration Bulletin 3: More Gear Train

Your advice is well taken. However, different folks have different goals in all this. My goals for my radio hobby are as follows, in order of my priority:

1) Spend happy hours messing with the equipment.
2) Get it running as well as possible.
3) Restore the equipment to original condition and performance.
4) Operate the equipment.
5) Operate the equipment on the air.
6) Collect operating awards like DXCC
7) Operate in contests
8) Amass a collection of CCA "Excllent" stuff that seldom gets used, and count the ventilation holes in the cabinets. <snip>

Date: Tue, 24 Jul 2001 08:11:33 -0700
From: David Wise <David_Wise@phoenix.com>
Subject: RE: [R-390] Restoration Bulletin 3: More Gear Train

I feel the same way to some extent, but who's to say the new one wouldn't be just as worn? I've never heard bushings mentioned on this list (including the archive), and I wonder if some cases of poor performance might not be traceable to the same mechanical causes. I'd like to hear from other people who've measured their backlash and tracked it down. This is a problem all heavily-used R-390*'s will eventually have, so I feel that grappling with it is in a small way a service to the group. And I'm having fun in spite of my occasionally bitchy tone. When it quits being fun, I'll get a spare.

PS - Did a few hot-cold cycles last night but nothing else. Instead of Freeze Mist, I just quenched it with ice water. If you use a propane torch, take it easy, stop BEFORE the solder melts :-) Caught it just in time, nothing shifted. Left it with Marvel Mystery Oil working its way in. I'll repeat this a few more times before picking up the hammer.

Date: Tue, 24 Jul 2001 08:45:32 -0700
From: David Wise <David_Wise@phoenix.com>
Subject: RE: [R-390] Terminology cross-reference (was Y2K manual)

Glenn, I'm really sorry to have led you astray. As I posted, I made up my own terminology because I had the deck on my lap and couldn't see the manual from where I was sitting.
What I've been referring to as "cam 203" is Index 163 (2.0MHz to 4.0MHz RF camshaft) on Figure 6-36. The gear at which I measured torque is Index 59 ("Number 2 gear assembly"), or Index X of Figure 3-10. The gear at which I measured backlash is Index 141 ("Loaded rack gear assembly..."), or Index DD of Figure 3-10. The gear I call "Sun-2", with the

backwards springing, is part of Index 39, or Index V of Figure 3-10. Note that "Number 2 gear assembly" has nothing to do with the camshaft it turns; it turns the camshaft that controls T203.

Date: Wed, 25 Jul 2001 21:52:27 -0700
From: peter murphy <pete@c-zone.net>
Subject: [R-390] rookie alignment problem

I am trying to align my R390A and things are not going well. It all started with a broken gear clamp and the radio lost mechanical synch. I dropped the front panel, replaced the clamp and aligned all the cams at 7+000. In the process, I also had to replace all 3 slugs from the 8mhz slug rack which bent and broke off. (Yup, I screwed up). So, I replace the front panel and start the electrical alignment. The only sections that I can successfully align are the L's @ 4400kc and the C's @ 7600kc. The rest are basically dead and can't even hear the sig from the signal generator (at the designated alignment freq). When I connect to an antenna, the 3,4,5,6,7mhz bands are OK, the rest of the bands are dead. An interesting note is that I copied a 3850khz qso on 15150khz. Also, with the R390A tuned to 15200khz, a 21 mhz sig is heard from the signal generator. Other similar anomalies also occur on other freqs. All the cams that I can see with the front panel on still are aligned. The lower left pair could have slipped but I doubt it. I am suspecting a "first time" rookie error on my part in mechanically synching the radio. Before I drop the front panel again, is there anything I am missing here. The PTO is only 1 kc long and was never detached from the RF deck. I am using the Y2K manual and old copies of HSN as my guides.

Date: Thu, 26 Jul 2001 06:58:59 -0400
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] rookie alignment problem

I was holding off for someone more experienced to reply, and maybe some have done so off the reflector :-(.

Anyway, your problem sounds annoyingly familiar so there's the outside chance I could say something helpful.

.....It all started with a broken gear clamp .....

Does this mean that everything worked beforehand?

> I .....replaced the clamp and aligned all the cams at 7+000. In....

I hate when that happens. What kind of slugs did you put in there? There's some possiblity they're wrong, but not likely that's the problem. If I'm not

mistaken, most of the coil slugs are the same on the A, though I've found some with color dots. Hope you didn't throw out the original broken ones.

>,,.....the 3,4,5,6,7mhz bands are OK, the rest of the bands are dead.....

I'm getting a definite deja vu sensation here. As I recall, I got some action on one of the 3 lower bands (0, 1 or 2), but just part of its range.

>.....All the cams that I can see with the front panel on still are aligned. .....

This is familiar, too.

> I am suspecting a "first time" rookie error on my part in mechanically.....

Methinks you're the victim of one of your namesake's laws -- yes, that Murphy. For what it's worth ... I think you need to drop the panel and go over the mechanical synch again -- from start to finish in the order shown in the manual. Here are some possibilities (don't ask me how I know this ;-)

1. You got confused and misinterpreted the orientation of one of the cams. I found one that was 180 degrees out -- yes, backwards. When I first looked at it, somehow it looked right. Force yourself to sight through the holes in the cams to the marks on the frame. Refer to the cam diagram in the manual on each one. You could be lining up a cam on the wrong "mark". Triple check that the counter stays on 7+000. More about that ...

2. There's another broken cam or one or more is not tight enough and slipping. When operating the MC and KC knobs to watch the cams and gearworks, it's distracting because there are so many moving parts and moving in odd directions. You have to keep your eyes on one shaft/clamp at a time and turn each of the knobs looking for slippage. I've noticed a devilish thing on this, coincidentally related to that backlash thread. A cam clamp can slip just over part of the rotation. It will track on the "low end", but as resistance increases moving to the topmost slugrack position (with fuller extension of the springs) it stops. It will then move on the downswing and may well be lined up when back to the 7+000 position. The cam you replaced is the prime suspect. Make sure they're tight but don't break them.

3. You sabotaged the synch at one point. This could happen: You go over each cam as per the instructions. However, to get at one or more of the set screws with the Bristol wrench, you had to move the KC off 7+000 and forgot to reset it before proceeding. Can't swear to it, but that's my theory

on what happened to me on with a non-A synch job I did. Got to be late at night and nothing worked so I gave up in frustration. ("Waaaah! I bwoke it!) Next morning, with a fresh brain, I noticed that someone had obviously broken into my place and scrambled all the cams. For a while there I was looking around for signs of the little people, but became suspicous that it was an inside job as nothing at all was missing and the ballast and rectfier tubes were still there and working. (Leprechauns or evil bizzaro R-390 phantoms would have stolen these or replaced them with fresh looking duds.) After going through a Columbo dirty raincoat and cigar self-analysis, only one suspect emerged.

4. As part of the synch, did you check the xtal deck? (the little MC numbers through the window?)

5. Might have to check the bandswitch synch, which requires removing the deck, but check the other stuff first.

6. Oh -- when you're turning the knobs watching for slippage, also look at the slugracks. Make sure they're really all the way down when the cam followers are in the lowest position. They can hang up -- and if, well, uh, someone might be capable of bending/breaking 3 slugs, that same someone might have slightly screwed up some others so they bind and won't drop down. Again, the mechanics are a bit devilish -- will track partway so if you don't watch through the full range, you could get the impression that they're OK. Lightly push down on the racks in the down positions. Watch for one that's cocked -- one end down, other hung up.

7. May be time for a tube check. While the coincidence that a tube failed is a long shot, according to one variant of Murphy's Law it's a virtual certainty. Or some other dumb coincidence.

Re-visit this when you're in the right frame of mind. If you're a bit groggy, first step is to get some coffee and not decaf. If you're jumpy, grab a Heinekin or similar and don't start until you've taken the full dosage. (I spec'd. Heinekin because that's Nolan's cerebro-cortical lubricant of choice and I figure ... y'know ..) Finally, have faith --you WILL fix this thing. If necessary, we'll make you fix it. Hope this helps, Barry

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Date: Thu, 26 Jul 2001 04:36:27 -0700 (PDT)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] rookie alignment problem

Peter: Two things,

A) I've never encountered a 390A that was aligned properly when I got it.

B) I've never had one that could not be aligned.

You'll get it done! I'm with a previous poster, check the xtal deck to make sure you are bringing up the right xtal, and that the right xtal is in fact installed. Also make sure the band switch (not the xtal switch) is incrementing at the right band-limits. Bonne chance. Tom

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Date: Thu, 26 Jul 2001 07:44:02 -0400
From: Bob Camp <bob@cq.nu>
Subject: Re: [R-390] rookie alignment problem

This is a bit weird but it can be fixed. More or less in order here's a couple of things to check, sorry if some if it's pretty basic:

1) Each RF slug rack should be near the bottom of it's travel at the low frequency end of it's range and at the top of it's travel at the high frequency end of the range. All racks reverse the travel outside the labeled frequency range.

2) The IF"s are nailed to the RF"s so if the RF racks are right the IF racks are right. This assumes you haven't been playing with taking cams off shafts

3) The material in the IF slugs is different than the material in the RF slugs so don't mix and match.- -- if you made it this far the racks are ok --

4) The crystal oscillator deck is also a mechanical sync item. There's a label on a drum that should point in between the 6 and the 8 at 7+000 MHz. Make sure the switch paddles are centered on the contacts at each stop.

5) Finally there's the dreaded band switch I'll bet a pound of used Lubriplate that's what the problem is. It is pretty darn deep in the radio. It should move as you go from 7 to 8 MHz. It moves each time you go from one RF coil set to another one. Like the crystal oscillator the switch paddles need to stop more or less centered on the contacts. This can be tough to figure out. The movement should begin a little after you start the MHz knob moving and it should complete a little before the knob hits the detent again. There is a setup procedure in the TM's for the switch but it's a bit brief ...

The main reason for going through steps 1 to 4 is to be sure you need to do step 5. The band switch is the hardest part of the whole mechanical alignment procedure. If you don't need to touch it then you don't touch it. It could have been a lot easier if they had included some kind of sync mark on the switch, but they didn't. Sounds like a good photo project for the Y2K

manual ...

Date: Thu, 26 Jul 2001 08:37:06 -0700
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: Re: [R-390] rookie alignment problem

Which gear clamp was broken?

>1) I've never encountered a 390A that was aligned properly when I got it.
>2) I've never had one that could not be aligned.

If 4 to 8 works then,
17 Mhz OCS and Ist mixer are OK.
2nd mixer is OK
2nd Osc crystal deck is OK.

Time to look into the band switch.
One day it worked.
The next day it did not.
One clamp broke.

It is, easy all you have to do is ..... It is a mechanical alignment problem.

As long as you have to do it, you should do it all.
MC detent stop. Zero adjust center. KC over run on both ends.
Cam alignment at 7+000 Band Switch alignment
PTO alignment. BFO alignment 3.5 to 2.5 IF
Second IF RF section.

Once is never enough.
When you get it all straight and have the electrical alignment done.
Do the electrical alignment again.

If the book is doing it for you, consider Chuck's video tape.

DO not feel bad. The US Army demonstrated this all in real time and let every tech to be have a day at it, to do a 1 hour job. Then in the field the new guys were always given these task to do under supervision. Leaping on one untrained and with out assistance is a real act of courage. Be proud.

Date: Thu, 26 Jul 2001 16:07:02 -0400
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] rookie alignment problem

The weird operation you describe may be due to the six-position RF band switch being out of alignment. This is driven by the intermittent switch

drive illustrated on page 6-8 in the Y2K manual. Page 6-9 gives the checkout procedure. It may be that while setting the cams the intermittent switch drive setting may have slipped.

Did the bands work reasonably OK before? If not, eyeball the workings of the intermittent switch drive. It's function is to engage the right set of RF coils through changes in bands as shown in figure 6-2 on page 6-8. If it doesn't work right and you suspect someone took the intermittent switch drive gears apart, there may be a problem. If you take them apart during a gear train tear down, be advised there is a single ball bearing type ball inside that must NOT be lost or omitted. Ideally one should have the RF deck with geartrain attached out of the set to get the RF switch adjusted and verified before attempting to go inside the intermittent switch drive or, heaven forbid, the gear train itself. This can be a can of worms, so be sure to have an ironclad reason for going in there.

Before considering that, check the crystal-oscillator subchassis band switch adjustment (page 6-10). The number in its window should match the megacyle number in the frequency readout. You should hear a click in the audio at the point where its contacts break. This should occur exactly midway between Megacycle changes. Are the crystals inside the oscillator subchassis oven the correct frequency and in the correct sockets? Crystals inside HR202 OK?

Other sources of help on the internet are Walter Wilson's pages and Jan Skirrow's. Hint for dealing with gear clamps: place a drop of (penetrating) oil on the Bristol screw thread and shoulder. Avoid over tightening. With that small touch of oil, you will feel the screw tighten down the clamp.

I'm always amazed at what a terrific job the Y2K manual is every time I open it. Can't sing its praises enough.

Good luck and let us know how you make out, OK?

Date: Thu, 26 Jul 2001 23:56:22 -0700
From: peter murphy <pete@c-zone.net>
Subject: [R-390] rookie aligner update

Many thanks to all of you for your very helpful (and entertaining) replies. I hard copied all of them and read them over on the back porch while sipping a cold 807 (sorry Barry, no Heinekins in the frig today). Feeling refreshed, confident and enlightened, I then went in the shop and tackled the R390A.

I dropped the front panel again and checked out the cam alignment. The unlikely had indeed happened.... both lower left cams had slipped. The

clamp on the 2-4mhz cam had loosened and is suspect. The splined screw is very worn and my bristol wrench is not getting a good "bite". I tightened it as much as I was comfortable and (crossed fingers) it seems to be holding as I exercise the geartrain. I will reinstall the front panel tomorrow (right now it's midnite) and complete the electrical alignment and report back.

If this happens again, I guess I have no choice but to replace another much more inaccessible clamp or at least the splined screw. Anybody ever replaced just the screw on that clamp without any other disassembly?

To answer some of your questions, the radio worked fine prior to the broken clamp. The broken clamp was the one in back of the large brass gear that the zero adjust pushes on.

A question for you guys: I need to locate pin D on J208. Can't seem to find the pinout in the Y2K manual. Does a '67 EAC have Field Change 7? I would like to check out the 6 position band switch as detailed on page 6-9 on the Y2K manual. You guys have me worried about that bandswitch.

Date: Sat, 28 Jul 2001 07:29:12 -0700
From: peter murphy <pete@c-zone.net>
Subject: [R-390] rookie update--it works!

It's now Saturday morning and I spent the majority of Friday on the R390A. After aligning the cams I fired it up with the same symptoms. I said some bad words and then did the bandswitch test as detailed on p6-9 on the Y2K manual. It failed miserably. So I dropped the front for the third time, removed the RF deck and took a good look. One of the gears that drive the bandswitch had come loose and was not even connected to any other gear. To make a long story short, I connected up the gear so that the 4 teeth were facing down like the picture in the manual shows, turned the bandswitch until it passed the meter test and all is OK now. Even without an electrical alignment, the rig sounds HOT! It's a GREAT feeling. Thanks to all you guys for the help and encouragement. You're a great group.
PS: Bob bet a pound of used Lubriplate that it was the bandswitch, anybody got any?

Date: Sat, 28 Jul 2001 13:28:36 -0700 (PDT)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] rookie update--it works!

Glad to hear it. This is well-engineered gear, and most all problems can be tracked down.

Date: Tue, 31 Jul 2001 13:28:31 -0700

From: David Wise <David_Wise@phoenix.com>
Subject: [R-390] Restoration Bulletin 4: Gear Train Breakthrough

(MOT, 363-PH-54) GEAR TRAIN:

I managed to get the rear cam off the 2-4MHz shaft. Last week I heated the cam with a propane torch (watch the solder!), quenched it with water, and let it sit with Marvel Mystery Oil. Multiple times. No good. I bent and straightened the punch a couple of times, and then it broke. I straightened what was left, then broke it too. Now all I had was a 1/8" stub. I blasted the cam one last time, and this time I wailed on it while it was hot. Pay dirt! The old bushings drifted out easily.

I got some bushings locally, P/N FF0310 from US Bearings. They're .250+-1 ID, .380 OD (too big), the right length, and have a 1/16" flange (too thick). I filed down the OD until I could press it into the panel's .375 hole, and thinned the flange down to .040 with 150-grit on an orbital sander chased with a single-cut file.

The 2-4MHz camshaft now has less than .001" side play! I think I'll do the same to 4-8MHz and 16-32MHz. (8-16 doesn't look to need it, thank goodness.) <poet> That, plus the spring mod I did to Sun-2 / should get my backlash down to better-than-new. </poet> :-) <snip>

Date: Thu, 2 Aug 2001 13:25:54 -0700
From: David Wise <David_Wise@phoenix.com>
Subject: [R-390] RE: Restoration Bulletin 4: Gear Train Breakthrough

> I managed to get the rear cam off the 2-4MHz shaft. Last week I
> heated the cam with a propane torch (watch the solder!),
> quenched it with water, and let it sit with Marvel Mystery Oil.....

Last night I drove out the pin on the 4-8MHz camshaft, the second sloppiest after 2-4MHz. The trick is to hit it while it's hot. I played a medium-intensity propane torch flame on the cam hub for about ten seconds, then immediately whacked it with a pin punch. Got it out in three or four strikes, and only bent the punch instead of breaking it like last time. I guess that's an improvement :-) I removed the bushings using the camshaft as a drift. Gentle taps and they came right out. I filed down the first two replacement bushings a little too far, and they're not quite press-fit. I'll apply a tiny drop of blue Locktite off the end of a toothpick.

Date: Sun, 12 Aug 2001 17:02:54 -0500
From: "Frank Gilmore" <klycotek01@home.com>
Subject: Re: [R-390] Sticky IF slugs

Tom I ran into a similar problem several years ago on a later model Collins. I was tempted to use a lubricant such as GE's Silicon or WD-40, but had seen what those do with aging on firearms (was a cop then). I got some of the most expensive olive oil I could buy, in fact a lot of it. It is graded as to purity with contaminates and the smoothness. I can't recall their terms but it has to do with Virgin Plus or similar. I got a one of the old needles, a clean one, I had confiscated from a perp and after carefully warming the oil I filled the syringe and injected it into each slug path from the topside. I repeated the process three times before trying to move the rack because I had seen how easily things can be torn apart...our 390s are tougher but why tempt fate? Might give that some thought.... I ate Italian for months to use up the remainder!

Date: Sun, 12 Aug 2001 18:34:15 -0400
From: "Ed Tanton" <n4xy@att.net>
Subject: RE: [R-390] Sticky IF slugs

You have run into exactly the problem with WD-40. It 'dries' to a gummy-film. Subject to a small test on one of the coil form bodies, I'd try alcohol to solvate the gum. With the 'mouth' of the coil form up so that the alcohol can work on the slug. I would not use heat since it is my belief that would only further harden the WD-40 gum.

Date: Sun, 12 Aug 2001 20:29:27 -0700
From: Dan <hankarn@pacbell.net>
Subject: Re: [R-390] Sticky IF slugs

Well Gang, I had one that was stuck and I threw the complete RF deck in the dishwasher on full heavy wash and full hot dry and let it run full cycle and left it closed all night, it looks new, feels new and is very smooth after a few squirts of Teflon lube on the gear train. I run all except the PS and PTO thru the washer including the back panel with the complete harness.

Date: Mon, 13 Aug 2001 00:05:41 -0500
From: "Frank Gilmore" <klycotek01@home.com>
Subject: Re: [R-390] Sticky IF slugs

Dan that washing machine experience is to as far fetched as it might first appear. I used to get a day off from my own ham store and drive to Butler, MO to kibitz with the gang at Bob Henry's. We exchanged a lot of ideas and gripes about service problems. One particular day as I pulled in behind the building to park I found one of the guys standing outside with a pressure spray giving a HQ-129-X a thorough dousing. Looking closer I could see why because it had to rank as one of the dirtiest receivers I ever saw. He said at least one or two rigs a month came in for trade-in that were so bad they had to go through this process. Back to the WD40 for a moment. To

be fair to the lowly lubricant I do recall about seven years ago I was talking to one of the techs at Drake about a particular receiver I was working on for a fellow that had the gunkiest nylon dial gears I had ever seen. He told me their standard procedure on those were to saturate them with WD40 and let them sit for a couple of days and then use Blue Shower or similar to clean the whole mess off. Said they came out sparkling clean. I just couldn't get up nerve to do that to a defenseless R4C....I had a very expensive can of General Motors trim cement remover that I had bought at a parts house. Used when the side molding falls off your new Chevy sitting in a parking lot. Following instructions it won't hurt the paint and will get every trace of that sticky goo off the car. I used a small paint brush and smeared it on the gears and let them sit about two or three hours and then used a air pressure hose to blow the stuff away. Worked very nicely. Whipped out the olive oil and put a light coating on the gears and all was well in the world. At least the owner never came back.... maybe he is sitting in a sidewalk cafe in Milan.

Date: Mon, 13 Aug 2001 08:22:34 -0400
From: "Warren, W. Thomas" <wtw@rti.org>
Subject: RE: [R-390] Sticky IF slugs

Anyone tried Marvel Mystery Oil on slugs/phenolic coil forms to loosen up the slugs. I'm a bit concerned about a possible interaction of the MM Oil on the phenolic. I don't need the phenolic swelling up. I simply need to get the slug to turn moderately easily. So far, I've tried isopropyl alcohol and that seemed to help on one transformer, but hasn't budged the others. Maybe modest heat from a hair dryer is the next step. Any comments from the group?

Date: Mon, 13 Aug 2001 08:54:24 -0400
From: "rbethman" <rbethman@home.com>
Subject: Re: [R-390] WD-40

The reason for this is simple. The WD in WD-40 stands for "water displacer". If one carefully reads all the little fine print, it is NOT intended as a lubricant. But humans being what they are, consistently ignore the labels. <grin>

Date: Tue, 14 Aug 2001 05:27:04 -0700 (PDT)
From: "Tom M." <courir26@yahoo.com>
Subject: [R-390] Dishwasher and Sticky IF slugs

If you get too rough with the RF/xtal deck, you'll screw up the insulation around the xtal over. This and the insulation in the PTO are about the only parts I can reckon shouldn't be washed. On the RF deck, I use a bug sprayer with hot water to selectively blast certain areas. Garden hose is

good for the frame and other modules.

Date: Tue, 14 Aug 2001 09:08:38 -0700
From: David Wise <David_Wise@phoenix.com>
Subject: [R-390] [390A] Restoration Bulletin 5: Gear Train Button-Up

[MOT 363-PH-54] I've been only getting in a little work each week, but I'm almost done with the mechanical end of things. The mechanical assembly is bolted back onto the RF chassis. The toughest screw is the hex capscrew by S201. I held it against the hole with the side of a screwdriver while turning it with an open-end wrench. Next most difficult are the two phillips screws on top of the antenna trimmer. I tackled these with a right-angle screwdriver. When you replace the shaft, be careful to keep the gear insulated from it. Mine was misinstalled, the fingers sprung inward.

I have replaced all camshaft bushings. The new ones' side play is smaller than the measurement error. I cut them down to a sliding fit in the panel, put the shafts through them, and locked them down with dabs of blue LokTite. Most of the cams I removed didn't sit absolutely tight on the shaft when I drove the pins back in, so they each got a dab of LokTite too. The blue stuff breaks down easily with heat, so I don't expect any trouble in 50 years when the next guy has to work on it. By the way, like Nolan I ran into a couple of ridges on the cams, where the machinist stopped briefly then continued. I smoothed them off with a fine-cut needle file.

I've reversed the springing on three split gears to reduce the tension needed to prevent backlash. As far as I can tell, these have always been wrong and constitute a design error or a manufacturing error. I'd like to hear from you on the status of your own gear trains.

Terminology:

"Hard-Dir" is which direction requires more torque. It's the direction that raises the rack against the steep "back side" cam profile.

"Spring L-R=": Rotate a gear until a spring is at the top.
Is the Left end of the spring attached to the Front gear or the Rear one?

"Movable Gear": Which gear is free to rotate and is held only by springs?

"OK": Is this gear sprung in the right direction?

Before:

GEAR	HARD-DIR	SPRING L-R=	MOVABLE GEAR	OK
0.5-1	CW	F-R	F	

Y
1-2 CCW F-R R
Y
2-4 CCW F-R F
N
4-8 CW F-R R
N
8-16 CCW F-R R
Y
16-32 CW F-R F
Y
SUN-2 CW R-F F
N

The 4-8 gear was trivial, just remove the three screws, pull off the gears, flip them over, and reassemble. The screws had something on them, so I put on a dab of blue LokTite. On the 2-4 gear, you can reverse the movable gear, but you have to drill a new spring hole in the fixed gear and relieve the slot with a Dremel to make room for the spring in its new position. The Sun-2 gear has no reversible parts, so you have to drill and relieve both front and rear.

After:

GEAR HARD-DIR SPRING L-R= MOVEABLE GEAROK
2-4 CCW R-F F
Y
4-8 CW R-F R
Y
SUN-2 CW F-R F
Y

All that's left for the mechanicals, is lubrication. I'll use synthetic gear oil, administered a drop at a time from the end of a wire.

The most tedious part of reassembly was synchronizing the intermittent bandswitch. What a pain! After about ten tries, I got it to where, in both directions, it just barely disengages the old contacts and just barely engages the new ones. I don't think there's more than five degrees of leeway.

Once I have the crystal deck mounted and synchronized, I'll reinstall the racks, and we'll see just how much all this work bought me.

Date: Sat, 08 Sep 2001 23:51:34 -0400
From: Norman Ryan <nryan@intrex.net>

Subject: Re: [R-390] Best slug lubricant

Use talcum powder. It works like a charm.

Date: Sun, 09 Sep 2001 17:56:06 EDT
From: NE7X@aol.com
Subject: [R-390] Gear pressure clamps

I am restoring my R-390A and for some reason two of the gears keep slipping even after I tighten them. When I took the gear assembly apart to clean and lubricate it, I found the gear clamps cracked on these two gears. Does anyone have two gear clamps from a junker which they would be willing to sell, or is there a know source where I can purchase two gear clamps? Without these two gear clamps, my restoration project is now at a complete stop!

Date: Sun, 09 Sep 2001 19:01:25 -0400
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] Gear pressure clamps

Check with David Medley. Website: <http://home.att.net/~d.j.medley/>

Date: Sun, 16 Sep 2001 18:06:24 EDT
From: NE7X@aol.com
Subject: [R-390] Best lub to use on gears

I am just about finished completely cleaning all the gears, gears and more gears on my R-390A receiver. Now its getting time to reassemble and lube all the moving parts. I want something that will last for years to come. What is the best lub to use?

Dry spray Teflon
Dry spray silicone
SAE 20 motor oil
3 in 1 oil
High temp electric motor oil
Silicone gear grease
Phonograph oil base grease

Maybe a combination of two or three of the above?

Date: Sun, 16 Sep 2001 15:54:37 -0700
From: David Ross <ross@hypertools.com>
Subject: [R-390] Re: Best lube to use on gears

Tom asks about lubricants for R-390 gears, and along those lines I have a

question for the group(s). Yesterday at a swapmeet, I found a spray can of "Perma-Slik G", made by E/M Corporation in North Hollywood, CA. This stuff is supposed to be a dry lubricant - comes in a 16 oz. spraycan.

I can't find much of use on their website: http://www.emcoatings.com/ but did request a spec sheet for Perma-Slik G

Apparently you just spray this stuff on, then it will air-cure, and then provide a dry lubricating film. I've tried it on a small steel part - Perma-Slik has a medium gray color and a very slick feel to it. The film appears to be quite thin. Has anyone ever used this stuff? Any experiences with this sort of 'air-curing' dry lubes?

Date: Sun, 16 Sep 2001 21:09:04 -0700
From: "Terry O'Laughlin" <terryo@wort-fm.terracom.net>
Subject: Re: [R-390] Re: Best lube to use on gears

I use Phil Woods Waterproof Grease. It is a dark green, non-staining, thick lubricant that doesn't creep, dry out, or separate and is slippery as hell. I've had several comments on the silkiness of R-390 tuning mechanisms that I have chemically stripped and relubricated with Phil Woods. Its thickness prevents some of the "grainy" feeling that Mobil 1 and thinner lubricants leave behind. It is sold at better bicycle shops.

Date: Sun, 16 Sep 2001 20:44:20 -0700
From: "Bob Tetrault" <rstetrault@home.com>
Subject: RE: [R-390] Best lub to uese on gears

Of all on your list, I'd suggest silicone gear grease, but personally I use synthetic gear oil, 80-90 weight. Red-Line. Mobil One just isn't good enough...

Date: Sat, 10 Nov 2001 18:06:25 -0600
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] Gearing-up question

.....slight mechanical bind when dialing between .....

Is the riveted dial-lock plate interfering with the neighboring gears? Is the dial lock partially on? Both of these could be related to the problen; remember that one turn is 100 KHz, and.....

Date: Sat, 10 Nov 2001 22:33:35 -0500
From: Bob Camp <bob@cq.nu>
Subject: Re: [R-390] Gearing-up question

More or less in the order you asked them: The most obvious thing that makes the counter bind up is one or the other of the right angle drive gears being to tight. Often I will get them all snugged up to reduce play in the system and then have to go back and move them a bit apart to take care of problems like you describe. The heaters switch does not have any affect on the oven that heats the crystal calibrator crystal. The heaters switch turns on a heater on the PTO and one on the main crystal bank. Both are set up to be used in *very* cold conditions and do no benefit in normal operation. I would check the radio against WWV and see if it's the calibrator or the radio that is drifting. If it is the calibrator I would check the B+ on the stage first.

Date: Sun, 11 Nov 2001 10:33:53 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Gearing-up question

Your dial lock plate is probably rubbing, sometimes the KC change shaft gets bent and causes this, usually its just the lock too close to the disk. Flip the radio over and watch the disk while turning the KC knob and you'll see what I mean.

Date: Mon, 12 Nov 2001 08:44:59 -0600
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Gearing-up question

I had a similar problem. When I rebuilt the clutch mechanism, I did not push the gear/plate that is controlled by the dial lock fully against the stop (only lacked about .020 or .030 inch). While your brake plate may be warped (I've seen that too), it may not be pushed all the way against the stop. You might try loosening the clamp around that gear and applying a bit of pressure to ensure it is against the bushing.

Date: Wed, 14 Nov 2001 06:24:50 -0800
From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] Gearing-up question

Thanks to all who responded. I had a chance to take a quick look this evening, and have found the main shaft is bent. I have straightened it out as best I can, but it seems to have a compound bend in it. Will have to look at it further. In any event, it is much better now. Also, with the adjustments, I can now hear something inside rubbing, very possibly the lock dial plate. Thank you again for your suggestions. I'll have to take the front panel off to see what to do next. Haven't gotten that far yet.

Date: Tue, 13 Nov 2001 23:08:16 -0500
From: Norman Ryan <nryan@intrex.net>

Subject: Re: [R-390] Gearing-up question

Before removing the front panel to check out the rubbing you hear, you should first see if you can spot the problem behind the panel visually. Removing the panel may cause the rubbing sound to go away because you have to turn the dial lock clamp aside-- the most likely, albeit not the only possible, source of the rubbing sound. So, be sure to eliminate that possibility first. The solution may lie with just shifting the disc inward or outward along the shaft a tiny bit. (Watch how the big gear behind it meshes with its pinion.)

It's been a while since I've torn down a gear train and I can't remember if the KC CHANGE shaft can be stripped down to where you can remove it for straightening. There is a pin in the shaft that's not meant to be removed and I think it basically captures the shaft in the gear train plate. (I think you can strip and remove the MC CHANGE shaft.)

If you get far far enough into dismantling either shaft, be sure you take note of the order in which the stop washers and brass washers go. Make sketches! You'll kick yourself otherwise.

If the shaft turns with only slight binding, see if it will free up further by loosening its bushing on the front panel. Secure it finger tight-- it does not need to be much more snug than that.

Good luck and let us know how it goes.

Date: Wed, 14 Nov 2001 09:43:59 -0500
From: Al Solway <beral@videotron.ca>
Subject: Re: [R-390] Gearing-up question

> If the shaft turns with only slight binding,.....

I had a similar problem with my R-390A. The solution was to do exactly as Norman suggests. It has been in operation now since Jan 2000 and is still as smooth and easy to turn as I could expect. This is my first radio so I have nothing to compare it to. One suggestion. Make sure that the Megacycle Change Indent Spring is lubricated. On my radio after cleaning the gears without disassembly I continually rotated the gears just to see everything work. I was fascinated with the mechanism. After some time I started to hear a rasping sound, something like worn disk brakes. The cause was the Indent Spring plating worn down to the base metal. No amount of lubrication fixed the problem. I could not get a new one. I had to finally fabricate my own replacement which operates OK. Good luck with finding the problem.

Date: Wed, 14 Nov 2001 09:10:15 -0800
From: David Wise <David_Wise@phoenix.com>
Subject: RE: [R-390] Gearing-up question

You might be better off removing the front panel's shaft bushing entirely. It's not essential. This leaves the main shaft running in two bushings in the mechanical assembly. You won't want to lean hard on it, but it should turn smoother.

Date: Wed, 14 Nov 2001 13:46:13 -0600
From: David Medley <davidmed@sbcglobal.net>
Subject: Re: [R-390] Gearing-up question

The bent shaft syndrome is very common in my experience in the R-390. You will never get really smooth operation unless the shafts are true. For minor misalignment you can get away with just loosening the bushing going through the front panel but this is only a stop gap. What I do is remove the shaft altogether and true it up in a lathe. Before you do this be sure to have spare retaining rings on hand. I had one recent case that was so bad the drive gear actually slipped a cog on each revolution resulting in gradual loss of mechanical sync. This problem does not occur so frequently (seriously) in the R-390A due to totally different design. The bent shaft syndrome is usually caused by improper packing. There needs to be at least 2" of foam (NOT PEANUTS) between the front panel and the inner carton. You do double box it I am sure!!

Date: Thu, 15 Nov 2001 02:27:13 -0800
From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] Gearing-up question

Thanks for your suggestions. I have managed to straighten the R-390 KC Change shaft fairly well, but suspect I will have to remove it from the receiver to make it "perfect". The rubbing noise scares me a little, especially with Al's comments. Thankfully such noises seem to have appeared with the straightening of the shaft, and it may just be the brake plate rubbing a little. In any event, tuning is much improved and is now very close to the floating effect I have noticed in the R-390A. At the moment, other obligations make the project only an intermittent subject of attention. The receiver seems to be in basically good condition, but needs a tune-up. The bandpass centers are not the same for 2,4,8 and 16 KC, the PTO needs a tweak, etc. No doubt these are all normal avenues of attention for a set that has not been refreshed for a while. It is very reassuring that so many people have taken an interest in these sets and have experience that makes repair and upkeep something much less than a research project! Thanks again for your insights and sharing your experience. Much enjoyment has already been generated just reading and listening to

this newsgroup.

Date: Wed, 14 Nov 2001 17:55:09 -0500
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] Gearing-up question

You can get a little more use out of the detent spring by shimming it with washers to expose a new surface to the disc. (Suggested a while ago by Jan Skirrow.)

Date: Sat, 17 Nov 2001 16:57:12 -0800
From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] Gearing-up question

The dial is free enough where I don't want to fix it if it isn't broken. :-) However, there is a squeak which appears to come from inside the PTO. That I do hesitate to disassemble from all reports, yet, something must be dry inside. It does not squeak if the KC Change is rotated counter-clockwise, but does emit a quiet yip in clockwise (up in frequency) direction. Wonder if there is some way to reach inside the unit without removing it, although it looks like the PTO unit is easy to remove from the receiver. Other than that, I think the best thing is to run it a while longer, and pick away at further cleaning. As it turns out, am still looking for a ferrule or the beveled washer that is mounted between the base of the handles and the chassis.

Date: Mon, 3 Dec 2001 11:01:35 -0800
From: David Wise <David_Wise@phoenix.com>
Subject: RE: [R-390] Low Sensitivity below 8Mhz not related to a low 17Mhz
osc level

Look at the coils first! before removing the RF deck. They are socketed. Pull off the slug rack, reach straight into the coil with a #1 phillips, undo the screw and voila. Hardest part is getting enough grip on the can to pull it out. Be ready to catch the screw when you turn the coil upside down. If you know anybody local with an R-390A, ask him if he'll let you try his coils for a quick go/no-go.

Date: Tue, 11 Dec 2001 10:05:14 -0600
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] R-390 Web Page up and running

> .....an increase in the torque required to rotate. .....

You might do well to pull the top and the RF section cover plate, and have

a look at the cam positions and motions around the point of most resistance. It may be that one of the slug racks needs a tiny bit of grease, or some cleaning, or that you're just moving a cam follower and its rack over the highest point of the cam, in which case one would expect more force to be required.
If that's not it, then you get to look at the gearing and other fun stuff. A sane alternative is to pay someone else to look at the gearing, etc. There are some good 390-fixers available, and if there weer something wrong that required disassembling the gearing, I'd happily pay someone else to do all that fiddly work. Good luck, and please tell us what you find.

Date: Tue, 11 Dec 2001 11:33:34 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] R-390 Web Page up and running

<snip>.....an increase in the torque required ...

Make the needed effort. Apply De-Oxit (tiny amounts, please) to the switch contacts only.. find the source of increased torque.. you could be destroying the switch if its gone awry.

Date: Tue, 11 Dec 2001 09:09:56 -0800
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: Re: [R-390] Tight At 24.

.....increase in the torque required to rotate. .....

I do not have my receiver here in from of me to check for you so. Look into the CAMS. At 24 one of the off band cams may just be going over the top and causing a bit more friction. It could also just be a dirty spot in the gears. The receiver may have set unused on 24 for a long time and there is some oxide in the switch at that point. As you move the switch through that spot it binds. A cam could also be hitting a cam bottom and the slug rack drags as it moves up off the bottom either side of 24. Some day Al, you are going to pull the RF deck to clean the spider webs out and want to be doing a good gear train cleaning. When that time comes you can clean it up. Just dial through 24 easy and do not go jamming it through hard until you can get to it and live with it. Its not unusual to have a tight spot some where in the gear train. Inspect the problem, clean and lube it as best you can to reduce it and then live with it. Please be carful with this subject. In the past, this phenomena of gear train friction was explored. Some good folks wandered off and have never been seen since. Its Christmas and all, so this is not the time of year to stir old memories. If you have problems, please feel free to ask for help. Just try to stay away from the hypothetical questions about how much torque should be needed to trun the knobs and the reflector bandwidth should not be taxed.

Date: Wed, 12 Dec 2001 11:03:35 -0800
From: David Wise <David_Wise@phoenix.com>
Subject: RE: [R-390] Low Sensitivity below 8Mhz not related to a low 17Mhz osclevel

>.....I have had slug racks bind in their tracks due to dried up lubrication or other misalignment. .....in which case you slightly loosen the three phillips head screws holding it to the rack and let it "seat itself", then retighten.

Good point. I'm pretty picky about my slugs and go over them first, so on any set of mine that class of problem would never get a chance to manifest. Everything I wrote before assumes that your slugs are going up and down smoothly. I also assumed you'd aligned your set first (since I always do) but caught myself. Aligning the set sometimes flushes problems out into the open that would be hard to diagnose otherwise. It's also a good way to get familiar. If you are pressed for time and don't want to turn slug adjusters back and forth, you can get a partial picture by simply lifting the rack slightly, one end, then the other, then the whole thing. If it's in sync with the others, everything you do will reduce the sensitivity. If it's out of sync, half the time you'll see a slight *increase* which says that that slug is riding too low. Back to sticky slugs for a moment, I have seen some coils that were too far out of line for the slug positioner to correct. In these cases I've filed the rack to enlarge the hole, or filed the bottom of the coil can to correct its tilt. There's no evidence that the deck was dropped. Anybody else run into this, and what did you do?

Date: Wed, 12 Dec 2001 14:51:45 -0800
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: [R-390] Coil Cans.

<snip>.....Back to sticky slugs for a moment,.....<snip>

You are right Dave, Do what you need to do to get the coil under the slug. If the coil is not standing straight up and down under the slug, It needs attention. Do not get frantic about this. But get close to reduce the slug to coil form wear as much as reasonable. These run dry with no lube. The can form has pins that plug into the deck. This limits how far you can move the can form around. The cover can get more adjustment by filing on the side tab slots if needed. You may want to look into the can.

The frame inside may be bent out of shape. (God knows how it ever happened but it can happen.) This can result in the coil form not standing straight up and down under the slug. A small bit of force can fit this. Should you screw this up, you will need to confess it to another R390

owner (Chuck or Dave) and for a small reasonable fee seek a token exchange to mend your destructive ways. You may want to retire a bent can and seek a replacement. The old aggravation exceeds return on investment option.

All the slug racks are not the same. Some of the little carriers if assembled to a bad press run of racks will be quite far off alignment. I have seen a receiver or two back in the 70's that were just functional. Its just the chance of tolerance of interchangeable parts manufactured over a time span of years. If you got a replacement part that looks like it could fit better if filed a bit. Take the time to do it. I can not say this will make one iota or quantum of difference in receiver performance. But it may extend the life of the receiver or reduce the incident of tunnel carpel abuse on the owner operator.

Date: Thu, 13 Dec 2001 16:30:00 -0500
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] The Plot Thickens (R-390)

A good way to keep the slug rack springs under tension while poking around the coils is to take a pair of paper clips and bend them into a sort of lower case letter "h." The long leg on the left makes a handy handle. The crotch (as it were) hooks over the plate. The short right leg has a small hook at the lower right serif for grabbing the spring. Happy hooking.

Date: Thu, 13 Dec 2001 14:10:07 -0800
From: David Wise <David_Wise@phoenix.com>
Subject: RE: [R-390] The Plot Thickens (R-390)

> A good way to keep the slug rack springs under tension while poking
> around the coils is to take a pair of paper clips and bend them into a
> sort of lower case letter "h." <snip>

Good idea, Norman. I tend to just hook them over the trimmer openings in the coil cans, but sometimes that feels like I'm stretching the spring close to its limit, and besides, it kind of defeats the point if you're trying to remove the coils.

Date: Thu, 13 Dec 2001 21:49:26 -0800
From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] The Plot Thickens (R-390)

C277 replaced. Next is a look inside Z215. Don't think this is related to the oscillation, though. Is great to have an exact replacement, junk boxes are good for something!

Date: Fri, 14 Dec 2001 11:11:32 -0800
From: David Wise <David_Wise@phoenix.com>
Subject: RE: [R-390] The Plot Thickens (R-390)

I doubt it, but it was screwing up your set and clouding the issue. On to the real quarry!

Date: Fri, 21 Dec 2001 20:48:11 -0500
From: Al Solway <beral@videotron.ca>
Subject: Re: S206 Bandswitch notes: Setting the Geneva mechanism synchronization

I am working on my first R-390. After removing the RF Deck for cleaning I found that it was hopelessly out of sync. Yes the Green Gear was properly installed. A couple of days ago I received a copy of the Manual and began the task realigning the Deck and was doing quite well until I came to Par. 50 and couldn't find Fig 76. But I did remember reading something about this in a previous post. Went looking for it and found John's post. What a great help. The procedure works very well and I now have an RF Deck that looks good cosmetically and is in full sync. I hope.So, thanks a lot John. This is the second time that the group came through with help. Much more work to be done. Al VE2TAS

John KA1XC wrote:
> R-390 (original)
> S206 Bandswitch notes: Setting the Geneva mechanism synchronization
>
> John Kay
> KA1XC
> 11/17/01
>
> These notes are meant to serve as a replacement for the missing Figure 76 in R-390 TM 11-5820-357-35 and to complement paragraph (50) on page 83. To some extent these notes may also be helpful to setting up the R-390A bandswitch synchronization, but of course there will be some differences. S206 introduction S206 is a good choice for setting the bandswitch sync as it is easy to view from the back of the chassis. It is the 6th wafer (counting from the front) and the switch contacts are on the side of the switch facing the rear of the RF deck.
>
> Essentially it is a 6 position single pole switch but it looks like something more complicated. The switch wafer was designed to be "low profile" so that it could fit into the relatively shallow underside of the 390 RF deck. In a "normal" rotary switch the contacts would be simply be placed adjacent to each other with their actual spacing depending solely on the angle between the switch stops. Some of the switch contacts would

be at the top of the switch and extra chassis depth would be needed to accommodate them.
>
> In S206 (and the other bandswitch wafers in the 390) the top and bottom of the wafer have been cut flat to save space and the switch contacts placed on the left and right sides. To make this still work as a normal rotary switch without dead spots in the middle) a second contactor arm was added 90 degrees CW from the first, and as the first arm is disconnecting from the contacts on the left side of the switch, the second arm is starting to connect with
the contacts on the right side. Whichever arm that is not being used is not
> connected to anything and just goes along for the ride. Pretty ingenious!
>
> S206 contact positions
>
> With the RF deck upside down, and looking at the switch from the rear of the chassis, contact 8 is the contact on the bottom left; it is the wiper which makes it an easy landmark to spot. To determine a contact number find contact 8 and then count down while moving in the CW direction.
>
> S206 Contact positions are as follows (rear view):
>
> (top)
>
> 5 4 (no contact)
> 6 3
> 7 2
> 8 1
>
> There is no contact 4 but there is a space for it directly across from
> contact 5. (The contacts are somewhat circularly arranged but I typed them
> in columns.)
> ----------
>
> S206 band positions are as follows (rear view):
>
> 5 (2-4 MC) 4 no contact
> 6 (1-2 MC) 3 (4-8 MC)
> 7 (.5-1MC) 2 (8-16MC)
> 8 Wiper 1 (16-32 MC)
>
> ----------
>
> S206 Electrical connections are as follows (rear view):
>

> 5 to Z203-pin3 4 no contact
> 6 to Z202-pin3 3 to Z-204 pin3
> 7 to Z201-pin3 2 to Z-205 pin3
> 8 to V201 pin5 1 to Z-206 pin3
>
> ---
>
> S206 Bandswitch synch position (the missing Figure 76)
>
> The starting position for the bandswitch synchronizing procedure is the .5
> to 1 MC band, (contact 7):
>
> The leftmost contactor arm will be on contact 7.
> The arm should be positioned so that its *lower half* is centered on contact 7
>
> The right-most contactor arm will be pointing almost straight up (actually
> slightly left of center) and not connecting to anything.>
> ---
>
> Other notes for the .5 to 1 MC position:
>
> 1) The bandswitch shaft itself will be at a 45 degree angle, with the
> topside "flat" facing to the right of center.
>
> 2) The inside of each wafer section has a little pointy "nub" where it meets
> the top flat of the bandswitch shaft. These serve as alignment points for all the wafers; all the nubs on all the wafers should be pointing the same way. (This makes sure that a wafer isn't 180 degrees out of synch).
>
> 3) Don't worry about setting the starting position exactly, the bandswitch
> synch will get checked and adjusted later.
> ---
> Electrical testing of S206 alignment
>
> The TM is a bit vague on checking the alignment but they are basically telling you to eyeball the contactor arm positions. This gets you close but I found that an ohmmeter can be used to buzz out the switch connections much more precisely.
>
> After the 00 MC position is set (paragraph 49) the alignment can be checked

> pretty easily from the top of the RF deck via the V201 tube socket and the
> RF coil connections Z201 through Z206.
>
> One of the really nice things about the R-390 is that good size connectors
> are used throughout the radio, and this applies to the coil and transformer
> connections too, they used Mini-Banana plugs instead of the much smaller
> pins seen on the R-390A coils.
>
> Mini-banana plugs are readily available from the larger electronics
> suppliers and can be used to make a great connection with the 390 coil
> sockets for the purposes of ohming them out. You could use a regular test
> lead to connect to them but then you have to make sure that it stays steady
> while cranking the MC gears around. I happened to pick up a few Pomona
> mini-banana patch cords in different lengths and colors at a local flea
> market recently, they worked excellently.
>
> Procedure
>
> (This assumes you are re-assembling the RF deck and all the RF coils have
> been removed. If they are still in they can still be accessed from the
> bottom of the RF deck, just not as easily.)
>
> Basically you just buzz out the connections for the six different positions
> of the bandswitch. Using an audible beeper is a huge advantage because it'll
> allow you to keep an eye on the Veeder-Root readout while moving the MC
> gearing around.
>
> Connect one meter lead to V201 pin 5. (I stuck a resistor lead into the tube
> socket to make the connection and then clip-leaded to it.)
>
> Connect the other meter lead to the mini-banana plug (if you have one). It
> will be moved between pin 3 of coil sockets Z201 through Z206.
>
> Looking at the top of the RF deck from the front, the 3 coil contacts
> of each of these coils form a triangle shape pointing to the rear; pin 3 is
> the contact in the left corner of the triangle.

>
> The table below details the continuity between tube socket V201-5 and the
> S206 and RF coil contact for each MC band.
>
> Veeder S206 RF
> Root contact Coil
> -MC- # pin 3
>
> 00* 7 Z201
> *01* 6 Z202
> *02 5 Z203
> 03* 5 Z203
> 04* 3 Z204
> 05 3 Z204
> 06 3 Z204
> *07 3 Z204
> *08 2 Z205
> 09 2 Z205
> 10 2 Z205
> 11 2 Z205
> 12 2 Z205
> 13 2 Z205
> 14 2 Z205
> *15 2 Z205
> *16 1 Z206
> 17 1 Z206
> 18 - 29 ==> continues
> 30 1 Z206
> 31 1 Z206
>
> The asterisk pairs (**) show the MC positions where S206 actually
> transitions from one contact to another and continuity is lost.
>
> Use the 5 transition points to set the bandswitch sych. exactly.
> (Actually once the 1st transition is set up the remaining ones will pretty
> much fall into place, but they should be checked.)
>
> Use the Veeder-Root MC digits to see precisely where the switch continuity
> transitions from one switch connection to the other.
> (This is much better than watching the barely-moving bandswitch contacts).
> Ideally the bandswitch transitions should happen at the 50% point between MC
> stops.

>
> Example:
> Connect the mini-banana test lead to Z201 and change the MC band from 00 to
> 01 and back again to see where on the Veeder-Root MC counter the S206 switch transition takes place. Then move the test lead to Z202 and check the same transition point as it makes/breaks
> moving from Z202.
>
> Repeat this technique for the other transition points, moving the test lead
> to the other coils as required. Be sure to move two MC stops past each
> transition in order to make sure the Geneva mechanism has reached its final resting position.
>
> Results
>
> The first time I synched the bandswitch I found that I was pretty close to
> begin with and that the bandswitch moved at about 30%/70% between the appropriate MC stop positions. After I loosened up the bandswitch gear clamp and slightly* tweaked the bandswitch shaft position. I got to within 10% to 20% of dead center between bands.
>
> Sanity check
> Once I was happy with the way S206 was behaving I wanted to see what the
> other wafer sections were doing.
>
> I checked S208 by the same method, except that I needed to connect to tube socket V202 pin5 and measure to coils Z207 to Z212. The S208 synch. also checked out good, although I noticed that at the extremes of its travel the transition points were perhaps another 10% away from dead center compared to S206. This is normal.
>
> I called it quits here; the switching in the other bandswitch wafers gets a
> lot more complicated and really only needs to be checked if trouble shooting
> a problem. The whole point of this exercise was to adjust and verify the
> bandswitch sync. before installing the RF deck back in the radio.

From: "Joe" <joe.amp@verizon.net>
Subject: Re: [R-390] switch contact cleaning question
Date: Wed, 26 Dec 2001 23:15:15 -0500

I don know it this was a good idea but it was the only thing that worked after several people trying.Its almost almost impossible to get to the R-

390 XTAL rotary switches without major surgery. I also made a steel hook tool and a 1/4 access hole to retention both wiper contacts at the bottom. After that: I cleaned off all the spray and silicone from past attempts and brushed in a past of Oxy clean. Scrubbed with pipe cleaner, rotating Rinsed with distilled water followed by gas line antifreeze (Alcohol) let dry Then used 50-50% Cramalon Blue and red. Its been 10 years and no more needing to jiggle, the contacts still look good after inspection last month. The 2-1oz's of Caig Labs http://www.caig.com/distrib.htm pure Cramalon Blue and red cost me more than the radio at the time. I don't see the pure 1 oz 100% DeOxit viles anymore,that was good stuff !

From: "Walter Wilson" <wewilson@knology.net>
To: "blw" <ba.williams@charter.net>, <R-390@mailman.qth.net>
Subject: Re: [R-390] Simple Green and best RF deck lube (

Now you really have opened a can of worms. But just to get the can open and spread out a bit, let's start with this:

1. Simple Green is great for cleaning purposes, but only if you're washing it off afterwards with a water hose. Don't spray it on and rub off with a paper towel. It has a funny smell if you leave some behind, and the long-term effects on the aluminum surface has been questioned. Yes it cleans well, but get it off the aluminum afterwards.

2. Best RF gear lube? There may be several brands here that will serve equally well, but here's the best I've found so far. a) For the slug rack bearings and anything needing "oil", I use a 50:50 mix of Marvel Mystery Oil (penetrating oil) and Mobil 1 synthetic. The penetrating oil seems to help the Mobil 1 get to where it needs to be. b) For the items needing heavier grease (detent wheel, bearing slides, slug rack sliding plates, camshaft surfaces) I have settled on Phil Wood waterproof grease, which is made for the bikes. After a recent experience where I had tried several greases (Lubriplate plus other stuff lying around), another list member recommended the Phil Wood grease. I was amazed at the difference this seemed to make.

I'm sure there are lots of other "can of worms" topics out there. Best primer for aluminum before painting? Whether the antenna balance adjustment makes any difference? [it does ;-)] Is it best to leave the power on 24x7? (where's Nolan)

From: "Joe" <joe.amp@verizon.net>
Date: Wed, 2 Jan 2002 01:04:46 -0500
Subject: [R-390] Kilocycle Dial Tightness (after cleanup)

I was just wondering: After removing the front pane of a (R-390 non A)

and "de gumming" gears, rollers, bearings, planetary, PTO coupler I assembled and lubed with 50/50 Marvel and PTFE synthetic (The marvel was a suggestion posted here).

I took my time and cleaned and polished everything on the RF deck also Results: I can now can use one finger to tune Kilocycle's I also feel the counter rolling now. Is this spec or to loose ?

Date: Wed, 02 Jan 2002 01:25:12 -0500
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] Kilocycle Dial Tightness (after cleanup)

Sounds like you've done good. If the dial stays where you leave it, everything is A-OK.

Date: Wed, 2 Jan 2002 03:26:55 -0800 (PST)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] Kilocycle Dial Tightness (after cleanup)

Joe, I don't think it can be too loose. Make sure that the zero set disk/push pin connection is also well lubed else the kcs knob will turn when disengaging the clutch.

Date: Wed, 2 Jan 2002 09:29:36 -0500
Subject: Re: [R-390] Kilocycle Dial Tightness (after cleanup)
From: Tom Leiper <twleiper@juno.com>

Seems a bit tight to me. You should be able to just sit back with your eyes closed, and it will spin itself to any frquency you think about (within that band of course). Only Uri Geller has shown the ability to rotate the megacycle control...

From: Llgpt@aol.com
Date: Wed, 2 Jan 2002 11:13:55 EST
Subject: Re: [R-390] Kilocycle Dial Tightness (after cleanup)

If done properly, they can all tune like this. It's only too loose if you don't like it.

Date: Mon, 21 Jan 2002 20:59:47 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: [R-390] Reverse Migratory Habits of RF Decks

Yes, One flew through the door Friday here in the Great White North, NY, that is. It had a tag on it saying it was from one of the Barrys in Alabama, thanks, Barry! Anyway, it was a typical mess, someone had greased it

long, long ago,..... probably not Barry. The grease had turned to glue, the ten turn stops were all stuck together, the split gears were stuck together, the clutch was in pieces in a bag, two corners were bent, the MC detent spring is missing,..... I stared at it for a few hours while doing other things, then I did it! I tore it apart! I ignored the little voices saying "Better make a drawing of that!", "Better check the manual first!" HAH! not me, I'm diving IN!! I soaked half of the gears Friday night, the other half Saturday night, got it put together Sunday night, Monday morning I found out the manual isn't much help anyway! There's a nice homey feel to having a bucket filled with Kerosene and gears soaking in the kitchen sink! I had to put the four top, right gear groups together three times before I figured out which ones went on first, I got the Geneva drive plate upside down on the first try, and I had the bandswitch gear and the clutch drive gear swapped, but that wasn't too hard to find. The Geneva plate also had a bent pin that I straightened, must have been rammed against the stop too hard. It works nicely now. I did, however, manage to put the clutch together right the first time,..... after I found all the parts. Adjusted the 10 turn stops, the band switch, the counter (KC gear is missing, too), did a two tooth preload on all gears, lubed with Hoppe's No. 9 gun oil.

What a SCHMOOZY!!

Not much wear on the gears, cams, or slides, I wonder if this deck ever got much use. Its a 1956 Motorola with two different serial numbers. Deck corners straightened, MC gears straightened, no damaged teeth, they run true, quiet, and free so I won't change them. MC and KC shafts straight and true, too.

I found that none of the split gear sets would slide past each other so I took Nolan's suggestion and honed the burrs off each gear, especially No. 74 which because of the grease and burrs wouldn't move at all! That has to be the most expensive single gear in the whole set with its internal spring set in the hollowed out halves. I filed that one, it took a lot of work, too. The burrs were quite big, but that gear has a lot of force on it and makes many revolutions as a pinion against the big gears of the differential.

Fun puzzle! Not nearly as bad as it looks.

Date: Wed, 23 Jan 2002 06:56:34 -0600
From: mikea <mikea@mikea.ath.cx>
To: r-390@mailman.qth.net
Subject: Re: [R-390] Below 8mhz problem

><snip> .....I have heard that Rick Mish routinely removes the balanced

antenna >jack and replaces the unbalanced jack with another type. Any truth to this?

He didn't do anything of the sort with the all-Collins 390 he restored for, and sold to, me.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Below 8mhz problem
Date: Wed, 23 Jan 2002 07:30:47 -0600

American Trans-Coil <http://www.atc-us.com/ATCSHOP/> shows antenna relays on their website. I think they have a minimum order, though. I think Fair Radio <http://www.fairradio.com/r390a1.htm> would have them, but I think
they have a minimum order as well. Perhaps someone on the list has some spares...

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Reverse Migratory Habits of RF Decks
Date: Wed, 23 Jan 2002 07:49:49 -0600

> >I did find one of the small, thin (0.010"?) washers <snip>
> We need to find a source of thrust washers, <snip>

Sky Craft Surplus sells RG179 and Fair Radio sells the MB connectors. Both have a minimum order, though. I think someone on this list bought some of the coax and might sell a small length of it. Don't remember who it was, though. Good luck and keep us posted with your progress with the rest of the radio. Barry(III) - N4BUQ

Date: Mon, 08 Apr 2002 12:01:43 -0400
From: tbigelow@pop.state.vt.us (Todd Bigelow - PS)
Subject: Re: [R-390] Need green gear info.

Some of you might not have been here long enough to recall, but there was a guy on here a few years back by the name of Walt Quitt who was going to make these gears. He got some tools made for the backs of the receivers, but went no further. I had offered to send him my green gear as a model, but now I'm glad I didn't. He ended up hosing me for $500 on a 75A-4 I sold him! Hope none of you sent him your gears. I'd still be willing to make mine available for use, but I'd certainly be a lot more careful in the approach. I'm not sure it would be a simple task of finding a generic gear since this one is stamped from a thin steel(maybe even tin?) and is concave in the center, allowing you to mount it against the frame but still get contact with the teeth properly. I was pretty surprised actually to see my first one - not at all what you'd expect from the discussion. Seems like a

gear with such an important job would just look more....substantial and important? The green paint does add a nice touch, though. So, if anyone has a way to do this properly and securely, I'll still offer up my green gear as a model. And, if anyone out around the Carlsbad area would like a good deal on a Collins 75A-4, call your friend Guido and get in touch with me for details.

Date: Mon, 8 Apr 2002 12:23:21 -0400 (EDT)
From: "Paul H. Anderson" <pha@pdq.com>
Subject: Re: [R-390] Need green gear info.

Gang, Here's what I can find in the Instruction book for the 390:
Paragraph 83, subsection c, item 6 describes gear EEE as being a locking gear shown in figure 59. In figure 59, it claims to have 70 teeth. The parts list at the end of the manual lists a locking gear this way:

0309 - Gear: spur type; steel; locking; 23/64" OD x 1/8", ID x 1/4" lg o/a; mts on 1/8" shaft; Colins Rad part/dwg No. 506 1879 302. "Locking Gear" - Signal Corps stock # 2Z4878A-231.
I'd suggest trying a regular gear of that size, and using a brass tube silver soldered on to offset the gear appropriately. That's all I know for now...

Date: Mon, 08 Apr 2002 14:44:03 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Need green gear info.

>Will some one count the teeth and measure the dia of the green gear and
>post it here. There is nothing special about the green gear.

Yes there is.

1) it has a double-D shaped center hole.
2) It is cup shaped - like a dinner plate with a flat rim.

Point 1 is important, I think.
Point 2 may not be depending on the mechanical arrangement of the place it mounts when installed.

>If we knew the tooth pitch and dia, we could find a
>generic gear from small parts and let every one know about it.

I think this won't work.
I wish it would.
Not even Boston Gear has them apparently. <http://www.bostgear.com/>

Subject: Re: [R-390] Need green gear info.

From: "Roger L Ruszkowski" <rlruszkowski@raytheon.com>
Date: Mon, 8 Apr 2002 13:30:14 -0700

Roy, The double-D hole when properly set on the stud nut mounting point let the gear keep the whole gear train from being moved. As I have not looked at a Real R390 (not a A) since Korea in '72,

I do not remember if some of the R390 gear train stayed in the chassis when the RF deck comes out. If we can find a gear, there is more than one way to mount it in place and keep it from rotating. Paul provided the following from the parts TM.

The parts list at the end of the manual lists a locking gear this way:

0309 - Gear: spur type; steel; locking; 23/64" OD x 1/8", ID x 1/4" lg o/a; mts on 1/8" shaft; Colins Rad part/dwg No. 506 1879 302.
"Locking Gear" - Signal Corps stock # 2Z4878A-231.

I do believe he did quote the TM exact here complete with 23/64 typo. I do not remember the green gear being .359" inch diameter. I thought it was a 1.359 dia. At 70 teeth it would be about 16 pitch. Are the gears in the drive train 16 pitch gears in general? Is the hole in the center of the gear?

From: "Jim Temple" <jetemp@insightbb.com>
Date: Tue, 9 Apr 2002 13:21:57 -0400
Subject: [R-390] R-390 (not A) green gear

Well, after several days of "arm twisting", I have finally got one of the list to drop a surplus "green gear" in my direction. *This is hard to do over cyberspace*. :-) I know, I know, the gear is not absolutely necessary, but I am like a Shaker in respect to work. Do it the simplest way possible. Thanks for your encouragement, guys.

From: "Wally Hunt" <wally.hunt@centurytel.com>
Date: Wed, 17 Apr 2002 15:00:51 -0700
Subject: [R-390] R390a Intermittent gear alignment

I came across a EAC R390a that was partially disassembled. The intermittent gear had been removed from the band switch. I have info on where the gear itself is supposed to be aligned while in the 7+000 mHz position but I need to know what position the band switch itself is supposed to be in also. Luckily, I have everything back together and have good audio, good gear
movement and even static so I consider the project worthwhile to try to complete. Any help on the band switch alignment would be appreciated. Thanks

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Subject: Re: [R-390] R390a Intermittent gear alignment
From: "Roger L Ruszkowski" <rlruszkowski@raytheon.com>
Date: Wed, 17 Apr 2002 15:02:14 -0700

Take the time to pull the RF deck to complete this alignment problem. Remember to remove the spring from the Odham coupler on the PTO. Once you have the deck out, you see the band switch is just a wafer switch. Before you drop the front panel. set the dial zero in the center of its range. Forget the numbers on the counter the dial has a range. Set it as close the center as you can. Remember to loosen the dial lock before taking the front panel down. Remember it switches as follows:

0.5 - 1
2 -3
4 - 7
8 -15
16 - 32

- You want to watch it as you run the MC both up and down.
- Watch that the switch wiper centers in the switch contact.
- Watch that each switch section is making contact.
- Watch that as you roll up 1-2, 3-4, 7-8, 15-16 each movement point sets the switch into good contact on each wafer segment.
- Watch that as you roll back down 1-2, 3-4, 7-8, 15-16 each movement point sets the switch into good contact on each wafer segment.

Remember, this switch not only used to work, it used to work for years.....
There is some adjustment point where it will work again.

If you remove the deck and do the adjustment by eyeball. It takes less time.

Plus the end results are much more positive.

You may also want to inspect the 6C4 2.2K resistors for value (often bad)

You may want to look at replacing brown and black caps.

Look into the CAL 5814 tubes for burnt resistors.

You know as long as you have that deck out, there is no reason to put it back in with problems that will need fixing later.

Panic Not.

Prop the front edge up on some 2x4 blocks so you can drop the front panel flat on the bench. Remember the there is a couple of green screws in the sides (outside right MC end) (inside under the deck from the left (IF) end. then there are two in the front. You need to stick the screw driver through a hole in the KC dial lock disk to get one of them. there are two (three) green screws across the back. you need a long skinny #1 to reach down to get those green screws. Remember to un couple all the cable (1 power) most are the mini RF. Watch the PTO coax as it is strung around and needs watching as the RF deck is lifted free.

In the wafer sections you can see which section is wired to which RF transformers. This helps you determine if the switch is set to the correct contact as the switch changes sections. The switch change is all magic in the gear train. A special gear there decides when to move the band switch shaft to change the wafer section contact.

You get that gear to move the change on the MC detente to detente stop. and the switch to center in the wafer by adjusting the switch shaft in the switch gear clamp. These changes should not change the KC setting. Run the KC to both ends (with the zero center) and set your counter. remember to set the KC back to where it was so you do not rip up the PTO. Reset your cams and PTO after you get every thing back together.

This should leave you with a good mechanical alignment on the RF deck. Except for PTO alignment you should never need to do this again in. Until some clamp comes loose or breaks.

Roger KC6TRU.

P.S. You do have the Y2K Manual don't you? It really helps to have a book in one hand.

From: "Jim Temple" <jetemp@insightbb.com>
Date: Sun, 5 May 2002 00:20:22 -0400
Subject: [R-390] R-390 slugs

Well, I have been going over the Yahoo archives and it seems that there is no easy way to judge what slugs and coils match in the R-390. There was considerable discussion about color codes, etc. Everything you ever wanted to know about R-390 slugs is discussed in the April 1999 time frame, give or take a couple of months, in the Yahoo archives, except the final, definitive answer.

So it seems there is no real answer, beyong going back in time to question the manufacturers of these items. :-)

Date: Sun, 5 May 2002 08:56:59 -0400 (EDT)
From: "Paul H. Anderson" <pha@pdq.com>
Subject: Re: [R-390] R-390 slugs

It seems to me that a slug is a bunch of iron powder in a binder. How tough would it be to dissolve the binder, then weigh the powder to see how much it takes, then make new ones? Hmm... I've got a gunpowder scale... maybe time to weigh the slugs themselves with binder to see if I can get weight differences.

From: "Michael P. Olbrisch" <kd9kc@elp.rr.com>
Subject: RE: [R-390] R-390 slugs
Date: Sun, 5 May 2002 13:14:58 -0000

Oohhhhhhhhh.... another thread slipping off-topic. This is what I love about the R-390 list. There is always so much to learn from and about our fellow list members...

I use a LEE Safety Scale. I have tried a few, almost bought the Dillon electronic scale, but found that the LEE was as accurate as any, and near impossible to screw up with. I do my development on the LEE single stage system, but once I pick a load, I do the bulk work on a Dillon RL-550B. You are right, it might be possible to weigh the slugs. BUT... if the spring is not EXACTLY the same in each slug, it might have an impact on the results. Dunno. Since I do not have a spare rack, and I am not willing to take the working unit apart, I will have to wait for your research.

Date: Sun, 05 May 2002 10:25:24 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] R-390 slugs

I don't know if the weighing approach is the best first step. As I recall, we found a variety of color marks on the non-A slugs with no particular pattern to which was used where. Then, someone reported first-hand knowledge that these were cherry-picked and/or hand matched to the coil they were to go in. That seemed to end the thread, if I remember right. What about this? Hook up a reference coil to a Q-meter and use a caliper or something to control vertical position. Then read Q and resonant frequency for an assortment of slugs at various positions in the coil. Maybe figure out a pattern to those colors and then weigh them. Any thoughts?

From: "Jim Temple" <jetemp@insightbb.com>
Subject: Re: [R-390] R-390 slugs
Date: Sun, 5 May 2002 10:33:05 -0400

It appears, from my research, that there are two series of R-390 slugs. The first series is for the earlier production runs of the R-390. This is discussed in the Final Engineering Report for the R-390, available at www.r-390a.net/faq-refs.htm . Apparently the earlier production runs used 3 different values of slugs in the R-390.

1. For the 8-16, 16-32 RF coils, and the 9-18 Variable IF coils.
2. For the 4-8 RF coils, and the 3-2 Variable IF coils.
3. For the .5-1, 1-2, 2-4 RF coils.

They are not necessarily matched to individual coils, but the type of slug is selected for the above listed coil banks. The second series of slugs, for later production runs, were poorly documented in the 1962 TM 11-5820-357-35, page 3. Nowhere is there a definitive explaination or graph detailing how to identify the different values of slugs for replacement or alignment purposes. Some on the list attempted to chart their exhisting R-390 slugs, to varying degrees of success. This is documented in the Yahoo Archives as discussed below.
I will continue to research this issue and report back from time to time.

From: "Cecil Acuff" <chacuff@datasync.com>
To: "Barry Hauser" <barry@hausernet.com>, <r-390@mailman.qth.net>
Subject: Re: [R-390] R-390 slugs
Date: Sun, 5 May 2002 08:58:43 -0500

You must have been reading my mind as I was reading your post! There has to be some analytical way of measuring the permeable or ferro-resonant characteristics of the individual slugs. (not sure those are the right terms) I'll have to think on this one for a while!

From: "Jim Temple" <jetemp@insightbb.com>
Subject: Fw: [R-390] R-390 slugs
Date: Sun, 5 May 2002 11:56:30 -0400

OK, I think I have found a pattern to the color dots on the R-390 non-a slugs. In reviewing the Yahoo archives, I found two different members reported a similar color pattern. This was:

RF COILS...
0.5-1 yellow dots
1-2 yellow dots
2-4 yellow dots
4-8 red dots
8-16 blue dots
16-32 blue dots

Variable IF COILS...
3-2 red dots
18-9 blue dots

These color dots are consistent with ALL the coils within the listed coil row. Although the color dot pattern was not 100% in agreement, it was something like 95% in agreement. In checking my new/old R-390 this morning, I observed the exact pattern that I listed above, 100%. I observed two dots of the same color, 180 degrees apart, on each slug. Based on the observations of three different individuals, at different times, I would feel comfortable with claiming that the color pattern outlined above is correct for the earlier production runs of the R-390. My observation is also consistent with the Final Engineering Report on the R-390, refrenced below. NOW, this does not explain the science of the material used, permiabilities, and other scientific properties, but it does seem to explain what color dots go to what slug and what slug goes to which coil row, IN EARLIER PRODUCTION RUN R-390'S. As I earlier observed, I had noticed one of my coils was aligning to instability. I noticed that one of the 16-32 slugs was of a different color. So I exchanged the slugs and the alignment went well after the swap. It is now clear, from my recent observations of the color dots, that the two slugs that I swapped, IN FACT WERE OPPOSITES, which when exchanged, correctly associated themselves with the same color slugs in that row. Now all the slugs, in each row, are of the same color. I present my observations in the hope that owners of the R-390 might be able to explain inexplicable alignment problems and use todays observations to, hopfully, realize that there are three different slugs used in the earlier production R-390's. Of course, this information is useful only to the extent that the subject slugs have surviving color codes painted at the top of the slug, where the spring attaches to the slug.

Date: Mon, 06 May 2002 09:25:50 -0400
From: Mark Masin <mmasin@atc-us.com>
Subject: Re: [R-390] R-390 slugs

Who is the manufacturer of the coils that have these cores? Also what are the
Signal Corp drawing numbers of the transformers? Perhaps I can help clear up
this mystery. Mark Masin American Trans-Coil

Subject: RE: [R-390] R-390 slugs
Date: Mon, 6 May 2002 09:26:39 -0400
From: "Veenstra, Lester B." <Lester.Veenstra@lmco.com>

Wrap a standard number of turns aound it and measure the L.

Date: Mon, 06 May 2002 11:12:40 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] R-390 slugs

I believe all the slugs/cores in the non-A are iron powder, not ferrite, whereas most of the slugs in the R-390A are ferrite cores. The variation in the iron powder cores was accomplished by varying the ratio of binders and fillers to iron powder. I'd imagine the instructions were to "mix well", or maybe "shaken, not stirred." Could have been some variation in characteristics due to settling during setting/curing. I don't have an RF deck handy right now to check manufacturer's ID on the cans. I've never seen anything printed on the non-A slugs I've seen. If anyone does have some ID on the cans, shoot the info over to Mark Masin as he requested earlier.

From: "Cecil Acuff" <chacuff@datasync.com>
Subject: Re: [R-390] R-390 slugs
Date: Mon, 6 May 2002 10:25:26 -0500

I agree with Barry, Mark is in a good position to answer some of these questions since he was a manufacturer of various parts of the 390 and other great radio's we all Love..i.e. R1051's (had to get a plug in there somewhere) I have an RF deck in pieces and can look at the numbers on the cans but don't know exactly what I am looking at... I will post what I have in the next few minutes. (after a trip to the shop)

From: "Jim Temple" <jetemp@insightbb.com>
Subject: Re: [R-390] R-390 slugs
Date: Mon, 6 May 2002 11:34:48 -0400

Although my R-390 non-a appears to have the correct complement of slugs/coils, there is a good possibility of mismatch in many of the R-390's out there. This is due to the fact that, at least in early production run R-390's, three distictly different slugs were installed. I have read archive reports of alignment and sensitivity issues that seem likely to be caused by slug mis-matching. I, personally, corrected an alignment problem after noticing the color dots on the slugs, and correctly exchanging slugs to match the color code reported by previous archive posts. Now my R-390 has a consistent match of color dots within coil banks and the sensitivity matches my R-390A. In correlating archive posts, personal observation, and the Final Engineering Report for R-390, the correlation consistently supports the following:

1. In early production run R-390's, three different slugs were installed,

and one type slug was installed in all positions of a given coil bank.

2. The color dots correlated to the following slug/coil banks:

RF....

0.5-1, 1-2, 2-4	S-51 iron,	Yellow dot.
4-8	S-62 iron,	Red dot.
8-16, 16-32	S-100A,	Blue dot.

Variable IF...

3-2	S-62 iron,	Red dot.
18-9	S-100A,	Blue dot.

In the 1962 TM 11-5820-357-35, page 3 notes that begining with RF subchassis MOD 2, the slugs of the antenna coils were changed to a different material and the size of the slug in the 16-32 coil bank were reduced in size. Hope this helps with tracking down the R-390 non-a coil/slug investigation. Let me know if anyone agrees or disagrees.

Date: Mon, 6 May 2002 11:41:18 -0400 (EDT)
From: "Paul H. Anderson" <pha@pdq.com>
Subject: Re: [R-390] R-390 slugs

I looked at my copy of the R-391 parts list. It does not list NSN part numbers. It does list Collins Drawing Numbers, and if those are of use, I'll get them posted. I'm very interested in clearing this up - my 390 and 391's have a mixed bunch of no-mod and mod-1 RF decks with inconsistent slug markings from what has been listed so far. Haven't had time to follow up as much as I want... sorry.

From: "Cecil Acuff" <chacuff@datasync.com>
Date: Mon, 6 May 2002 11:03:23 -0500
Subject: [R-390] confusion

Am I creating confusion on this issue....is this only a NON-A issue. All the info I posted was for the A. Looking back at the posts it appears the questions are for NON- A's I may have jumped into something that I cannot help with....Have no NON-A's here!

Date: Mon, 6 May 2002 12:11:45 -0400 (EDT)
From: "Paul H. Anderson" <pha@pdq.com>
Subject: Re: [R-390] R-390 slugs

The following comes from the preliminary R-391 manual (seem to be the same as my preliminary R-390 manual in my lap): I believe these three cores are the main ones used in the the RF deck Tuner Assemblies. Note

that this is almost certainly ONLY for the R-390/391 no-mod RF deck. The Mod 1 RF deck has different slugs, and probably FOUR different types:

CORE, adjustable tuning: iron; 21/2" lg x 1/4"
Tuning slugs for Z202, Z208, dia w/one .062" dia phosphor bronze shaft Z214, T202, Z201,Z207, 7/a" lg o/a; Stackpole mfg type S-51.
Z213, T201, Z203, Z209, Z215, and T203. CORE, adjustable tuning: iron; 21/2" lg x 1/4"
Tuning slug for Z204, Z210, dia w/one .062" dia phosphor bronze shaft Z216, T204, Z222, Z223, 7/8" lg o/a; Stackpole mfg type S-62. and Z224.
CORE, adjustable tuning: iron; 21/s" lg x 1/4"
Tuning slug for Z205, Z211, dia w/one .062" dia phosphor bronze shaft Z217, T205, Z206, Z212, 7/8" lg o/a; Stackpole mfg type S-100A. Z218, T206, Z219, Z220, and Z221.
The Tuner Assemblies are (antenna ones listed first):

T202 TUNER ASSEMBLY, RF: aluminum housing; 1- to 2-mc antenna coilas trimmer cap. w/scdr adj; 1.672" lg x .918" wd sembly. x 21/4" h max; mtd by two #4-40 NC-2A tapped
holes spaced .594" c to c, accom captive mach screw; principal parts c/o fixed mica dielectric cap. C1, fixed, tubular, ceramic dielectric cap. C2, fixed mica dielectric cap. C3, dual variable ceramic cap. C4, and trimmer cap. C5; plug-in type term.; Sickles FW per Collins Rad spec
278 0165 00. Ref Name of part and description Function of part Signal Corps symbol stock No.

T203 TUNER ASSEMBLY, RF: aluminum housing; 2- to 4-mc antenna coilas adj trimmer cap. w/scdr adj; 1.672" lg x .918" sembly. wd x 21/4" h max; mtd by two #4-40 NC-2A tapped holes spaced .594" c to c, accom captive mach screw; principal parts c/o fixed mica dielectric cap. C1, fixed, tubular, ceramic dieleclectric cap. C2, fixed mica dielectric cap. C3, dual variable ceramic cap. C4, and trimmer cap. C5; plug-in type term.; Sickles FW per Collins Rad spec 278 0168 00; part of Sig C Radio Receiver R-391/URR.

T204 TUNER ASSEMBLY, RF: aluminum housing; 4- to 8- me antenna coils trimmer c/scdr adj; 1.672" lg x .918" wd x sembly. 21/4" h max; mtd by two #4-40 NC-2A tapped holes spaced .594" c to c, accom captive mach screw; principal parts c/o fixed mica dielectric C1, fixed, tubular, ceramic dielectric cap. C2, fixed mica dielectric cap. C3, dual variable ceramic cap. C4, and trimmer cap. C5; plug-in type term.; Sickles FW per Collins Rad spec 278 0171 00.

T205 TUNER ASSEMBLY, RF: aluminum housing; 8- to 16-mc antenna coil as trimmer w/scdr adj; 1.672" lg x .918" wd x sembly. 21/4" h max; mtd by two #4-40 NC-2A tapped holes spaced .594" c to c, accom captive

mach screw; principal parts c/o fixed mica dielectric cap. C1, fixed, tubular, ceramic dielectric cap. C2, fixed mica dielectric cap. C3, dual variable ceramic cap. C4, and trimmer cap. C5; plug-in type term.; Sickles FW per Collins Rad spec 278 0174 00.

T206 TUNER ASSEMBLY, RF: aluminum housing; 16- to 32-mc antenna coil as adj trimmer cap. w/scdr adj ; 1.672" lg x .918" sembly. wd x 2 1/4" h max; mtd by two #4-40 NC-2A tapped holes spaced .594" c to c, accom captive mach screw; principal parts c/o fixed mica dielectric cap. C1, fixed, tubular, ceramic dielectric cap. C2, fixed mica dielectric cap. C3, dual variable ceramic cap. C4, and trimmer cap. C5; plug-in type term.; Sickles FW per Collins Rad spec
278 0177 00. spec 278 0177 00.

Z201, TUNER ASSEMBLY, RF: aluminum housing;
Covers from .5- to 1-mc frequency

Z207, 1 trimmer cap. w/scdr adj; 1.168" lg x .918" .

Z213 wd x 21/4" h max; mtd by two #4-40 NC-2A tapped holes spaced .594" c to c, accom captive mach screw; principal parts c/o fixed mica dielectric cap. C1, fixed glass dielectric cap. C2, and trimmer cap. C3; plug-in type term.; Sickles FW per Collins Rad spec 278 0117 00.

Z202, TUNER ASSEMBLY, RF: aluminum housing;
Covers from 1- to 2-mc frequency.

Z208, 1 trimmer cap. w/scdr adj ; 1.168" lg x .918"

Z214 wd x 21/4" h max; mtd by two #4-40 NC-2A tapped holes spaced .594" c to c, accom captive mach screw; principal parts c/o fixed mica dielectric cap. C1, fixed glass dielectric cap. C2, and trimmer cap. C3. plug-in type term.; Sickles FW per Collins Rad spec 278 0121 00.

Z203, TUNER ASSEMBLY, RF: aluminum housing;
Covers from 2- to 4-mc frequency

Z209, 1 trimmer cap. w/scdr adj; 1.68" lg x .918"

Z215 wd x 2 1/4" h max; mtd by two #4-40 NC-2A tapped holes spaced .594" c to c, accom captive mach screw; principal parts c/o fixed mica dielectric cap. C1, fixed glass dielectric cap. C2, and trimmer cap. C3; plug-in type term.; Sickles FW per Collins Rad spec 278 0125 00.

Z204, TUNER ASSEMBLY, RF: aluminum housing;
Covers from 4- to 8-mc frequency

Z210, 1 trimmer cap. w/scdr adj ; 1.168" lg x .918"
Z216 wd x 21/4" h max; mtd by two #4-40 NC-2A tapped holes spaced .594" c to c, accom captive mach screw; principal parts c/o fixed mica dielectric cap. C1, fixed glass dielectric cap. C2, and trimmer cap. C3; plug-in type term.; Sickles FW per Collins Rad spec 278 0129 00.

Z205, TUNER ASSEMBLY, RF: aluminum housing;
Covers from 8- to 16-mc frequency

Z211, 1 trimmer cap. w/scdr adj; 1.168" lg x .918" .
Z217 wd x 21/4" h max; mtd by two #4-40 NC-2A tapped holes spaced .594" c to c, accom captive mach screw; principal parts c/o fixed mica dielectric cap. C1, fixed glass dielectric cap. C2, and trimmer cap. C3; plug-in type term.; Sickles FW per Collins Rad spec 278 0133 00.

Z206, TUNER ASSEMBLY, RF: aluminum housing;
Covers from 16- to 32-mc frequency

Z212, 1 trimmer cap. w/scdr adj; 1.168" x .918" .
Z218 wd x 21/4" h max; mtd by two #4-40 NC-2A tapped holes spaced .594" c to c, accom captive mach screw; principal parts c/o fixed mica dielectric cap. C1, fixed glass dielectric cap. C2 and trimmer cap. C3; plug-in type term.; Sickles FW per Collins Rad spec 278 0137 00.

Z219, TUNER ASSEMBLY, RF: aluminum housing;
Covers from 9- to 18-mc frequency.

Z220, 1 trimmer cap. w/scdr adj ; 1.168" lg x .918"
Z221 wd x 21/4" h max; mtd by two #4-40 NC-2A tapped holes spaced .594" c to c, accom captive mach screw; principal parts c/o fixed mica dielectric cap. Cl and trimmer cap. C3; plug-in type term.; Sickles FW per Collins Rad spec 278 0183 00.

Z222, TUNER ASSEMBLY, RF: aluminum housing;
Covers from 3- to 2-mc frequency.

Z223, 1 trimmer cap. w/scdr adj; 1.168" lg x .918"
Z224 wd x 21/4" h max; mtd by two #4-40 NC-2A tapped holes spaced .594" c to c, accom captive

mach screw; principal parts c/o fixed mica
dielectric cap. C1 and trimmer cap. C3; plug-in
type term.; Sickles FW per Collins Radio spec
278 0141 00.

From: "Bill Hawkins" <bill@iaxs.net>
Subject: RE: [R-390] R-390 slugs
Date: Mon, 6 May 2002 20:23:39 -0500

Haven't seen anything on why the slugs are different. I remember seeing the answer in the technical report. It has to do with the variation in Q as the slug pulls out of the form. If the rack has high Q then it is not possible to align it over the full range of motion. Or something like that - no time to read it again now.

From: "scott" <polaraligned@earthlink.net>
Date: Wed, 26 Jun 2002 06:38:44 -0400
Subject: [R-390] Broken slugs

What is the best way to deal with broken slugs on a 390 non-a? I crazy glued a slug on a Hallicrafters SX-71 and had good results. Thanks for any input.

Date: Wed, 26 Jun 2002 08:46:41 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Broken slugs

In an SX-71 the slugs don't have to move as they do in an R-390. I've had uneven results with crazy glue on things in general. I remember crazy gluing a handle back on a ceramic mug. Stuff seemed to set OK, but I'd come back a day later and the handle would be lying alongside the mug. There are different grades of crazy glue and the hobby shop or industrial stuff is supposed to be much better that the garden variety. However, when I repair slugs, I prefer two-part epoxy. Mix it well, apply a very thin coat -- if mending a cracked-through slug, or a reasonable mini-dollup if re-attaching a springy-thingy. Gently scrape off any excess before it sets fully, so you can basically "roll" it off without taking any iron powder with it. Let it cure for a few hours.

Date: Sat, 29 Jun 2002 23:27:06 -0400
From: Albert Solway <asolway@sympatico.ca>
Subject: Re: [R-390] update

<snip> One more item and it's related to the Deoxit and the problem with over application on rotary switches. I just about ruined a Yaesu FT901DM two years ago by applying to much Deoxit on the Band switch. The switch

just about froze up. I sprayed it heavily and often with isopropyl alcohol over a two week period. This seemed to help. It is now just about normal. Time seems to help also. My First R-390A was under restoration and suffered the same problem on one of the front panel switches. Stopped in time before I caused to much damage. I have tried all sorts of Deoxit applicators including Q-Tips, syringes, very fine artist brushes etc. All of these were to large, unwieldy or to expensive. Well this morning while taking the wife out to spend some of my hard earned money, I dropped in at a local hobby shop specializing in model trains and plastic model just to browse and kill time. What I found was something called a **Microbrush.** As soon as I saw it I knew that I had found the perfect Deoxit applicator. Total plastic handle length is 4 inches. Diameter about 0.125 inch with the last inch tapering down to 0.018 inch. At the tip is the brush which is molded into the tapered plastic. It is about about 0.100 in long and 0.040 in diameter. I tried it on the R-390 Harness switches and connectors. Much better and easier to use than the expensive artist brushes I have used. For tube sockets it's perfect. The brush will compress enough to fit within the rotary switch contacts. I used their Superfine size. The MFR has an internet site that describes the product very well. The price is right also, 10 for $1.75 CDN or about $1.10 US. Your local hobby store should stock them. The North American Free Trade Agreement has opened up to us Canadians a wealth of U.S. made hobby goods at fair prices. Prior to NAFTA we bought U.S made goods. The duty made prices out of reach on a lot of U.S. made hobby supplies. The pacific was our only source of reasonably priced goods. This is not a political statement but a statement of ordinary consumer satisfaction. Will climb down from the the soap box and say good night and have a good weekend.

From: "Bob Tetrault" <r.tetrault@attbi.com>
Subject: RE: [R-390] update
Date: Sat, 29 Jun 2002 21:10:58 -0700

Good call Al. Anyone sell micropipettes?

From: "John Saeger" <john@whimsey.com>
Subject: Re: [R-390] update
Date: Sat, 29 Jun 2002 21:38:13 -0700

Wow, now this is a great idea! I've been trying to figure out how to lubricate the rollers without getting too much lubricant all over the place. Microliter drops. Perfect. Too bad the pipettes are so expensive. I'll just have to borrow one over the weekend from my work.

From: "scott" <polaraligned@earthlink.net>
Subject: Re: [R-390] Gear Train Guru Wanted
Date: Sat, 3 Aug 2002 05:51:46 -0400

I'm about to do my 390A geartrain. While I am certainly no expert, (first time) I'll be happy to shoot digitals. I'll shoot them in full resolution (3 meg). They can always be compressed. I was going to do it for myself anyway. Might need them as a guide putting the gear train back together. :-)

From: "Walter Wilson" <wewilson@knology.net>
Subject: Re: [R-390] Gear Train Guru Wanted
Date: Sat, 3 Aug 2002 07:31:58 -0400

You may have seen the pictures I have posted on my website already. I think there are only eight shots taken during disassembly, but I've used these pics a number of times when rebuilding gear trains, and they work well for me. If you'd like more pics added to this sequence, give me some idea of where you'd like to see more details.

At one time, I was limiting the number due to web space size restrictions, which is no longer an issue.

http://r-390a.us/gear_train_rebuild.htm

Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Gear Train Guru Wanted
Date: Sat, 3 Aug 2002 09:43:29 -0400

The photo sequence and instructions on your site are terrific -- many thanks. However, I see where you started to move from "baby steps" to giant ones, no doubt owing to the web storage limits. Later on, you go with more of a verbal description I just spent about 30 mins., so need to look over it more to see where to add intermediate steps. Meanwhile, I humbly submit the following suggestions:

1. Superimpose number labels on the gears that are about to be removed. Maybe I'm a dummy, but I had to flip back and forth between adjoining photos a few times before I could spot what was coming off. It might be a good idea to use the numbering scheme from the manual blowup.

2. Use arrows in addition to "spotlight" highlighting. In particular, it's a bit difficult to make out the two gears that should not be meshed.

3. Do a step by step reassembly sequence, not simply rely on the "assembly is simply the reverse of dissasembly" approach. Fact is, it's not, and that's where a lot of the vebiage comes in. You can re-use most of the disassembly shots, but the key difference is this is where the synchronization takes place. (Actually, the _assembly_ sequence is more important than the disassembly -- it's generally possible to take something

apart with little or no instructions, however, tradition has been the ol' "reverse of dissassembly" thing.)

4. Maybe I didn't notice, but along the way I recalled some advice from various posts to the reflector. For example, the split gears may have burred or chamfered over from wear such that they won't slip smoothly against each other -- which is easy to test with the gear sets out and the springs removed. Someone had recommended (Nolan?) to lightly polish the mating surfaces with very fine grit abrasive - or maybe a wet stone? May not be necessary in most cases, but this would be the time to fix them..

5. I test printed everything in black & white on a 600 dpi laser printer, just to check if all the detail comes through. Sometimes, even starting from excellent quality color, detail is lost when adjoining parts are of similar color or shade. They print quite well in B&W -- the detail and contrast hold up. Only thing I'd point out is the superimposed text about the two-gears-not-to-mesh is hard to read in B&W. While the color contrasts on screen, the shade is too close for B&W. It's over a shadow, so yellow would work better when printed in B&W.

6. It would be good to illustrate directly how to set up the intermittent gear, rather than refer to the manual -- so your creation can be a stand-alone.

7. I strongly (but humbly ;-) suggest that you leave the disassembly be for now, and start with the assembly sequence. This will make it clearer as to what additional shots are needed. In many cases, photos can be the same between the assembly and disassembly sequences, so it won't be added storage, just an html photo link. You probably have a lot of the photos already.

8. I dunno -- might be better to break it up into pages with "next" buttons. This would help control the pagination for printing purposes and it might make it easier for you to clone assembly from dissassembly pages by doing a "save as" as a first step before editing.

9. Now this one will illicit an involuntary ROTFL reaction in some readers, but ... For a real gear-train-for-dummiies no-brainer approach, someone could put together a grid that prints out on, say 4 pages to be taped together which would have a place to lay down each part as they're removed, with the corresponding reference number. Many of the gears look different enough, some look similar and some may be the same/interchangable or maybe not, duhhhhhh. Eventually, we could turn the R-390A into a true Heathkit experience. ;-).

10. An emergency 24/7 hotline to call. OK, I've gone too far.

Great site, though. Hope you use this in the spirit intended (everybody's a critic, yadda yadda). I posted my suggestions in case some one else has additional or alternative ideas.

From: "fstyron" <fstyron@nc.rr.com>
Subject: RE: [R-390] Gear Train Guru Wanted
Date: Sat, 3 Aug 2002 10:07:05 -0400

Barry, I can certainly vouch for Walter's gear train pictures. They were very helpful on my first 390a (and second). Thanks Walter!

From: "Jim Temple" <jetemp@insightbb.com>
Subject: Re: [R-390] Gear Train Guru Wanted
Date: Sat, 3 Aug 2002 10:18:13 -0400

A few weeks after I obtained my first R-390a, I ordered a spare RF deck from Fair Radio. I understand that they have a few palletts of them, as rejects from the depots. They are complete, to include coils, racks, slugs, transformers, etc. I mean they are plug and play, except you have to find the fault before it will work. In my purchase the fault was only an intermittent RF coil that ended up being caused by a malformed coil pin socket. No amount of bending or forming would remove the intermittent. So I simply removed it from the plastic holder (which destroyed the plastic) and then it was easy to reform it. I now only needed to remember to plug in that individual pin from the bottom of the RF deck. It works like new now. I digress....

The point I wanted to make was that this RF deck is an excellent model to compare to when disassembling and assembling your subject gear train. And it is only $40 from Fair Radio. When I rebuilt my gear train, I used Walters photos and dialog as a step by step guide to disassembly and assembly. But as good as Walters efforts are, 2D photos have limitations that a 3D model does not have. I have no doubt that the guys that did this for a living referred to a 3D model, frequently, while learning their trade. For the best and easiest rebuild, both methods together are superior to either one by itself.

Date: Sat, 03 Aug 2002 07:36:43 -0700
From: Dan Arney <hankarn@pacbell.net>
Subject: Re: [R-390] Gear Train Guru Wanted

Barry, I agree on your post. I have one comment. When trying to read it on the computer the text is very close to the background color. Yes I know that is PC correct to merge the text and graphics to make it fancy but hard

to read.. A good contrast makes it a lot easier to read. It prints out fine TEXT wise and I think numbers would help immensely.

From: "Walter Wilson" <wewilson@knology.net>
Subject: Re: [R-390] Gear Train Guru Wanted
Date: Sat, 3 Aug 2002 10:56:08 -0400

Thanks for the comments. I especially like your suggestions about the numbers and arrow pointing to the gears to be removed or aligned, and can make some improvements with these existing photos. I may also take your suggestion of a PREV/NEXT sequence, just to make it more navigation friendly and to control the print pagination. I'll have to take some more pics during the next rebuild, as I didn't take too many more than shown during this rebuild. I really do need to take some good pics of the intermittent gear, as I've had to refer to the manuals a few times to get mine back together correctly. I've got a really nasty but spare RF deck and gear train in the workshop, and I might tackle that one sometime this fall. I don't believe I want to turn this into a Heathkit experience yet, but a better sequence and layout may be called for the next time I take the pics. The hotline will be open only on evenings from 7-9 PM EDT, Saturday afternoon following my nap, and Sundays before the R-390 net. BTW, it's nice to be back on topic.

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Gear Train Guru Wanted
Date: Sat, 3 Aug 2002 11:50:38 -0400

Hi Walter .. again ... Sounds good. It would also be OK I suppose if some others on the list with a gear train teardown in progress shot a few photos and sent them on to you. This would be in the spirit of a joint project and ... (read Groucho-style) we could use a few more projects around this joint (raise eyebrows and flick cigar.) Now that you mention it -- a preparatory nap of at least 2 hrs. should be recommended before starting. Should be full horizontal position to maximize blood flow to the brain as a warmup. If that's not enough and there are signs of the jitters, a suitable liquid sedative & confidence booster should be included in the chemicals kit along with the carb cleaner, WD-40, Mobil
One, and so on. BTW - Jim Temple's advice about having a spare deck on hand sounds good to me. Or even another whole R-390A. Even with the panel in place, you can peek behind it, but would that be cheating?

From: "Jim Temple" <jetemp@insightbb.com>
Subject: Re: [R-390] Gear Train Guru Wanted
Date: Sat, 3 Aug 2002 12:20:19 -0400

Back in 1969, in boot camp, I had to disassemble and reassemble an M-14

blindfolded. An R-390A gear train blindfolded now? Some might say, if it was good enough then, then why not now?? .....Nahhh, are you crazy?? The simpler the better I say. :o).

Date: Sat, 03 Aug 2002 11:25:52 -0500
Subject: Re: [R-390] Gear Train Guru Wanted
From: blw <ba.williams@charter.net>

I uploaded a TIFF file to Al Tirevold over a week ago on the RF geartrain. I scanned the exploded assembly drawing of figure 6-36,which is two pages at a very high resolution around something like 1200 dpi. I aligned the two pages in Photoshop, did touchup work on the alignment so it would look seamless, and sized it for a one page figure. I uploaded the 150 dpi version to keep the file size down as much as possible. The 150 dpi version prints good at 360 dpi on an inkjet printer using regular non-inkjet paper. Everything is sharp and easily read. I thought that would be a good test of resolution and readability for most people. If it prints well on regular paper, then it will look excellent on inkjet paper or on laser printers. I have a 300 dpi version ready to upload if a higher resolution is more suitable. If anyone else wants the work to put on a website, just let me know. I'll be happy to upload it if that is okay with the Y2K folks. It is ready for final annotations, such as page number, etc in Acrobat to make it complete for the manual. I'm just waiting to hear if the work is acceptable for the manual, and I'm ready to do any other figures that may need something more done to them. I sometimes miss doing this for a living, so working on Y2K manual stuff is the next best thing.

Date: Sat, 3 Aug 2002 14:50:55 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Gear Train Guru Wanted

I did one, its not that bad! Hone all the mating gear sets with a wet stone, like Nolan said, use a dental pick shaped like a hook to align the cams, use small Pony clamps to hold the spring tension on the double gears, the plastic shoes on the clamps won't mar the gears. The Geneva drive is a pain and touchy to align. You might need to straighten the dial lock disc, it is not easy to assemble onto the shaft as the notch is tight on the roll pin make a note of this at disassembly. Check the KC CHANGE shaft for true, it may be bent slightly, its a target for getting knocked sideways. Pull the rack springs off before you go too far with this, if the racks snap down the cores will fall of the springs!! Note the insulators on the Antenna trim shaft, clean, clean. There's a pinion gear, it runs on a much larger gear, on the right-hand side, about the middle of the deck. Its about 1" in diameter with the tension spring INSIDE the two halves, neat, huh!? This gear will have BIG burrs on it because it makes so many turns against the larger gear, mine was frozen because of the burrs,.....240 grit sandpaper! I

didn't drive out the pin. Note the thrust washers, they may be in the right place, they may not. Mine weren't! Impossible to tighten the post that the Geneva drive runs on! Well,.... without taking the front of the deck off, I didn't. Anyone want to hash over the proper assembly of the clutch? Oh, boy!

From: "Richard Biddle" <theprof@texoma.net>
Subject: Re: [R-390] Gear Train Guru Wanted
Date: Sat, 3 Aug 2002 23:27:33 -0500

Once upon a time a few years ago, I was told by an old hand on the pay-per-view boatanchors list "Don't mess with the gears. They were assembled by elves. And all the elves are dead now." Armed with a spare RF deck from Fair Radio and a manual, I tore into the gear train and scattered it all over the desk. I found and fixed the broken hootus and put it back together. I didn't know any better - it looked like a motorcycle transmission and I had already done some of those. When done I could spin the KC knob with my little finger For that I was named an honorary elf. (A 6'2" 280 lb elf at that!) So all youse guys that tear into gear trains (and make them work) are or will be honorary elves as well:) Give it a try - a worst you can send all the pieces to one of the gurus to reassemble. Can't be any worse that some of the shoebox jobs my shade-tree gunsmith friends have had me reassemble. The best was the Colt revolver.
The guy removed the side plate to lube it and pulled the trigger to "spread around the grease". He found all the big pieces.

From: "scott" <polaraligned@earthlink.net>
Subject: Re: [R-390] Gear Train Guru Wanted
Date: Sun, 4 Aug 2002 21:18:40 -0400

No, not at all. I just finished it, and made some major improvements. A very minor gear modification has enabled me to improve the tuning range of this unit from 000 Khz up to 55 Khz. I also found no need for the 10 turn stops and canned them- so now I tune right from 55 khz down to 0 Khz. No spinning the Mhz dial all the way down!!!!. It is a real time saver.

From: "scott" <polaraligned@earthlink.net>
Date: Tue, 6 Aug 2002 07:30:22 -0400
Subject: [R-390] RF rebuild

I have photos of every step of the dis-assembly and re-assembly of the geartrain. The pictures show the individual gear and the geartrain, and the next shot shows it installed with the next to go gear on the bench. They are good quality with a white background. If anyone wants these to annotate them, let me know and I will send you a CD copy. My first geartrain rebuild was a piece of cake. I used Walter Wilsons photos as

guides and had no problems. Mechanical alignment and the RF bandswitch alignment was also no problem, unlike I thought they may be. The hardest part was hooking the damn springs up to the racks. It operates very smoothly and there is no slop at all in the geartrain. Oh, and it tunes only 500Khz to 32 Mhz. I need something more complicated now to keep me out of trouble....bring on a non-A. Scott

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Date: Tue, 06 Aug 2002 05:32:20 -0700
From: Dan Arney <hankarn@pacbell.net>
Subject: Re: [R-390] RF rebuild

Hey Scott, sure is nice to hear that with all of the parts installed correctly it only tunes in the designed bands.. It sure would be nice to have a copy of the CD to try and get my friend Alex to annotate it in his spare time. I would be more than willing to pay any related cost for a copy. Thanks,

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From: "Biddle, Richard" <s-biddle@ti.com>
Subject: Re: [R-390] RF rebuild
Date: Wed, 7 Aug 2002 16:12:58 -0500

From my deep dark days of repairing teletypes, I managed to hang onto a couple of spring hooks. I never thought I would need them again until the R-390A RF deck appeared.

http://www.tecratools.com/pages/service/spring_hooks.html

was them for less than $5.00. Having them saves making up new cuss words like "dog crotch"

Date: Mon, 12 Aug 2002 00:23:38 -0400
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] Green gear redux

> The hardest part was hooking the damn springs up to the racks.

Use paper clips bent to suit for hooking and unhooking the rack springs. Mine look like a lower case letter "h" that hooks over the edge of the frame. The lower right "serif" is bent into a hook for the spring. When engaged, the paper clip hooks keep tension on the springs while the slug rack is out of the RF chassis.

Date: Wed, 14 Aug 2002 07:51:34 -0700
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: [R-390] Cute little RF connectors

I am trying to make some debugging harnesses for the R-390A so I can

take various modules out and debug them on the bench. One of the things I need is a set of extension cables for those cute little cables with the tiny connectors at the ends. They look like TNC connectors, but not like any I have been able to obtain. Does anybody know if there is a modern connector that will fit? And where do you get them?

Date: Wed, 14 Aug 2002 13:45:09 -0400
From: rbethman@comcast.net
Subject: Re: [R-390] Cute little RF connectors

Andy, Fair Radio has a set of extensions for the R-390s. You take it and go back to the IF out jack which makes it a standard BNC.

Date: Sat, 17 Aug 2002 05:59:30 -0700 (PDT)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] Zero Adjust

Make sure all you panel screws are tight, and that the clutch is clean. You can clean it with gumout carb and choke cleaner, then try again.

From: "Kurt" <r390auser@cox.net>
Subject: Re: [R-390] Zero Adjust
Date: Sat, 17 Aug 2002 09:15:10 -0700

Tom Thanks for the response. The front panel screws are all tight.This is one of Chuck R's radios. There is a lot of travel on the zero adjust so I will clean the clutch and try again.

Date: Tue, 27 Aug 2002 20:10:35 +0000
From: Philip B Atchley <ko6bb@juno.com>
Subject: [R-390] Slug rack question

I'm putting the final touches on this RF deck. I went to the 7+0000 position and notice I have two cams that are off a little. the 4.0-8.0 cam is probably off by about 1/4-3/8 inches. The 16-32 cam is probably about 1/4" or a little less off. Never had to correct one of these before. I 'presume' that I just loosen the gear clamp, position the cam where I want it and retighten the clamp? Also, I don't see any marks visible on the rear two racks. Can these be checked for a "high point" or "low point" at a known frequency?

Date: Tue, 27 Aug 2002 14:56:03 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Slug rack question

Yes, that's all there is to it! I used a dental pick to access the little hole in

the cam so that I could drag it into alignment. I think the rear cams are run off the front cam shafts but I can't remember and my two radios are either in the rack or packed in a box.

Date: Wed, 28 Aug 2002 00:31:53 +0000
Subject: Re: [R-390] Slug rack question
From: Philip B Atchley <ko6bb@juno.com>

Thank you. Found out the rear cams are pinned and not adjustable anyway. But I got the two front cams that were off, adjusted.

Date: Mon, 16 Sep 2002 10:38:34 -0500
From: Don Reaves W5OR <w5or@comcast.net>
Subject: RE: [R-390] Rf Geartrain rebuild CD

Here are Scott's pictures and instructions. For an albumatic presentation:
<http://militaryradio.com/R390A/R390RFDeck/index.html>

For a complete file, suitable for saving and viewing off line:
<http://militaryradio.com/r390a-rfdeck-geartrain.html>

> I have sent out 23 rebuild CD's. Some of you have already sent me $ for the CD's even though I have not asked for any. Thank You. Some have said they are going to send $ to me.

Please, redirect any donations to help QTH.NET. Read the following and send donations to Al. If it were not for him we would not have this wonderful forum.> Thanks, > Scott

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Date: Mon, 16 Sep 2002 12:13:24 -0400
From: Jim Brannigan <jbrannig@optonline.net>
Subject: Re: [R-390] Rf Geartrain rebuild CD

Wow....great pictures, Tnx Jim

Date: Mon, 16 Sep 2002 16:24:18 -0400
From: tbigelow@pop.state.vt.us (Todd Bigelow - PS)
Subject: Re: [R-390] Rf Geartrain rebuild CD

Thanks for posting this, Don - I've been too busy to even view my CD, so it's wonderful to see it firsthand. Scott, you did a fabulous job!

Congrats for certain, and many thanks as well for making your rebuild process one that we all can share and benefit from. Between you, Walter, and a some of the others on here, the R-390A has come of age in high resolution via internet access.

Combine these images with the Y2K updated manual and servicing your 'A' model just got a lot easier. A great way to cut your teeth too, before getting into the rebuild of an R-390. I'd sure hate to learn on one of those first.

From: Al Tirevold <tirevold@mindspring.com>
Date: Thu, 26 Sep 2002 21:42:46 -0400
Subject: [R-390] R-390A Gear Train Rebuild

Scott Steickel's excellent gear train rebuild photos have been used to create a .pdf document which I placed on the R-390A FAQ site.

The URL is: http://www.r-390a.net/R-390A-Gear-Rebuild.pdf

This tutorial is as good as they get - It is an outstanding treatise.

Date: Fri, 27 Sep 2002 04:45:44 +0000
From: Philip B Atchley <ko6bb@juno.com>
Subject: [R-390] Sticking R-390A clutch plate.

.Perhaps a month ago I had the RF deck out of this '67 EAC and very thoroughly cleaned the gear train and cam assembly. I didn't tear the gear train down as I didn't feel I wanted to go that far. The entire mechanism is very 'free' and easy tuning. In use though, I have noticed a problem with the Zero Adj clutch. If I haven't adjusted the Zero adjust for a couple days, when I crank down the knob (to release the clutch) and then tune the KC knob the clutch sticks or drags the Veeder Root counter off Zero until it "breaks free" and then it's ok and good to go for future adjustments.

I 'suspect' that old grease and grime may still be lurking on the clutch plate and that's causing the problem. Is there a way to clean this critter WITHOUT having to remove the RF deck again and disassembling the gear train? If I have to go through that I'll probably just live with it until the next time I have cause to do a teardown (the receiver is in daily use).

Date: Fri, 27 Sep 2002 07:12:20 -0700 (PDT)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] Sticking R-390A clutch plate.

What I've done in the past is to disengage the clutch as much as possible, and then squirt in some carb and choke cleaner or similar to clean off any old gunk, and then let it dry out and lube with synthetic gear oil.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Sticking R-390A clutch plate.
Date: Fri, 27 Sep 2002 09:30:04 -0500

I had a problem with my clutch and ended up disassembling it, cleaning it, and reassembling it a couple of times. You will probably find it is old grease/lube causing the problem. If I recall, I found it best to leave it dry, or just a tiny bit of oil -- not grease. I don't think you have to pull the RF deck. You have to drop the front panel, and remove the counter and a few other odds and ends, but it's not a bad operation.

Date: Fri, 27 Sep 2002 11:42:57 -0400
From: Jim Brannigan <jbrannig@optonline.net>
Subject: Re: [R-390] R-390A Gear Train Rebuild

Thank you for the PDF of Scotts (gear train rebuild photos) excellent article.

Date: Fri, 27 Sep 2002 16:41:01 +0000
Subject: Re: [R-390] R-390A Gear Train Rebuild
From: Philip B Atchley <ko6bb@juno.com>

GREAT article! Should be in every R-390A enthusiasts archives. I removed the RF deck and cleaned my gear train "in place". If I'd had this article at the time I might have had the incentive to do a teardown.

From: "Tom Bridgers" <tarheel6@msn.com>
Date: Sat, 28 Sep 2002 11:04:58 -0400
Subject: [R-390] RF Deck: 8-16 mHz synchronization question

Hi... First, many thanks to Scott for the *first class* photo's and instructions on how to rebuild the RF Deck! My question conerns a otherwise high number and excellent looking EAC that does not receive signals, except on the 28 mHz band. After checking things out, I found that in the RF deck, the 8-16 mHz cam does not line up with its associated black line when the counter is at 7 +000. It's waayyyy off.

How do I align it; it does not have a clamp to loosen for alignment. Versus the other 5 racks/cams that have clamps for that purpose. (One step I tried: I loosened the clamps on the cams on either side of the 8-16 mHz cam plus another one just under the 16-32 mHz cam --- all to no avail; I could not get the 8-16 mHz cam to move.)

Do I have to disassemble the entire RF deck gear train mechanism to the point where the 8-16 mHz cam is physically free of touching the other gears and then reposition it to align with the black line? Or is there another way? I hope so... thanks in advance for your help!

Date: Sat, 28 Sep 2002 13:47:39 -0700 (PDT)

From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] RF Deck: 8-16 mHz synchronization question

My book says to set that one (8-16)first. That is because I wrote it in my book many years ago. This "feature" you discovered is not addressed in the manual. Plan to adjust all of the cams, and simply do 8-16 Mhz first. Then do all the others independently.

From: "Tom Bridgers" <tarheel6@msn.com>
Date: Mon, 30 Sep 2002 18:44:08 -0400
Subject: [R-390] Success: synching the 8-16 mHz rack

Tom Marcotte's advice solved the problem: loosen all clamps for all cams. That frees up the 8-16 mHz cam ... and so it did. Removing the 12 springs and repositioning all 6 cams to line up with their associated black line was then a breeze. I tightened clamps from left to right ... and had no problem keeping the cams aligned.

Reattached the springs, and voila, the once dead EAC presented me with faint signals on every band. I then found that whoever had been there before me had misaligned virtually everything. After carefully realigning the crystal deck on each band and all adjustables on the RF deck by category, the radio came alive with strong signals on every band!

From: "Roger L Ruszkowski" <rlruszkowski@raytheon.com>
Date: Mon, 30 Sep 2002 08:34:50 -0700
Subject: [R-390] Re: 390A tuneup

I vote you move that receiver off the shop bench. Roger.

From: "Mark Richards" <mark.richards@massmicro.com>
Date: Thu, 19 Dec 2002 00:15:55 -0500
Subject: [R-390] MHZ gear clamp busted

Hello to the R-390 group. I am so pleased that there are still enthusiasts of this fine radio active. May I draw on the knowledge herein?

I have stolen an hour from our demanding new twins :) (5 weeks old) and, while my wife and the children were snoozing, managed to begin some work to replace the MHZ Gear Clamp on my R390a. The MHZ knob never worked since I acquired this radio years ago. I never used it seriously and planned to rebuild it someday. Someday has arrived. Besides, my life has to consist of more than changing diapers and burping babies! Through the good auspices of David Medley, I've secured a gear clamp. Now I need some good advice before I get myself into a deeper pickle. It appears that it is impossible to replace the MHZ Gear Clamp without actually disassembling

the entire shaft. I began this work by removing (actually breaking) the snap-ring on the end of the MHZ shaft and then tried to pull the shaft out, using the MHZ knob. Hopefully this is a common ring that I can get at the local auto parts store :)
Anyhow, this method failed as it appears that a component of (the very novel) mechanical turns limiter is fastened to the shaft. I cannot determine how it's fastened, but it's definitely on there. Perhaps there is a pin driven to hold it in place? It does not appear possible to remove it with simple tools.

Therefore it appears my only option is to remove the front panel of the radio and then disassemble the front portion of the gear mechanism (the Veeder-Root counter assembly). Perhaps then I will have access so that I can slip on the new clamp?

I want to remove the front panel anyway and perform some of the cleaning steps you recommend but first wanted to make sure the unit was electrically sound before I messed up the mechanics.

Would any of you experienced folks be able to offer me some sound advice?

Oh, I did manage to power up the radio and found it to be actually in fairly good working order. It does appear that the sensitivity drops off dramatically below 7 MHz, however. I did not make measurements - these were simply done with a signal generator attached to a wire - yet the differences were dramatic enough to suggest that there is a problem below 7 MHz.

I have a capacitor rebuild kit so once I get the MHZ gear back in service, I will strip the radio down, clean it up and replace the pesky capacitors.

One more question - regarding the actual MHZ gear. It is assembled, as you all know, as two thin gears, independent of each other but connected by a small spring. I understand this is an "anti-backlash" mechanism. When I reassemble things should BOTH of the MHZ gears be engaged with the gear they connect to or just one? How does the anti-backlash mechanism actually work?

So in summary my questions are

(1) how to replace the MHZ gear clamp and

(2) how should the MHZ gearing be engaged and

(3) how does the anti-backlash work.

From: "Walter Wilson" <wewilson@knology.net>
Subject: Re: [R-390] MHZ gear clamp busted
Date: Thu, 19 Dec 2002 05:58:13 -0500

> So in summary my questions are (1) how to replace the MHZ gear clamp and
> (2) how should the MHZ gearing be engaged and (3) how does the
> anti-backlash work.

You will have to remove the front panel. No real difficult steps here. First, set the KC setting at +000 (that's one KC above 999), and the MC at 7MC. Just remember to loosen the 1/4 shaft nut around the dial lock, and rotate the dial lock about 1/4 turn to disengage it from the KC disc. Shine a flashlight down in there, and you'll see what you need to do. Then loosen the 13 screws that secure the front panel and remove the knobs, and you're ready to go. Oh, and you'll have to loosen the clamps the secure the Bandwidth and BFO shafts to their respective shafts on the IF deck. Now pull the front panel loose from the MC and KC and AGC shafts, and tilt forward. It helps if the R-390A is sitting on a platform about 2 inches higher than your workbench or table, so that when the panel lays forward, its handles will rest straight against the working surface.

Now you have a more challenging task. If you set your frequency at 7+000, then all your camshaft marks should be aligned with the points of the camshafts. This was done just in case you move something during these next steps. You'll have to remove the veeder root counter, and all the gears in front of the front gear plate. Then you will be able to loosen the screws on the front plate and "gently" remove the plate. You should now have access to the MC gear clamp. After replacement and reassembly, check to see that the cams are still aligned, which will be the case if nothing bad happened while the front plate was off.

The MC gearing engages both of the split gears to the other wider gear, with about two gear-teeth of rotation to stretch the spring. Both teeth engage in the middle of the wider gear, and the spring is stretch if you get it back on correctly. The spring tension works in a fashion to pull the two gears to fill the entire width of the space between the gears of the wider brass gear. It essentially gives this split gear a variable width tooth, that stretches to fill any gap that might otherwise exist. IF the gear train moves smoothly, then this amount of spring tension is enough to overcome any gear friction. If the gear train has a lot of gear friction somewhere, then the anti-backlash features are basically defeated by the friction (that is stronger than the spring tension of the split gear).

Your 7MC problem is very often due to C327, which is a 100pF capacitor. Your capacitor kit should contain a 100pF capacitor to replace it with.

While it's not always a problem, I'd personally never go to the trouble to remove the RF deck without replacing this capacitor, the three paper capacitors, and checking all the resistors underneath (there are several resistors that seem to be persistant problems).

From: "Mark Richards" <mark.richards@massmicro.com>
Subject: RE: [R-390] MHZ gear clamp busted
Date: Thu, 19 Dec 2002 07:02:53 -0500

Walter and Matt - many thanks for your excellent advice! I suppose that, given I must at least partially disassemble the gears, it's not a bad idea to clean and re-lubricate everything, correct? I have read somewhere that once this is done the performance of the tuning can be quite smooth. The pictorial for disassembly seems straightforward enough. We'll have at it!

From: "Dave Faria" <Dave_Faria@hotmail.com>
Subject: Re: [R-390] MHZ gear clamp busted
Date: Thu, 19 Dec 2002 06:31:22 -0800

Hi Mark. It sounds like u r very new to these radios. I strongly suggest finding a friend near by with a 390a that u can use to "GO BY" for reassembly. The other option I like if u plan on keeping the radio is order a junker 390a RF deck from Fair Radio for future parts specifying that the gear train needs to be in tack. The gear trains usually r but, just to be sure. Using the 2nd deck u have a "GO BY" If u get lost and spare clamps if needed. I think Fair still sells the 390a deck for $40 + shipping. Tightening the clamps I just use two fingers. I have rebuilt more than one deck where the builder was a little to aggressive and snapped the clamp by over tightening. The bristol wrenches can be gotten at most electronic suppliers. Fry's electronics has em if u have one near by.

If u don't have a manual I think the list has one u can down load from the net. There are alignment marks for positioning the cams which raise and lower the tuning slugs decribed in the manual. One hint - Always when installing clamps always aim the head of the clamp screw either up or down so that its accessible after the gear train is assembled. U will know what I mean after ur 1st deck.

From: "scott" <polaraligned@earthlink.net>
Subject: Re: [R-390] MHZ gear clamp busted
Date: Thu, 19 Dec 2002 07:12:54 -0500

Why not rebuild the whole geartrain? You will be happier if you do. I have a complete rebuild and alignment instructions with many high quality pictures at:

http://www.r-390a.net/faq-refs.htm

Just scroll down to tutorials and you will see the file there. It is a PDF file that you can download and print out. If you have any specific trouble I will be happy to help you. 5 week old twins Yikes!!! I have a 18 month old and a 5 year old and time is really in short supply around here. They are a whole lot of fun (and headaches!!). Enjoy them!!!!

From: "Scott Seickel" <polaraligned@earthlink.net>
Subject: Re: [R-390] MHZ gear clamp busted
Date: Thu, 19 Dec 2002 07:22:09 -0500

> Tightening the clamps I just use two fingers.....

The aluminum used for the 390A clamps is cast is is very brittle. It is not hard to break these. On the other hand, the 390 clamps appear to be extruded aluminum and I have not had one of these break yet. I think this change in the clamps was another cost saving step, and just another reason why the 390 is a better built radio. But yes, be very careful with the clamps and get 390 clamps if you can.

From: "Mark Richards" <mark.richards@massmicro.com>
Date: Sat, 21 Dec 2002 00:41:50 -0500
Subject: [R-390] More - MHZ gear clamp busted - removing gears

As many of you are very experienced with the R-390, I hope you will not mind my asking stupid questions. However I really want to avoid making mistakes, particularly with the complex mechanics of this receiver. I am in the midst of a breakdown (not nervous, although this is also approaching) of the geartrain. I began this because the MHZ gear clamp is snapped. In order to get to it, I've first removed the front panel (taking all the steps outlined by others on this great e-mail list). Next, I removed the veeder root counter. Now I have two large gears staring at me, begging for removal. A photo of them is here:

http://www.massmicro.com/boatanchors/DSCN9065.jpg

The gear in question is the one pointed out. I can determine how to remove the other one (there's a clamp). How in the world is the other gear removed? I am very concerned that I will break something in the process of trying to get it off. Also, it seems impossible to remove either of these without winding the KHZ settings slightly.

Date: Sat, 21 Dec 2002 13:04:29 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] More - MHZ gear clamp busted - removing gears

To: r-390@mailman.qth.net

> As many of you are very experienced with the R-390, I hope you will not
> mind my asking stupid questions.
++++++++++
HA! Go ahead and ask, we all started somewhere and that was the same place you are now at!

> However I really want to avoid making mistakes, particularly with the complex mechanics of this receiver.
++++++++
In order to avoid this you MUST download THE manual!

> I am in the midst of a breakdown (not nervous, although this is also
> approaching) of the geartrain. I began this because the MHZ gear clamp
> is snapped. In order to get to it, I've first removed the front panel
> (taking all the steps outlined by others on this great e-mail list).
> Next, I removed the veeder root counter. Now I have two large gears
> staring at me, begging for removal. A photo of them is here:
> http://www.massmicro.com/boatanchors/DSCN9065.jpg
++++++++++
Confucius say: First of all we must call everything by its proper name. That is the "Zero adjust clutch". Associate it with its knob on the front panel. At this point you can determine how it works. IF you should happen to dis-assemble it be sure to DRAW A PICTURE of it as it comes apart, there is nothing in the manual about this. Also, don't assume that the last owner put it together right.

> The gear in question is the one pointed out. I can determine how to
> remove the other one (there's a clamp).
++++++++++
At this point you may want to check the run-out on this shaft, its the KC CHANGE knob, being in the center of the front panel it is a good target for a
shot to the side, it is often bent slightly.

> How in the world is the other gear removed? I am very concerned that I will break something in the process of trying to get it off. Also, it seems impossible to remove either of these without winding the KHZ settings slightly.
++++++++++
Don't worry about that, you'll do a mechanical alignment as you put it together, probably needs to be done anyway. It'll be good experience for you, too. You can clean and lube the gear train while you're in there. This is the best time to look for other problems, too. Take the double gear sets apart and check the mating surfaces for burrs, remove them with a honing

stone, this will let them slide against each other. Get a set of dental picks to use when setting the cams
in relation to the gear timing marks. Can you juggle? It'll come in handy later.

Date: Sat, 21 Dec 2002 15:47:15 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] More - MHZ gear clamp busted - removing gears

Yeah, to hook into the hole to pull the cam to where you need it and hold it while you tighten the clamp.

From: "Scott Seickel" <polaraligned@earthlink.net>
Subject: Re: [R-390] More - MHZ gear clamp busted - removing gears
Date: Sat, 21 Dec 2002 19:59:20 -0500

> The gear in question is the one pointed out. I can determine how to remove the other one (there's a clamp). How in the world is the other gear removed? I am very concerned that I will break something in the process of trying to get it off. Also, it seems impossible to remove either of these without winding the KHZ settings slightly.

The clamp is in the "rear". Look under the alum plate. Follow the shaft the gear is on. The clamp is behind the gear and under the plate!!!! Don't worry about changing the settings slightly. If you download the PDF file of the rebuild as I previously pointed you to, then realignment should be simple if your settings change.

Date: Sun, 29 Dec 2002 23:12:41 -0800
From: Dan Merz <djmerz@3-cities.com>
Subject: [R-390] kilocycle/megacycle movement

Hi, I haven't used my 390a much over the last 2 or 3 months and I was listening on 80 meters tonight and found a problem tuning up near 4 Mhz. It seemed dead there and I could tune in stations down near 3.9 somewhat better (I started listening on another set for comparison to be sure the band wasn't dead). After awhile I noticed that the megacycle knob seemed to move off its "lock" position and was moving as I tuned the kilocycle knob. It did this sometimes and would get off the band position but not always. Is this most likely a lubrication problem? I really never was able to pick up a known signal at around 3.99 Mhz and I tried rocking the megacycle knob to improve things, or to find if something else was "hanging up". I haven't lubed the set since about 2 years ago when I did a pretty thorough job in this regard and everything seemed very free. I'll pull it open tomorrow and take a look but was curious if there was an obvious known component that causes this kind of symptom. It seemed ok

on other bands but I didn't spend a lot of time checking. thanks, Dan.

Date: Mon, 30 Dec 2002 03:18:08 -0500
From: Jim Miller <jamesmiller20@worldnet.att.net>
Subject: Re: [R-390] kilocycle/megacycle movement

Sometimes a coil slug will stick at a band edge causing low sensitivity. Look at the slug rack as you tune at the high end and see if any slugs stop moving prematurely. If you see one, tap on it ot wiggle it by hand to see if sensitivity returns. If it is a slug that is sticking, you can usually free it up by loosening the screws that hold it to the slug rack and allow it to re-seat itself so it doesn't bind.

From: "Scott Seickel" <polaraligned@earthlink.net>
Subject: Re: [R-390] kilocycle/megacycle movement
Date: Mon, 30 Dec 2002 06:49:21 -0500

> sure the band wasn't dead). After awhile I noticed that the megacycle
> knob seemed to move off its "lock" position and was moving as I tuned
> the kilocycle knob. It did this sometimes and would get off the band

The MHZ knob should have a good solid click as it falls into each detent. I have seen the detent plate get worn out from lack of lub and the knob just doesn't have a good lock at each position. But the problem probably is in the differential gear assembly. The gears could just be sticking and need a cleaning and lube. No need to disassemble the differential. Just soak the whole thing in gas for an
hour or two to clean off the crud. Relube with Mobil 1 synthetic oil. If this is the problem, you might as well rebuild the whole geartrain while you are at it because there are other gears that are crudded also.

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] kilocycle/megacycle movement
Date: Mon, 30 Dec 2002 08:11:57 -0500

In addition to a worn, bent or loose detent spring/plate, check carefully for a loose or broken gear clamp. A broken clamp, or one that isn't positioned right, may snug up with the bristol wrench, giving the false impression that it's tight.
The situation sounds familiar. I got one unit in here a few months ago and noticed the MC knob creeping. One broken and one loose clamp. I don't recall which ones. You have to look carefully behind the panel as you rotate the KC knob with the MC set in various positions, including the 4 MC position. The mechanics of the gearworks is such that the backlash varies over its travel, largely due to the spring tension on the slug racks..

As suggested, gunked up gears could do this, but they'd have to be pretty bad. Check all clamps using the close eyeball inspection method. And, whatever you do, don't blink!

Date: Mon, 30 Dec 2002 09:41:11 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] kilocycle/megacycle movement

Don't forget the possibility of the split gears having burrs on them and being stuck together so that they can't take up the backlash. They should be taken apart and honed flat. Especially that little one on the right hand side that has the spring inside the two halves. Mine was stuck TIGHTLY together. Nolan would have raised this point.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] kilocycle/megacycle movement
Date: Mon, 30 Dec 2002 11:48:17 -0600

While this indeed could be a problem, can the symptoms described be caused by backlash? If tuning up from 3.8 to 4.0 and the radio becomes "deader" towards 4.0, the backlash would all be in the same direction. I'm not sure how this could be the problem here.

Date: Mon, 30 Dec 2002 09:54:30 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] kilocycle/megacycle movement

Sounds like the MHz detent spring has a groove worn into it, it should be a positive lock-up. Nolan would suggest putting some washers under the spring to bring a newer area into contact with the notched disk. Typical problem having the KC knob turn the MC knob, the MC detent should hold the MC in place, sounds like time to lube! Check for burrs on the split gears. Let us know what you find,

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Date: Mon, 30 Dec 2002 12:24:54 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Finally!!!

How many colors of grease are evident on the gears? That sounds like a weird question but there is a point to it. If you have a radio that has seen little use it will have one color grease and not a lot of it. If it has been through several owners or shops it will generally have a lot of grease and several different colors. If it's a multi color job I would recommend a fairly full strip down, clean, and mechanical alignment on the gear system. It's not a whole lot more work once you have all the modules out and are going to do an electrical alignment anyway. With a variety of grease on there

you never quite know what is down inside the anti backlash gears. There is almost no way to get them properly lubricated once crud or dead grease builds up inside them. Before you go in you might do a quick check on each band. It's always a shame to pull the whole thing apart, put it back and then find a problem.

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] kilocycle/megacycle movement
Date: Mon, 30 Dec 2002 15:06:58 -0500

I don't know about the split gears either -- not good if they're stuck, but probably not the cause of Dan Merz's problem. A bit more about the slipping clamp deal -- The works can appear to rotate OK though part or most of its travel, until a certain point in the upswing of the slug racks, where the spring tension is at it's highest. Then a shaft can slip for, say 1/8 turn. Rotating in the reverse, it slips again over that range and then grabs as the remaining friction is then sufficient when the slug rack springs are relaxed. That clutching action can be very consistent. It can cause the radio to mistune or go dead through part of
the band. It's difficult to spot. You have to force yourself to look at each shaft/gear set and watch to see if the gear stalls as the shaft continues to rotate or vica versa -- through the full range of the band(s).

Another more basic possibility is that the mechanical synch is slightly out somewhere. And, yeah, I suppose there are other possibilities, like a hanging slugrack -- on the downswing. That will also be very consistent. Looks like the little roller bearing is following the cam (they're cam followers, aren't they?), but then the slug hangs and the bearing is really suspended a fraction of an inch over the cam, not resting on it. Might be flush in front and high in the back. As a slug rack moves down to its lowest position, gently tap on front and back to make sure it's really all the way down against the cam.

Gotta look at the thing ... in motion.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] kilocycle/megacycle movement
Date: Mon, 30 Dec 2002 14:27:37 -0600

I would never have to _force_ myself to look at the gears.

Date: Mon, 30 Dec 2002 16:05:23 -0800
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] kilocycle/megacycle movement

Hi all/Jim, I took a look inside and did some reach-in cleaning/inspection

but didn't find anything obvious. And the detent spring seems to be ok though difficult to inspect. I can't see all the cam alignment marks but noticed the 4-8 mhz cam was off the mark some but was still operating on the right surfaces. The 2-4 mhz cam mark is not too visible but I noted that it didn't look right as far as how the cores were traveling at the upper end of 3 to 4 Mhz - aha , the Mc/Kc link that started the Mc knob moving occurred when near the upper end of the range around 3.92 Mhz where the core rider was actually dropping on the wrong side of the cam surface. The cam is out of proper adjustment, and the cam surface is steep enough on the "forbidden" side that it locks the cam shaft which forces the detent on the Mc knob to give way to accomodate the motion of the Kc knob as I tune within the band. Mind you, this doesn't take much force on the Kc knob, hardly different than regular tuning so there must be some gearing that is helping the detent disengagement - I didn't quite have the patience to analyze that . Intuitively, I would have thought it would be the other way around - a lot of force on the cam to hold it solidly enough to disengage the detent. I haven't figured out where the loose connection is that got the 2-4 cam out of sync, I guess the gear on the cam shaft since that's closest. I seem to remember checking these alignments when I first got the radio a couple of years ago and I haven't loosened anything in the gear train except to put the PTO Oldham coupler in the right position after I worked on the pto. I think pulling the front panel is probably the best step to take next so I can see all the cam markings and alignment. Or is there an easier way? thanks for all the suggestions, some of the split gears were checked and seemed ok. So far I haven't seen a shaft slipping in a gear but that could be happening.

Date: Mon, 30 Dec 2002 16:36:07 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] kilocycle/megacycle movement

Well, some of the cams are supposed to go "over the hill". Use a small inspection mirror to see the alignment marks. You can re-align them without dropping the front panel, too. Use a hooked dental pick to "grab" the hole in the cam, hemostats will clamp the gears to keep them from moving if needed. You won't be able to see or feel the burrs on the split gears until you seperate the two halves and they won't be able to move against each other while meshed
to another gear.

Date: Mon, 30 Dec 2002 22:59:12 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Finally!!!

The only real way I have ever found to clean up the anti backlash gears it to pop them apart. Once you do that just about anything will clean them. I

mostly use alcohol based cleaners these days. I suspect that a mixture of 75% alcohol and 25% water would do every bit as good as anything I use. The water is there to keep the fire risk down ....

The obvious disadvantage is that you can get a rust problem if you do a dunk and drip wash process. Teflon grease and silicon based oils can be a chore to get back off. Some of them are fairly immune to the normal solvents. A lot of it depends on exactly which one was used and how it has aged. The traditional cleaners still work the best - Freon and Tri Chlor do an excellent job. Of course they also nuke the ozone and / or kill you.

The final recommendation is good old WD-40. The smell may be a bit much in doors but it is a pretty good cleaner. Don't depend on it as a lubricant though.

Date: Mon, 30 Dec 2002 21:10:11 -0500
From: Robert Bethman <rbethman@comcast.net>
Subject: Re: [R-390] kilocycle/megacycle movement

Let's think about this one a little. If the spring loading is supposed to take up slack, i.e., backlash, then even while meshed it SHOULD be possible to move one of the two spring loaded gears while meshed.

From: "John KA1XC" <tetrode@worldnet.att.net>
Subject: Re: [R-390] kilocycle/megacycle movement
Date: Tue, 31 Dec 2002 00:49:13 -0500

Yup, your right Bob. On a correctly working split gear you can usually see a tiny bit of movement between the adjacent teeth when the KC tuning is rocked back and forth; it helps to use a magnifier to see this.

From: "Giles Gant" <bgant@bellsouth.net>
Date: Tue, 31 Dec 2002 03:31:24 -0600
Subject: [R-390] R-390A Calibrator

I attempted to calibrate the 100kc calibrator on my 390A but it just won't get there. I set up as given in the TM using WWV and 5.2 KC above is as close as the C310 trimmer will bring the oscillator. I am thinking a bad tube but I guess it could be the xtal. Anyone had this problem. What do ya'll think?

Date: Tue, 31 Dec 2002 09:32:35 -0500
From: Mike Sullivan <vze344qr@verizon.net>
Subject: Re: [R-390] R-390A Calibrator

Mine was about 2 kc off; fixed with a new (old) crystal from a friend.

YMMV.

From: "Jerry Kincade" <w5kp@direcway.com>
Subject: Re: [R-390] kilocycle/megacycle movement
Date: Mon, 30 Dec 2002 19:45:39 -0600

I'll hazard a guess here that after a thorough disassembly, cleaning and degreasing of the gear train, most of us very carefully put that good 'ol slippery Mobil 1 30W on everthing in sight. Some of that oil will inevitably find its way onto the shafts during reassembly, just from oily fingertips if nothing else. Then we clamp down on a nicely but inadvertently oiled shaft with the old Bristol wrench instead of on a completely dry shaft, and voila! slipping clamp one of these days... Don't know how one can prevent this, unless a final degreasing of the shaft and inside of the clamp with Q-tips prior to putting on and tightening the clamps might help. It might even allow nice tight clamping without so much pressure on that poor wimpy little
screw.

From: "Scott Seickel" <polaraligned@earthlink.net>
Subject: Re: [R-390] kilocycle/megacycle movement
Date: Tue, 31 Dec 2002 06:53:54 -0500

Yup. Some of the cams do go "over the hill" The 2-4 MHZ cam goes around 360 degrees The 1 to 2 MHZ cam does NOT make it over the hill. I think the Y2K manual has a good section telling where the cams "run to". Check manual. And be careful tightening clamps. They break real easy.

From: "Scott Seickel" <polaraligned@earthlink.net>
Subject: Re: [R-390] kilocycle/megacycle movement
Date: Tue, 31 Dec 2002 07:03:32 -0500

Yes, if you stick a small screw driver between the teeth and twist, you will see it moving slightly. BUT just because you can move the 2 with a screwdriver or other object does NOT mean the gears are working properly. The gears rely on the small springs to apply enough pressure to remove backlash and any burrs may be just enough to prevent this from happening. Joe is right, the only way to know if these gears are operating properly is to remove them and spin one half against the other. Then assemble with gears re-loaded. Movement alone does not assure proper operation.

Date: Tue, 31 Dec 2002 11:19:29 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] kilocycle/megacycle movement

Nah, I take mine off to see the close up stuff. I have done this, I was surprised at how much better they worked after honing them. And I did find one gear set that was very much stuck together.

Date: Sat, 04 Jan 2003 15:28:18 -0800
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] kilocycle/megacycle movement

Hi, just a word on what I did so far. I tried Joe's approach, being a little strapped for bench space at the moment, and fashioned a wire hook and moved the two cams that were obviously at the wrong spot. The screw/nuts on the two gears involved were verrrry tight and I soaked the screws a bit with penetrating oil overnight before putting some real force on them. After bringing the cams to a better position, the set tuned much better on the 3 to 4 mhz range where I first noticed a problem. Once I get the bench cleared, I'll do a better standard alignment since this has been on my agenda since I got the set. I keep thinking I'll come up with a URM 25 s.g. in my wanderings but so far still have only a Heathkit "lab grade" generator that I've always used, not very well shielded. But I suppose it might still do a reasonable job? Again just looking into a 390a is a pleasure so pulling it out of its cabinet has its own reward. After all the backlash talk, I did a little reading in the spec. documents available online and see that the only backlash specification had to do with the tuning knob, pto and dial readout, at max of 100 cps. My radio behaves itself well in this regard. No mention that I could find of the amount allowed for the rest of the gear train going to the coil racks, etc. I suppose this is indirectly covered by the requirements on uniformity of output over the bands. I wonder if one can get a rough idea of how insensitive (or sensitive) tuning would be to this kind of backlash by rocking the Mhz knob a bit off the notch and noting whether the signal level drops. Since I don't really know how well my set is aligned, I can't go any farther with this idea yet. Maybe someone with a carefully aligned set could describe what happens. Thanks again for all the suggestions, Dan.

Date: Wed, 08 Jan 2003 20:13:27 -0500
From: Bob Camp <bob@cq.nu>
Subject: [R-390] Cleaning

Hi, Is on topic judged in relation to one's most recent posts ..... in that case I guess this is on topic. We seem to spend a lot of time trying to figure out how to clean off gear trains. I just came across an official US Navy process from back in 1947. It *looks* like all the stuff is still available. You use:

Naphtha (70 to 72 degrees Baume)
99% Isopropyl Alcohol
Distilled water

Cleaning solution a mix of:
30 liters distilled water (gulp)
300 grams Oxalic acid tech grade
3 liters Isopropyl Alcohol
800 cc ammonium hydroxide
200 cc alkamine (alkyl sulphate)
Rinse solution:
2400 cc distilled water
48 grams Orvus flakes (alkyl sulphate)

The process:

two minutes in naphtha
One minute in alcohol
two minutes in cleaning solution
one minute in rinse solution
two minutes in distilled water
one minute in fresh alcohol
one minute in even fresher alcohol
finally dry it with a hot air blower

Except for alkyl sulphate stuff it all sounds like pretty common stuff. I suspect it will clean the guck off of gear trains pretty well. It's even older than an R-390 so it's gotta be good !!! Also note - no I"m not going to ask for any more chemestry help from the associated hangers on around the house here. You are on your own for the alkyl stuff.

From: ToddRoberts2001@aol.com
Date: Thu, 9 Jan 2003 00:17:32 EST
Subject: Re: [R-390] Cleaning

I have had good luck cleaning a grungy R-390A RF Deck geartrain by soaking the whole works + counter dial in a large plastic tub of Kerosene for a few days, after removing the RF Transformers and slug racks. Do not allow Kerosene to come in contact with the small ceramic RF Trimmer caps in the RF Transformers - it can cause the rubber-like gasket material between the rotor and stator to swell up. I found that out the hard way! Best to keep the RF Transformers dry! Otherwise the Kerosene seems to be safe for all the other components in the RF Deck. The Kerosene removed the worst kind of dried-up grease and dirt+sand between the gears. I would periodically brush the gears and shafts and all the nooks and crannies with a stiff paint brush while the assembly was submerged in the Kerosene.

After about 2 or 3 days of this I would remove the assembly and place it in another tub with a 32:1 mixture of Kerosene and Pennzoil SAE 75W-90

Synthetic gear lube. I would let it soak in this tub for another day then remove the assembly and place it on a clean towel in front of a dehumidifier for about a day. After the Kerosene evaporates there is a thin film of the synthetic oil left soaked into all the gears and bearings and all the works. The RF Deck looks brand new.

Some people say not to use Kerosene as a solvent but it is relatively safe to handle, is non-conductive, does not harm components (except the rubber gaskets in those small ceramic RF Trimmer Caps) and evaporates completely leaving no residue and all the parts looking shiny and new. Does this method sound OK? I wonder if anyone has used one of those automotive-type parts washers that recirculates a cleaning solvent? 73 Todd Roberts WD4NGG.

Date: Thu, 09 Jan 2003 06:08:17 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Cleaning

I totally agree that kerosene is a good solvent. It seems to be a reasonable way to go for the gear clean process. My only argument (this being the R-390 list after all ...) is with the thin film of stuff you seem to get after the cleaning process. Even if you don't put oil in the mix kerosene seems to leave a film. The film acts as a dirt magnet. We shut off the class 100 clean room here at the West Redding R-390 palace a while back. The net result is a radio that I have to go back and touch up again in a year or two. How about a kerosene and lube soak / clean followed by a quick alcohol dunk? The alcohol should take off the film but not have enough time to soak into the split gears and take out the lube. Just a thought.

From: "Jerry Kincade" <w5kp@direcway.com>
Subject: Re: [R-390] Cleaning
Date: Thu, 9 Jan 2003 06:41:22 -0600

Being a Navy formula, it was probably intended for shipboard use, although I think the naptha thing would be frowned on by the Damage Control Officer responsible for fire prevention. With a couple of minor exceptions (exterior saltwater washdown system, etc.) ALL water aboard a Navy ship is distilled as part of the steam plant operating process. Oil fired steam boilers require pure distilled water to operate, so a large capacity fresh water distilling plant is built into the system. Some of this water is saved aside for crew use, where it is carefully managed and restricted in its applications (thus the old term "Navy shower", which means a quick wet-down, turn off water, soap down, quick rinse, turn off water). Newer gas-turbine driven ships have a seperate fresh water distilling system for the same purpose. "Water Hours" is a dreaded term used aboard ship to describe water restrictions which allow use of distilled

fresh water only during certain hours of the day. If you had the watch and missed your shower, tough bananas. Also, you don't dare cut it too close at the end of the advertised Water Hours time frame - if you are soaped down and ready to rinse, some fiendish and diabolical snipe might turn the water off just at that moment. The same snipe would sometimes cross up some valves and dump a little flavoring agent (fuel oil) into the fresh water tanks, making for a couple of weeks of nasty smelling and tasting water, thereby making himself a temporary outcast among his shipmates. OTOH, it still beat the hell out of taking a bath in a muddy foxhole using a helmet liner for a bathtub. :-) You can buy distilled water for about a dollar a gallon today, and I wouldn't be surprised if it cost dang near that much to produce it aboard ship if all the costs were figured in. Subject tie-in: we had six R-390A's and a dozen CV-591A's up in the radio shack on my first ship. They almost never broke. End of Navy Lore 101.

From: "pete wokoun, sr." <pwokoun@hotmail.com>
Subject: Re: [R-390] Cleaning
Date: Thu, 09 Jan 2003 19:38:13 -1000

Just to bring you 'old salts' up to date, they're now installing reverse osmosis systems to replace the distilling plants, both surface and subs. Of course, that old navy formula would give the current EPA/haz mat monitor fits. The only things they carry today are probably the water and alcohol. But there are no gear trains onboard that need degreasing anymore.

From: R390rcvr@aol.com
Date: Sat, 8 Feb 2003 17:07:22 EST
Subject: [R-390] R-3909(non A) - ten turn stop question

A rather sad R-390 followed me home last night. One of the oddities is that it won't go onto band one. The megacycle shaft hits the ten turn stop before it will allow the gearing to drop into the detent. Its close, but won't quite make it. It seems to go a bit too far on the high end of the range.

I have looked through the manual for this radio, and the R-390A, and although the stops are discussed, how to adjust them isn't. I am not going to do a complete gear train dismantle at this point, and wonder it just that adjustment can be done, without upsetting synchronization? There is a clamp on the gear driven by the MC shaft, so perhaps by locking the dial lock, loosening that clamp, and rotating the shaft just enough to allow it to drop into the detent will work? The radio is working, kind of, so I would like to not disturb too much until I have a good baseline performance check. Thanks Randy Stout

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From: R390rcvr@aol.com

Date: Sat, 8 Feb 2003 20:44:49 EST
Subject: [R-390] Ten Turn Stop adjustment

Thanks guys: I deceided to just go ahead and try it. I forgot that the dial lock doesn't lock the MC knob, but it really isn't needed. I had visually checked the stop, and there was no doubt that in this case, it was the stop limiting the travel. I loosened the clamp slightly, turned the large MC gear that the clamp holds, until the veeder root registered between 00 and 99 when just off the detent, all the way to the stop. That is the position specified in the manual. Snugged the clamp, and I now have full range. I had never had any problems before with a ten turn stop either, but this poor radio has been rather roughly treated, and I suspect someone had slammed it against the high end of the stop, and it shifted slightly. I think to the casual user, they see there are higher numbers on the Veeder Root, and try to keep turning beyond the end of the normal range! This rig has a Cosmos PTO, which I don't recall seeing in a non A. I have only seen Collins or Motorola PTOs. Some of the wiring for the PTO is cobbled together. Could you adapt a R-390A PTO to the non A? The bracket is definitely for the non A. Thanks again folks. I will have a few more questions, as I get into it more. Randy Stout

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Date: Sat, 8 Feb 2003 16:09:21 -0800 (PST)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] R-3909(non A) - ten turn stop question

I've never had to adjust the ten turn stop on the Mcs Change shaft, but there should be nothing wrong with doing what you suggested. You're not going to break it. Make sure you tighten it up well, as this is probably how it got whacked in the first place.

Date: Sat, 8 Feb 2003 16:15:29 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] R-3909(non A) - ten turn stop question

Better check the stop pin on the Geneva drive on the bandswitch under the RF deck, too. That may be where the stoppage really is.

From: "Richard Biddle" <theprof@texoma.net>
Date: Sun, 23 Mar 2003 13:09:23 -0600
Subject: [R-390] Re: R-390A tag with A on it - field mod

<snipped>

P.S. I was looking at my maintenance log for the radio. This one was cleaned and lubed by me in 1996 using Hoppes gun cleaner, gun oil, and gun grease. (This was before everyone became an expert.) The KC knob

can still be turned with my little finger. I was called a heretic then and probably will be again:)

From: "Bill Smith" <billsmith@ispwest.com>
Date: Sun, 13 Apr 2003 22:49:24 -0700
Subject: [R-390] R-390A Geartrain CD-Rom

I'd like to thank Scott Seickel (again) for the CD-Rom filled with pictures depicting the rebuild of an R-390A gearchain. They are so clear, it tempts one to perform a rebuild just to go through the procedure. Is there similar information for the R-390?

From: "Josh Heide" <kd6kml@interx.net>
To: "HWA QTH Reflector" <k6bw@mailman.qth.net>
Sent: Thursday, April 17, 2003 6:20 PM
Subject: [K6BW] Some helpful radio hints

> Here are a few things I have found over the years. Hope you find something
> useful here. Maybe some others here can pass on some helpful hints.
<snip>
> 5. To lubricate the gears and other mechanical parts of the older military
> radio equipment (R-390, R-1051 and such)
>I use a mixture of Marvel's Mystery Oil and Mobil 1 synthetic gear oil mixed in equal amounts. Really keeps the parts operating smoothly and does not gum up.
> 6. To clean the mechanical parts of the above mentioned radios, go to an
> automotive paint store and get some wax and grease remover. This is used
> before painting to clean the surface. It will not harm most painted surfaces.
> I have not had any trouble with it bothering the lettering or laquer on the
> coils and chassis of my R-390. It will really cut through the old hard
> grease. (PPG number DX-330)
> 7. To lubricate coil forms to allow the slugs to move freely, like in the
> rack on a R-390, carefully clean the coilform and them dust it lightly with
> ground mica. This is available from gun shops with a good selection of
> reloading supplies. <snip>

From: ToddRoberts2001@aol.com
Date: Sun, 27 Apr 2003 14:53:10 EDT
Subject: [R-390] Marvel Mystery Oil Does Turn To Gum

I think some people in the past have recommended using Marvel Mystery

Oil or mixing it with another lubricant as a good way to lubricate an R-390A RF Deck? I thought I would relate an experience I had with Marvel Mystery Oil. I had a can of the stuff sitting in a cupboard for about 15 years. Some of the oil leaked around the top of the can and after being exposed to the air for 15 years it did indeed turn into some kind of sticky red gummy substance. It would seem this is not a good indicator of the oil for use as a lubricant exposed to air over a long time = 15 years or more? It looks like Synthetic oil or grease would be the best bet for a long-term lubricant exposed to air?

From: R274C@aol.com
Date: Sun, 27 Apr 2003 17:55:43 EDT
Subject: Re: [R-390] Marvel Mystery Oil Does Turn To Gum

I think the "clue" is.....to lubricate more often than "15" years. I use Mobil 1 synthetic gear kube, but clean and lube every 2-3 years.
YMMV.....
Les Locklear

Date: Sun, 27 Apr 2003 21:31:16 -0700 (PDT)
From: Robert Meyer <meyer_rm@yahoo.com>
Subject: Re: [R-390] Marvel Mystery Oil Does Turn To Gum

I had something similar happen. I have model aircraft that have glow-fuel engines on them. Someone recommended that I use Marvel Mystery oil to lube the engines prior to storage. I had one engine that sat for about three years. When I went to turn it, it was so gummed up that it took significant force to get it to move. Poured some solvent into it and it freed up. I only use synth oil, now.

Date: Sun, 27 Apr 2003 23:22:31 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] Marvel Mystery Oil Does Turn To Gum

Hi, I used Marvel Mystery oil to degunk my 390a gears when I first got it - worked great and loosened things up very well - I then oiled it with synthetic oil and I've been happy with the result - about 2 years into it now and still works ok. I may repeat the process in a year or two. I like the MM oil for cleaning - I used to like kerosene to clean away grime on gears, parts, bicycle chains etc, but I think it stinks a bit more. I would guess you could gum up something pretty good by putting on an inadequate amount of MM oil and letting it set - not enough to flush out the old residues that might be there - but I'm just guessing on that. Does anyone know what MM oil is? maybe a mixture of kersone and oil   Dan.

From: "Drew Papanek" <drewmaster813@hotmail.com>

Date: Mon, 28 Apr 2003 13:46:59 -0400
Subject: [R-390] Marvel Mystery Oil Does Turn To Gum

Marvel Mystery Oil is described as a solvent/penetrant and all penetrating oils with which I have had experience have gummed up, some after only 1 week. Penetrants are good for freeing up stuck mechanisms but ultimately should be cleaned out and replaced with a non-gumming lubricant such as Mobil 1 or other synthetics. I have not used the Nolan Lee-recommended mixture of 50:50 MMO and Mobil 1 for R-390 series RF geartrains but have wondered if the Mobil 1 inhibits gumming tendencies of the MMO.

My approach has been to completely tear down gummed up geartrains and soak in lacquer thinner (any brand except that in the red white and blue can from A* * Hardware). On assembly I apply Mobil 1 and re-apply semi yearly or yearly as needed. I have heard that Mobil 1 was recently reformulated and may possibly not be as good as previously. Maybe time to switch to Amsoil? Kerosene or fuel oil will gum up after a year or two.

Date: Mon, 28 Apr 2003 15:01:44 -0500
From: Terry O'Laughlin <terryo@wort-fm.terracom.net>
Subject: [R-390] Gear train lubricants

The best lubricant I have found for a freshly stripped and cleaned R-390 gear train in **Phil Wood's bicycle grease.** The viscosity is perfect, it does not creep and it maintains the same viscosity for years. It makes the gear train feel almost silky, which is no mean feat. I did my first R-390A with it seven years ago and the tuning still feels almost silky. I use lacquer thinner to strip the old lubricants, but I also clean and relube the slug rack.

I clean all the slug rack rollers, guides and cams with swabs and lacquer thinner. I use a swab to put a thin coat of Phil Woods on the appropriate edges of all the rack parts.I've done three complete cleanings this way. They still feel great (two have been sold).

It's a one time job with no need to pull the radio for periodic lubrication. Oil does not evaporate. Every re-application is just replacing oil that migrated somewhere else inside your radio. I wouldn't do that to my R-390s. Phil Woods is commonly available at better bicycle shops and it works great on bicycles as well.

Date: Mon, 28 Apr 2003 15:19:26 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] Gear train lubricants

Hi, another data point.... in a sea of 390 experience. I have some Phil

Wood's around somewhere that I bought when I was into bicycle lub tasks. I thought about using it when I starting cleaning my 390a but instead followed the "conventional wisdom" posted somewhere about Marvel M O and Mobil 1. I'm glad to hear that Phil Wood's grease works so well. Maybe I'll dig it out and see if mine has congealed yet, hi. As I recall it was still pretty "juicy" and flowed out from the light green plastic toothpaste type tube it came in - I may have tossed it because it was about 30 years old 2 years ago. Another data point may have been lost, but maybe today's Phil Wood's grease is different than the stuff I had. Dan.

From: "Bob Tetrault" <r.tetrault@attbi.com>
Subject: RE: [R-390] Gear train lubricants
Date: Mon, 28 Apr 2003 20:25:35 -0700

Synthetic is synthetic. They don't evaporate. That's why they are the only lubricants for gas turbines and such. Thicker is better for the gear train as it is less likely to wander. You can get synthetic wheel bearing grease if you talk to your local race car parts store. I use RedLine 75-90 gear oil and their CV/wheel bearing grease for everything needing lubricant. Well, almost. My Audi quattro has 286K miles on RedLine, still gets 5K/quart, original clutch, though that's my fault, I take it outta gear at the stop sign even. But the running gear is original and still breaking in as far as it feels.

From: "Ed Zeranski" <ezeran@concentric.net>
Subject: Re: [R-390] Gear train lubricants
Date: Mon, 28 Apr 2003 20:32:03 -0700

Too Funny! I remember Phil Wood hubs when they were new (73 or so?). Sealed bearings who woulda thunk it? I was riding a Raleigh International criterium bike(all 531 tubing with Campy Strada road set), Nishiki touring, and a Motobecane road bike. R390s were $15-$20 at swapmeets, I was much thinner and had hair color...and more hair. Remember the Brooks seats with copper rivets...the "S Line" of bike saddles! OK ..enough...my ..regression into BoatAnchor Bike riding....when a 2A3 was less than a quarter. Super 8mm Home movies.....?? Will be at the West Coast Military Radio Colector's Group annual meet Thursday - Sunday...gotta get into the retro mind set .

Date: Wed, 30 Apr 2003 09:09:16 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] Gear train lubricants

Hi , I think one of my reactions to the Phil Wood grease was that it was too thin, but then the Mobil synthetic gear lubricant seems thin also but I used it. I picked up a "review" of the PW grease Strengths: Good

lubrication. Pretty green color. Smells like a machine shop. Beautiful Phil logo. Weaknesses: There's no such thing as waterproof grease. Expensive.

Similar Products Tried: Lubriplate. Gold Medal. Chassis lube.

Bottom Line: A good grease with lots of sulfur in it so it has that good machine-smell (and scuff resistance too). The green color is cool, but RED chassis lube is cooler. Don't know where the waterproof claim comes from. This grease will eventually wash out like any other if exposed to water. You can get comparable performance from regular auto bearing lube or chassis lube for MUCH less money The squeeze tube is convenient though.
In searching I came across "Militec-1" touted as a gun lubricant. It is pretty expensive except for the free sample that you can get. ($28 for 16 oz - like the quart of Mobil 1 I bought, that's a lot of lubricant).

Does anyone have experience with Militec-1 relevant to 390 gears? Evidently it is hard to get off your hands and a little goes a long way, and it's a synthetic oil? Dan.

Date: Wed, 30 Apr 2003 12:18:53 -0400
From: "rbethman@comcast.net" <rbethman@comcast.net>
Subject: Re: [R-390] Gear train lubricants

I don't know if anyone has tried it, but powdered graphite mixed with either water or light machine oil would seem a likely candidate. The method of mixing with water results in a dried graphite coated surface. Since the gears aren't in an electrical circuit, this would seem to be another possibility to pursue.

From: "Bob Tetrault" <r.tetrault@attbi.com>
Subject: RE: [R-390] Gear train lubricants
Date: Wed, 30 Apr 2003 09:25:01 -0700

Hoppe's makes a volatile with moly suspension for this purpose for firearms. You can get it at any sporting goods store, though I don't know their particular trade name.

Date: Wed, 30 Apr 2003 12:32:45 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Gear train lubricants

Not a such a good idea if the graphite can fly around, settle in places where the sun don' t shine -- inside coil forms, fouling insulators, and possibly creating high resistance connections where infinite ohms should be, etc. Alternatively, you can treat the gear teeth surfaces with moly paste -- coat them, run in the gear train and than remove the excess. But not sure it's

worth it vs. just Mobil One. It does work well on the slug rack rubbing surfaces and a few other places. The molybdenum particles suspended in the paste work their way into the tiny pits in the metal surfaces. You apply as if Simonizing. The paste itself is just a vehicle and not a lubricant. The moly particles stay put and can't fly around like graphite powder or graphite coating flaking off and flying around.

Date: Wed, 30 Apr 2003 13:17:54 -0500
From: Terry O'Laughlin <terryo@wort-fm.terracom.net>
Subject: Re: [R-390] Gear train lubricants

Your Phil Woods must be compromised or an ancient formula. The grease in the tube I have is quite thick. As far as price, one tube has lubed dozens of bicycle bearings and three R-390s and is still half full. I use it pretty sparingly in an R-390 because the excess collects dust and spoils the appearance. I offered my advice because I have tried Lubriplate and Mobil 1 and found them wanting, especially Lubriplate which is atrocious stuff. I tried Phil Woods because it worked so well on my old Eddy Merckyx bike that it seemed a possible solution. I lubed the first R-390 RF deck and gear train a long time ago and it's worked out better than I ever expected. I'd be interested in hearing from people who have actually tried some of these other lubricants and have some time tested results.

Date: Wed, 30 Apr 2003 14:07:53 -0700
From: Robert Simpson <_bobs@pacbell.net>
Subject: Re: [R-390] Gear train lubricants

Does anyone know what the ingredients were in the "Grease, Aircraft and Instrument (GL)" specified in the Organizational Maintenance Manual - TM 11-5820-358-20 for gear teeth, cam edges and guide slots? If my feeble memory serves me correctly, it was a white grease. Was there a problem with this lubricant?

From: "Bob Tetrault" <r.tetrault@attbi.com>
Subject: RE: [R-390] Gear train lubricants
Date: Wed, 30 Apr 2003 16:37:21 -0700

Other than age, there is no problem. At the time these manuals were written, that was the best available. As well as being Qualified for Mil use, which means they were probably years older than the 390 when they were qualified. Now there are VASTLY superior lubricants in a range of choices that defy this list's ability to qualify. I've mentioned the Tri-Flow brand of Silicone with Teflon grease and Red-Line synthetic gear lube, others prefer something more crepuscular.

From: "Fred L. Haney" <fhaney@inteliport.com>

Subject: Re: [R-390] Gear train lubricants
Date: Wed, 30 Apr 2003 23:58:41 -0400

Try "SuperLube" also available at Radio Shack as "Lube Gel" in 3 oz tube....goes a l o n g way.Superior adhesion-stays where you put it.....non-toxic/non-corrosive. Won't wash off, disperse, break down or turn rancid. Does not attract dust or other contaminants. Impervious to salt and fresh water. All temperature use, -45 degrees to +450 degrees F. Non-conductive. I've used it on lots of stuff from sailboat winches to electronics. Leave the dinosaur lubricants to the dinosaurs.

Date: Sat, 24 May 2003 16:18:01 +0100
From: "David P. Goncalves" <dpg@coe.neu.edu>
Subject: [R-390] Differential Gear Assembly

Hello all, After disassembling the differential gear assembly and cleaning it,
I put it back together with a smile of accomplishment. Unfortunatley, the bastar* binds up now.

I did some reading on this in the Pearls, and it seems that the differential assembly has a particular assembly order. Oops, I didn't note that. Now that makes it 18 different ways to assemble it.

Question: Why does it have a preferred assembly order? Why must a gear go onto a particular shaft? Will it ever work again? Observations: When it binds, it is a soft bind; it can turn through it, but with some force. The rear steel gear is obviously not parallel to the brass detent plate. One of the small planetary split gears has a noticable gap in the split gears - the worst binding occurs then this gap runs into the sun gear. Oddly, one of the planetary gear shafts is loose.

Date: Wed, 04 Jun 2003 13:11:09 -0400
From: tbigelow@pop.state.vt.us (Todd Bigelow - PS)
Subject: [R-390] MC/KC knob dancing

Okay, now for something completely different.... Can someone tell me what the correct term is for the phenomenon exhibited when the MC knob slowly turns when the KC tuning knob is turned? I noticed this the other day on my Teledyne which has been sitting for a while unused. Also, what causes it? I know the gears are obviously crudded up since I've not yet done the complete tear-down, but specificially is seems like a type of clutching taking place? Yep, I know - it's been mentioned before. I've just forgotten. They say the mind is the second thing to go, can't remember what the first one is..... de Todd/'Boomer', KA1KAQ

From: "John KA1XC" <tetrode@worldnet.att.net>
Subject: Re: [R-390] MC/KC knob dancing
Date: Wed, 4 Jun 2003 14:06:19 -0400

Todd, there is a stainless steel "leaf" springy thing in the front of the RF deck which presses into the notches on the differential gear plate (I think), thus holding it in place when the KC knob is tuned. If the tension is insufficient it will allow slippage; the tension is an easy thing to adjust. On the other hand the spring could be cracked; I had this problem in my EAC and replaced it. Not a big problem, but if the MC knob turns it means the cams are moving too which will affect the RF alignment.

Subject: RE: [R-390] MC/KC knob dancing
Date: Wed, 4 Jun 2003 13:35:37 -0700
From: "David Wise" <David_Wise@Phoenix.com>

Excess friction in the gear train exacerbates this. Also, the MC detent notches wear with use of the MC knob and may simply be worn out. It's probably possible to re-cut them, but you have to get them exactly 120 degrees apart to avoid poor sensitivity on some bands due to misalignment. IMO Collins should have used a pull-to-turn or push-to-turn arrangement with positive locking.

Date: Wed, 4 Jun 2003 16:42:05 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: RE: [R-390] MC/KC knob dancing

Nolan Lee says: The detent spring can be shimmed out by putting washers between it and the mounting panel, this will give some new metal to wear on if the spring is grooved.

BUT, the most common problem is that the gears need to be cleaned and lubed.

Date: Thu, 05 Jun 2003 10:53:27 -0400
From: tbigelow@pop.state.vt.us (Todd Bigelow - PS)
Subject: Re: [R-390] MC/KC knob dancing

Many thanks to all who offered advice and suggestions. The 'gears need cleaning' part rang a bell, but for the life of me, I couldn't remember the detent/spring part. Although this unit appears to have seen little use, the metal could still be fatigued I'd guess. At any rate, it tells me right where to look when I tear back into it. I ned to get after the band/crystal deck switch as well, so maybe it'll make a good weekend project. Forecast is for rain again, so why not? Too wet to plow, too windy to stack BBs...

Date: Fri, 06 Jun 2003 11:48:38 -0400
From: tbigelow@pop.state.vt.us (Todd Bigelow - PS)
Subject: [R-390] Mystery solved....sortakinda...

After reading all of the responses on the MC/KC waltz, I decided to pull the Teledyne out of the rack last night for a quick peek. Really had no expectations of finding anything too exciting or amazing and NO intention of getting into it in any depth. Sure 'nuff, those "clean" looking gears and cams really had a nice gray crud about them. I sprayed some WD-40 into the gear train just to loosen things up a bit, not as a long-term solution of course. Well, it did work better and the MC knob seemed to stop turning when the KC knob was tuned, at least for the most part. HOWEVER....while tuning to and fro, I noticed something *else*. The two slug racks to the right weren't even moving...ever! I could switch bands, tune up and down, all to no avail. This also means one of the rear racks wasn't moving either, since it apparently keys off one of the front racks. Further inspection showed a gear or two, doing absolutely nothing. Damned freeloaders!

In a weak attempt to ascertain what was going on, I reached in to spin the front most, smaller gear. It flew off the shaft and fell onto the front porch. Still more inspection showed....a cracked clamp. a HA! So maybe this is why I couldn't make it work anywhere but the broadcast band, and then on last checking, not even there.

Now it's time to bite the bullet and do it all the right way. No more piecemeal approaches to specific symptoms. Somehow I got distracted with the mongrel A and never got back to the 'good' radio, probably because the mongrel worked! At least for now I have some idea where most (if not all) the problems with the radio lie. Once I get a clear work area, I'm going to take the 'one module at a time' approach and got through the entire radio. Pull a unit out, clean, repair, and replace it after completion to be sure I haven't made it worse. There's always the mongrel set too, for temporary donor parts. So....who has clamps? Or where? Recalling Scott's advice on his gear train restoration, I'm thinking it would be wise to have a few spares on hand. Also - any other suggestions on spare items (beyond complete modules/chassis) to have on hand? Besides a good bottle of scotch?There's just no way around it. I'm gonna hafta do it right.

Date: Fri, 06 Jun 2003 16:08:05 -0400
From: Gene Beckwith <jtone@sssnet.com>
Subject: Re: [R-390] Mystery solved....sortakinda...

Interesting post...and a common problem... Regarding clamp sources...I had a friend machine a couple for a ST. J Blue Striper....and in this case it

was not necessary to disassemble the whole system...because I made dual clamps...i.e. two halves with two bolts...not the horse shoe type... If u have a machinist friend it will be good to make up a few...because it is only a matter of time, and you will find the need...

Efforts here, as have been posted earlier, have been to advance the rehab capability by acquiring a lathe...and in the fall a small milling machine. Great fun, and then no reason not tackle any restoration project...plus u learn more neat stuff if u've never done machine type work... Alternatively, check with a company called. W.M. Berg out of East Rockaway NY...try 1-800-232-berg for starters....I think they're still in usiness...ask for catalog...huge assortment of gears, shafts, clamps and belting for instrumentation...

Date: Fri, 06 Jun 2003 16:35:00 -0400
From: tbigelow@pop.state.vt.us (Todd Bigelow - PS)
Subject: Re: [R-390] Mystery solved....sortakinda...

Thanks for the tip, Gene - another source to add to the file! I've "started" this project several times, but something always gets in the way. If I have to take a day or two off from work to get it done, then I will. It'll probably be raining anyhow. I'd be interested to hear how the machine shop project goes. A fellow I used to work for had a small milling machine and a few other goodies which came in handy for odd jobs. Unfortunately he wasn't cut out for Vermont's climate and moved back to California. But it sure planted some seeds in the ol' Mr. Fixit file. BTW, how did the T-3 project come out? Did you make it online for the Heavy Metal Rally? Just the thing to offset a rack of R-390s.

Date: Fri, 06 Jun 2003 19:00:51 -0400
From: Bernice & Al <bernice@videotron.ca>
Subject: Re: [R-390] Mystery solved....sortakinda.../Clamp Source

Check out Item #3028404570, Qty 10 clamps. Qty. 10 went for $26.50 back in April. See Item 3018437605.

From: "Phil Atchley" <k06bb@elite.net>
Date: Tue, 1 Jul 2003 21:14:25 -0000
Subject: [R-390] Clean gear train

Hi Folks. Today I pulled the RF deck out of this EAC that I'm presently overhauling. This unit has to have absolutely the cleanest gear train I've ever seen in an R-390A upon arrival at this QTH. When I got it I was told the set had been "gone through" but could probably use lubing as it had been awhile. I'm not sure what "gone through" meant but it certainly wasn't re-capped. Yes, there is some light dirt between the coils etc but

nothing like what I've come to expect. Even the rack springs are still shiny! Normally, I pull the RF deck, remove all slug racks, tubes coils etc and then do a complete "slosh" cleaning of the mechanism with a solvent and garden hose. Not this time. Instead I'm removing each rack and its coils individually, clean said coils/slugs, squirt a little DeOxit in the coil sockets, clean/oil the rollers and reassemble doing one rack at a time. Then of course I'll "LIGHTLY" lube any points that I feel need it. I've been down that road several times now and feel that excess lube is worse than no/little lube. NOTE: My first R-390A ever got a FREQUENT and GENEROUS treatment of a special "extra slick" lubricant from a pump spray bottle at regular intervals. This was BEFORE I was on the Internet or had even heard of the R-390 mail reflector. Needless to say, there was always a "puddle" of that stuff on the table under the receiver!!! I don't recall the name of the product but I must say it was slippery, but I'm not really sure it made the receiver any easier to tune!)

From: "John Page" <k4kwm@hotmail.com>
Date: Mon, 07 Jul 2003 01:57:16 +0000
Subject: [R-390] Help needed

Well I tried to do what I thought was going to be an easy job. That is to replace the on switch behind the panel. Panel came off just fine. Switch changed out fine panel went on fine and off/on switch works fine.Problem. The tuning is now terrible. Main tuning binding. Sometimes doesnt work at all. It was great before. It now tunes from around x.600 to +x.600. In other words it is now tuning into the next megacycle range. The problem seems to be in the zero adjust mechanism. I have not removed the panel the 2nd time as I want to get the wisdom of the group. Hope I havent screwed this thing up too bad. Thanks in advance for any help. John

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From: "John Page" <k4kwm@hotmail.com>
Date: Tue, 08 Jul 2003 02:48:25 +0000
Subject: [R-390] Re: help needed

Thanks to all who offered suggestions on the binding problem. Gene Beckwith gets a gold star as he hit it right on the nose. The right side angle gear on the counter was out off adjustment just a touch and would slip and then bind up. This of course screwed up the dial alignment. It is smooth as silk now. I really feel better. What a great bunch of guys. I knew that I could putz around and maybe screw it up or go upstairs and ask a whole bunch of experts.

Thanks again guys. And thank you Gene. John

Date: Tue, 08 Jul 2003 00:00:57 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Re: help needed

<snip> Anyway -- I can't seem to picture how dropping the panel and changing out a switch affected the counter gears. Thanks for letting us know you've got it fixed.

From: "James Smith" <n1xas@comcast.net>
Date: Fri, 18 Jul 2003 13:16:13 -0400
Subject: [R-390] Oldham Coupler Spring

The spring is missing from my R-390A/URR oldham coupler. Is there a source of them available? Or if someone has a spare that they will sell me. Please email me at N1XAS@comcast.net Thanks Jim Smith N1XAS

Date: Fri, 18 Jul 2003 15:36:14 -0500
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] Oldham Coupler Spring

I imagine that they're still being made, or at least something close enough for a replacement. I know what "Close enough for government work" originally meant, and it did *NOT* have to do with accepting sloppy work.

Date: Fri, 18 Jul 2003 23:04:07 -0400
From: Bernice & Al <bernice@videotron.ca>
Subject: Re: [R-390] Oldham Coupler Spring

I have enough of them to last me a lifetime. Email me direct for my mailing address and you can have a few of them for the price of postage. Anybody else need some let me know. There are more available at my source here north of the border. Al

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From: "Steve Hobensack" <stevehobensack@hotmail.com>
Subject: Re: [R-390] Oldham Coupler Spring
Date: Sat, 19 Jul 2003 08:12:47 -0400

I have used one out of a ball point pen. Clip it to size and bend hooks

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Date: Sat, 19 Jul 2003 07:47:13 -0700 (PDT)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] Oldham Coupler Spring

Your ACE hardware will have a box with beaucoup springs in it. I've used one from ACE.

From: "Phil Atchley" <k06bb@elite.net>
Subject: RE: [R-390] Oldham Coupler Spring

Date: Sat, 19 Jul 2003 15:04:46 -0000

Yes, I've found many items at my local ACE hardware store that I never thought I'd find including steel pins for gears on old radios, cotter keys, springs and you name it. No I have no affiliation with ACE, but think that most any radio restorer would enjoy just going to their local store one day and browse the little boxes of goodies to get familiar with what they have. I've found very nice Stainless screws of all varieties, brass thingies and you name it. AND, they have screws in both "Metric" (what's that!) and standard threads too!

From: "Phil Atchley" <k06bb@elite.net>
Date: Wed, 23 Jul 2003 20:45:33 -0000
Subject: [R-390] Today I Tweaked my PTO endpoint and lubed gear train.

<snip> Then, I went down to the auto parts store and bought a Quart (!!) of Valvoline DuraBlend (synthetic blend) 85W-140 gear oil. When I got it the gear train of this R-390A was the cleanest one I've ever seen. It had either been VERY thoroughly degreased, and not re-lubed in it's past or it had never been lubed. While it was quite "free" in movement and fairly smooth I felt it could be a lot better as you could just feel that it needed a little lube. It seemed to have "sticky" spots where the tuning wasn't quite so free. I suspect it may have been "degreased" as, when I got it most of the rack rollers were bound up, some not turning at all or very stiff. They were taken care of when I went through the RF deck, along with a very light coat of Valvolene DuraBlend grease on the inner surfaces the racks rub against. Anyway, after using a toothbrush and a artists paintbrush (I buy "throw-a-ways" at Ace Hardware for 29 cents each, buy them by the dozen for odd jobs) to apply a light coat of the gear oil to all the gear teeth, planetary gears, 10 turn stops etc. I'd dip the toothbrush in the oil, hold it against a gears teeth and "tune" the set. After everything was oiled I used a small cloth on seizers to soak up any residue or excess so it wouldn't run where I didn't want it to. This is my first experience with the gear oil and I'm not sure how well it'll stay "put", but the set is MUCH, MUCH smoother in it's tuning (It wasn't too shabby before) and doesn't have any "sticky" spots in its tuning. 73 de Phil, K06BB

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Today I Tweaked my PTO endpoint and lubed gear train.
Date: Thu, 24 Jul 2003 01:51:31 -0400

>Then, I went down to the auto parts store and bought a Quart (!!) of
>Valvolene DuraBlend (synthetic blend) 85W-140 gear oil.

Is that hypoidal gear oil -- with sulphur content? I picked up a quart of

Valvoline synthetic gear oil (75W-90, I think). Enough to do 5000 radios, but has that sulphur odor. Nolan warned that this stuff in proximity with silver will cause extreme tarnishing (as with silver plated contacts). However, I conducted a long term experiment, suspending a freshly cleaned silver plated connector over about 1/4 inch of the gear oil in a styrofoam coffee cup. After many months -- no tarnish. However, the experiment did firmly establish to a high degree of statistical significance (well... as high as you can get with an N of one) that synthetic hypoidal gear oil eats through styrofoam. Fortunately only a small puddle. I suppose the stuff is OK, but it does stink.

<snipped>

>They were taken care of when I went through the RF deck, along with
>a very light coat of Valvolene DuraBlend grease on the inner surfaces the
>racks rub against.

If you wanna really gild the lilly, first treat the surfaces with moly lube paste. You don't glop it on -- you simonize it in. The moly fills the pits and pores in the metal and makes the surface very smooth. Then apply very very little lube -- the surface won't hold as much anyway. You can also leave it dry on sometimes sliding surfaces (slug rack ends and frame) to avoid attracting dust.

>Anyway, after using a toothbrush and a artists paintbrush (I buy
>"throw-a-ways" at Ace Hardware for 29 cents each, buy them by the dozen
for
>odd jobs) to apply a light coat of the gear oil to all the gear teeth,
>planetary gears, 10 turn stops etc. I'd dip the toothbrush in the oil, hold
>it against a gears teeth and "tune" the set.

While you're at "Ace is the Place", they have flux brushes for about 10 cents apiece. Those are the ones with the hollow sheet metal handles. I find that they are very handy for cleaning and applying lube. I take some and cut the bristles halfway to make them stiffer for working into the gear teeth, etc.

>After everything was oiled I
>used a small cloth on seizers to soak up any residue or excess so it
>wouldn't run where I didn't want it to. This is my first experience with
>the gear oil and I'm not sure how well it'll stay "put", but the set is
>MUCH, MUCH smoother in it's tuning (It wasn't too shabby before) and
>doesn't have any "sticky" spots in it's tuning.

Interested to know if the stuff you bought has that sulphur aroma. Even though I have a lifetime-supply-and-a-half remaining of the Valvoline gear

oil I bought, I don't care for the "bouquet."

From: "John KA1XC" <tetrode@comcast.net>
Date: Wed, 22 Oct 2003 16:04:52 -0400
Subject: [R-390] R390A slugology

In the course of doing some troubleshooting I'm trying to nail down my understanding the slug types/colors in the 390A RF deck. My research seems to indicate that:

-all the RF coil and transformers slugs are identical, all bands (usually red/white dots)

-all the 1st and 2nd VIF coil slugs are identical (green dots)

Sound reasonable?

Date: Wed, 22 Oct 2003 16:43:27 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] R390A slugology

My notes include this from Bob Camp <bob@cq.nu>: "The material in the IF slugs is different than the material in the RF slugs so don't mix and match. "

This would imply that what you report above is right. (The R-390 non-A is a different matter altogether. It has slugs of both different diameters and different materials, and may even have slugs selected for best tracking in each transformer.)

From: "John KA1XC" <tetrode@comcast.net>
Subject: Re: [R-390] R390A slugology - Problem fixed
Date: Mon, 3 Nov 2003 13:32:44 -0500

thanks for the feedback, it helped lead me to the problem with this 390A. It turned out that it had TWO wrong slugs in the Z206-1 and Z206-2 16-32 MC coils. In hindsight, it now seems obvious what the problem was because these two slugs had a shiny green coating instead of the dull chocolate brown color that the other RF slugs have; most likely they are from the 1st VIF.
The weird thing is that they appeared to work, sort of. The first one peaked at the same position as the good slug in T206, but the second one peaked several turns out with respect to the other. Tracking was also screwed up, and the gain was also down by almost 20 dB, even with all the slugs peaked on the same frequency.

I used the substitution method swapping in coils/slugs from a good radio to isolate the problem, and then borrowed two slugs from the 8-16 MC coils to test a little more. If anybody has some RF slugs they'd like to unload for a few bucks let me know, otherwise I'll be putting an order into Fair along with some other parts I need.

From: R390rcvr@aol.com
Date: Sat, 8 Nov 2003 20:17:58 EST
Subject: [R-390] Best angle for slug rack ends

Just looking over the RF deck in a 67 EAC, and noticed quite a bit of variation in the included angle of the of the slug rack ends. Most were close to 90, some were significantly narrower, perhaps as little as 85 degrees. Is there a theoretical, and practical ideal? How tight are the tolerances? I am sure that was specified in the original drawings. Does anyone have such info available?

From: <mahlonhaunschild@cox.net>
Date: Tue, 23 Dec 2003 15:15:01 -0500
Subject: [R-390] Crystal osc. dial drum transplant

Am gearing up to start the rebuild of my "good" all-EAC R-390A. I was fortunate to find one that is in terrific shape internally (and has all-polyester capacitors from the factory so it's Less Work For Baby) but has the usual wear on the front panel and chassis exterior. One thing I would like to do is replace the crystal oscillator dial drum (the one you can see through the hole in the top of the crystal oscillator deck). For some reason, the labels on the drum have deteriorated for reasons I can't figure out. I've got a Stewart-Warner/Amelco RF/osc. deck hulk I can use the drum from, but R&R'ing the drum looks troublesome. Has anyone actually done this? If so, how did you do it? I'd prefer to not use a paper label on the existing drum if I can help it (though I could easily make one).

From: "Craig McCartney" <craigmc@pacbell.net>
Subject: RE: [R-390] Crystal osc. dial drum transplant
Date: Tue, 23 Dec 2003 17:37:55 -0800

Dave Medley has done this. There is, I believe an article on his web site about it he has, or used to have, the parts (new label, etc.).

Date: Wed, 24 Dec 2003 09:51:30 -0500
From: K2CBY@aol.com
Subject: [R-390] Crystal osc. dial drum transplant

Swapping dial drums on the crystal oscillator shaft isn't an impossible task; it's just a little awkward. You have to detach the gear, remove the

oscillator subchassis, undo the snap ring at the forward end of the shaft where it rests on the front side of the bronze bushing. Then push the shaft out the back. The dial drum then falls off the shaft. If all else fails, you can restore the markings with a paper dial. I made one using Microsoft Word (which took a lot longer than removing the dial drum) that produces an exact replica of (white on black) type style, size & spacing. Contact me off list. I can send it (with directions) as an e-mail attachment or can mail you one or more paper copies. Whatever you do, take care: The drum is indexed to the shaft. If you destroy the old decal, be sure you mark the "1" point on the drum and make a note of the direction the numbers go. Miles, K2CBY

Date: Sat, 24 Jan 2004 09:19:10 -0500
To: <r-390@mailman.qth.net>
Subject: [R-390] Kilocycle Change Knob Collar

The kilocycle change internal knob retention collar with the set screw on my early Motorola R-390A has broken. This makes it impossible to tune the radio, obviously. Does anyone know of a quick fix for this? I thought of using or modifying a drill bit stop collar or something similar. Barring that, are the knob retention collars available out there somewhere? Hate to have to obtain an entire knob assembly, but would like to find one as a final alternative. Thanks, in advance, for the help.

From: ToddRoberts2001@aol.com
Date: Sun, 25 Jan 2004 13:23:32 EST
Subject: Re: [R-390] Kilocycle Change Knob Collar

Bob, a close match for a replacement knob retention collar for the large KC/MC knobs for the R-390A is available from Stock Drive Products online. Catalog number S3701Y-C112. It is known as a Split-Hub Gear Clamp, I.D. 0.438", thickness 0.250", set-screw size #6-32. Single price $8.34. You can see their product line at www.sdp-si.com. I think someone has been selling R-390A knob clamps on the e-place from time to time also. A small size hose clamp might work in a pinch but I would go with the proper style split-hub clamp. 73 Todd Roberts WD4NGG.

Date: Fri, 13 Feb 2004 14:16:30 -0500
From: JMILLER1706@cfl.rr.com
Subject: [R-390] Interchangeability of RF Deck Mechanicals

I have a Collins made 390-A that is "almost" all Collins except for the IF which is Motorola. It receives exceptionally well. However a previous owner apparently took a Drimmel grinder or a file to one of the vertical slots on the front face of the RF deck (the slots where the RF slug racks ride up and down in). And it was not just a little filing, there is some

significant amount of metal whittled out of one of the slots. The slug rack rides up and down OK with no apparent problem, but some day I want to replace the slug rack front plate. I would like to find a junker RF deck to cannabilize for this. Question: Should the mechanics (hole locations, machining, etc.) of RF deck metal stock be identical between manufacturers? In other words, if I find an old EAC RF deck, take the front slug rack plate off and put it on the Collins RF deck, should things still line up mechanically and physically?

Date: Fri, 13 Feb 2004 11:40:27 -0800 (PST)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] Interchangeability of RF Deck Mechanicals

The parts "should" all line up exactly as they were made from the same drawings and gauges. You should not have any problems getting it to fit up. The only noticeable differences I know of are the late EAC RF and IF mainframes which are made differently from the other makes. EAC got permission to do this and it is reflected in their drawings. I know of no differences in the slug guide plates.

Date: Fri, 13 Feb 2004 14:59:31 -0800 (PST)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] Interchangeability of RF Deck Mechanicals

Compare the corners of the IF deck of the EAC to the Collins. You'll see that they were constructed differently. This is to facilitate wiring of the EAC decks prior to the sides being crimped up. This is why there are some splices in the wires on EAC's, normally a NO-NO in military construction.

From: "massimiliano" <pucroc@inwind.it>
Date: Sat, 14 Feb 2004 21:50:31 +0100
Subject: [R-390] Lubricate my 390A/URR

In the Y2K-R2 manual I read I have to use MIL-L-7970 and MIL-G-7421 for lubricate my 390A/URR. Were can I buy this type of oils ?

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Lubricate my 390A/URR
Date: Sat, 14 Feb 2004 19:40:27 -0500

I don't know where you would find those MIL lubricants, but they are probably no longer the best choice anyway. R-390A owners use a number of different favorites. One is synthetic motor oil, such as "Mobil One" here in the US -- 10W-30 or similar. Some use synthetic gear oil which is 70-90 weight. One quart or liter is enough for at least a thousand radios. Avoid hypoidal gear lubricant which contains sulfur. Some say the fumes cause

oxidation of silver plated contacts, but I just do not like the aroma. The main reason for favoring the synthetics is that they should never harden up or become sticky. However, someone pointed out that quality regular oils and grease should be good for many years and it would be OK to have to clean and re-lubricate every 5 to 10 years or so. (In other words, synthetic lube might be over-doing things -- but we are R-390 owners with 75 lb. radios, so perhaps over-doing is something we like to do ;-) (Like making sure that who ever owns the radio 50 years from now is happy with our work.) You are likely to already have some oil that will do the job. The main thing is to clean the gear train completely and use very little. A single drop on the end of a wire or paper clip is enough for a bearing or bushing. Just coat the gear teeth with a small amount using a brush. Make certain that the rollers on the slug racks (cam followers) spin freely. (Keep oil away from the antenna trimmer shaft.) I sometimes apply a molydenum paste lubricant to sliding surfaces, such as the inside surfaces of the RF deck frame, ends of the slug racks, etc. You apply the paste as if you were polishing a car -- rub it in and buff. It fills the pores in the metal and leaves a slick, dry surface.

Do you have the R2 version of the Y2K manual? I may be wrong, but I thought
some notes were added about lubrication. If not, you can find more in the "Pearls of Wisdom" on Al Tirevold's site.

Date: Sun, 15 Feb 2004 15:44:25 -0800
From: Leigh Sedgwick <bipi@comcast.net>
Subject: [R-390] Thanks for Megger Info + A Question

I want to, first, thank all those who responded to my question regarding proper megger operation and I was glad to get that confirmed for future reference. Folks on this list are a big help for sure! I have completely dissassembled the RF deck on my R-390A and want to get it back together before I completely forget what I did :-). However, in the process of cleaning all the parts, I have found 2 broken clamps and a couple more that have serious stress fractures and will fail in the not too distant future. Anyone know of a supply of either NOS or re-manufactured clamps in both the larger and smaller sizes needed on the RF deck? I think I would like to replace all of them while I'm at it and possibly save some grief downstream. Any leads would be appreciated. BTW, just for the record, my RF deck gear train appeared to be about as clean as you could find before I started. When I began this adventure, I was just planning on fixing a broken clamp on the megacycle gear shaft. What I found was the lubricant between all of the split gears had hardened due to age and those gears no longer functioned properly. So, I guess the old "if it ain't broke, don't fix it" may not completely apply to the R390 because you might not know that it "ain't working" properly. Anyway, thanks again for the

megger help and any clamp leads would be appreciated.

Date: Mon, 23 Feb 2004 20:28:06 -0800
From: Leigh Sedgwick <bipi@comcast.net>
Subject: [R-390] Anti-Backlash Gear Tension?

Question for the experts...what is the rule of thumb for tensioning the anti-backlash gear sets on the RF deck of the R-390A, i.e., 1, 2, or 3 gear teeth after tensioning begins on the springs. Thanks 73 de Mike K7PI Mercer Island, WA

Date: Mon, 15 Mar 2004 20:39:46 -0800
From: Leigh Sedgwick <bipi@comcast.net>
Subject: [R-390] R390 Clutch/Differential Gear Assembly Details

I am working through a rebuild of my R390A RF deck including a complete teardown and cleaning of the gear train. Everything was going fine until I decided to clean the split gears on the clutch/differential gear assembly. The 2 split gears were froze together. I should know by now when disassembling something to leave it in one orientation. Well, I didn't and turned it and all of a sudden I have a handful of spring shims without a clue on how to reorient them upon assembly. Here is a picture of the sping shims - notice the names of the JPG picture files :-)

http://home.comcast.net/~bipi/miscpix/booboo1.jpg

I pulled apart the rest of the clutch assembly and did my best to keep everything in its original orientation as shown in the next 2 pictures.

http://home.comcast.net/~bipi/miscpix/booboo2.jpg
http://home.comcast.net/~bipi/miscpix/booboo3.jpg

My best guess for spring shim orientation is shown in the next 3 pictures. But they could easily be oriented the opposite way (hell, maybe it doesn't matter).

http://home.comcast.net/~bipi/miscpix/booboo4.jpg
http://home.comcast.net/~bipi/miscpix/booboo5.jpg
http://home.comcast.net/~bipi/miscpix/booboo6.jpg

Anyone on the relector here have some first hand knowledge of their proper orientation? I have reassembled the unit and it appears to function as before (best I can tell without having it in the receiver) but I don't trust a guess and would sure like to get this confirmed before I completely reassembly the RF deck. Here are pictures of it reassembled.

http://home.comcast.net/~bipi/miscpix/booboo7.jpg
http://home.comcast.net/~bipi/miscpix/booboo8.jpg

While I'm at it, if anyone knows the order orientation of the brass spacers shown previously in pictures 2 and 3 so I can confirm their positions that would be great too. Anyone have a current e-mail address for Scott Seickel? The one listed in his gear train pictures no longer works. Thanks in advance for the help.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] R390 Clutch/Differential Gear Assembly Details
Date: Tue, 16 Mar 2004 08:20:29 -0600

I think I did the same thing. If I recall, I put the side with the "sharper edge" toward the harder material. Other than that, I don't think it really matters. It is just a spring that pushes the same in either orientation. I could be wrong, though. I went to the trouble of polishing the bronze (brass?) clutch disks. I was having problem getting the disks to slide freely and tried a bit of oil. Big mistake. The oil made the disks stick together. I'd suggest leaving them dry.

Date: Fri, 16 Apr 2004 09:50:42 +0200
From: "Bryce Ringwood" <BRingwoo@csir.co.za>
Subject: [R-390] 390a - Switch Wafer Alignment

Pulled the RF section and crystal oscillator last weekend to try and cure one or two irritating faults, particularly that of having to rock the wavechange switch on the bands 11 to 17 MHz to get reception. On close inspection of the switch wafers in the crystal oscillator, I noticed that they are out of alignment, with the front wafer being displaced sideways just enough to make contact unreliable. The contacts on the low range and high range are good. The question is, how easy is it to realign the wafer ? It needs to ne moved about 0,5 to 1 mm sidways
- is there enough play on the mounting screws ? and has anyone else had this problem ? Amazingly, the switches and contacts all look bright and shiny and new. Once this is fixed, the only remaining problem will be intermittent low sensitivity on the 0,5-8 MHz range which almost always presents itself after switching to the 0,5 to 1 MHz range. (Doesn't make sense to me, but it might to one of you.)

From: "Dallas Lankford" <dallas@bayou.com>
Subject: Re: [R-390] 390a - Switch Wafer Alignment
Date: Fri, 16 Apr 2004 06:44:41 -0500

I never moved the mounting screws, but I would assume there is enough "play" to move them sufficiently to realign them. However, are you sure

that is the problem?

Put the MCS knob on its shaft and run the bands from 0 to 30 and back to 0 again as you look very closely at how the nipples make contact with the wipers. At various band positions (say 3, and 10, and 17) change back and forth between adjacent bands while looking very closely at how the nipples make contact with the wipers.

In oscillator decks that I have examined, there is quite a bit of backlash... enough so that one wafer is "good" but the other is "bad." This is due to the fact that the cutout in the bakelite disc in the center of the wafer is larger than it should be. With care and patience, you can resync the osc shaft (loosening and tightening the non-mar clamp on the osc shaft gear) so that neither is good or bad, but both are merely O.K.

As I recall, I adjusted the shaft at least half a dozen times, maybe several dozen times before I got it like I wanted it. Anyway, it fixed my similar osc problem. It seems like I tried to use thin shims against the shaft flat through the bakelite disc, but I didn't like the idea of metal pieces that could fall out and cause other problems. But that might be the only solution in some cases

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Date: Mon, 19 Apr 2004 15:00:26 +0200
From: "Bryce Ringwood" <BRingwoo@csir.co.za>
Subject: Re: [R-390] 390a - Switch Wafer Alignment

Thanks to Dallas Lankford and Pete Wokoun,sr. Concensus is that there's a lot of slop on the shaft and some good can be obtained by putting a shim one side of the shaft under the misaligned wafer.

Dallas also cautions about attempting to align the crystal oscillator section wafers with the unit detached from the rest of the RF unit. I followed their advice and aligned it as best as I could without dismantling the wafer mounting screws. So far its working quite nicely.

Date: Sat, 26 Jun 2004 00:38:48 EDT
From: ToddRoberts2001@aol.com
Subject: [R-390] Synthetic Grease For R-390A Geartrain

I have had trouble finding a local source for synthetic grease to use in the R-390A geartrain after cleaning. I found a good online source - www.oil4kids.com

They have a nice selection of synthetic oils and greases under the name AMSOIL that you can order online. Their Series 2000 synthetic grease is rated even better than RedLine grease, but RedLine would be my second

choice. I wouldn't consider using anything other than synthetic oil and grease when rebuilding an R-390A geartrain.

Date: Sat, 26 Jun 2004 10:51:33 -0400
From: Bob Camp <ham@cq.nu>
Subject: [R-390] R-390 gear train

You have pretty much all you need to do the gear trains. The video's are vital to the process (seeing it is a *lot* better than reading it). A second radio to look at as you put things back together is a very nice supplement to the pictures in the manuals. There are also some great pictures on the web that can be helpfull. The main thing that I find troublesome is getting the crystal deck timed right relative to the RF deck. It's well documented but I usually have to do it more than once to get it right.

About the only other thing you might want to pick up is one of Fair Radio's $35 RF decks. They are a good source of most of the things you will need to fix up an RF deck. The deck you get should have a full set of working RF coils and gears on it so it makes a pretty good spare part kit. Tearing one down to bits and pieces is a great way to get a feel for what is involved in the gear train rebuild without risking a good deck from a working radio. I have bought two or three of them over the years and been happy with all of them.

The main advantage of doing a gear train rebuild is that you get the grit out of the gears. Depending on how your radios spent their life this may be more or less of an issue on your radios.You can spray all kinds of junk on an assembled gear and still not blow the crud out of them. The grit makes the anti backlash gears hang up a little. This adds a bit of slop and friction to the tuning process.

The gear train process is more or less a day to tear it down, two or three days to clean everything and maybe two days to put it back together. Depending on how much double checking you do it might take you another day or two. As far as I can see there is almost nothing you can break in the process. Sometimes the clamps that hold things to the shafts crack but a spare rf deck has *lots* of them. The only way to fail is to simply give up on putting it back together. Even if things get a bit overwhelming a week time out can do wonders ....

Date: Sat, 26 Jun 2004 12:01:00 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Synthetic Grease For R-390A Geartrain

One thing to be very careful about when picking lubricants is to be sure that they are compatible with each other. Lubricant's don't always play

well together. In general you will be using something like a grease, a light oil, and a couple of cleaners (including contact cleaner ...). Some people also add a heavy oil to the process. The more things you use the more odd combinations you can wind up with, but the more you can optimize the lubricant to each part of the radio.

In some cases you can get a wonderful gummy goo when you mix cleaner X with heavy oil Y. In other cases it's light oil A and grease B that creates an amazingly rugged varnish. On the other end of the process you can find a light oil that does a great job of acting as a cleaner for the grease. You may even find that none of your cleaners have any affect at all on your grease. A light oil that instantly washes the grease away may not be a real good choice ....

The solution isn't terribly complex, just try mixing a little of each of the things you plan to use. Some people add a little water to each of the mixtures just to throw in another variable. Leave them out in the air for a while and see what happens. If all is going well then apply some heat for a couple of days. Something around 120_ to 150_ F is a pretty good starting point. If nothing odd happens you might go up to 200_ F for a few weeks. Ideally you would like nothing at all to happen to any of the chemicals or the mixes after a couple of weeks in the heat. A light bulb in a box type heater works fine for this sort of thing or a surplus lab oven.

There are actually more combinations that you might think. A little grease in a lot of light oil is a different combination than a lot of grease and a little oil. In one case you are checking the grease and in the other you are checking the oil.

Generally you find that some of the light oil evaporates and the cleaners are gone before you ever get to the heat stage. In both cases you want to be sure that there is no residue when they evaporate. If you do the test on a piece of glass this can be easy to check out.

The heavy oil and grease should hold up very well to the heat process. The thing here is to be sure that the mixes behave the same way as the unmixed combinations. If the light oil combined with the grease turns into bubble gum after a couple of weeks then it's not a good combination.

I have never found a problem using stuff that all came from the same manufacturer and product line. I wouldn't worry a whole lot about mixing a light oil and heavy oil from the same product line with each other. Unfortunately I have yet to find a cleaner and all the other stuff from one guy that I actually like. That's where the combination can get you.

Combinations of synthetic products with "natural" compounds seem to be

the most likely to have trouble. You can also find light oils that don't seem to be very well made or are actually being sold as a varnish.

The wild card in the whole process is that you may or may not be starting from scratch on your radio.I have yet to see two radios with the same set of lubricants on them. If you don't know what the previous owner used then you are more or less playing a random combination game. There is no way to know what the outcome will be. Another strong argument for tearing the whole thing down, cleaning it all and then lubricating it from scratch.

Even if you don't go with all the weeks of heat stuff simply doing the combinations and letting them sit for a couple weeks will give you a pretty good idea if there's a major problem. I would at least do this part of the process before using any combination of lubricants and cleaners. I would always check any multi manufacturer / multi product line combinations.

Sorry for the long post on a fairly simple topic ....

Date: Sun, 27 Jun 2004 19:18:17 -0400
From: polaraligned <polaraligned@optonline.net>
Subject: Re: [R-390] R-390 gear train

5 to 7 days to do the RF deck! I hope you mean only a couple of hours a day! I rebuilt mine for the first time in 1 day. No problem doing so. I also spent time documenting my rebuild during that day. The rebuild can be found at: http://www.r-390a.net/R-390A-Gear-Rebuild.pdf It is a much better resource than the videos as you can print pictures of the rebuild for each step of the way. It shows detail that the videos can't. Scott

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Date: Sun, 27 Jun 2004 21:55:47 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] R-390 gear train

I have found that different people may work at radically different speeds on this sort of thing. A lot depends on how much time you spend around mechanical stuff. The cleaning process will vary quite a bit depending on what you have for cleaning gear and how bad a shape your gears are in. Getting all the crud out of the teeth on a bad set of gears is usually the part that takes me the most time.

The thing you don't want to do is get a first time tear down set up with the expectation that you have failed if it takes you more than an afternoon .....

Date: Mon, 28 Jun 2004 13:01:47 -0500
From: "Don Reaves W5OR" <w5or@comcast.net>

Subject: RE: [R-390] R-390 gear train

> The thing you don't want to do is get a first time tear down set up
> with the expectation that you have failed if it takes you more than
> an afternoon ..... Bob Camp

I have to laugh, and agree with this statement, Bob. Some guys do a complete bare metal rebuild of the subject device within four hours after first contact. Others take a little longer. My projects tend to take *years* to complete, due to interruptions like work, family, wars, pestilence, etc.

But completing a project you started several years ago is especially satisfying, if for no other reasons than you didn't lose any of the parts, and there aren't any screws left over. :-)

Date: Tue, 3 Aug 2004 21:02:42 -0400
From: "JamesMiller" <jmiller1706@cfl.rr.com>
Subject: [R-390] Differences in Slug Carriers

On the metal carriers that hold the coil slugs, in some radios you see a rod running from front to back. At each end of the rod ar small cylindrical bearings that ride on the cams. In the S&W radio I have, the slug carriers have this rod in them front to back. In my Collins 390a, there is no rod. Only a metal tab at each end that holds the cylindrical bearings. Did Collins never use slug carriers with this rod? The rod seems to offer more mechanical rigidity or stability than the "tab" type. I would have thought Collins would go for the more substantial design.

Date: Tue, 3 Aug 2004 18:40:24 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Differences in Slug Carriers

I've got one of those decks without the rod, too! I was wondering who made them. Are you sure it was Collins? The RF deck in my EAC has the bearings but I believe they are assembled incorrectly as the roller that rides in the slot is narrower than the roller that rides on the cam, I'd think it should be t'other way round, it would fit better. Joe

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Date: Tue, 3 Aug 2004 22:39:06 -0400
From: "JamesMiller" <jmiller1706@cfl.rr.com>
Subject: Re: [R-390] Differences in Slug Carriers

The RF deck has the Collins name stamped on the side, so unless someone swapped out the slug carriers some time in the past, then Collins used the ones with out the rods. But on the other hand it looks like someone has taken a heavy file to the slug rack slides, so I can't be sure. Anyway,, as I

said someone in the past took a file or grinder to the inside edges of the slug rack slides on the front of the deck, so I bought a junker EAC RF deck from Fair with the idea of changing out the front plate of the RF deck. I am hoping the holes and all are the same dimensions and spacing. While looking at it this question ahout the rods came to mind. The junker EAC deck has the rods, as does my Stewart Warner, but the Collins deck does not. Just wondering if that's normal...

Date: Sun, 19 Dec 2004 13:17:32 -0500
From: "Scott Bauer" <odyslim@comcast.net>
Subject: [R-390] R388 rf slug needed, Help. My band cruiser died.

I lost sensitivity while listening on the 41 meter band. After removal of the bottom cover, I noticed the slug had broken off and fallen out of the coil. I am hoping that somebody might have a spare powdered iron core. It is from the RF rack in my R388 and it is the slug from L111 in the 4-7mc section. If not, will crazy glue work? I have both parts.

Date: Sun, 19 Dec 2004 13:31:15 -0500
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] R388 rf slug needed, Help. My band cruiser died.

As long as you can get it back in where it belongs, powdered iron cores can be glued with no problem.

Date: Wed, 29 Dec 2004 08:53:29 -0500
From: "Sandy Geiger" <chg111@hotmail.com>
Subject: Re: [R-390] 390() vs 390(A)

Guys- I have an R-391, s/n 282, that I got from Rick Mish. Electronically, it is tweaked to the nines,as all Rick's restorations are, but I've never been brave-or foolish-enuff to fire up the Autotune. Rick kinda suggested it would be in my-& the radio's- best interests if I left it alone. Too many tales of R-391s eating themselves have convinced me this is the right thing to do.-Sandy

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Date: Wed, 29 Dec 2004 17:56:49 -0500
From: polaraligned <polaraligned@optonline.net>
Subject: Re: [R-390] 390() vs 390(A)

If the radio is restored and properly assembled, why not fire it up? What is there that could go wrong on a properly restored Autotune? Is this just lack of confidence in one's work? Is there not risk to firing up any old radio after restoration? Do I ask too many questions?

Date: Wed, 29 Dec 2004 20:20:32 -0500

From: "Sandy Geiger" <chg111@hotmail.com>
Subject: Re: [R-390] 390() vs 390(A)

Well, for one thing, I don't have the-what izzit- PP-629 power supply to make the beastie run. ONLY one I ever saw went for something over $300 on You-Know-Where last fall. And yes, I guess you could make one up, but I have neither the skills or knowledge-or INCLINATION- to do so. The radio is an EXCELLENT specimen, I don't particularly want to take a chance on it's getting trashed. They only made, what, 1300 or so of them things, & sometime after I've long since taken my EternalDirt Nap,some radio nut who hasn't even been born yet will hopefully be enjoying this marvel of 1950s mechanical & thermionic technology Much as we enjoy Stradivaiuses today. Sure, I'd like to see an R-391's Autotune run, just not necessarily MY R-391's Autotune.-Sandy G.

Date: Wed, 29 Dec 2004 22:11:04 -0500
From: "Ray, W2EC" <w2ec@attglobal.net>
Subject: Re: [R-390] 390() vs 390(A)

Foolish enuff?? Them's fightin' words!! Actually, I must admit I don't find much use for mine in the auto-channel select mode, but what is the sense in having one if you don't use it occasionally? Pass it on to someone who will appreciate it and get a plain R-390.

Here's a video of my military auto-select station (R-391 & ATC/ART-13), maybe someday I'll add audio: "http://www.w2ec.com/Autotune.html"

Date: Wed, 29 Dec 2004 22:20:50 EST
From: ToddRoberts2001@aol.com
Subject: Re: [R-390] 390() vs 390(A)

Good advice Sandy. I feel the same way about the motorized tuning on the R-389. It was fun to watch it work once or twice but after seeing how fast it would spin the main tuning dial I just don't think it would be wise to use that feature day in and day out. I don't like to see that kind of possible wear and tear on the tuning mechanism if I can help it. I would imagine the same goes for the R-391 unless you absolutely positively have to see the autotune work. Just tune it manually and enjoy it for what it is - a fine example of engineering from the 50's era! 73 Todd Roberts WD4NGG

Date: Thu, 30 Dec 2004 17:42:48 -0500
From: "John KA1XC" <tetrode@comcast.net>
Subject: Re: [R-390] 390() vs 390(A), R-391

Well Barry, I've got two of the 391 beasties, one has been given some attention and is working well as a 390, the other is still waiting in line.

Both were missing the locking keys and the state of the autotune is TBD. On the one I worked on I did remove and open up the autotune boxes in the front - and yikes, talk about a box of complicated mechanical doodads. They of course were smothered in old dried grease so I had some fun scrubbing the mechanisms clean with WD-40 and oiling up the little oiler sponge inside. That's about as far as I got, after that I re-installed them and told myself I wouldn't attempt any further until I learned a lot more about how they work. I also thought the MC detent in the 391 was very well done; it is a much better engineered mechanism than the little spring steel weenie that wears out in the 390 and 390A . Too bad they didn't use that design in all the radios. Without a functioning autotune I would say a R-391 is definitely second to a R-390 in desirability due to the fact that the autotune mechanisms add a lot of extra drag to the KC tuning. It gives you about 1/4 turn of easy turning before it kicks in, and then the drag is much more noticeable. Another item lacking here is a good 28 VDC power supply with enough oomph to drive the motor. Ideally what I'd like to get or build is a fully metered regulated supply with adjustable current limiting, that way I'd set the current limit to just above what the motor normally draws and the power supply would go into current limit if something went wrong with the autotune control and the motor hit a stop. It'd probably need at least 10,000 uF on the supply output to take care of the motor start-up surge current too. Since I needed locking keys I bought a set from Hank Arney and they look real sweet. I tried inserting them into the knobs and into the innards of the autotune and they thread in nice and smooth to a point but then appear to bind up before the locking handle makes it down to flush with the knob face. Is this normal or do they really need to be screwed in very hard all the way down? Since I don't have any experience with using the autotune section I'm taking it real cautious here, don't want to beak anything! I'd appreciate some advice on this.

Date: Thu, 16 Dec 2004 17:26:28 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] 390() vs 390(A), R-391

>. ...appear to bind up before the locking handle.....

That means they are locked. Don't force it.

>Is this normal or do they really need to be screwed in ...the way down?

Yes, it's normal. the end of the shaft pushes against some thing inside, it does not clamp the front of the knob to anything. Sounds just fine to me!

Date: Thu, 30 Dec 2004 18:52:24 -0500

From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] 390() vs 390(A), R-391

> R-390 in desirability due to the fact that the autotune mechanisms add a lot
> of extra drag to the KC tuning. It gives you about 1/4 turn of easy turning
> before it kicks in, and then the drag is much more noticeable.

I've never noticed that. Hmmmm. KC positioner may need cleaning and more super- slippery lube.

> Another item lacking here is a good 28 VDC power supply with enough....

I believe there's quite bit of surge current. If I recall, when I used a metered supply, it was something like a peak of 7amps and down to 3 amp when spun up. A simple supply should suffice. You could even use a couple of 12v. gel cells in series. A current regulated supply would probably not be a great idea as you'd have to set it either too low whereby it would interfere with operation -- e.g. stall at higher mechanical resistance points -- and afford no real protection set high enough for it to work right in the first place.
>
> Since I needed locking keys .....

As Roy already posted, no they should stop short of the knob. I'd guess between 1/4 and 1/8 inch. The clutch is engaged when the rounted tip of the key presses against the works inside. You tighten them very firmly and test by trying to turn the KC and MC knobs. When sufficiently tight, it shouldn't be possible to turn them. You don't want them slipping when the autotuner is running.

Date: Thu, 30 Dec 2004 19:06:29 -0500
From: "Drew Papanek" <drewmaster813@hotmail.com>
Subject: [R-390] 390() vs 390(A), clattering away

Many years ago I added a spinner to the Kc (not kilohertz!) knob on my '67 EAC. That was way back before any of the '390x clan had become sacred objects, so I am hereby granted absolution. I used a Torrington needle bearing cam follower in a hole spotfaced and tapped near the knob's edge and it works quite well, perhaps a little too well. When rapidly cranking to QSY I get at least the clatter portion of that "fair sample" alluded to by Barry, so much so that I am afraid to crank very fast. The Veeder-Root counter seems to be the source of most of the clatter.

Date: Thu, 30 Dec 2004 19:38:00 -0500

From: "Drew Papanek" <drewmaster813@hotmail.com>
Subject: [R-390] Autotuners

Sandy Geiger expressed misgivings about firing up the autotune on his Mish-restored R-391:

>Guys- I have an R-391, s/n 282, that I got from Rick Mish.
>Electronically, it is tweaked to the nines,as all Rick's restorations
>are, but I've never been brave-or foolish-enuff to fire up the
>Autotune. Rick kinda suggested it would be in my-& the radio's- best
>interests if I left it alone. Too many tales of R-391s eating
>themselves have convinced me this is the right thing to do.-Sandy G.

He cited Barry's observations:

>It is impossible to walk this gizmo through manually in steps, though
you
>can put a bristol wrench in the synch >adjuster, lock the knobs down and
>rotate it. However, it's not a complete simulation as the relay and
>control unit aren't doing their things. It's all hard-wired together --
including the
>relay -- no socket.

I was able to manually operate the autotune and exercise the electrical portion of an ART-13 by mechanically disconnecting the motor from the rest of the autotune. With power applied and channel selected, the motor would run until I had turned the shaft (many turns!) to operate the limit sensing switch, whereupon the relay would pull in and the motor would reverse; running until I had turned the shaft enough(the other direction) to operate the channel position sensing switch (too lazy to go get the manual and see what they call those switches). Yes, the slip clutches were frozen with gummed-up lubricant and I did not force the movement. Who knows what damage would have resulted had I tested under motor power.

Disassembly, soaking in lacquer thinner, relubrication and reassembly corrected the problem. I don't think I used a synthetic lubricant; the process will therefore have to be repeated in another 20 years or so. There is a special tool for turning the ART-13 autotune line shaft; I did not have the tool but it was a simple matter to make one up. It would be a simple matter to lower voltage to the motor to reduce the torque for testing purposes (for the R-391, back on topic, whew!).I used an old Telco power supply salvaged from the junkheap for the 24VDC - no construction required there.

Date: Thu, 30 Dec 2004 18:38:10 -0600
From: William J.Neill <wjneill@lcc.net>

Subject: Re: [R-390] 390() vs 390(A), R-391

I have 3 R-391's and one R-389 with working autotunes. I also have caged squirrels on amphetamines that are a half-assed form of autotune for my 51J4.

Date: Fri, 31 Dec 2004 11:09:04 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Autotuners

<snipped> Yes, the slip clutches were frozen with gummed-up lubricant.....

Careful checking, soaking, re-lubing. is generally in order with these things. Also, Dave Medley advises to check the motor on the '391 -- brushes, commutator, etc. I'm told there are motor repair shops that can service these still. May just require some cleanup around the commutator and brushes and lubricating the bearings. It would be good to know the correct lube to refresh those bearings - not only for '391's but for a vintage power tool, etc. Anybody know? It has to be something that soaks into the bronze without killing it.

> I don't think I used a synthetic lubricant; .....

The mechanical positioners, with sandwiches of rotating, rubbing pawls, might benefit from silcone lube, but that doesn't seem to be as popular these days. The stuff I'm thinking of was very thin and its primary attributes - super slipperyness AND does not tend to attract dust. For example, it was the lubricant of choice for those bars in line printers and selectric typewriters that the print heads traversed on. So it wasn't so much the long-lasting, non-gumming properties as minimum friction where large areas of metal were sliding and where dust could be a problem, as with paper dust and fallout from printer ribbons. The positioning units have covers, but are not sealed in a '391. The worm drive goes through several sintered bronze Oilite bearings. These are porous bronze bushings that were permanently lubricated. But, "permanent" generally assumes for the "life of the tool" or whatever, not necessarily 50 years going on another 50. Those bearings were pre-soaked in a special lubricant -- but I don't know what. I have one '391 where a couple of bearings partially disintegrated ... with some bronze dust trails. New bearings are still made -- but there are dozens of sizes. The originals are pressed into (maybe glued?) the cast aluminum frame.

> It would be a simple matter to lower voltage to the motor to reduce the
> torque for testing purposes (for the R-391, back on topic, whew!).

I doubt that it would work. The '391 needs some minimum amount of torque to actuate the contraptions or it will stall and malfunction.. However, you gave me an idea. Disconnect a motor lead. Hook up a zero center meter or DVM to the loose motor supply lead. Power it up and change channels. Use a good Bristol wrench (like an Xcelite) to manually turn the worm drive shaft in the correct direction according to the polarity of the meter reading. (There is an access hole on the right side and a spline socket in the end of the shaft for doing the synch procedure. Make sure it's a snug fit as you don't want to strip that socket.) Offhand, I don't know which polarity corresponds to what direction, but that could be figured out from the manual. Part of the problem is that, under power, the thing moves a bit too fast to figure out what may be wrong and both KC and MC shafts may be turning at the same time. By hand cranking it, you can slow down to a crawl, look, listen and feel, at what should be the changeover or stopping points. Since the motor is not running, you can use a lower current supply -- anything strong enough to actuate the relay. The receiver itself can be turned off.

> I used an old Telco power supply salvaged from the junkheap for the 24VDC - no construction required there.

That' right -- improvise. You can also rig a separate 24 volt supply line and use it with a bench type P/S or temporarily borrow a supply from something else of adequate current rating. Chances are, even if the thing works, you'll only use the autotune on special occasions, or periodically to prevent "sticktion". "Gentlemen ... Actuate your contraptions!"

Date: Mon, 03 Jan 2005 09:02:41 -0800
From: Leigh Sedgwick <bipi@comcast.net>
Subject: [R-390] Mechanical Filter Issue

<snipped> 2. I tore the RF deck apart with the idea I would get it rebuilt within a week or 2. No such luck...work issues caused a significant delay of almost a year before I was able to get back and finish it. During that time, I lost track of the ordering of the slug racks and was forced to go with a "best fit" approach to reassembling them. Other than the fact that the alignment is totally hosed up, will I be faced with any other issues, i.e., are they all identical or are there differences I cannot see visually. I saw something on the FAQ page that some are different. They all looked the same to me. Thanks for any help.

Date: Mon, 3 Jan 2005 11:45:38 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Mechanical Filter Issue

I did the same thing. From what I understand there is no problem mixing

up the slug racks in the A model. If it were an R-390/URR it would be a problem. Seems all the slugs in the big racks are the same...but don't mix them up with the slugs in the small racks.Someone else jump in here if I am misleading him!

Date: Mon, 03 Jan 2005 14:24:52 -0500
From: N4BUQ@aol.com
Subject: Re: [R-390] Mechanical Filter Issue

As I recall, if they aren't interchangeable, it will be obvious that they are not. What you can do is make sure the slugs are centered and inline with each transformer. There are two phillips-head screws that hold each slug in the slug rack. You can loosen these and allow the slug to center itself and then re-tighten them. This can allow the slugs to move much more freely than if they are mis-aligned.

Date: Mon, 03 Jan 2005 14:27:17 -0500
From: JMILLER1706@cfl.rr.com
Subject: Re: [R-390] Mechanical Filter Issue
Content-Type: text/plain; charset=us-ascii

I have heard it said that there are slug permeability differences between some of the racks, not sure which. Seems they may have colored dots on them to indicate their category. I think the differences are between the mixer slugs and the RF slugs, but I am not 100% sure. Sorry, that's the best I can do without opening a radio and looking.

Date: Wed, 05 Jan 2005 09:17:00 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Autotuners

> Sintered bronze is porous, but you can't relube it by soaking. <snip>

I don't know how practical it would be to apply a vacuum -- don't exactly have a vacuum pump on hand. It may be that penetrating oil -- which has solvent mixed in -- would leach into the bronze sufficient to replenish. However, that oil might be too thin. May well be that the bearing is typically too worn by the time the oil is spent. They still make a wide assortment of these bearings and the correct size -- inside & outside diameter could be found. The existing ones are pressed into or glued into the casting and possibly peened over a bit. They are mostly (4 or 5 of them) mounted in small, fragile protrusions.

The casting is aluminum, aluminum alloy or pot metal and probably fairly brittle. The geometry is such that I doubt if they can be pressed out on a standard arbor press. There are other approaches to removing them, but

anything involving impact -- hammer blows, etc. -- would be dicey. Might have to be drilled through and ground out with a Dremel or something. Similar approach that modern dental surgeons use in extracting big molars <ugh>. They drill through the bifurcation (junction of roots in the base), breaking it up into 3 or 4 pieces in the jaw, then extract each separately to minimize trauma to the gum and jawbone socket. (Aren't you all glad you read this far?) It would be a piece of work.

Date: Wed, 5 Jan 2005 13:57:42 -0500 (EST)
From: "Paul H. Anderson" <paul@pdq.com>
Subject: Re: [R-390] Autotuners

My guess on removing them? If you can get to the back side, like you can on the various RF decks, the right size punch will pop them out with no trouble at all. I scavenged a junk 390A RF deck and removed all the bearings this way with no damage to them (that I could see) nor to the RF deck. Of course, the RF deck is stainless steel, but my sense was that the forces involved were so small, even brittle pot metal wouldn't be a problem. I scavenged the bearings with the intent of seeing if they were the same as the ones in the R-391 autotune mechanism line shaft, but I haven't had a chance to look that closely yet.

Date: Wed, 05 Jan 2005 19:50:57 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Autotuners

I would not risk the casting with a punch. The bearings may have been pressed in with some kind of glue. They take up a large proportion of the small protrusions of the casting. Very high probablilty of snapping off one of those. Something like a miniature gear puller might work -- also heating with a torch -- maybe the aluminum casting expands faster than bronze? Anyway, I have a spare casting with shaft and bearings in good shape, so I'll go that route first. But, what I need first is to get a round tuit. ;-)

Date: Wed, 5 Jan 2005 21:45:12 -0600
From: Tom Norris <r390a@bellsouth.net>
Subject: [R-390] Re: Autotuners 'n' bearing pullers

At one time I made such a puller to remove the bearings on an old-old score board timer mechanism I was rebuilding for my high school. Seems to me I used a simple thing made from a machine screw, a small socket from a cheap wrench set, a fender washer and an appropriate nut to fit the screw. I first threaded the old bushing, screwed the bolt into the threaded bushing, then using the socket affair as an "anchor." slowly tightened the nut until the bearing/bushing popped out. The replacement bearing was

tapped into place with a rubber mallet driving a piece of dowel. Dunno if that would work with the bearings in the '391 mechanism.

Date: Thu, 06 Jan 2005 17:31:17 -0800
From: Leigh Sedgwick <bipi@comcast.net>
Subject: Re: [R-390] Mechanical Filter Issue

Well, I'm making progress. The 2 khz filter has been replaced and is working fine now. I have completed an alignment of the radio and it is working reasonably well but needs some additional tweaking. It was interesting that although all of the RF slugs appear to be identical, I had to switch a couple of them to get them to peak at a reasonable spot in the coil form so I am not confident that they are same. I recommend marking them in a clear and concise manner prior to removal so you don't run into the same problems that I have had. <snip>

Date: Sat, 8 Jan 2005 22:15:59 EST
From: JGolden365@aol.com
Subject: [R-390] r390a problems

My Motorola R390A, which RIck Mish reworked in August, has a recurring problem:

6 mHz: weak, images
7 mHz: dead
8 mHz: no true signals, but images
9 mHz: no true signals, but images
11 mHz: dead
12 mHz: dead
13 mHz: dead
14 mHz: dead
15 mHz: weak, no true signals, but images

anyone got any ideas about the source of this problem?

Date: Sat, 8 Jan 2005 22:45:10 -0500
From: "James Miller" <JMILLER1706@cfl.rr.com>
Subject: Re: [R-390] r390a problems

Did a gear clamp come loose, causing the tuning chain to get out of sync?

Date: Sat, 8 Jan 2005 22:14:43 -0600
From: "Dallas Lankford" <dallas@bayou.com>
Subject: Re: [R-390] r390a problems

For the 6 and 7 look for a hanging rack in the 4 - 8 band. Ditto for the 8 - 15. Also, for the 8 - 15 look for a missing core, or a bad transformer.

Date: Sun, 09 Jan 2005 14:09:59 -0500
From: "Steve Hobensack" <stevehobensack@hotmail.com>
Subject: Re: [R-390] r390a problems

I might add to James Miller's email:
Turn the MC change knob and the KC change knob until the dial reads 7+000.
Look at the egg shaped cams. Are they reasonably close to the scratch marks?

Date: Sun, 09 Jan 2005 16:18:54 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] r390a problems

While that's a fundamental check -- lineup of the indexing marks -- nevertheless it's possible, even if they do, that the situations Dallas described are still at work.

Slug racks can hang for a portion of their travel. You have to crank the RF deck up and down through all the MC positions and pay particular attention to the racks as they move downwards -- or are supposed to be -- that the cam follower rollers are truly in contact with the cams. Tap gently on the rack(s) to make sure of this as it is often difficult to see. I had a similar situation and the symptoms sound very familiar -- dead bands, images and other strange stuff. Do the same with the KC knob and watch the cams at various MC positions.

A loose or broken clamp can also play clever tricks. There may just be a hairline crack that is barely visible. The clamp is tight on the screw side, but loose on the split side and may act like a clutch -- grabbing through part of the rotation, slipping on the other part, depending on the mechanical resistance, which varies. This can be such that at "7+000", the marks on the cams line up on their respective index points - at least I think so. Watch the gears and shafts while working the MC knob -- a gear may rotate in synch with the shaft for part of the travel, then slip the rest of the way. Crank it backwards, slips then grabs, etc. If a slug rack is in fact hanging up, detach the two rack springs from the top (they may stay attached at the bottom) and lift straight up. See if any slugs are hanging at a substantial angle. If so, gently bend the "springy thingy" -- coiled rod -- to straighten. If when straight, one or more still doesn't line up well enough with the coil center, make use of the lateral adjusters. While you're at it, wipe off the slugs with a clean dry cloth and use a cotton swab (dry) to clean any dust out of the coils. Don' t force anything. Line up the slugs

with the coils and re-install the rack. It should be able to move up and down without any binding or sticking. Reattach the rack springs and try again. You might also have a broken or dropped slug. Sometimes the "springy thingy" comes loose from the brass bristol screw. This can be epoxied. Slugs can also be glued back together if broken. Use a very thin coating of epoxy. I have variable results with crazy glue on things, but might be OK. Clean off any excess ASAP. Very likely based on what you report that it's one of the three. Just look very closely at the mechanicals as you turn the knobs -- don't get distracted, don't assume, and ... don't blink. Hope this helps & good luck ..

Date: Wed, 23 Feb 2005 21:19:19 -0600
From: "Barry" <N4BUQ@aol.com>
Subject: [R-390] More geartrain rebuild info

In the process of tearing down this geartrain, I noticed the planetary gears were quite clogged with grease. Scott's slide show says it probably isn't necessary to tear the planetary gears apart, but it didn't appear I would get this one clean unless I did and I'm sure glad I did. Upon taking apart the three split gears, all three exhibited a fair amount of drag when I twisted them against each other. Upon closer inspection, I could see small burrs on the teeth. After removing these burrs, the gears ride smoothly against each other. I would never have known this unless I disassembled them. Also, it gives me a good chance to ensure a lot of the hardened grease and dirt is removed. After a 24-hour soaking in kerosene, there was still a significant amount of grime in this assembly. Now if I can figure out how to get four split gears all tensioned and reassembled at the same time!

Date: Wed, 23 Feb 2005 19:23:02 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] More geartrain rebuild info

Hemostats, Barry!

Set each gear set, then clamp each set together with a pair of Hemostats.

From: R390rcvr@aol.com
Subject: [R-390] Plastic hemostats

My favorite for holding tension on the split gears are the disposable plastic hemostats used in prep sets. They don't mar the gears, but hold beautifully. I suspect if you asked at the local ER or doctors office you could scrounge some up. They often are just discarded from kits, never used.

Date: Thu, 24 Feb 2005 18:50:32 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] More geartrain rebuild info

I very much agree that a gear train with a reasonable amount of crud in it probably will require the planetary gears be torn down. When you do the only way to really get them clean is to take them down to pieces and clean each one. The obvious gotcha is how do I get these back together with only two hands and a limited number of toes involved. Cleverly bent paper clips seem to be the "other" way to do this if you don't have access to stuff like plastic hemostats.

Here's an issue that's a little more subtle. The gears probably left the factory all nice and uniform. When they did you could swap any "top" with any "bottom" and there would be no net effect at all. Over the years each "top" has rubbed against it's respective "bottom" for a really long time. Essentially you have created matched pairs of gear halves.

So in addition to needing a number of fingers and toes to put it all back together you also need three sets of eyes to make sure all the sets remain with each other.

The gear will work pretty darn well even if you randomize the gears. My story is that it was a controlled experiment and I'm sticking to it. If you want a silky smooth gear set when you are done it seems to be best to keep everything in order ....

Date: Thu, 24 Feb 2005 19:41:25 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] More geartrain rebuild info

Did we ever come up with a video or a series of pictures detailing the reassembly of the gear train. I am faced with the prospect of rebuilding several over the next several months. I have in the past been fortunate in being able to very successfully clean them without disassembly. Gummout carb cleaner does wonders for cutting the crud. That and simple green do a great job. I re-lube with Mobile 1 synthetic motor oil in a syringe with the hypo ground flat on the sharp end. Works great! I would like to go through one using the disassembly method of cleaning to see if it is really to any advantage. Even the split gears can be separated enough with a knife blade to blow the carb cleaner in...but I would like to try it the other way and get a good feeling for doing a full resync.

Date: Thu, 24 Feb 2005 21:14:33 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] More geartrain rebuild info

I have tried gear trains with the soak it out approach and and then popped them apart. When I have done so There has been grit in some of the split gears. I have not found a really good way to get grit out of them without taking them apart. Getting old lubricant out seems to go pretty well with various solvents. Depending on the radio you may or may not need to pop apart all the gears. As long as you can keep the parts all straight I guess I can't see any problem with taking the gears apart. It's enough work just to strip the whole gear train apart that the added work to separate the gears never seemed like a whole lot more effort. Truth in advertising - yes I have seen some grubby gear trains. Not all gear trains seem to have the same level of fine dust embedded in the lubricant.
Splitting the gears apart does is it lets you get a nice uniform layer of the Mobil gear lube on the inside of the gear. I will admit that I have no idea if there is any more uniformity doing it that way than just trying to "ooze" in in from the edges. Finally there is the "the refrigerator door is closed but is the light *really* turned off? You soak the gears in cleaner. You blow the cleaner off. You lube the gears. If you don't take the gears apart how can you be sure there is no cleaner left inside the gears? Of course you can simply *trust* that the light turned off ....

Date: Thu, 24 Feb 2005 22:17:34 -0600
From: "Barry" <N4BUQ@aol.com>
Subject: Re: [R-390] More geartrain rebuild info

Well, I suppose I'm outta luck on this one. I've played musical gears with them already so there's no way for me to tell which one's mate is which. I just hope any effect will be minimal. Also, does the planetary gear revolve on KC changes or is it only on MC? I can't see the geartrain on my other radio to tell.

Date: Fri, 25 Feb 2005 08:41:33 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] More geartrain rebuild info

Purely as a controlled experiment I have *also* done the gear shuffle. They do go back together fairly well when you randomize them.

The real trick is to put it all together and then rotate it. It should spin freely with no binding. If you have a point that it binds at then there is a gear mismatch or bur somewhere. On page 3-23 of the Y2K manual there is an interesting block diagram of the RF deck gear train. The gizmo we call the planetary gear is called out as a differential in the drawing. On page 3-26 section 4 goes into all the messy details of the beast. Bottom line - yes it is driven by both the KC and MC knobs to allow you to tune to both the correct KHz and MHz.

My main concern with the planetary is that it is very much driven off of the KC knob. Because of that any drag is noticeable as you tune in a signal. If you want one of these radios that will tune from one end of a sub band to the other with a single twist of the KC knob then the planetary needs to be in pretty darn good shape.

Date: Fri, 25 Feb 2005 08:30:08 -0600
From: "Barry" <n4buq@aol.com>
Subject: Re: [R-390] More geartrain rebuild info

This geartrain was just a tad dirtier than my first one, but not by much. I did not tear down the first one because I had no instructions for putting it back together. Now that I've done the complete teardown on this one and found what I have found, once I get this radio finished, I'm probably going to tear down my first one and do a complete cleanup on it too. After taking all the gears off, I took the cam/frame assembly to the automotive shop here at work and washed it in one of their parts cleaning tanks. It didn't really do much to cut the dried grease. I tried denatured alchohol with not much better results and am now using kerosene. That works a little better than the other things I've tried, but it doesn't really dissolve the dried grease without a lot of rubbing either. While it might work better, I really don't want to have an open container of gasoline. Any other good solvents? Brake Cleaner? Carb Cleaner? Fire?

Date: Fri, 25 Feb 2005 09:33:42 EST
From: Llgpt@aol.com
Subject: Re: [R-390] More geartrain rebuild info

Carb Cleaner works the best.

Date: Fri, 25 Feb 2005 10:03:17 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] More geartrain rebuild info

For a nice complete list of all the things that work best check out the Montreal protocols under the heading "banned substances". The closer you get to something like carbon tetrachloride the better it works. At the moment (like for another couple of months) they can still sell you bromide compounds that at least work a little like the chlorine based stuff. That stuff starts going away in June at least for electronic applications.

Date: Fri, 25 Feb 2005 10:32:48 -0500
From: <robert.boyd@sdc-dsc.gc.ca>
Subject: RE: [R-390] More geartrain rebuild info

Another great cleaner and almost as good as carbon tetrachloride is available from your friendly local dry cleaner. It's called perc for short- don't know the full chemical name. Arrive with a 500 ml bottle and green stamps-most times you'll get it for free!

Date: Fri, 25 Feb 2005 11:01:04 -0500
From: "John KA1XC" <tetrode@comcast.net>
Subject: Re: [R-390] More geartrain rebuild info

Well, I've found the best solvent is old-fashioned Elbow Grease and a few good brushes, there's no other way to dislodge the really solid gook. For brushes I use old toothbrushes, nylon wooden handles brushes, and for long reaches into tight spots the brushes made for silk-screening work well because they have long handles and short stiff bristles. Q-tip type swabs are also a must for small areas, I buy them in the biggest packages I can find. Kerosene works as a grease solvent, but I usually use mineral spirits or WD-40 for cleaning. They are good grease solvents but have a low enough evaporation rate so as not to cause breathing problems and are generally not to rough on the skin.

Carb cleaner works well but it's better as a spray-flush to use after the main cleaning is accomplished because it evaporates too fast to remain on the "work". It can also be rough on the skin and creates loads of fumes and I usually don't use it unless I can take the gizmo to be cleaned outside. Ditto fume warning for the brake cleaner aka carbon-tet type sprays. A can of Carb cleaner (with a stem) is also my weapon of choice for instantly taking out big spiders and wasps.

Date: Fri, 25 Feb 2005 11:35:51 -0500
From: "John KA1XC" <tetrode@comcast.net>
Subject: Re: [R-390] More geartrain rebuild info

Perc is perchlorethylene aka tetrachloroethylene. Really, you got it for free? I used to work in my dad's drycleaning plant and remember that it cost many bucks a gallon, which justified using lots of extra machinery to recover the lost vapors and also residual perc left in the carbon filters prior to their disposal. Because of environmental and health reasons (it's a carcinogin) a lot of plants are phasing it out in favor of other solvents or hi-tech "wet" cleaning.

It is a great solvent but it evaporates like crazy, and it is a close cousin to most Brake-cleaner products and even smells the same. Sometimes when I'm shopping for Brake cleaner in the big auto parts stores I'll spray a small burst into the can cap, if I smell the "perc" smell I know I'm getting the original formula as opposed to the newer enviro-friendlier non-chlorinated formula which is being phased in. I guess I like to buy what I'm

familiar with.

Date: Fri, 25 Feb 2005 12:32:17 EST
From: ToddRoberts2001@aol.com
Subject: Re: [R-390] More geartrain rebuild info

I have had pretty good luck using a long Kerosene soak in a large plastic tub to clean the RF geartrain assembly. Several days seemed long enough plus occasional breaks to rotate the gears and swish around in all the tight spots with a stiff paintbrush so that nothing gets missed. After a days soaking I would pour the used kerosene thru a filter and toss out the sand and dirt that settled to the bottom of the tub and reclean the tub before soaking another day.
After about 4 days of this the assembly looks pretty clean and I would pull it out, put it on a large soft cotton towel and place it in front of a dehumidifier for a day or two and let the warm dry air blow over everything. After about 2 days of this the RF assembly is bone-dry. It is amazing how dull and porous the metal looks after a thorough cleaning and drying. It is not a good idea to rotate the gears and shafts when the metal bushings/bearings are bone dry like this.

What I have done in the past is spray everything with WD-40 and the metal would soak this right up and become shiny again and then individually lube all the bushings and gears with synthetic oil. With what I know about WD-40 now I don't think I would do this again. What I will try next time is put the dry assembly in a tub with light weight Mobil One synthetic oil and let it soak in again for a few days and then let it drip-dry on a big cotton towel.

Probably expensive and messy to do it this way but I think that is the best way to insure the synthetic oil will get a chance to penetrate in-between all the split gears and bushings. 73 Todd WD4NGG

Date: Fri, 25 Feb 2005 12:42:47 -0800
From: Dan Arney <hankarn@pacbell.net>
Subject: Re: [R-390] More geartrain rebuild info

I have found that the dishwasher does a great job. Yes I do not have a XYL to run around screaming at me. They sparkle when they come out and work just fine. I remove the xfmrs.

Date: Fri, 25 Feb 2005 19:28:33 -0300
From: "Francisco E. Viegener" <fev@ciudad.com.ar>
Subject: RE: [R-390] More geartrain rebuild info

One way I use sometime to take dried grease is use normal comestible oil.

It works very nice ! Then you can use any other substance to clean.

Date: Fri, 25 Feb 2005 17:32:49 -0500
From: "Scott Bauer" <odyslim@comcast.net>
Subject: [R-390] Gear Cleaning = Rifle bore cleaner

Well Guys, I read most of the emails and did not see one for rifle bore cleaner. Although any brand will work. I use a brand called "Wally's". Not only does it clean the grease, but it will make your radio smell really nice. He keeps the ingredients down to just his trade secret, Petroleum by products. It is the best bore cleaner I have ever used and it cuts right through the cosmoline.

Date: Fri, 25 Feb 2005 19:35:28 -0500
From: "Drew Papanek" <drewmaster813@hotmail.com>
Subject: [R-390] RE: More geartrain rebuild info

Lacquer thinner (not mineral spirits) works quite well to dissolve gummed lubricants (it will also dissolve gummed gasoiline in fuel system components). Don't get the brand in the red white and blue can, it has an odd smell, does not work well as a solvent and is no good for thinning lacquer. The brand carried by your local W**-Mart works well.

Date: Sat, 26 Feb 2005 09:25:48 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] More geartrain rebuild info

Sometimes, the thing to try if petroleum based solvents and/or trichloroethylene don't work is hot soapy water -- or very hot water itself.

The kerosene or denatured alchohol will get some of it, but the hardened stuff may need some heat. If detergent doesn't work, try mild bar soap -- old fashioned stearate-based soap, like Ivory. You might still need to use an old toothbrush or nylon auto detailing brush -- or that electric toothbrush that needs a new brush end anyway.

Another idea -- one of those small steam cleaners -- if you already have one. If you're in a hurry, an "As seen on TV" version can be bought at places like Walgreens. (They still steam-clean car engines, don't they?) Might work, and they're fairly cheap.

Some have reported good results with the dishwasher -- that means super hot
water and maybe some dishwashing detergent too. I haven't yet been so bold,
but I have been surprised from time to time, after struggling with one

aggressive chemical after another, that hot soapy water cleaned something up
right away. Of course, the part was ususally hit with a few different solvents first, so may be a combined effect.

Date: Sat, 26 Feb 2005 09:57:38 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] More geartrain rebuild info

If you do decide to go the dishwasher route be *very* careful to tie down the parts you are trying to clean. At least around here destroying the dishwasher by getting a gear stuck in the impeller would not enhance the reputation of the boat anchor effort .... As long as we are on exotic cleaning methods here's one that has not come up recently. Reasonable sized industrial ultrasonic cleaners show up surplus from time to time. The ones I would watch for are made by Crest Ultrasonics. They are a bit higher power than the hobby cleaners out there and are designed for 24/7 use. Even a fairly small one is plenty big enough to fit R-390 gears into. Since they are stainless steel you can use almost any solvent or cleaner in them. An over night run should do wonders .... If you are going to keep the gear halves together during cleaning then I suspect the only way to get the stuff out from between the gears is some kind of long soak ...Something that the industrial cleaning gear does is to re-distill the
solvent. This lets you get a lot more miles out of a gallon of stuff. Might be a use for that moonshine setup out behind the barn .... Regardless of how you do the cleaning a good drying process is important. The family oven could be used, but a $3 garage sale toaster oven probably makes a bit more sense. You want to get the metal parts up to about 250F for 15 minutes or so to be sure you have driven off all the water or solvent. Going a whole lot above this temperature doesn't do a lot of good and you may start to affect the parts. Another nice way to do this is with a surplus lab oven, provided you can pick one up cheap.

The need for drying the parts is debatable, but I think it's well worth it if you are using soap and water. Even with solvents you can get some odd results from small amounts of solvent mixing with lubricant. Air blow off is another alternative and it works, it's just a bit exciting when that little spring slips and now is *somewhere* over on the other side of the room ...

Date: Sat, 26 Feb 2005 10:27:01 -0600
From: "Barry" <N4BUQ@aol.com>
Subject: Re: [R-390] More geartrain rebuild info

One thing I'd like to add to all this. When disassembling the planetary gears, I discovered the spring-loading mechanism is different from the standard ball-point-pen-style springs in the other gears. These are a

single circular piece of spring steel enclosed inside the gear halves. Each half has a hollowed-out place to accomodate the spring. If your geartrain is particularly gritty, these can be great little traps for dirt. While you can probably get the regular flat split gears pretty clean without disassembling them, it would take a lot of washing and blowing to get these gears really clean without disassembling them.

As I said, the more I see in this geartrain, the more I'm convinced I need to give my first radio the same treatment.

Date: Sat, 26 Feb 2005 10:10:06 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] More geartrain rebuild info

Now THAT is an impressive piece of work! There is another gear built that way outside of the planetary gearset, it's meshed to a larger gear and as such it makes many more revolutions than the larger gear and therefore is prone to having huge burrs between the halves. Definitely in need of honing.

Date: Fri, 04 Mar 2005 18:38:10 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] R-390A geartrain rebuild pics

1)From the the Pearls website: <http://www.r-390a.net/Pearls>
Nolan Lee's treatise: RF-deck-lubrication.pdf

2) On the R-390 site of KK4DF: which includes:
Parts kits are now available to help with your rebuilds. These include:
<http://r-390a.us/parts.htm>Capacitor-only kit (Orange drops, tantalum, C327)
<http://r-390a.us/parts.htm>Complete Rebuild kit (above plus filter caps, inrush limiter, precision 10-turn pot)
<http://r-390a.us/parts.htm>Front Panel kit (stainless steel screws and conical lock washers)
His Gear train rebuild page: <http://r-390a.us/gear_train_rebuild.htm>

3) Scott Seickel's detialed set of photos and instructions (referenced in the above link):

"Scott Seickel rebuilds an R-390A RF Deck Gear Train and shares his photos and step by step instructions. "
<http://militaryradio.com/r390a-rfdeck-geartrain.html>

Date: Fri, 4 Mar 2005 18:41:37 -0500
From: "Mark Richards" <mark.richards@massmicro.com>

Subject: RE: [R-390] R-390A geartrain rebuild pics

Google is a bit fussy, but powerful.
Instead of R-390A geartrain rebuild; try: R-390A gear train rebuild

http://r-390a.us/gear_train_rebuild.htm
http://209.35.120.129/R-390A-Gear-Rebuild.pdf
http://www.militaryradio.com/R390A/R390RFDeck/toc.htm

and this on the PTO: http://www.r390a.com/html/body_n5off_pto.html

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Date: Sun, 6 Mar 2005 20:39:00 -0600
From: "Barry" <N4BUQ@aol.com>
Subject: [R-390] Planetary Gear Assembly

Just thought I'd pass along a tip. When I tried to reassamble the three planetary gears to their mating gears, I could never get them to go together without something going wrong. Preloading the anti-backlish gears and holding them with hemostats just wouldn't work. The assembly would bind and be misaligned. I never did figure out what caused this, but I did figure out a way to successfully reassamble them.

The method I used was to assemble the planetary gears without the clip that holds the anti-backlash gear in place. The assembly will go together quite easily this way and there is room for the anti-backlash gears to move out of the way slightly so that they don't interfere in this first step. Of course, you pre-load the anti-backlash gear in the center at this point as it can't be done later.

After tightening the three screws that hold the planetary gear shafts, you can then load each anti-backlash gear, one at a time. There is sufficient clearance just above the center gear to allow this. It's a bit tricky to get both nibs of the internal spring into their respective holes in each half of the gear, but it can be done. With the anti-backlash gear cocked just a bit to clear the mating gear, you can put a few teeth of spring load on the anti-backlash gear half and then let it slide down onto the mating gear. Press the "C" clip in place and proceed to the next gear. It really worked out rather easily.

AND, if you want some real fun, take a toothbrush and some Brasso(tm) to that big brass gear assembly that is comprised of two larger gears that are riveted together. Wow. Does that thing ever shine up nicely! Yeah, I know it won't work any better shiny than dull, but there's just something about a sparkly gear that satisfies my R390A rebuilding soul.

Happy rebuilding,

Date: Mon, 7 Mar 2005 09:27:27 -0600
From: "Barry" <n4buq@aol.com>
Subject: [R-390] Geneva Mechanism question

I've started reassembling the geartrain (yes, I work slowly with limited time). Since I disassembled the Geneva mechanism, I started there. When I disassembled it, I didn't pay too much attention to how it worked. When I reassembled it, though, I was pleasantly surprised. The Geneva mechanism of the subassembly is common enough (although the intermittent action of having different groups of triggering gears is a bit unique), but the other part is quite amazing too. The little ball bearing's action with the larger part of the Geneva mechanism is quite unique. The ball bearing along with the accompanying slots and hole are a marvel to see in action. It allows the main gear to make nearly two complete revolutions before coming to a hard stop. I don't think I've ever seen anything quite like it. Does this part of the mechanism have a name? It is perhaps one the cleverest part of the entire geartrain. If you do decide to do a rebuild, I would definitely recommend taking this thing apart just to see how it is designed. Mine had a bit of crud in the gears that needed to be cleaned out (and besides, it allowed me to polish the brass outer gear) and it really works smoothly now.

Date: Mon, 7 Mar 2005 11:04:23 -0500
From: "John KA1XC" <tetrode@comcast.net>
Subject: Re: [R-390] Planetary Gear Assembly

Interesting technique. You know, the springs in those planetary gears are so weak I'm never sure when to actually start counting the gear teeth when loading them. I've never used hemostats for holding any of the other split gears together, a small screwdriver blade always worked fine for me. Maybe I'll try it next time.

For holding the planetary gears I've always used plain old solder; wrap a couple of inches or so of it around the tensioned gear front to back so as to engage the teeth and then finger twist it tight. Because the solder is soft it mushes into and around the gear teeth nice and close. Then after the whole thing is assembled just snip the solder loose. Some folks use solid hookup wire too.

Date: Mon, 7 Mar 2005 11:22:59 -0600
From: "Barry" <n4buq@aol.com>
Subject: Re: [R-390] Planetary Gear Assembly

Yeah, I had problems counting teeth too, especially with the halves apart like that. I think I got at least 2 teeth loaded on each one, though. I'm

figuring that with three gears, a small amount of anti-backlash tension on each one is sufficient - especially considering how soft those brass gears are.

Interesting idea of the solder. As I said, though, with pre-tension on the planetary gears, I could never get them together without something mis-aligned; however, given the mechanics involved, I could never figure out what was causing the "crookedness" I was seeing. It was so bad that the whole assembly would not slide onto the shaft. The pressed gears in the "front" would be cocked to one side and I just couldn't figure out what was causing it. My new method (while a bit tricky) did work great. I have a broken bandswitch clamp that I need to get a replacement for; however, once I get that, I can't wait to get this back together and see how much difference I can feel between this one and my first one which I did not tear down. If there's a lot, then it looks like I have one more job to do

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Date: Tue, 8 Mar 2005 16:03:28 -0500 (EST)
From: "Paul H. Anderson" <paul@pdq.com>
Subject: Re: [R-390] Geneva Mechanism question

Don't forget that these little guys are sensitive to proper spacing on the shaft. They may need very thin shims to get them to not rock so much that the ball bearing slips enough that the band tuning switch doesn't make definitive transitions from band to band going both forwards and backwards.

I've run across a few in R-392's (and one R-390A) that had this problem, and I also introduced this problem myself when I wasn't careful.

Date: Tue, 8 Mar 2005 15:42:52 -0600
From: "Barry" <n4buq@aol.com>
Subject: Re: [R-390] Geneva Mechanism question

Thanks for the advice. I'll try to remember to watch that the bandswitch gear makes good, clean transitions. I placed a 0.003"-0.004" shim washer between the outer gear and the sandwiched plate.

It seemed that with the outer gear riding directly against the plate, I could detect a very small of drag. With the shim washer, it is very smooth; however, if this causes too much 'slop', then I'll remove it. Everything appears to be 'tuned' quite nicely here, though.

Date: Thu, 10 Mar 2005 22:57:30 -0600
From: "Barry" <N4BUQ@aol.com>
Subject: [R-390] Another geartrain tidbit

While cleaning and reassembling one of the split gears tonight, I discovered something interesting. No matter how much I wetsanded the faces of the teeth, when I reassembled the halves the assembly would bind and the two halves would not move freely against each other. I had this happen (to a lesser degree) on another gear set and I was determined to figure out why on this one.

It turned out that the half of the gear that has the hub brazed onto it had a slightly convex shape. When I pushed the snap ring down into its groove, it was applying pressure on the flat gear forcing it against the non-flat half and only the outer edges near the teeth were pressing together. Laying a straight edge against the side of the gear confirmed this. It was about 0.015" to 0.020" out of flat.

I was able to use a steel disk (with a hole in it just a little smaller than the OD of the gear and a neoprene hammer to flatten the outer gear. Well, actually, the gear material was a lot softer than I anticipated and I ended up getting it convex in the other direction; however a few taps with another setup and I was able to get it flat again. Now the two halves rotate quite freely against each other with the snap ring in place and the antibacklash springs are easily set to a tooth or two of tension.

Just thought I'd pass this along. It wasn't easy to see the problem with this one

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Date: Fri, 11 Mar 2005 13:48:51 -0500
From: "John KA1XC" <tetrode@comcast.net>
Subject: Re: [R-390] Another geartrain tidbit

Interesting find, that is one of those arcane problems which are only discovered only by those who tear down the gear train. The 390A currently on the bench has what I eventually started to call the "RF deck from hell" as it had so many problems. One of those involved the split gears, and *none* of them moved. As you discovered, the two gear halves had to be compressed so much for the snap ring to take hold that the whole thing bound tight. Upon inspection each was found to have one of its gears out of "flat" and I proceeded to fix them in a similar fashion to what you described.

All seemed OK until the gears went back on the shaft during reassembly and then I noticed they were now wobbling when rotated. Took them off and apart again and gave them a closer look and what I discovered made me feel sick - the center hubs had been soldered/brazed into the gear crooked! These were obviously defective parts, and this deck likely had this problem since day one out of the factory. My fix was to pick up some

replacement gears from Fair and things went back together smooth after that. The RF deck was a '63 Teledyne BTW.

Date: Fri, 11 Mar 2005 16:05:30 -0600
From: "Barry" <N4BUQ@aol.com>
Subject: Re: [R-390] Another geartrain tidbit

I noticed the same thing. Some of mine wobble just a bit, but not enough to matter. There is one (not a split gear) that drives the bandchange to the crystal deck and the MC section of the VeederRoot counter that wobbles a bit more than the others. It doesn't really affect performance so I just decided to leave it alone. It's odd that some of the gears were manufactured to very precise standards, but then some of the quality steps like the brazing of the hubs to the gears didn't get a lot of QC.

Date: Fri, 11 Mar 2005 22:25:49 -0600
From: "Barry" <N4BUQ@aol.com>
Subject: [R-390] Geartrain Alignment Question

As soon as I get the replacement gear clamp, I'm ready to begin aligning the gears and cams; however, I realize there's something I'm not sure how to do. There is a relationship between the Geneva drive and the 7.000+ position on the cams. I don't know how to determine this. I assume that when approaching the 7.000+ position, the Geneva drive's gearteeth are in a certain orientation. In other words, it has most likely just clicked the bandswitch gear just before or just after the 7.000+ position. The gear teeth on the Geneva drive are intermittent and do not click the bandswitch between every band and there is some correlation between it and the 7.000+ position, I just don't know what it is.

I have Scott's CD that illustrates the rebuilding steps and it goes into detail about setting the actual bandswitch with respect to the 7.000+ position, but it doesn't mention the relationship between that position and the Geneva drive. Can someone help me out here? Hopefully I'm being clear with the question.

Date: Sat, 12 Mar 2005 08:15:00 -0600
From: "Barry" <N4BUQ@aol.com>
Subject: Re: [R-390] Geartrain Alignment Question

Joe Foley pointed me in the right direction. On page 112 of the TM 11-5820-358-35 Field & Depot Maint Manual, it shows the position of the "intermittent switch drive". Not too absolutely clear as to how to verify it's set right, but it gets me in the ballpark.

Date: Sat, 12 Mar 2005 08:42:54 -0600

From: "Barry" <N4BUQ@aol.com>
Subject: Re: [R-390] Geartrain Alignment Question

...and page 153 of TM 11-856A Technical Manual give me a procedure. Looks like I'll be able to figure this one out.

Date: Sat, 12 Mar 2005 10:49:52 EST
From: Flowertime01@wmconnect.com
Subject: [R-390] Gear Train Alignment At +7.000

I think the item we are missing here is some black lines scribed on the cams and RF subassembly. Hopefully your receiver still has them. These lines were just inked on during manufacturing. Aggressive cleaning of the chassis is known to remove the lines. At +7.000 a line on each cam will line up with a line on the RF deck face. At +7.000 all the cams are mostly pointed up, and it makes it easy to check the alignment.Two ways into the alignment after replacing the clamp (Quick, Full Process) Depending on the clamp that is being replaced the outcome is more or less precise. If its the 16-32 band, the outcome of a quickie is more positive than if you are doing the 5.-1 band. Always more precision in adjustment is better receiving.

1. Check the zero adjust. This is an eyeball to center it in the midpoint of the adjustment range. Do set it to center.

2. Check the dial counter over run on each end. It should be at least 25 or more on both ends. A. change the zero adjust a little to get both over run counts equal. B. drop the dial cover and reset the over run (this should be followed by a full RF deck alignment). If your receiver has had a full up good alignment, the dial over run should be good.

3. Roll the count up to 7.000+ and look at the cam alignment marks. All 6 RF band cams should have their marks aligned (except the one with the broke clamp).

4. If the-5-1 bank mark is off just a little, you can do a zero adjust of 2 or 3 maybe 5. If its off more than that, then a mechanical cam adjustment and signal alignment are in order. (The receiver will work as is, some of us are just fanatics)

5. If some of the other band cams are off, consider a full mechanical alignment and full RF alignment. Mechanical being an eye ball thing. RF being the signal generator and slug alignment.

6. When installing the new clamp consider where the clamp bolt goes and where the spline wrench is going to be placed to adjust the bolt. Once you

get the new clamp on the shaft, rotate the clamp so you can get the wrench on it. Rotate the cam to the alignment lines. And tighten the clamp.

7. If you had a full up running receiver, you can just put the new clamp in on the visual alignment and be done with it. If the receiver is carefully aligned, then loose and broken clamps can just be reset, replaced and your good to go. The mechanical setting of the clamp should be within the zero adjust range. You are trading VFO frequency against the band pass skirt of the RF band section in use (the one with the to be replaced clamp). The old prior proper planning prevents poor performance applies here.
Roger L. Ruszkowski KC6TRU

Date: Sun, 13 Mar 2005 12:41:33 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Geartrain Alignment Question (Band Switch)

On page 112 of the TM 11-5820-358-35 Field & Depot Maint Manual, it shows the position of the "intermittent switch drive". Not too absolutely clear as to how to verify it's set right, but it gets me in the ballpark. Dont' get too happy with that one, it still requires generous applications of "technicians' license". Joe

I care not what the manuals say about you can do a band switch alignment with a meter probing into the pins of tube sockets. Sure you can do a lot of things. The question is should you do it? Drop the front panel, pull the RF deck, turn the deck upside down on the bench and put the MC knob back on the shaft. Roll the MC through the ranges both up the bands and down the bands. Look at the switch and the amount of contact mesh at each wafer section and at each change point going both up and down. As you move the MC change knob through the receiver range you will see the band switch change as you roll up or down across (.5-1 , 2-3 , 4-7 , 8-15, 16-31). At each change point, the switch should move over one contact and seat as the MC change knob sets into its detent position.

Now this is a judgment call. Depending on the free lash slop, mechanical exact construction of any given wafer and straightness of the switch assembly, how much contact mesh you will get varies. Resist thoughts of touching or adjusting wafer switch contacts of section. Just do not go there. Now looking at the switch contacts do the adjustment of the band switch. Your goal is to get the maximum contact overlap at all switch sections on each band.

You will find that one end the wafer is just making to the left of a contact, and when you dial to the other end of the receiver, the same wafer will just be making to right of a contact. One switch wafer will be lining up real good and another wafer will just barely be making contact. Remember,

that receiver has worked for over 40 years, what ever adjustment is needed is very small.

The idea of doing this adjustment visually is to get maximum switch contact area. When you are doing the meter check, the meter current is very low and contact will "test" OK. You can get close with a meter and start burning the switch contact in actual use. Also the meter test is only one switch section. One section may be making contact while another switch section is not quite making it. The first indication you may need a band switch adjustment is when you change bands and have to roll over (up or down past) the switch change point to get switch contact.

As long as you have the RF deck and crystal OSC deck there on the bench, check the crystal oscillator switch also. It chages every MC. Again contact area will drift from end to end. Also some contacts in the mid range may not be exactly spaced so some judgment must be applied to where best to set the switch. Check the contacts tuning both up and down as the gear lash will be different each way.

Roger KC6TRU P.S. Am I using the correct detent spelling here?

Date: Sun, 13 Mar 2005 11:18:52 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Geartrain Alignment Question (Band Switch)

Thank you, Roger! I should have said that in more exact detail, I guess I was waiting for more questions to be asked. I agree with what Roger said he covered some that I forgot. It's exactly as he said. That's one for the manual!

Date: Sun, 13 Mar 2005 22:20:38 -0600
From: "Barry" <N4BUQ@aol.com>
Subject: [R-390] Geartrain pic

Just posted a picture of my almost-ready-for-prime-time geartrain.
http://members.aol.com/n4buq/r390a/ (Scroll to the bottom)

Date: Mon, 14 Mar 2005 23:22:44 -0800
From: "wglevy" <levyfiles@att.net>
Subject: [R-390] grease

I use gun grease. The stuff you put on a semi automatic pistol instead of oil. You can buy it in small quantities. Try a gun store. It comes in syringe type devices. Trust me, if you put it on a pistol you can put it on a radio! Both made for the same guv'ment

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Date: Tue, 15 Mar 2005 15:23:54 -0500
From: Rbethman <rbethman@comcast.net>
Subject: Re: [R-390] grease

There is also a gun lubrication product that one MIGHT consider, it is "anhydrous graphite". I would ONLY use it on the gear train, and NEVER inside the R-390(*). This being that graphite IS conductive.

Date: Tue, 15 Mar 2005 21:12:14 -0500
From: <robert.boyd@sdc-dsc.gc.ca>
Subject: RE: [R-390] grease

Your suggestions are appreciated, but I personally would not want to use powdered graphite in close proximity with RF circuitry, because sooner or later this stuff is going to migrate and cause all number of conductivity problems. Comments?

Date: Wed, 16 Mar 2005 16:36:09 +0000
From: rbethman@comcast.net
Subject: RE: [R-390] grease

Yes, as originally stated - "Anhydrous Graphite". It IS in solution. I don't remember "exactly" with what, BUT it is. It applies "like" grease out of a squeeze tube. The spray type lubes NEVER get applied in ANY of *MY* radios. I do not care if it is molybdenum disulfide, OR silicone. If you ARE spraying - YOU don't know WHERE the overspray goes! I apply by toothpick, "Q-Tip", or other VERY directive means. Sometimes syringe and fine gauge needle. An for Lord's sake - STAY AWAY from WD-40! It is NOT a lubricant! READ it carefully! The "WD" stands for "Water Displacer". Best and almost ONLY use for THAT *crud* is in locks that are exposed to the elements. I.e., on sheds, trailers, and perhaps auto door locks after exposure to heavy rains. Always follow WD-40 up with a REAL lube!

Date: Wed, 16 Mar 2005 09:24:48 -0800
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] grease

Hi, what brand/type of silicone grease do you use? I hardly ever am tempted to use silicone grease because I recall that it is near impossible to clean from a surface once applied but my attitude is biased by my work experience where we used it routinely on O rings for vacuum seals because of its very low vapor pressure. But it had to be kept away from any surfaces that we wanted to be clean because it could not routinely be removed by vapor degreasing in some pretty potent degreasers. I'm aware it has outstanding dielectric properties and is available in many varieties

including some that are sold as lubricants. So far I've been using synthetic Mobil 1 gear lubricant on the gears with the hope that it wouldn't gunk up as quickly as other types or evaporate and leave a residue. Maybe silicone-based lubricants are a choice I should reconsider. I'm cleaning up an R-390 and will be re-examining my choice on what to put on the gears soon. I've been happy with the Mobil 1 so far, about 4 years since I put it on, thanks for the info and any other info, Dan.

Date: Wed, 16 Mar 2005 15:37:31 -0000
From: "Andy Jackson" <andy@champ1.freeserve.co.uk>
Subject: RE: [R-390] grease

For decades, electro-mechanical telephone exchange equipment (Strowger, or Stepper in the US) used a product called "Oildag" which was a suspension of graphite in oil. This was used in areas where one metal part impacted on another - ratchets, pawls etc, and providing it wasn't applied too liberally, stayed where you put it. This was usually in close proximity to open relay contacts and mechanically operated contact sets and it was normally applied as a drop with a small artists brush. The great benefit was that even after the oil component dried out, the graphite continued to lubricate. The disadvantage was that the graphite did produce a rather messy appearance. In the 1970s it was replaced in the UK at least by a specially formulated oil to which a "stickyness agent" had been added but general opinion was that it was never as good as the old Oildag. Unfortunately, modern exchanges don't require any oil at all - except maybe on the main door hinges

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Date: Thu, 17 Mar 2005 12:35:35 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Green Grears

When used to lock up the RF deck gear train for removal, the gear always went in the same place. There are several 6/32 taped holes in the R390 gear train frame. At least two of them will hold the green gear without getting in the way when not in use. Us 33's would use what ever location got under our hands first. Where you find a gear mounted today is no clue as to how it was factory assembled. There are some old TM graphics that show gear storage location.

The original R390 TM was photographed from an original production first run Collins. Later changes to the TM were mostly to correct text (and add a few missing sections). The photos did not change. I do not think we can infer anything sacred about the receivers from the location of the gear.

I do not have my R390 TM at hand, Its still packed in the moving cartons.

There are differences in the RF deck caps that were added in later production runs. If someone has a TM they may be able to list them for you. There is a short note paragraph in the TM that list what was added when. You can look at your RF deck someday and see if it was real early production Collins or a later production run. Roger KC6TRU

Date: Thu, 17 Mar 2005 16:51:12 -0800
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] Green Grears

Roger, thanks for the overview on green gear. I haven't studied or even looked at the manual I have beyond the schematics so I need to do a little homework on the mod's that you remembered. I have TM-11-5820-557-35 which is a field and depot maintenance manual from 1962 that I downloaded as a pdf file. I see the types of mod's you mentioned but no dates attached to them.

The one thing that caught my eye was two ways that the green gear is used depending on whether mod 1 is present or not. In one case the green side faces the rear and doesn't engage the clutch gear. With mod 1 the green side faces forward and engages the clutch gear. I haven't gotten far enough with my receiver to know the significance of this, but probably obvious when trying to use it??

Does this ring a bell? Later in the manual there is mention of a difference in how the green gear works in early production models - but no mention of whether this has to do with mod 1 or not mod 1. This all is probably of little consequence but interesting to my idle mind, regards, Dan.

Date: Thu, 17 Mar 2005 21:37:03 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Green Grears

I'm sorry I kicked this can. I just have a poor memory of my R390's production models. Better we all go back and read the TM's and consult the archives we have collected.

Some new owners are looking for the real truth about the receivers they have, and are entitled to the best knowledge we have. Off the top of my head, I do not know the exact truth.Lets go read the archives again.

Date: Fri, 18 Mar 2005 04:57:46 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Green Grears

Roger -- that's what we do here - a cyberspace version of the time-honored persuit of "kick the can." That is, when we're not playing beating-the-dead-horse. ;-) As far as I know, the "mod" consists only of an additional tapped hole in the front of the RF deck. The green gear is a stamped stainless steel gear painted green on its concave side. It has an oval hole and is secured by a small panhead screw. It mounts to a shaft on the front of the deck -- lower center right
location. The shaft has a mating oval keyway. When the gear is mounted with the green side out and secured to that shaft, the teeth engages the gear train to keep it in synch when the deck is removed. On many 390's, (and I think all '391's) the gear stays on that shaft -- mounted one way for storage, the other for use. The manuals refer to it as an "offset gear." On other 390's, there is an extra tapped hole in the upper left front of the RF deck for stowing the gear. It's held there by the same screw used to mount the gear on the shaft. That tapped hole, as I recall, is to the right of the big hole where the two cables pass through. This might have been to meke it easier to find in the works and, perhaps, less likely to be overlooked and left in the lockup position -- only to be discovered after reassemby. (Downside -- more likely to disappear as it could be purloined without the inconvenience of pulling the front panel.) I cannot guarantee that ALL '391's have the original configuration (no upper storage position). The RF deck may have been swapped for a later one as they are the same as on the R-390/URR. You may find an RF deck with the tapped hole and no green gear -- either missing altogether or hiding in the original storage position. Some initially have trouble locating it when properly stowed in the original position -- it isn't green. Hope this helps.

Date: Sun, 20 Mar 2005 15:59:44 +0000
From: rbethman@comcast.net
Subject: RE: [R-390] grease

I obtained two or three VERY large tubes of Silicone Grease from a Xerox copier repairman. These are about a pint or so in size. I couldn't tell you whom makes it, I think there is a "xerox" part # on the tubes. As to removing it - I also obtained a bottle or two of degreaser from the same tech. This item has since been consumed. I got these items about ten years ago. He even managed to mess up one visit. He left behind a vacumn cleaner that fits in a tool kit. I hung on to it at the office for over 7 months, but I never saw him again. So I became the owner of it when our Org moved. It is VERY convenient, about 12" X 4" X 8" for the entire system, bag, hoses, motor, and accessories. Now I only have to find bags for it, or "make" some. VERY nice for cleaning out a chassis!

Date: Sun, 20 Mar 2005 19:13:04 -0500
From: "John KA1XC" <tetrode@comcast.net>
Subject: Re: [R-390] grease

It sounds like you might have got Mobil 1 Synthetic Gear Lubricant (not grease) which is SAE 75W-90. There is also Mobil 1 Synthetic Grease which *is* thick grease and is used in wheel bearings and such.

From: sdaitch@ibb.gov
Subject: Re: [R-390] grease

Another source of synthetic grease is AmsOil. See:

http://www.amsoil.com/products/grease/index.aspx

Specifically, the GLC which is available in a squuze tube.

https://www.amsoil.com/storefront/glc.aspx

Disclaimer, I have been an AmsOil user and dealer since the early 1980s, but if you don't use my dealer number I personally get nothing out of it.

Date: Sun, 20 Mar 2005 21:59:56 -0800
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] grease

John, thanks for insight into the Mobil lubricant. It is exactly what you said, Mobil 1 Synthetic Gear Lubricant - I don't recall seeing the grease when I went looking at the local auto store. And I seem to recall that Rippel recommended the gear lubricant, though I think there was another type/brand recommended by one of the other knowledgeable guys as well. Now I'll have to have another look. I think the stuff I used is ok even though it's not a grease but maybe it tends to flow away a bit more than grease. But it's easy to apply in that regard And when I look in, it still looks "wet" and it's been 4 years since I first put it on. I think I may have added a bit a year or so back, but the radio didn't seem to need it. I used the lighter weight Mobil oil on the sliding contacts on the rf chassis.

Date: Sun, 20 Mar 2005 22:32:14 -0800
From: "Dennis Deaton" <d.a.deaton@adelphia.net>
Subject: [R-390] Silicone Grease

There's been a recent thread on the list concerning a silicone-grease-type lubricant for the R-390 gear trains. I got a tube of some Dow Corning High Vacuum Grease from the local Dow distributor. Can't remember the cost. It's used primarily to seal rubber o-rings in food machinery. I believe its the stuff that used to be marketed as DC-4. I remember using DC-4 just about every where when I worked on AN/SPG-55B Radars at Sperry Gyroscope. It came in handy when lubing the geartrain for the train and elevation servo indicators. These gear units resembled the RF deck gear trains of the R-390A in complexity, so I think that the grease should work fine in that area. When I tear into my first-contract Collins-built R-390A,

I'll let you know the results.-

From: Bob <enigma_y_2000@yahoo.com>
Subject: [R-390] ATF for lube

I've used Dexron ATF for lubing the gears and bushings. Seems to work fine, stays put, and makes things turn very smoothly. BTW I'm told that ATF is synthetic. But as far as synthetic goes, it just means that the molecules are more uniform. That uniformity isn't needed for our low rpm geartrains.

Date: Mon, 21 Mar 2005 14:55:04 -0800
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] ATF for lube

Bob, a quick look at Dexron ATF (Valvoline) indicates it is a synthetic/conventional oil blend and even lower viscosity than the Mobil 1 gear lubricant I've been using which is the 70/90W variety. There's a higher viscosity Mobil 1 I saw on the shelf today, 80/140W but it costs about $17/qt here compared to half that price for the stuff I'm using. If I were starting over, I might go for the thicker Mobil stuff for the gears but I've still got 0.98 quarts left so plan to use that up first - laughter appropriate. Mobil 1 gear lubricant is the only synthetic of that type carried in the store I frequent so that was a factor in brand choice - other brands probably are comparable. I think I made my choice based on two ideas

- what others used and in the long run what might be left around if it evaporates eventually. Somewhere I heard that the straight synthetic types don't leave a residue, maybe to do with the molecular uniformity, but that may be wishful thinking. I know that whatever was put on my two 390 type radios left a pretty solid residue and I would guess it was a grease topped
off with other expedient lube jobs. After picking that grudge out, I opted for Mobil 1 gear lube which others had recommended and which to my simple way of thinking might not selectively evaporate and leave sludge behind Maybe the solids left are dirt, which will be there no matter what you use. I think using the thinnest oil that will not run away by gravity is desireable since it can be more easily maintained by subsequent oil flushing and more application of the same at a later time. For this reason, greases don't appeal to me. They seem to accumulate where they do nothing, are more trouble to apply and are hard to flush away for renewal. I might change my mind if I start finding oil where I don't want it but so far after 4
years that hasn't happened. Mobil 1 is a little stinky during application but the smell subsides - I don't know if all synthetics have this

characteristic or whether that's a deliberate brand add-in. Dan.

Date: Tue, 26 Apr 2005 16:25:59 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] R390 progress

The 6AK5 is used in the R390/A it is also a 5654. I do not remember what belongs in the R390 for mixer tubes. I really hate to send you into the RF deck. Not the first task to take on as a new R390 owner. But it sounds as if you need to get a look under there. Read up on the band switch adjustments, and how to set the receiver up on blocks to get the front panel off. Locate your green gear. (You did not hear it from me, but you can do a RF deck pull on the R390 without a green gear. It is of course easier with the gear than without by some margin or the military would not have spent the money on the gear)

R390s tune in bands. (.5-1) (2-3) (4-7) (8-15) (16-31) If 4, 5, 6, and 7 are not sounding good you must suspect the RF alignment. As you have a cal tone on every 100 Hkz you know the crystal oscillators are good. They could be better maybe, but they are at least not dead.

Since you tweaked the RF bank for the 4, 5, 6, 7 band and did not get these bands to sound as good as some other bands, you need to do two things. You may have done them and just not reported it. Check the mechanical cam alignment at 7.000+. Lift the slug rack for the band and make sure the slugs are all there.

You could have a the cam mis-aligned for the band. A slug may be broken and the bottom of it setting in the coil tube. This could have happened in shipping the receiver to its new home with you. Look at the color dots on the slugs in the 4-8 slug rack. One of the slugs could be the wrong part. (mechanical size is OK but materiel is wrong) The 4-8 band could have had a wrong slug in it for a long time.

While your at it, loosen the adjustment plate and let the slugs recenter while the slugs are as far down in the coil as they go (bottom of the cam). You will need some pointy nose pliers to undo the slug rack springs. Undo the springs from the rack while the rack is at the bottom of the cam. You way want to just watch the cam and slugs travel in the coils while you move through the MC bands. the racks will bind in the slide ways and not follow tightly on the cam. This will give you weak signals. All cal tones on all bands will not have equal strength. Weak tone on a Mhz band is a call for a new crystal in the second oscillator. Not something you have to do now, but it gives you a chance to get things on the shopping list. OK so now you done all this and life is still not wonderful. You may need to pull the RF deck and do a band switch alignment.

More mail to follow on that subject. Please let us know how these simple checks went.

Roger KC6TRU

Date: Wed, 27 Apr 2005 10:00:10 -0400
From: "AI2Q" <ai2q@adelphia.net>
Subject: Re: [R-390] R390 progress

Pulling the RF deck out and re-installing it is not difficult---even if you didn't have the green gear. I was entirely successful with my R-390 restoration (see the archives for details) and my set was missing the gear. I simply held the gears in place with duct tape (!) while dropping the chassis back in. Followed the instructions in the TM to the letter. Worked just fine. GL es enjoy a great old piece of equipment.

Date: Wed, 27 Apr 2005 11:39:24 -0400 (EDT)
From: "Paul H. Anderson" <paul@pdq.com>
Subject: Re: [R-390] R390 progress

If you are slightly patient, you can do the mechanical alignment while it is installed. I think you just have to have the crystal deck off the back of it. The "hard" part there then becomes putting the oldham coupler back in between the RF bandswitch and the crystal deck.

Date: Wed, 27 Apr 2005 09:23:44 -0700
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] R390 progress

Paul, I guess I already did the hard part. I had the crystal oscillator chassis out already, wanting to take a look at the switch/crystal but stopped at the heater box and put it back in, thinking I'd better check some other possibilities first, like the tubes and maybe pinpointing the problem before tearing things apart. The oldham coupler disc was nice to me and stayed in place while I tightened the clamp - need 3 hands for this so I guess I got lucky. I didn't even grease it up like the manual suggests to keep it in place. My confidence is growing, thanks for the suggestions/and relating your experience, Dan

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Date: Wed, 27 Apr 2005 15:19:40 -0700
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] R390 Band Switch Alignment

Roger/others, I'm getting nearer to doing what you're suggesting and pulling the rf chassis. I started listening on 40 meters to see what I could

get out of the 390. At first, not even the calibrator signal was audible on the 7 Mhz range but I got it to come in weakly by turning the Mhz knob a bit about the detent point. I put some deoxit on the tube pins, 1st/2nd mxr, r.f. tubes - things seemed to get better. I rocked the Mhz knob for a while and pretty soon I was picking up a West coast noon net, with signal coming in pretty good and some very strong. It seemed to be on a par with the 390a at that point - at least it was acting like a radio where I could peak the background noise with the ant. Trim. So I'm thinking there is a dirty switch contact in there someplace, maybe under the rf chassis and it seems only to be affecting the 4,5,6,7 Mhz ranges. The lower bands seem to always work and the higher bands seem to always work. So I left the set on for a couple of hours and it continued to be ok on 7 Mhz range but when I went back after about 3 hours, it was back to nearly dead not able to hear the calibration oscillator and then only weakly on 7 range and only slightly better on 4,5, and 6, after some moving of the Mhz knob but I wasn't able to revive it to the former state of operating much better. I going to start loosening up the front panel screws.... Roger, I remember the post on alignment of the switch - I may still have it in my mail here - will take a look, Dan.

Date: Wed, 27 Apr 2005 20:57:32 -0400
From: "Jim Miller" <jmiller1706@cfl.rr.com>
Subject: Re: [R-390] R390 Band Switch Alignment

Could be the xtal oscillator. Try giving the xtal trimmer caps for the questionable bands a few spins to work through any oxidation, then repeak them. Also be sure no slug racks are sticking. Give them a tap with your finger to be sure they pop into place and see what happens.

Date: Wed, 27 Apr 2005 22:08:25 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] R390 Band Switch Alignment

John, Thank you for the archive link. I need that and did not know it.

Mark Huss, Thank you for putting up the post from my soap box.

Dan Merz, You may have a band switch alignment problem where the 4, 5, 6, 7 setting is not making good contact in one of the wafer sections. As you have Cal tones on each band, the oscillators and crystals are good. The only things in common with the four bands being weak is the RF switch and the set of tuning coils. The rack, the slugs, the switch, Check the slugs and rack from the tops side before you pull the RF deck. Do peak the second crystal deck caps. One additional idea before you go into the bottom of the RF deck. Pull the slug rack by releasing the two springs (one front and one rear) on the rack and lift it out of the slides. Insert a #1 Philips

screwdriver down the slug hole and remove the 6x32 screw that holds each coil can in place. The coil cans plug into the deck with several pin contacts. Wiggle them up free and clean the contacts and pins. These contacts have been known to oxidize like tube and crystal pins and sockets.

Mark Huss put up a soap box of mine about why we should pull the RF deck and do the band switch alignment by eye. It looks like you have a classic case of band switch just not quite making on one position. Some time if you tune from high to low or low to high the switch will make for you going one way and not the other. Some time you can do 8, 7, 6, 7 and get the 7 Mhz to work. some times you can do 3, 4, 5, 4 and get the 4Mhz to work. These are clues the switch lash is to far out and needs adjustment. May as well get your self a some deoxit or other favorite switch contact cleaner and go after the band switch. As long as you have to pull the RF deck, you may as well do a full PM under there and be done with for a couple years. Plan to clean the switch, set the switch adjustment, give the deck a bath, and check the state of the capacitors under the deck. If you have some brown beauties in there, change them out. Just do not jump in real fast. work with the receiver, Use it a while, work on the other parts of the alignment and see how it works out. After you get all the other easy top side items fixed up, then plan a Saturday to do the RF deck. By that time you will have gotten the tools and materiel together for the task.

Date: Thu, 28 Apr 2005 09:56:37 -0700
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] R390 Band Switch Alignment

Hi, ok, here's some more data to chew on. The 390 non-a seems to have settled into working pretty well on the lower bands except for the 7 to 8 Mhz range. At least I can consistently hear the calib oscillator on most others. I put my scope on the oscillator input to the cathode of the 2nd mixer tube - the rack gets in the way using a tube extender on the 1st mixer so I focused on the 2nd for now. The oscillator output should be 20 Mhz (10 doubled) for this band. It is, but the waveform is badly distorted and at least half the amplitude of most of the output for most of the other bands. If I look at the 17-18 Mhz range where the same crystal is used, again the waveform is distorted and even smaller in amplitude. The distortion is mostly of the nature that every other cycle never goes down very far so the wave is almost like a 10 Mhz wave with a notch instead of a complete cycle in between to make the 20 Mhz form. The 27-28 Mhz range, which uses the third harmonic of this same crystal, doesn't look so distorted, go figure. If I can figure out how to get a tube extender into the 1st mixer socket, I'll look at the 1st oscillator output, but the 10 Mhz xtal for 7-8 Mhz for that oscillator is also used on 2-3 Mhz and that band seems to be ok. So it looks like the xtal or it's connection is the problem.

Are the crystals in the 390 soldered in or are they in sockets? I tinkered with the trimming caps on the back a bit but that didn't resolve anything. I suppose the bandswitch could still be the problem but the waveform on the scope doesn't show any evidence of intermittent or inconsistent connection when I change bands. But I should check the 1st mixer tube for the signal from the first oscillator also. In looking thru the Field and Depot Maint Manual (last digits 35) and the Organiz. Maint Manual (last digits 20) I mostly understood the xtals and the conversion scheme in 35 and which xtals were used on the various bands but failed to understand one table in 20 that identified which xtals were bad based on which bands didn't work. That table is in Sect 14 under troubleshooting in Manual 20. Does anyone recall a problem with this table. Also in Manual 35, alignment of 2nd xtal oscill. Sect. 77 advises which trimming caps to adjust for each band. Cap. number 16 seems to be left out and Band 17 seems to be left out. Anybody recall this omission? More later, Dan.

Date: Thu, 28 Apr 2005 17:32:50 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] R390 Band Switch Alignment

It sounds like you have narrowed this down to a weak crystal. Sorry I do not have an R390 manual at hand to help my memory. The cover does come off the crystal cover deck. All the crystals do plug in. You should try to pull the cover and clean the crystal contacts. Likely the cover has been off before. I do not know if the osc deck ovens are switched. In the R390/A the ovens are switched. If the R390 ovens are on the switched circuit someone may have left the oven leads unsoldered the last time the crystal oven cover was off. You can get the cover off without pulling the RF deck. It just takes some creative work. Once you get the cover off, you mite look at all the crystal socket contacts and give them some cleaning. The trimmer cap may be broken or need cleaning. I always hated to work on the caps in the osc deck. You can pry the retained clip sideways off the under side, lift the cap and washer out. Clean every thing up and put it back together. The crystal are used on the fundamental and harmonics. You can have one perform not well on one band and be OK on the harmonic. The crystals do go bad. Replacements are available. You will find some of them off frequency. The cal tones on the band will all be high or low. If the crystal is used on a harmonic the cal tones on that band will be twice as far off. If the crystal is just off frequency, that's what the zero adjust is for. If you have a weak band, then you may want to change the crystal. Again this why I suggest you just play with your receiver as is for a while and get a feel for its behavior. You can do the clean and lube and see how many problems get cured with some cleaned up contacts. Roger KC6TRU

Date: Fri, 29 Apr 2005 21:35:15 -0500

From: "chacuff" <chacuff@cableone.net>
Subject: [R-390] Green Gear

I have heard so much about the "Green Gear" over the years that I figured it was absolutely essential. I'm in the middle of an RF deck teardown and all I can see the thing does is keep the counter sync'd to the gear train. If one is going to remove the counter to disassemble the gear train or even to just give it a good wash down it's going to get out of sync anyway. I would guess one could spin the gear train around to align the cams with the marks, put the counter back on set to 2.000 and it would be good to go right? Of course I didn't address the bandswitch.....I'll look at that a little closer! Am I missing something??

If not I'll be pulling things down tomorrow and I'll put the green gear back in it's storage spot!

Date: Sat, 30 Apr 2005 09:37:50 -0700
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] Green Gear

material. I put one of these in a text file (Bonds, Jan 13, 1999) for my future reference when I take my rf deck out at some point. I can send you the text file, either as Word or WordPerf. File, if you like, off the posting. My interpretation is, the green gear isn't essential but makes things a lot easier. Bonds describes a scenario of re-assemblying if you don't have a green gear, which makes me think it's not as straightforward as you suggest. Duct tape was suggested to me as a substitute to hold the positions also, instead of the green gear. Why not use the gear, if you have it? Maybe you're taking the gear train apart as well? Best regards,Dan.

Date: Mon, 9 May 2005 13:36:40 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: [R-390] Beware RF deck coils.

While going through an R-390 RF deck as part of a restoration it was discovered that one of the coil forms had come loose from the glue joints to the end plates. This allowed the coil to move vertically about 1/8th of an inch and to also rotate. The rotation was only limited by the length of the excess coil wires. (not a good thing) Very little effort was required for the coil form and coil to move certically... probably the dragging of the core would have easily moved it causing problems with proper/reliable tuning of the coil resulting in sensitivity problems. I re-glued the coil form to the end plates with some Duco bond cement and all should be ok. I have only found that one so far but am only half way through the cleaning and visual inspection of the coils. Just a heads up...if you are going through one of these things...or an "A" it pays to check each and every coil as part of the

process. I found many spider nests in the coil housings as well.

Date: Tue, 10 May 2005 22:48:49 -0700 (PDT)
From: "W. Li" <wli98122@yahoo.com>
Subject: [R-390] Re: unable to get past 29MC

Have just started to look critically at my Capehart R-390A. First thing I noticed was that the MC dial does not go past 29MC! I hit a stop just before the Veeder-Root comes to 29... weird. The gear train looks OK, dial lock and zero adjust are free, and the unit works OK and is approx on freq in all bands below 28... What am I missing? It's got to be mechanical. Oh yes, checked all the tube pin resistances to ground, and was surprised to find that all were within 20% of the Y2K manual... that has got to be a first..... Electrically, it needs an alignment, but that's for later.

Date: Wed, 11 May 2005 07:21:01 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Re: unable to get past 29MC

The gizmo that stops the MC knob at the top and bottom end is attached down by the main vertical internal bulkhead in the radio. The setup uses a series of stamped metal fingers that mesh together. When you get to one end or the other of the range the "stack" of fingers locks. The easy way to find the stack is to look at the bottom of the radio and follow the MC shaft through the bulkhead. 7 You may have two fingers glued together with some old lube (not unusual) and need to squirt them with WD40. If the MC shaft goes below 0.0 (500KC to 1 MHz range) then the finger stack simply needs to be reset. A very bizarre situation would be that a finger is missing from the stack. If so I'm sure a number of us have some sitting around for replacements. There are a couple of other crazy things that could happen. If it's not one of the things above let us know and somebody here will have an idea. Either way you are correct, it's a mechanical problem and should be fairly easy to fix. My bet would be on the gunk gluing two fingers together.

Date: Wed, 11 May 2005 05:19:39 -0700 (PDT)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] Re: unable to get past 29MC

Have you checked the multiturn stop on the MC's knob? It may be misaligned. I've never seen your problem, but that would be the most obvious (and easiest) place to start.

Date: Wed, 11 May 2005 14:55:48 -0700 (PDT)
From: "W. Li" <wli98122@yahoo.com>
Subject: [R-390] Re: unable to get past 29MC problem solved

Many thanks for all who responded so quickly to my dilemma. The problem was indeed mechanical. As it turned out, the "ten-turn-stop" was maladjusted. I loosened the clamp on the MC tuning shaft, carefully turned the gear train by hand on the first large planetary gear to read 32MC on the Veeder-Root... and retightened the MC shaft's clamp at that position. Now I can move the MC control thru all 32 stops from 00 to 32 with no undue resistance. All the stamped metal fingers moved freely and are free of gunk or dried grease. You guys are great!

Date: Fri, 13 May 2005 22:04:38 -0500
From: "Barry" <N4BUQ@aol.com>
Subject: [R-390] Slug Rack Lube?

What are some of you guys using to lubricate the slug racks? I have a very squeaky 0.5 - 1.0 rack. It is not the cam followers, but the rack sides against the frame. I had thought about some kind of silicone coating (spray?) but didn't know. It seems MobilOne is too thin in this area, but maybe not. Thoughts?

Date: Fri, 13 May 2005 23:01:00 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Slug Rack Lube?

The MobileOne gear lube seems to work just fine. It's sort of like a 90 weight oil.

Date: Fri, 13 May 2005 22:23:02 -0500
From: "Barry" <N4BUQ@aol.com>
Subject: Re: [R-390] Slug Rack Lube?

That's what I'd heard before. Perhaps I can find a small amount somewhere.
I just hate to get a whole quart for a thimbleful.

Date: Fri, 13 May 2005 23:37:53 -0400
From: "Jim Miller" <jmiller1706@cfl.rr.com>
Subject: Re: [R-390] Slug Rack Lube?

Your squeak may not be metal moving parts. If the slugs are tight inside the coil forms, they might squeak too. Slugs get tight if the coil form has expanded (may have gotten wet). I take some very fine sandpaper and roll it up like a cigarette so it fits inside the coil forms and gently smooth down the insides of the coil forms. Your mileage may vary, N4BE

Date: Sat, 14 May 2005 00:09:38 -0400

From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Slug Rack Lube?

I've used molybdenum ("moly") paste with good results on the slug rack ends and the inside surfaces of that part of the RF deck. You apply it as if you were simonizing/polishing. Fills in the pits in the metal and leaves a slick surface. You can add a film of oil or not. You could try polishing the rubbing surfaces, but the moly stuff works by filling in rather than removing material.

Date: Fri, 13 May 2005 21:45:25 -0700
From: "Dennis L. Wade" <dwade@pacbell.net>
Subject: Re: [R-390] Slug Rack Lube?

I used Woods Waterproof Bicycle grease since I have alot of it around (my other avocation). Works great, and you can dunk your `390 and have the grease stay put. :)

Date: Sat, 14 May 2005 07:26:52 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Slug Rack Lube?

The other advantage of using the Woods stuff is that it adds a nice green touch to the radio.

Date: Sat, 14 May 2005 08:39:27 -0500
From: "Barry" <N4BUQ@aol.com>
Subject: Re: [R-390] Slug Rack Lube?

Ding ding ding! I removed the slug rack, removed the transformers, replaced the slug rack and no squeak. Must be in the coils. Replaced everything. I then rotated the KC to mid point (X.500) where the slugs for the 0.5 - 1.0 rack are all the way down in their respective cans. I loosened the slug holder thingees and let the core spring center itself in all three cans. Squeak gone!

Date: Sat, 14 May 2005 23:08:22 -0500
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] Clutch!

> So, this is what it's like to have a clutch that works properly! I rebuilt
> the clutch mechanisms in both my R309A's. The Motorola has always been
> sticky. Disengage the clutch and the VeederRoot still moves a bit until I
> rock the KC knob a bit. On the "new" one (Teledyne), disengage the clutch
> (and I can really tell that it disengages) and the VeederRoot counter

stays
> very still and I can adjust zero very easily.
> > So much fun...

Now that you have a good one, you can see what to do to fix the bad one in the Motorola, too.

Date: Sat, 14 May 2005 23:51:16 -0500
From: "Barry" <N4BUQ@aol.com>
Subject: Re: [R-390] Clutch!

Perhaps. I disassembled and reassembled the first one several times with the same results. I'm thinking of doing a geartrain rebuild on it so I'll dig into it one more time then.

Date: Sun, 15 May 2005 15:02:39 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Slug Rack Lube?

I have been working on an R-390 recently that is also exhibiting the squeaking noise on a couple of the racks. I know it's not the coming from the cam/bearing contact points because they are well lubed and all rotating. (bearings) The ends of the slug racks and the RF deck frames are not touching or loose in my radio so It's not that...so it only leaves the cores sliding in the coils. The R-390 has no adjustment that allows tensions to be removed from the cores due to slight misalignments as the "A" does. I noticed the cores are also coated with some type of shiny outer coating as well. Maybe to aid in friction reduction.

I have heard of guys using a ceramic stone and polishing those contact points. I would assume some type of lubrication would also be in order. I have used the Mobil 1 synthetic lube at those points as well with good luck. A good Teflon gun lube would also be another thought...

Date: Sun, 15 May 2005 17:57:01 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Slug Rack Lube?

Be careful with Teflon gun lubes in combination with other odd lubricants and cleaners. You can wind up with Teflon gumbo in a big hurry. Moly powder and talcum powder have both been suggested as core lubes for the R390 not an A's .

Date: Sun, 15 May 2005 19:43:05 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Slug Rack Lube?

OH...I was speaking of the metal to metal points on the ends of the slug racks...I would never use a lubricant in liquid form on the slugs or coils...That would be inviting big time trouble for sure. I personally haven't used the gun lube on any of my radio's as the Mobil 1 has worked great!

Date: Mon, 16 May 2005 14:22:03 +0100
From: "G4GJL" <g4gjl@btopenworld.com>
Subject: Re: [R-390] Clutch!

How many degrees of rotation do you need to get satisfactory disengagement? My 390As all seem to need 270 to 360 deg. My R391 needs a lot less.... maybe 90 degrees only. Is there a difference in the designs here? I have not had the 391 apart to look at the mechanism closely.

Date: Mon, 16 May 2005 11:13:41 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Slug Rack Lube?

>... an R-390 recently that is also exhibiting the squeaking noise.....

It may well be that the core material turned out shiny after the manufacturing process. I suggest you find a bit of car wax, butcher's wax, or bowling alley wax. If you garage doesn't have any car wax, look in the housewares section of the grocery store. You won't need much money. Put a little wax on a Q-tip and wax the inside of the coil form, and the outside of the slug. I'll bet the squeak goes away forever. If you want to use the ultimate was, get Rennaisance Wax, designed and used by the curators at the Victoria and Albert Museum, London. Expensive, but archival quality. Ultra fine microcrystalline structure or some such stuff.

One source is: http://www.restorationproduct.com/ (200ml (7fl. oz.): $20.00 per can) where the price is about the same as at
http://www.lightimpressionsdirect.com ($19.95 for 8 oz.)

The first place offers a 12 ounce quantity for less. This stuff is good for any radio, metal, painted, wood, bakelite, or whatever.

>I have heard of guys using a ceramic stone and polishing those contact points. I would assume some type of lubrication would also be in order. I have used the Mobil 1 synthetic lube at those points as well with good luck.

I assume you mean the metal parts, not the coil slugs or phenolic forms. Just the smallest bit of grease of almost any kind will do the job. The wax

probably would, too.

Date: Mon, 16 May 2005 13:07:40 -0500
From: "Barry" <N4BUQ@aol.com>
Subject: Re: [R-390] Clutch!

For the new one, it is about 180 to 270 degress from the point at which I can feel the disk first engage the posts to where the clutch is disengaged. When it does disengage, the geartrain is immediately freed from the PTO; not exactly so on the older (Motorola) one. On the older one, it doesn't seem that much different, but when the clutch disengages, it isn't quite fully disengaged until I rotate the KC knob a bit. It's as if something is sticking and it takes a slight bit of rotational force to free it. Once that happens, it rotates pretty freely. I'm thinking it may have some sticky residue somewhere on the clutch disks that still needs to come off. I tried it oiled which did not work very well at all. The oil caused the plates to stick together big time. It should be dry at this point, but maybe some of the Mobil One got into it. Either that or there is something else sticking.

Date: Mon, 16 May 2005 22:01:49 +0100
From: "G4GJL" <g4gjl@btopenworld.com>
Subject: Re: [R-390] Clutch!

Thanks for that, Barry. You have prompted me to tak a closer look at the clutch designs. I seem to recall about 90deg was all you needed on one or two sets I have played with at a local Ham's QTH.. I think you would be right to remove all their MAX amount of stray oil / grease etc. I dont think it would help the clutch bite at all. Im doing a couple of St Juliens rebuilds at the moment , so I have the opportunity to get to grips with the designs at CLOSE quarters! Thanks for the comments.

Date: Mon, 16 May 2005 19:51:24 -0500
From: "Barry" <n4buq@aol.com>
Subject: Re: [R-390] Clutch!

When / if you do the clutch rebuild, I'd like to know how many spring washers you find in each. I'm wondering if they Motorola may have too many spring washers thus requiring just a wee bit more disengagement pressure than might be necessary and that's what might be causing the stickiness. Just a thought. I'm thinking this might have been something they set at the factory based on some pressure test, but not sure.

Date: Mon, 16 May 2005 21:48:24 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Clutch!

The zero adjust clutch has no "adjustment" they either work or do not work. The different production runs had different "feels" to the adjustment. The critters did and do get dirty, mostly they were "washed" and "run dry" with a minimum of oil. The disk on the zero adjust shaft does not have such a good shaft bearing. This has always been a point of friction in the design.

You can read the TM and take the clutch apart if you need to really get one clean (you may have to). Otherwise you hung the RF deck off the edge of the bench and sprayed liberal amounts of your favorite solvent through the gear train and followed with compressed air to blow dry. Mobil synthetic oil is now the relube of choice.

The clutches all sort of had a different feel. Some would open up and roll nice, others just felt like they dragged. We never did any thing about them in the service. The zero adjust was a go no go item. It did or did not function. when the receivers were much younger a good wash and lube got them back into a passing condition. No disassembly was required. Considering the age and where some of these receivers have been, a one time disassembly and cleaning could
very well be in order.

I see some on the market trying to tell me I need to go an extra C on a receiver that has a smooth zero adjust and knobs that do not induce tunnel carpo and I may need a few minutes to pick my butt back up off the floor and stop snickering. Real R390's needed work to operate and were part of every operators personal physical fitness program. A day cranking a R390 and you bend an elbow to get a few beers disposed of. Roger KC6TRU

Date: Mon, 6 Jun 2005 11:43:22 -0700 (PDT)
From: Jack Sullivan <jsullivan10512000@yahoo.com>
Subject: [R-390] R390 (non "A")--question on mechanical regulation

In cleaning up my R390 (non "A"), I installed the "green gear" to gear train, prior to removing the RF subchassis from the main frame. I cleaned up the gear train, lubed it, as the original military manual showed, but am now wondering if that gear train is "regulated" as it should be. In trying to follow the military manual, I set the dial to 02000, to see if the holes in lobes at rear of subchassis would line up with lines engraved beneath them. THEY DON'T, to my surprise, so now I wonder if someone messed it up prior to my getting it. With green gear in place, shouldn't lobe holes line up with engraved lines, or do I not understand this whole thing correctly?

Date: Mon, 06 Jun 2005 18:39:36 -0400

From: shoppa_r390a@trailing-edge.com (Tim Shoppa)
Subject: [R-390] Megacycle detents, nominal B+, and bad tube brands

The megacycle detent on my 390A seems not as tight as it should be. Especially tuning around bands with a "cusp" (e.g. middle of 15MHz) in the cams the Megacycle knob will occasionally twist out of the detent as I tune the kilocycle knob around. Is it a good or a bad idea to bend the megacycle detent spring a little bit to help out? Or any ideas for a more permanent solution? <snip>

Date: Mon, 6 Jun 2005 20:14:26 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] R390 (non "A")--question on mechanical regulation

Are you on the wrong zero? I have not found my R390 manual after my move yet. Memory is not good. I thought it lined up on the 2 +000. Is it way off, or just a little off? Read the manual again and check what you did.

If it's only a little off, it could be the cams need some adjustment. We would inspect the mechanical alignment for a semi annual preventive maintenance ever 6 months. I was amazed at how often the mechanical alignment would need a bit of adjustment.

Date: Mon, 6 Jun 2005 19:25:29 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Megacycle detents, nominal B+, and bad tube brands

Sounds like you need to lube the whole transmission. The MC CHANGE detent is adjustable, just loosen the screws and move it closer to the detent wheel. Sometimes the wheel will wear a slot in the detent spring, if this is happening you can move the spring to another area to wear on by putting washers between the spring and its mounting plate.

Date: Tue, 07 Jun 2005 10:05:02 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Megacycle detents, nominal B+, and bad tube brands

>The megacycle detent on my 390A seems not as tight as it should be.....

The detent spring, and to a lesser extent, the detent disk (whatever the right name is) are the culprits. Bending the spring is a start. Do check that it is not worn out and making little shavings from the disk (unlikely). You may be able to bend it sideways a bit to bring a new portion of the spring to bear on the detent disk.

>Or any ideas for a more permanent solution?

New spring and or disk. Also, check lubrication of the gears/clutch etc. between the KC actions and the MC actions. Just a bit of oil or grease in the right spot may reduce the friction enough to to the trick. <snip>

Date: Tue, 12 Jul 2005 09:20:22 -0400
From: n4tua@aol.com
Subject: [R-390] Gear train cleaning

I am wanting to clean and re lubricate the 390A gear train. Are there any suggestions as far as whose approach is best? Is it worth doing? I mean doing right like KK4DF describes in his procedure. Any suggestions would be appreciated.

Date: Tue, 12 Jul 2005 09:42:45 -0400
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: Re: [R-390] Gear train cleaning

> Is it worth doing?

Depends on where you're starting from. On my yellow-striper, where are all the gears were encased in dirt and sand, it's necessary. It'll be many hours of work the first time. Lots of little retaining rings and springs you have to be careful you don't lose. If you've never taken out your RF deck you probably need to buy a long phillips screwdriver, the bristol spline wrenches, and retaining-ring pliers. And if you tear everything apart you're probably also going to do RF bandswitch and crystal oscillator switch realignments which are another little bit of work and worry. If you have some existing dried grease on the mechanism, you can probably do a spot cleaning more easily than tearing the whole thing down. If you have a lot of existing dried grease, you may want to tear down the whole thing just to get it shiny and clean. If you want to do it, but cannot justify doing it on your existing clean radio, just get a yellow- or blue-striper :-)

Date: Tue, 12 Jul 2005 10:20:28 -0400
From: "Patrick" <brookbank@triad.rr.com>
Subject: Re: [R-390] Gear train cleaning

The way I have done several ones is to take the RF subchassis out (you must follow the manual instructions), then I take out the ferrite slugs and the cans easy job...with the unit now as mention and outside on a crate, I spray carburator cleaner at will to clean the whole gear assembly, one took 2 cans, but they do clean good, after that I clean with a oily rag all of the slots where the ferrite slugs slide on making shure that there is no deposit of grease at the bottom, also clean very wellthe ferrite slides (be careful not to damage the slugs themselves)., this is a good time to give the

entire assembly a good cleaning, I usually do it with a damp cloth followed with an oily one and then a dry one. Now lubricate the gears, cams and cam followers (I use 10 oil), but be careful not to overlubricate, that causes more problems by attracting dirt, I use syringe to make sure to reach with a small dab of oil all places, as you oil, move the gears to evenly distribute the oil.....now since you have the unit out check for the cam alignment, correct it if out of specs and you are ready to replace unit....to me the most tedious part is to take the front panel out and then replace it. After this procedure and with the receiver being use in a normal house environment, I have never had to do it again.

Date: Tue, 12 Jul 2005 08:24:34 -0600
From: "Kenneth" <crips01@msn.com>
Subject: RE: [R-390] Gear train cleaning

There is a real interesting article in the latest ER on this subject.

Date: Sun, 17 Jul 2005 20:13:10 EDT
From: N4TUA@aol.com
Subject: [R-390] What to do now

I have discovered an interesting thing while cleaning the gear train on my Motorola 56. The split gear #59 on the drawing seems to be out of specification. This is the gear on the center bottom cam shaft. The two halves fit together fine but the snap ring will not go down into the groove. It was like that when I disassembled it and may have been built like that. Seems to have held up that way for almost 50 years. It looks like the individual gear halves are too thick. What would be the general suggestion to do here? These gears are stainless and would be hard to sand down to fit. I thought this was most interesting to find a manufacturing defect like this.

Date: Sun, 17 Jul 2005 18:03:21 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] What to do now

Did you happen to hone the burrs off the sides of the teeth? Where the two gear sides mate? If they don't slide against each other smoothly the burrs may make them to be too "thick".

Date: Sun, 17 Jul 2005 21:31:42 -0500
From: "Barry" <N4BUQ@aol.com>
Subject: Re: [R-390] What to do now

I can't recall if this is one of the gears built like this, but if it is the kind with a collar brazed to the gear, sometimes this causes them to become

slightly convex. I had this problem on a couple of split gears on my last rebuild. If they are not exactly flat, you can VERY GENTLY flatten them (they are quite soft). After doing this, these gears spun together quite nicely.-

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Date: Thu, 21 Jul 2005 04:16:56 -0400
From: n4tua@aol.com
Subject: [R-390] Non fitting gears

Thanks to all who have replied to my non fitting gear problem. I have decided to put the gears back together the way they have been for the first 49 years of their life and hope they hold together for at least another 49 years. I think they will since they are also held captive by the gear clamp. I could not see any warpage or burring that would cause this misfit. Nor wrong gear placement either. The only things I could see was, 1) the gears are too thick. 2) the soldered on collar was soldered on with the collar a little bit out. If I ever get another set of gears I plan to justify this conclusion. Now on to the next problem.... Does anyone know the specifications for the small springs that hold the split gears tight? I have broken one quite by accident. I will either need a new one or a used replacement.

Date: Thu, 21 Jul 2005 06:18:11 -0400
From: shoppa_r390a@trailing-edge.com (Tim Shoppa)
Subject: Re: [R-390] Non fitting gears

My guess is: slightly less than 1/8" outside diameter. Maybe 0.100". Overall length 3/8". Wire diameter seems to be 0.020". In my brief looking around, 0.1" diameter springs made out of 0.020" wire seem to be fairly common. But not in a length as short as 3/8". I'd hazard a guess that a very workable substitute could be made by buying a longer spring, cutting it, and bending a new hook on one end. Probably you want to replace them in pairs. If you want to wind a spring from scratch, I had this web page pointed out to me a few days ago. It makes it look easy!
http://home.earthlink.net/~bazillion/springs.html If you're going to make one, I'd make two just to do both side in a matching pair. I have bought stock springs etc. from http://www.mscdirect.com/ for
the springs that tension the slug racks down. (Which are 3/16" OD, 1.5" overall length, 0.020" wire.)

Date: Thu, 21 Jul 2005 08:36:56 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Non fitting gears

I can get custom springs made to order, just having trouble getting that MC CHANGE detent made.

Date: Thu, 21 Jul 2005 12:00:00 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Non fitting gears

>.....small springs.....

I think someone on the list has some spares. But: If you get a spring out and figure out what it's characteristics are, do this:

1) take apart any ball point pens you find to see if those springs would work.

2) Go off to your local hobby store with the broken spring and put it down on the counter in front of the store person who looks most knowledgeable. You know, the model airplane and railroad store. Warning: while you are there, do not approach the tiny nuts and bolts display, the racks of metal rods and tubes, and the paint and finishes section. If you do, you are in serious danger of spending lots more money that you had planned to.

3) See Small Parts, Inc, for replacements if you can't find anything. http://www.smallparts.com/

Date: Thu, 21 Jul 2005 14:09:02 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Non fitting gears

I already recommended the ballpoint pen spring idea privately. They may not have exactly the right parametric characteristics, but .. highly available. Have to caution against option #2 as stated. You instructed to go to the local hobby store with the broken spring. This will subject instructee to risk of ill treatment, as in Old Joke #340-299433, sub-part Q. "Home mechanic walks into auto parts store and holds up grungy, grease-dripping, cruddy broken part and says "Got any of these?". To which, slack-jawed, war-weary counter clerk hauls out a grimy box and dumps it out on the counter --- and a whole mess of dirty broken parts of the same kind spill out, as he replies "Yeah, I got a hundred of 'em.". Lesson being -- remove one of the good springs and take that to the store. But as advised, put horse blinders on first so you will not be attracted to the myriad small parts -- or worse -- become afflicted by a one or more additional expensive hobbies. Ideas may creep into your brain before you can do anything about it -- like "Geee, I could stack up the radios like buildings and run the HO layout around 'em." Or, worse yet, when you mention to the store guy that it's spring for a radio and get to talking about R-390's and the like, he will haul out the most elaborate, control 'n meter festooned piece o' gear and mosey on over to the servo's and say something like "You mean you're

into radios but not RADIO
CONTROL!!!???" Let's see now,the spring is 25 cents, tum-te-tum, the Zorchmaster-8-Channel is $799.95, the five servo's at $89.99 a pop, the 1/8th scale B-29.... four engines. Wadditya say your credit limit is on this card? By the way, these are 3 times more powerful than your weedwacker. " You better check the junk drawer for plastic ballpoints. Somebody mail him a couple of springs. If Collin gets infected, the rest of us will be at risk. Hmmmmm..... there are computer controlled radios -- how about radio controlled radios? Ya see....

Date: Wed, 10 Aug 2005 10:37:18 -0700
From: "David Wise" <David_Wise@Phoenix.com>
Subject: RE: [R-390] 7 +000 alignment

Don't sweat the cam alignment - it's not at all critical.As long as every cam is on its front, or active side at all frequencies for which that cam is used, it's probably fine. The cams are spiral-cut, which means that the lift is proportional to the angle. As long as the slug adjusters are able to total up the proper lift, there will be no degradation in tracking. This is very different from most radios, and comes from Art's insistence that it tune linearly. It's also documented in the Final Engineering Report, which is available on the R-390A FAQ site.

Date: Mon, 15 Aug 2005 10:52:05 -0700
From: Dennis Wade <sacramento.cyclist@gmail.com>
Subject: [R-390] Needed: T203, RF Slug, Oldham spring

Swapped out the core from T203 with the adjacent (4-8) slug rack, and re tweaked the antenna coils. The different slug aligned very differently than the previous one, so I will infer that the original one does indeed not belong. The suspect core behaves has the same odd behavior in the 4-8 mc/s rack, i.e. has to be screwed ALL the way in, almost to the point where it falls into the core, without reaching an obvious peak. (signal level keeps increasing while turning the core in without peaking). So, does anyone have a spare RF slug?

However, the proper slug does not apparently help the deafness of the 2-3 and 3-4 mc/s bands. Therefore, I'd like to swap out T203 before I decide I have to pull the RF deck again :(. Rocking the bandswitch doesn't seem to affect the deafness at all, so I'm hoping that helps eliminate the bandswitch itself. Or am I just kidding myself. Anyone have a spare T203?

And finally, (it comes in 3's), my Oldham coupler spring went into orbit recently and I'd like to get that back on the coupler. I could use at least one, and a couple of spares if anyone has any to part with. Reasonable

costs gladly paid.

Date: Mon, 15 Aug 2005 13:22:50 -0500
From: "Barry" <n4buq@aol.com>
Subject: [R-390] Possible Oldham Spring source?

I wonder if the springs shown on this page would work for Oldham springs? I can't tell from the pics as to the size, but they sure look close. Might be too much tension for the application, though?

http://www.radioverzameling.nl/repro/uk/

Date: Thu, 25 Aug 2005 11:47:52 +0000
From: jonklinkhamer@comcast.net
Subject: [R-390] Trouble Shooting R390A/Backlash

<snip> ..... I'm focusing my attention now to the RF Stage and have a question concerning backlash. I noticed a certain amount of backlash while turning the KC knob counter clockwise. The lower and upper frequency ends seems to move about 1 to 2 clicks while the mid freq range, approx 300 to 500 appears to move as much as 4 clicks. Can anyone point me in the right direction as far as adjustment(s) to correct this? Hopefully nothing is warped.

Date: Thu, 25 Aug 2005 08:23:04 -0400
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: Re: [R-390] Trouble Shooting R390A/Backlash

Check the Oldham coupler (between the kc knob and the PTO) and the split gear that drives the counter for missing springs. From the bottom you can see where the springs are supposed to go. If the gears are rusted or burred then it may not matter if they've got the springs or not. Without taking apart the geartrain you ought to be able to wiggle the two halves of a split gear just a tiny fraction of a tooth and feel/see them snap back.

If turning the KC knob causes neither a change in frequency or movement of the counter, then it's likely the Oldham coupler spring. If turning the KC knob does cause a change in frequency but doesn't cause the counter to turn, then it's likely the gears that drive the counter. Also the two bevel gears that do the right-angle thing to drive the counter may be not close enough, that would cause some counter backlash too.

Not sure exactly why the backlash would depend on position of the KC dial. The springs pulling down the cams do exert some torque backwards through the geartrain. Oh, wait, if one of the two springs on a split gear was missing, then you might see the effect you see, although it would

depend not on KC display but on the angular position of the KC knob.

Date: Thu, 25 Aug 2005 08:50:18 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Trouble Shooting R390A/Backlash

<snip> ..... Seems familiar. If you look at the cams and slug racks as you're turning the KC knob, you'll probably see that the backlash occurs as one or more racks are raising up and it's the pull of the rack springs pulling the cams backward. It was mentioned recently that the exact position of the cams was not critical -- i.e. when lining up the holes in the cams with the scribe marks on the deck. Not sure about that. I seem to remember doing a mechanical allignment where I had one cam off a bit and correcting it fixed the backlash. Also possible you may need a bit more tension on one or more of the split gears.

Oh... one more thing -- a slipping gear clamp. Hmmmm .. it's coming back to me now. I had correctly aligned the cams, but one clamp was not holding, so in the alignment position (-7.000KC?) all the cams were OK, but didn't stay that way through the full cycle. Carefully observe the works as you turn the KC knob from lock to lock -- several times -- and if that's the case, you'll eventually spot it.

Look for hairline cracks in the clamps. Even if slipping or split, the clamps can hold for most of the rotation -- except where the reverse tension is at its strongest -- i.e. more of the slugracks are being lifted. And the devilish thing -- they act like automatic clutches -- when the KC knob is turned back, they start grabbing again and "re-synch".

The loose/split clamp also caused the backlash action. Tighten up any suspect clamps -- but don't overdo it - that's how they split and these problems often surface after a "tweaking" -- on that good deed principle. Yup, a slipping clamp can turn this mechanical marvel into a Rube Goldberg contraption.

Date: Thu, 25 Aug 2005 09:18:06 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Trouble Shooting R390A/Backlash

>> The lower and upper frequency ends seems to move .....Check the Oldham coupler.....

Doubtful that the extreme backlash would be due to a missing Oldham coupler spring -- that mostly serves to reduce slop and rattle and maintain "reset-ability". A rubber band will do in a pinch.

>If the gears are rusted or burred .....

Possible - or insufficient or no offset on the split gears. But more likely a broken or slipping gear clamp somewhere.

>If turning the kc knob causes neither a change in frequency or
>movement of the counter, then it's likely the Oldham coupler
>spring. If turning the kc knob does cause a change in frequency
>but doesn't cause the counter to turn, then it's likely the gears
>that drive the counter.

I think Jon is telling us that the whole business is cranking back on him -- won't stay put over some range of the KC setting. More like recoil than backlash. Sounded like everything -- counter etc. -- is turning, but spins back at certain points. I suspect a clamp is not holding at maximum tension points.

>The springs pulling down the cams do exert some torque .....

The tension is not constant through the full range of the KC tuning. Sometimes more racks are being raised up through part of the cycle and stretching more of those slug rack springs, or stretching one further. If a clamp is slipping, it may just slip on the most extreme upswing, then starts grabbing again on the downswing. It's difficult to see when it happens - and maybe so hard to see that it just pays to inspect for cracked clamps, snug them all up and try again.

>Oh, wait, if one of the two springs on a split gear was missing,.....

Usually even one spring is enough for the split gear to work sufficiently. Perhaps, if the deck had been reassembled without offsetting several of the split gears, I could see that happening. Again, though, after re-thinking and recalling a similar extreme backlash/spinback situation, I'd strongly recommend checking the action through the full cylcle of the KC train and looking for a cracked or loose gear clamp.

Date: Thu, 25 Aug 2005 12:09:03 -0700
From: Dan Arney <hankarn@pacbell.net>
Subject: [R-390] RE OLDHAM coupler Springs

I have the springs 2 for a dollar plus SASE which in English means Self Addressed Stamped Envelope. Out of 12 orders, 3 came with SASE, 4 came with addressed envelope NO STAMP, 2 came with other orders and three came with just the buck. The posting asks for SASE. No more blanks please. The CNC disc comes with one spring $12.00 plus mailing. $1.00 USA

Date: Sun, 28 Aug 2005 21:11:59 -0400
From: "Jon" <jonklinkhamer@comcast.net>
Subject: [R-390] backlash on R390A

This weekend was a crash course on the RF Deck. After reviewing the manual(s) and Chuck's video, I finally got enough nerve to take out the deck. Two things I immediately noticed. First the spring for the Oldham Coupler is missing - gone. No I did not do it - really. Also on one of the slug racks a tension spring is also missing. These especially the former might be the perpetrator of why I'm seeing so much backlash. I'm now at the mercy of finding parts. I don't necessary like that feeling but it goes along with repairing/restoring boatanchors I guess. I noticed www.atc-us.com <http://www.atc-us.com> is selling a deck for $35. I'm thinking I might need the gears and clamps depending on what I find. Does anyone have much experience dealing with this company? Is there anybody in the group that could sell me an anti-backlash and tension spring(s)? Being always the optimism, I feel good that this may solve the problem. PS: While cleaning the dirt off the chassis where the RF deck was I noticed a message scribed into the metal. It read "Bud was here 30 Nov 69" Bud if you're out there thanks for serving and God bless you!

Date: Mon, 29 Aug 2005 11:44:03 +0000
From: jonklinkhamer@comcast.net
Subject: Re: [R-390] backlash on R390A

Yes you're right it's more of a recoil as you described. I have not checked for broken clamps but I will. I may have to clean a little there is lots of dry up grease. I have a busy schedule this week but hope to get back on it soon. Will definitely use your procedure and see what turns up. As far as the RF Deck. If you let me know the shipping cost and address I'll get something out this week to you for sure. Thanks for all your help and the groups,

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Date: Mon, 29 Aug 2005 09:36:54 -0400
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: Re: [R-390] Oldham and other springs

By my measurement the Oldham coupler springs are 1/8" diameter, 0.016" diameter wire, and about 0.65" or 0.75" long unextended between hooks. The springs used for the split gears are 1/8" diameter, 0.016" diameter wire, and about 3/8" long between hooks unextended. The springs used to pull down the slug racks are 3/16" diameter, 0.020" diameter wire, and about one and a half inches long between hooks unextended. These are all fairly vanilla springs, with the exception for the split gear springs which are a bit shorter than you'll find in standard packages. It is fairly easy to wind your own springs or take a long spring and make it shorter. See for example

http://home.earthlink.net/~bazillion/intro.html

I think the original R-390A springs must've been stainless if you want to be really picky.

Date: Thu, 21 Jul 2005 14:48:37 -0400
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: Re: <<<SPAM>: Re: [R-390] Non fitting gears

Major problem: ballpoint pen springs are compression, not extension springs. May be good raw material for spring winding though. I like the stainless springs in computer keyboards better for that myself.

Date: Wed, 10 Aug 2005 06:53:04 -0400
From: n4tua@aol.com
Subject: [R-390] 7 +000 alignment

I have a question concerning the mechanical alignment at 7 +000 of the cams. My Motorola has lines but they are not long enough to be seen through the holes. My question is: Does the tip or high part of the cam line up the same as the hole? In other words can I use the tip of the cam to line up with the line? Or is it that critical? I can see how the hole can be very accurate alignment, but that line is not real fine. Any help would be appreciated. I have the gear train cleaned, deburred and back together, and am working on the mechanical alignment now. Progress at: www.hometown.aol.com/n4tua/main.html..... Thanks, Collin

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Date: Wed, 10 Aug 2005 10:04:32 -0700 (PDT)
From: "KC8OPP Roger S." <kc8opp@yahoo.com>
Subject: Re: [R-390] 7 +000 alignment

This may not be too elegant, but I have done this once or twice. With a straight edge and a pencil, extend the lines to a point where you can see them. I seem to remember that the hole in the cam is in line with the point, but that is an old memory talking!

Date: Wed, 10 Aug 2005 13:19:43 -0400
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: Re: [R-390] 7 +000 alignment

It's very close to being in line. If I dial the cusps of the cams so they point to the line, then on my rigs the line is visible through the hole but it's not always centered in the hole.

Date: Sun, 04 Sep 2005 19:39:51 -0400
From: Dave or Debbie Metz <dmetz@ntelos.net>

Subject: [R-390] RF Deck clamp source

After quite a few times in and out of the chassis, I can practically put the RF deck in blindfolded. The cause: 4 broken clamps! Anyway, I found a source for two part stainless clamps via WW Grainger for about $4-5 each. The nice part about the two piece clamps is the lack of need to disassemble the gear train to replace a couple of them on through shafts. A bit of challenge is to get the old one out but I'll leave that to one's imagination. The 5/16" bore two piece stainless is stock # 1L714 and the 3/8" bore two piece stainless is 1L715. The also sell a cheaper steel one and one piece for lesser amounts. Obviously there is the old standby of Small Parts, but many people might have a Grainger closer and easier.

Date: Sun, 4 Sep 2005 20:07:26 -0500
From: "Barry" <N4BUQ@aol.com>
Subject: Re: [R-390] RF Deck clamp source

Some enterprising guy made 2-piece aluminum clamps for many of the shafts and gears on my latest R390A. While the original design is easier to manage since there's only one screw, I think the 2-piece design is very strong and you certainly don't have to worry about clamps breaking with them.

Date: Sun, 04 Sep 2005 18:05:09 -0700
From: Dan Arney <hankarn@pacbell.net>
Subject: Re: [R-390] RF Deck clamp source

I have all sizes of the original clamps in stock, Hank

Date: Fri, 23 Sep 2005 09:27:26 -0400
From: Jack Absalom <kf4yio@charter.net>
Subject: [R-390] RF sub chassis slug rack problem

I'm new to the group and am restoring a 1963 Teledyne R390A. I have a problem. I'm cleaning all the slug racks and roller bearings and one of the rack's bearings are frozen tight. They have appaerently been this way for quite a while as grooves have been worn on each side of the bearing where it slides up and down the mount. The outer bearings on this particular rack that roll on the cams are ok and cleaned up well. I just can't get these inner bearings to unfreeze. That's right, both sides are like this. All the rest of the slug racks have been cleaned, reassembled lubed and replaced. This rack has been cleaned lubed and replaced but I would like to either replace or fix it. Any ideas ? Thanks guys..... I used the R390A 's in the Navy and and NSA during the cold war and Vietnam. What a machine/rig!!!!!

Date: Fri, 23 Sep 2005 15:02:41 +0100
From: "Peter Worrall, G4GJL" <g4gjl@btopenworld.com>
Subject: Re: [R-390] RF sub chassis slug rack problem

Jack which slug rack is the problem? I have a few spares, but not all versions. Happy to send FOC from UK if you cant get a more local fix. Will be on VAC for 3 weeks so if time is not pressing you have at least a chance.

Date: Fri, 23 Sep 2005 09:09:03 -0500-
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] RF sub chassis slug rack problem

I think Fair Radio is still selling RF decks; I know they used to, and have some from there. I think they have the slug racks. Check with Fair first, to see if they'll sell you a slug rack or RF deck. If they're out or won't part one out for you, then get back with me and I'll see what we can work out.

Date: Fri, 23 Sep 2005 09:22:37 -0500
From: "Barry" <n4buq@aol.com>
Subject: Re: [R-390] RF sub chassis slug rack problem

Didn't some of the slug racks have non-rolling "bearings"? In other words, they were there just to keep the slug rack aligned, but didn't roll. I think some of my Motorola racks are that way. Perhaps your RF deck has a renegade slug rack from another deck?

Date: Fri, 23 Sep 2005 15:16:21 -0400
From: JMILLER1706@cfl.rr.com
Subject: Re: [R-390] RF sub chassis slug rack problem

Assuming it is really a roller bearing and not just a guide, try some Liquid Wrench to loosen the bearing. Heat from the tip of a soldering iron or a few gentle taps may also cause the bearing to loosen it up.

Date: Mon, 26 Sep 2005 21:46:24 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] RF sub chassis slug rack problem

If someone has not offered you an RF rack direct, ask for one here. All the RF racks are the same. You do not need the slugs or the keepers on top. You see what your other racks have. Flat sides are not what you were expecting to see. Even if you get yours to freeup, they will hang again every time the flat rolls over to the rail. If after asking you do not get an offer call or E-mail Dave at Fair Radio. They have the parts. Do not ask for more than you need. That just cost
money and then you have parts setting not in circulation. If you got some

help, please put a thank you out here so we know the problem is resolved. You do not need to list the ugly details. Just a Thanks to someone (insert name here) for solving my silly little problem. So happy you had one to part with. Sorry I do not have one to offer you

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Date: Fri, 7 Oct 2005 14:10:54 -0600
From: "DW Holtman" <future212@comcast.net>
Subject: [R-390] Variable Caps

Is there a way to clean the variable caps in the Rf transformers located in the RF Module. They look like they cannot be dis-assemblied, they look sort of sealed with a rubber looking gasket/seal around the bottom of the top ceramic part, under the adjustment screw. The shaft extends through the board to the solder connections. Is there a good way to clean these caps? Thank you in advance for any information.

Date: Fri, 7 Oct 2005 16:26:12 -0500
From: "Barry" <n4buq@aol.com>
Subject: Re: [R-390] Variable Caps

If these are the caps I'm thinking of, you should be able to *carefully* push the "Y-looking" clip (the solder connection thingee) from around the center shaft underneath the board. The top part of the cap should then pull out from the bottom part and the cap will come right apart.

Date: Mon, 10 Oct 2005 08:05:36 -0400
From: JMILLER1706@cfl.rr.com
Subject: Re: [R-390] Variable Caps

Yes they can be disassembled and cleaned - carefully. The three-pronged spring thing under the circuit board slides into a groove on the shaft, it can be gently pulled away from the shaft with needle nose pliers, even without de-soldering. Then the rotary part just lifts out, and you can clean the surface with denatured alcohol. And clean the metal parts with deoxit and a tooth brush. Alternately, just dab a very small amount of deoxis onto the shaft where it is held by the spring piece and rotate it a few times to clean off any corrosion.

Date: Tue, 08 Nov 2005 11:18:51 -0800
From: Dan Rae <danrae@verizon.net>
Subject: [R-390] R-390 Coil Rack Springs?

Does anyone know what material was used for the springs that are between the adjusting screw and the core itself on the R-390? It looks like hard brass to me. I have one rack where all four are either broken or looking fragile and need to replace them all. I was wondering if my son

would notice if I stole one of his guitar strings, that looks as if it might make a good alternative.

Date: Tue, 08 Nov 2005 14:46:10 -0500
From: "Miles B. Anderson" <mbalaw@optonline.net>
Subject: [R-390] Coil rack springs

Whatever the material, they solder very easily. I have repaired a couple of broken ones just by soldering the ends together.

Date: Wed, 12 Oct 2005 15:54:35 -0400
From: "Al Parker" <anchor@ec.rr.com>
Subject: [R-390] R-390/URR Geneva Mechanism needed

I have discovered, much to my chagrin, that the Geneva Mechanism is different in the R-390 and the R-390A -- they are mirror images of each other. My R-390 has a stripped large brass gear on it's G-mech. I helpful friend and list member has supplied a mechanism for an R-390A, and I first thought that the brass gears were the same. They are not, the indexing pin is placed one tooth away from being 180 degrees from the notch that the ball fits in, in opposite directions for each unit. (the other parts are also mirror images.)

I may be able to drill a new hole & relocate the pin, but it's only 8 degrees difference, and not having an indexing head for the drill press I may mess it up.

So, does anyone have, for the R-390, a complete Geneva Mechanism, or just the brass gear, that they would sell me? You can see pix and more of the gory details of all this at:

http://www.thecompendium.net/radio/R390sn385.htm

Date: Sun, 23 Oct 2005 17:50:21 -0400
From: "Jon" <jonklinkhamer@comcast.net>
Subject: [R-390] Calibration marks on the RF Deck

I have a question regarding the markings on the RF deck with respect to calibration at 8Mhz. Some of the them are almost worn away and one is gone completely. With the ones almost gone I repainted with enamel paint. The one that is missing, I do have another deck and was going to trace out the marking and transfer it over. Is there a better way? Are there any bugaboos I should be aware of?

Date: Sat, 19 Nov 2005 09:04:17 -0600
From: "tfrobase" <tfrobase@kitparts.com>

Subject: [R-390] Cleaning Gears & Cams

Several years ago, while living in eastern Pennsylvania, I found an industrial ultrasonic cleaner at one of my favorite scrap yards. It has become invaluable in the restoration of r-390a's. I have been fully immersing the detached gear assembly and the inductor racks, with the inductors removed. I use a solution of water based degreaser in fairly high concentration. It takes about 3 - 5 minutes to complete the job. After the ultrasonic cleaning I thoroughly rinse the assembly in hot water and dry. I then apply heavy oil lubrication with a hypodermic. My experience has been excellent, tuning has been smooth as silk ... Tom, N3LLL

Date: Sat, 19 Nov 2005 11:05:14 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Cleaning Gears & Cams

Ultrasonic cleaning is a good way to go if you have one big enough to fit something as large as the gear train in. I wish I did.... I guess it gets the gunk in between the split gears..have you ever pulled a pair apart after a cleaning to see what is left between them?

Date: Sat, 19 Nov 2005 16:48:40 -0600
From: "tfrobase" <tfrobase@kitparts.com>
Subject: RE: [R-390] Cleaning Gears & Cams

<snip> An additional explanation of my RF deck cleaning procedure is as follows: I disassemble the mechanical section form the electronics chassis, Jan Skirrow has this procedure documented on his web site. Once the separation is complete, I remove all of the RF inductors from the chassis opening and cleaning each can and trimmer. With the base chassis clear I clean the chassis with spray cleaner on a rag, following up with alcohol and anti-ox on the sockets. Once that is complete I test the tubes, reassemble the electronics deck and clean the mechanics as stated earlier. My day job is managing people, my lifelong love is fixing and restoring electronics, I would be interested in doing this for others, please contact me offline, as this is not the scope of this forum and I hope I have not over stepped my bounds ... tom, N3LLL

Date: Sat, 19 Nov 2005 18:33:40 EST
From: ToddRoberts2001@aol.com
Subject: Re: [R-390] Cleaning Gears & Cams

I have been doing some research on ultrasonic cleaners. It seems they can damage aluminum parts in a process called "embrittlement". A standard test for ultrasonic cleaners is to immerse a piece of aluminum foil in the tank for a few minutes - the foil will be peppered with pin-prick holes that

were blasted into the aluminum. If you leave the aluminum foil in the tank for 30 minutes it will be pulverized. Also have read it will strip the anodizing right off of aluminum. Supposed to be okay for steel parts though. Also read that ultrasonic cleaners will dull threads and dull the edges of sharp tools like scissors. Not sure if it's worth the risk? Maybe safe if used for just a few minutes? Sounds like a great way to clean an R-390A geartrain but don't want to risk damaging parts. Guess I will stick with using a kerosene soak and bath for now until I know more.

Date: Sat, 19 Nov 2005 19:58:43 -0600
From: "tfrobase" <tfrobase@kitparts.com>
Subject: RE: [R-390] Cleaning Gears & Cams

The mass incorporated in the mechanical mechanism of an R-390 is rather large to be effected in an ultrasonic bath for the period of 3-5 minutes. The goal is to leave it in just enough time for the detergent, excited by the ultrasonic waves, to soften and remove the old grease and dirt without effecting the paint and other markings. As for stripping the anodizing off, I am not sure, other than maybe couple of the gears that there is any. The major aluminum components in the R-390A use an iridite yellow chromate finish which is conductive, unlike anodizing oxide which is an insulator. Maybe it could strip the iridite off, but I have seen no indication. I'll try your aluminum foil test and give you a report ... Tom, N3LLL

Date: Sun, 20 Nov 2005 08:39:22 -0500
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] Cleaning Gears & Cams

As long as you use a non-alkaline cleaner, ultrasonic cleaning is perfectly safe for aluminum. Alkaline cleaners that contain sodium hydroxide or sodium carbonate will attack aluminum although they are safe for steel or brass. Use a solvent base cleaner for aluminum. We used ultrasonic cleaners for years to clean precision parts of dies and never experienced any damage from the cleaning. Properly applied anodizing or other bonded coatings, not paint, will not be
affected by ultrasonic cleaning.

Date: Sun, 20 Nov 2005 09:43:05 EST
From: ToddRoberts2001@aol.com
Subject: Re: [R-390] Cleaning Gears & Cams

Hi Dave, thanks for the info on the ultrasonic cleaners. Can you recommend a safe cleaning solution for aluminum parts? I know that sodium hydroxide will attack aluminum. I think I read that it is also the water itself in the cleaning tank that is harmful to aluminum - something

about the hydrogen in the water that "embrittles" the aluminum - is that why you recommend using a solvent cleaner? A non-water-based solvent cleaner for aluminum? I have heard using kerosene in a USC works great but you need to be careful with it? Thanks for any
further tips or suggestions.

Date: Sun, 27 Nov 2005 16:12:07 -0500
From: "Jon" <jonklinkhamer@comcast.net>
Subject: [R-390] RF Gear Question

Happy Holidays!! I have a question concerning a particular gear in the RF deck. The gear is the one with the clutch for zero adjustment. I noticed when I calibrated the root meter to +/- 35 above and below. While turning thru the range the nipples would move to the end of their range resulting in misalignment. If I have this gear in my hand, I am able to turn the gear and its secondary gear by hand, which results in realignment of the three nipples. My thinking is that I should not be able to turn the two gears at all unless I press very hard against the three nipples and turn at the same time. Does anyone have any experience in dealing with this and how would one correct this. Thanks.

Date: Fri, 2 Dec 2005 01:30:38 -0500
From: "Norman J McSweyn" <normn3ykf@stny.rr.com>
Subject: [R-390] six position rf bandswitch

I cleaned the geartrain by separating it from the rest of the RF deck. The six position RF bandswitch won't align properly(they all do work, however!). I have had the deck out three times and it's still not right. When tuning, sometimes you have to go below (electrical) the band and come back up. The manual is pretty vague, such as: "center the contacts on the switch". Not very helpful. When this deck was out, I looked carefully at the switches and I do realize that if I screw this up by a few degrees, it never will work right. Does anyone have a good proceedure to set the switches so that this works every time, or is it just an "r390a-ism"It's a bug that I'd like to shoot once and for all. Thoughts, questions or comments!

Date: Fri, 02 Dec 2005 10:21:55 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] six position rf bandswitch

Make sure the wafer is not worn at the point that the switch shaft goes through it. This can cause enough play to create the trouble you describe above. The moving wafer positions correctly when moving clockwise but not when moving counter clockwise (or vice versa).

I have a Crystal Oscillator module with a shim jammed in the hole where the shaft passes through the wafer. NOT a good solution. Some kind of surgery on the wafer may be in order, such as epoxy-ing a section of metal or phenolic onto the wafer to re-create the correct face for the shaft to bear against. (Saran Wrap will keep the epoxy from sticking to the shaft and causing other troubles.) From the "GOOD ole Days": The RAL and RAK and the RBA -B, and -C radios have ceramic band switches. The rotors have a central metal bushing staked to the ceramic rotor and having a square hole for the shaft. The R-390 folks could not afford this kind of build quality. The manual is pretty vague, such as: "center the contacts on the switch". Not very helpful. That means "center the moving contact within the fixed switch contact and tighten the gear clamp for best alignment throughout the range of the switch." I was a kid when they were writing those manuals.

Date: Fri, 2 Dec 2005 11:25:24 -0500 (EST)
From: "Paul H. Anderson" <paul@pdq.com>
Subject: Re: [R-390] six position rf bandswitch

One thing I found is that the Geneva coupler is highly sensitive to being securely shimmed into place. There are some very very thin shims that go in to hold it in, and I _think_ they are there to reduce the side to side rocking that is _just_ enough to cause problems with the bandswitch mechanism getting too sloppy. I had exactly your problem with several RF decks, and this was the best explanation I could come up with. When I scraped around and found a shim that seemed hard to put in, that was about right. I also noted that after removal, trying to put exactly the same shim into exactly the same spot wasn't always easy. It may be that this calls for a very tight fit just to get rid of the slop. I don't exactly know what will work for you, but I'd hold the deck so you can see this coupler turning and moving, and look very, very closely at it while turning through the bands to see if you're getting any slop there. This problem cropped up in R-392, R-390A and R-390 radios that I have here.

Date: Sun, 4 Dec 2005 03:58:09 -0800 (PST)
From: "KC8OPP Roger S." <kc8opp@yahoo.com>
Subject: Re: [R-390] Need Oldham Coupler Spring

Old VCR's or Old tape players

Date: Mon, 5 Dec 2005 19:14:22 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Need Oldham Coupler Spring

There is nothing sacred in the springs. They need to be stiffer than the coupler back lash. short enough to get stretched between the pegs. On a

bad day a twist tie in there will do better than nothing. Most ball point pen springs are not stiff enough. The small diameter is the tricky part. The guys are right, start looking into old VCR's and other items for a spring that will work. True Value hardware may have some stock that will work. My Ace hardware has become as lost as Home depot and Lowes for this small stock. Someday when you tare down a relay in an octal plastic box to make a capacitor package, the relay spring may be just about the right size. Hope you do not have to resort to a whole order from a web site to get yourself a spring

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Date: Wed, 14 Dec 2005 15:20:08 -0800
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] 390/390a gear train

Craig, I perused the various manuals that I've downloaded over a couple of years and found an exploded view of the gears and connections to the cores, with number of teeth indicated on each gear, but so far have found nothing on dimensional layout of the shafts that go through the gears. Maybe this kind of info never reached the public, or has not been found yet. Perhaps it exists in an old file cabinet somewhere. The manual photos of the front and rear of the rf deck could be used to extract the layout dimensions using a reference dimension or two but I don't think all the shafts could be located this way in the photos I've seen. The posted assembly of the rf deck by Scott Seickel with all the steps documented would also be a good way to put approximate locations on the shafts. I'm still wondering if anyone has seen a set of engineering drawings of the gear assembly. It seems rare to find original drawings used for the manufacture of any old radios. I have a Westinghouse drawing for a 20's RC set, but I know the only reason it made it out of the company was because some collector in the 50's wrote to Westinghouse concerning the set and some staff member was kind of enough to dig through files and send a copy of an original drawing. Unfortunately, he did not include the mechanical layout drawings, which were probably in the same file. Dan.

Date: Wed, 14 Dec 2005 18:56:47 EST-
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] 390/390a gear train

Joe Foley ask any chance anyone would like to do CAD drawings of the gears and cams? Page 50 figure 30 Tuning system, simplified mechanical diagram of TM 11-5820-358-35 has a fair cartoon of the gear train for the R390A. How about we get someone to do a good scan or photo of that figure and get up on Al's R390 page. Could we find the equivalent one for the R390?
But then if someone wants to go into history as the Fellow that did a CAD drawing of the R390 gear train here is your invitation to immortality.

Roger

Date: Wed, 14 Dec 2005 16:08:49 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] 390/390a gear train

You betcha! My idea was that the file would then be ready to dump into a CAM equipped machine that could then spew forth finished gears, the programming being the expensive part.

Date: Wed, 14 Dec 2005 18:53:38 -0600
From: bw <ba.williams@charter.net>
Subject: Re: [R-390] 390/390a gear train

Are you talking about the exploded parts diagram? I checked my files and have the 3 page diagram scanned, pieced together, and cleaned up. I use it to zoom in, but it prints well too. I have several versions if that is what you mean. I have one that is probably around 500k, and the full rez version that weighs in around 2 mb. I spent a lot of time doing 3D CAD a few years back and still have 3 or 4 software packages here. The main program is Alias Sketch by Alias Research, but I also have a nice, fast one called Swivel 3D by the forerunner company that later became Macromedia. It has a companion rendering system called Renderman by Pixar. The problem is the work load. I spent a few evenings experimenting with some of the gears when we first started the Y2K manual. It looked to be several weeks, if not more than a month of work to get it right. One of the problems with doing it as a 3D CAD work is that the true value lies with everyone having the same CAD program to manipulate it all, explode the parts, rotate it to look-see, etc. Otherwise, it would produce a rather nice file like the existing exploded parts figure only with shading, customized parts placement, etc. Another and better idea, IMO, is to do a full illustration file. That I could do also as that used to be my job, but I would only start it if I knew it would be of value to everyone. Still, doing gears is a beach of a job. I once did a fully shaded 3D cutaway of an Allison turbine engine and that took more than a month at a job that was only 4 hours a day. The computer I used was a 33 Mhz job. Yes- thirty three Megahertz. I still have that file. Anyway, this approach would produce a very nice file that could be saved out at a TIFF or PDF. It could be changed around and customized further if that was needed too Barry ----

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Date: Wed, 14 Dec 2005 20:04:57 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] 390/390a gear train

That diagram has been in the Y2K manual since the first version -- Fig 3-10, page 3-25 (printed page), page 63 (pdf page.) The diagram is also

available in a number of other downloadable manuals, including the copy on the LOGSA army web site. While in the Y2K manual, it can be blown up in Acrobat for viewing or printing. It can also be copied out and pasted into a single page file. (A page was reserved for an improvement later on in the Y2K with the notation "Photo Needed".) A higher res scan wouldn't accomplish much other than make the file larger. (Been there, done that.) Resolution is not the problem. So, not clear on the purpose of someone doing another scan and uploading it separately.

Date: Wed, 14 Dec 2005 23:52:04 -0500
From: roy.morgan@nist.gov
Subject: RE: [R-390] 390/390a gear train

Has anyone got "The EDMICS Drawing Set" for the R-390A available? This is a large set of the original drawings, with a very lame index, and the special reader program needed. I had it installed on an earlier computer that more or less died some time ago. As I remember, someone developed a supplemental index that was more useful. (Sorry if someone has investigated this set of drawings, and reported - I have not seen every mesage in this thread.)

Date: Thu, 15 Dec 2005 07:30:58 -0600
From: "Craig Anderson Ext 1365" <Craig.Anderson@saintpaul.edu>
Subject: [R-390] RE: R-390 Digest, Vol 20, Issue 34

The detailed drawing of the gear set is in the CD-ROM set that I have which includes the complete drawing set for the 390A. These could be digitized into an AutoCAD file. I actually did that with the front panel and had a CNC file created to reproduce the front panel. I have access to a 50,000 sq. ft. machine shop filled with 3 to 5 axis machining centers. Craig W9CLA

Date: Thu, 15 Dec 2005 08:24:12 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] 390/390a gear train

To add to what BW has said...I'm not a production pro but I don't think it is as easy as just dumping a CAD drawing into a CAM machine and out pops new gears and what not. My brother is in that business with Volvo...I'll pick his brain on that part. To document and display the gear train I think it's a good idea for the printed page but not as good as one might expect for a computer screen displayed version of the gear train because of the proprietary nature of most of the programs that generate output. You pretty much have to own a copy of the software used to generate the graphics to display the graphics. Most of these programs are expensive. We have the same problem in the workplace. Our engineers use AutoCAD.

Problem is the guys that use the drawings in the field can't display them without having a version of AutoCAD on their laptops...too expensive and not intuitive at all. We like Visio in the field because it's easy and fairly cheap to distribute to 100 folks. The engineers don't like it because it won't do what they like to do. We went to another product...can't remember what it was....but it would allow you to view an Acad file but you couldn't make any changes....so much for field modified "as built" drawings. Then that company quit supporting the product. It's a nightmare...and none of that even touches manufacturing....it gets deeper as I understand it!

Date: Thu, 15 Dec 2005 09:52:49 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] 390/390a gear train

For the heck of it, I quickly converted Scott Seickel's gear train photo instructions to a single pdf file. I brought the graphics into a Word file and "printed" to a file with a pdf driver. Without any optimizing for efficiency, it's only 3 MB or so. It could be a good deal more compact if the text were separated from the graphics and re-stroked as true text, and some other things could be done without much sacrifice of quality. So, if Scott's permission could be secured, his gear train rebuild sequence could be part of either the next revision of the manual (there's a spot for it) or an addendum/supplement. It could benefit from some labeling of the gears by the same references as in that exploded diagram. At any rate, the combination of the two should be more than enough unless someone wants to recreate the gear train in a CAD program for sport. <snip>

Date: Thu, 15 Dec 2005 09:36:33 -0800
From: <mdmerz@verizon.net>
Subject: RE: [R-390] 390/390a gear train

Roy/Craig, very appropriate to what I was looking for. I don't think I've seen reference to "EDMICS Drawing Set" in my travels through the 390a archives or elsewhere. This sounds like an important piece of data to keep track of for future 390 travelers. Is this file format the same as "JEDMICS" which I get reference to if I google EDMICS ? I see one can download a "free" JEDMICS viewer. I hope your memory of this particular 390a material turns up a source for the drawings. In looking thru Craig McCartney's list of drawings on the R390.net page, I realize I don't know where the drawings that the numbers refer to are located. Is this a list of drawings that are available somewhere to me or is this just a list of drawing extracted from some document, and the drawings themselves are unavailable? To the "new" traveler like me, I'm unsure where to pursue seeing the actual drawings. Perhaps this is the index to the "EDMICS" drawings? Maybe this is the set of drawings that Craig Anderson

mentions
having on a CD-ROM in a later post? regards, Dan

Date: Thu, 15 Dec 2005 19:57:01 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Call for input on 1st addendum topic

After one has done a good receiver cleaning and before one jumps into an electrical alignment of the receiver a good mechanical alignment is in order. At http://www.r-390a.net/ under Wei-Li's Pearls of wisdom is a couple of papers on cleaning and oiling the gear train. A popular wish is for collection of wisdom on the alignment of both the R390 and R390/A receivers. That wish feels like a small book in its self and needs some decomposition into manageable sections. An electrical alignment begins with a mechanical inspection and adjustment as necessary. Most receivers having been well adjusted mechanically need no adjustment. However a proper inspection is in order. Before plunging into an electrical alignment section the mechanical alignment should be conducted. <snip>

Date: Thu, 15 Dec 2005 20:22:40 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] 1st addendum topic bushing inspection / repair

Good question, Thank you. There are two bushings in the front panel around the Megacycle and Kilocycle shafts. These need alignment. There are also two bushings around the BFO and bandwidth shafts for the IF. These need adjusting. There is a bushing around the Antenna trim in the R390A. Were you thinking of other bushings? Fellows, does the R390 have a bushing around the antenna trim? Any other questions on bushings that need consideration?

Date: Thu, 15 Dec 2005 17:59:16 -0800 (PST)-
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] 1st addendum topic bushing inspection / repair

Um,.... Can we change that for the KC CHANGE knob? There are THREE bushings on that shaft, the one on the front panel should be left "snuggish" so the other two won't be bound by it. Also, that shaft is the one most likely to be bent, being that it is so far from the protective handles. On a total rebuild of the radio it should be removed and centered on a lathe to be checked for run-out, then straightened. This will make it run true, not be apt to bind and will help to keep the DIAL LOCK from binding and making that awful scraping noise so common on these radios.

Date: Thu, 15 Dec 2005 20:59:30 -0600
From: bw <ba.williams@charter.net>

Subject: Re: [R-390] 390/390a gear train

Actually, it is worse than that. Most of these packages rely on .DXF files for interchange. But, these aren't always compatible. Then, there are various DXF formats brought about over time. More compatibility issue here. Well, I say that they rely on DXF. Maybe it has changed in the past few years.

Autocad isn't very intuitive and never was. The whole CAD scene is a mish mash of features. Some of the best aren't numerically accurate for measurements. Those that are lack other vital modeling tools. For instance, Alias Sketch by Alias Research is a top name program. Alias was the leader in video modeling some years back and I bought it because I had plans to start my own video company for southern Alabama. If you could do Alias modeling, you were hired pretty much on the spot. My main gripe about Alias Sketch is that it wouldn't mirror objects. For instance, if you designed a right wing for an airplane you couldn't mirror it for the left wing....at least not easily if at all. I guess I could have copied the right wing coordinates and entered negative signs to each coordinate but that would have been a nightmare. Anyway, that is an example of a fine program with fundamental problems like most of them.

Sketch was orphaned a few years after I bought it. It still runs just fine on new operating systems so I can still run it. Barry

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Date: Thu, 15 Dec 2005 21:38:22 -0600
From: Tom Norris <r390radio@gmail.com>
Subject: Re: [R-390] Troubleshooting "unrepairable" radios

<snip> For the wishlist? The bushing suggestion -- partially loosen all the front panel bushings before replacing the front panel to the shafts a bit of "play" so they'll be less likely to bind.

Date: Fri, 16 Dec 2005 09:27:53 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] For the r-390 wishlist -- Things for the R-390/URR

I've done a few in the last year and to tell you the truth they are much easier to work on than the "A". (MHO) Mainly because they don't require so much concern about the capacitors used when manufactured. I have spot checked in the few I have done and found maybe one or two I have replaced due to leakage. One was the top hat looking tantalum that is often found in the "A" all corroded up. It was strange because I had not seen one of that type in an R-390 before.. only in the "A". There are 4ea. 47 ohm resistors that need to be replaced usually. I upgrade those from 2 watt to 5 watt. And that's about it. I have never found the filter caps to be out of

spec but it's because they used high quality oil bath caps for filters. (I'm not saying they don't go bad...just I haven't come across that yet) It's a good thing I haven't found them bad because I don't know what you would ever do to replace them and not make the radio looked hacked.

As far as the gear train....the fabled "GREEN GEAR"....is of no real use! You don't need it to keep the world from coming apart. The only purpose it serves as far as I am able to tell is to keep the Veeder-Root counter in sync with the gear train if removing the RF deck for a simple repair and dropping the deck back into the chassis. If you are doing a restoration you will probably remove the counter anyway. I sat for hours one night on the bench pondering the purpose of the green gear with the RF deck out and the green gear in place. I studied and studied and finally through caution to the wind and pulled the "GREEN GEAR" off and went to work. I figured if I had overlooked some obscure function of the gear it would become obvious upon reassembly. It never did and all worked fine. The biggest "Gotcha" if there is one is to mark the band switch in some way to get it back to a known position upon reassembly and sync of the RF deck.

I start by setting the radio at the prescribed 2.000 Mc and begin disassembly. I take a spring loaded hand punch and put a dot on the two brass gears that mesh on the band switch. Kind of a timing mark of sorts for you old car buffs. Now you have 90% of the battle under control...the other 10% is the PTO position. I do my best not to disturb the PTO shaft but if you do that is pretty easy to fix too with a frequency counter. The PTO tracks from 3.455 Mc to 2.455 on each band. It is inverse to the tuning so it starts out on the high end and tracks to the low. So if you set up the gear train after cleaning to the marks, reassemble the counter to the front and set it to 2.000 Mc, have the timing marks on the band switch gears back to their original position and the Xtal osc coupling adjusted to indicate 2 Mc in it's window you can reinstall the RF deck. It's a little tricky to hold everything in place as you remesh some of the chassis gearing to the RF deck gearing but it can be done...without the "GREEN GEAR". If you have it you can screw it in place after you set the gear train to the marks and sync the counter to 2.000 Mc just to hold everything in place while you set the RF deck back in place. A dab of heavy synthetic grease will hold the Xtal switch Oldham coupler insert in place as you reassemble the RF deck to the chassis. Leave the Oldham coupler insert out of the PTO shaft coupling allowing easy adjustment of the PTO shaft position with your fingers. At 2.000 Mc the output from the PTO should be near 3.455 Mc. Just get it close so the couplers will align and reassemble the Oldham coupler. Helps to have the screws on the PTO loose to do that. With that your gear train is resync'ed.

At this point you go through the alignment which will include the fine tuning of the PTO. The book covers all the rest! Not a hard radio to work

on. The IF is straight tuned...as opposed to the stager tuning in the "A". The adjustment of the trimmers on the rear panel can be a little tricky and if you get out of whack there the radio behaves strangely but the procedure in the book works.

That's my experience with the R-390....in a nut shell.

I'd love to own an R-390 someday....all the ones that have passed through my fingers have belonged to others. I really hated to see the last one go...it was in such nice shape. Maybe someday....would be a nice companion to the "A" and the SP-600 I think.

On another subject....I am in the process of finishing up the replacement of the small coaxial cables on an R-390A RF deck...what a pain!

Date: Fri, 23 Dec 2005 21:07:54 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Mechanical Alignment Part 01 Front Panel Bushings (start)

Fellows, For reading and editing. Thanks Roger.

Mechanical Alignment
01 Front Panel Bushings

>Mark Richards asked; is there any tolerance for the front panel control bushings?

Once upon a time and some where in all the military specifications you know in your heart that some one specified exactly how much clearance every one of the bushing must have. Enough to allow the shaft to turn freely and not so much as to be excessive. As a shaft is hand rotated, it is unlikely you have a bushing with a hole worn to large.

>Mark Richards asked; how do you replace front panel control bushings?

The bushing come in two sizes. There is a small bushing for the Bandwidth, BFO pitch and Antenna Trim shafts. There are larger bushings for the KC and MC change shafts. The small bushing are standard 1_4 inch shaft extension bushings. A suitable replacement is available for small parts houses. A potentiometer can be scraped to salvage the mounting bushing from it as a replacement part. The larger bushings for the KC and MC change shafts are somewhat rare. If you are short a large bushing, place the one you have on the KC change shaft. Several members on the R390 mail reflector know of limited parts. The inventory is always changing so ask the current members in a mail posting if you need a

bushing. The larger bushings are not exotic and a reasonable bushing can be machined to fit. The bushing need not be stainless steel. A plastic bushing would give years of service. The bushings have two problems. The shafts get burs on them that prevent the front panel from being removed and bushing bind after the front panel is replaced.

To disassemble the large KC and MC change shafts bushing in order to removes the front panel remove the knobs and then remove the retaining nut from the front of the bushings. Let the large bushing remain on the change shaft. If your receiver bushings are assembled with the retaining nut inside the front panel, reverse the bushing assembly the next time you have the front panel off your receiver. The KC and MC knobs have a clamp and sleeve design so as not to score the shafts and prevent the bushings from sliding off the shafts when the front panel is removed. Burs happen. Use a small file to remove any burrs that prevent the bushings from sliding off the shafts. Burs are a repeat offence and you may encounter one any time you need to disassemble the front panel.

The antenna trim bushing should also be assembled with the retaining nut on the outside of the panel. The knob and bushing retaining nut can be removed to disassemble the front panel. The shaft has a flat milled on the shaft. The antenna trim knob should always placed on the shaft so the knob set screw rest on the shaft flat. This practice helps reduce bus on the shaft that hampers the front panel disassembly process.

The Bandwidth Select and BFO Pitch knobs and extension shafts are almost never disassembled. The standard practice is to loosen the clamp on the extension shaft and pull the shaft forward to release it from the IF deck shafts before the front panel is removed. The shafts float in the front panel bushings while the front panel is removed. The knob pointers are set by positioning the knobs and then tightening the extension shaft clamps onto the IF deck shafts. The knobs set screws on the extension shafts generate burs on the shafts. These burs make setting the knobs on the shaft for exact alignment a problem. These burs also make getting the shafts out of the bushings a problem. The shafts can be filed to remove the high burs and allow disassemble.

Once you have these five major bushings, shafts, knobs disassembled the front panel bolts can be removed and the front panel dropped. Remember to also disassemble the dial lock before pulling on the front panel. The front panel is almost never "removed" as the wire harness to the front panel is still attached to many switched mounted on the front panel. However the front panel can be dropped. There are several maintenance actions that require the front panel to be dropped.

Once the front panel is dropped and alignment is not an issue of the

moment the bushings likely run free on the shafts. If a bushing is binding some small amount of filing or use of emery stone will return the bushing and shaft to a free moving condition. You likely find you do not need to replace the bushings. The bushing only needs to be replaced if the threads on the bushing have
become so fouled that the retaining nut can not be easily seated.

Bushing can be drilled or reamed out. Likely a bur on the shaft has been forced into the bushing and "turned" some metal thus causing the bushing to bind on the shaft. Cleaning the grim and bits out of the bushings will also helps. Some bushing have been squeezed out of round. If one of these bushings can not be reamed to run free, then by all means replace it.

All bushing should be assembled with the nut outside the front panel. Thus if a shaft binds in the bushing, the nut can be removed and the front panel dropped with the barrel of the bushing left on the shaft. With the front panel dropped the shaft and bushing can receive whatever maintenance is required to remedy the assembly problem. When reassembling the dropped front panel, leave the bushing nuts loose on the bushing barrels.

Mark Richards asked; what do we do for the worn bushings between the front panel controls (particularly the tuning knob) and the proper operation of the gearing? With the following ideas YMMV and FWIW here are some thoughts.

Joe [name please] contributes

There are THREE bushings on the KC CHANGE shaft the one on the front panel should be left "snuggish" so the other two won't be bound by it. Also, that shaft is the one most likely to be bent, being that it is so far from the protective handles. On a total rebuild of the radio it should be removed and centered on a lathe to be checked for run-out, then straightened. This will make it run true, not be apt to bind and will help to keep the DIAL LOCK from binding and making that awful scraping noise so common on these radios.

Tom Norris contributes

Partially loosen all the front panel bushings before replacing the front panel to the shafts a bit of "play" so they'll be less likely to bind. The sequence in which the front panel bolts are tightened will make a difference in the bushing alignment. Set the receiver frame on blocks so the front panel hangs free when reassembling the front panel. Leave the bushing nuts loose on the bushing barrels when first mounting the front panel. The IF deck green bolts can be loosened to shift the IF deck and improve the alignment of the extension shafts. The same can be done to

the RF deck. RF deck alignment does not offer as much shift as the IF decks appear to have. But it has been found to work. A little here and a little there and soon you have a smooth running assembly.

The bushing are "standard interchangeable parts" that are not perfectly centric. Thus the bushings are eccentric by definition. That hole is not exactly in the center of the mass. So some time rotating the bushing to one position will allow some more freedom than other positions. Almost always some combination of deck shift, front panel bolt insertion sequence and bushing rotation will allow all the shafts to operate very smoothly with bushing nuts tightened. If you have a bent KC change shaft, you can operate the receiver with the front panel bushing nut loose on the barrel until you have time to get into a shaft bending maintenance period. The shaft may be straightened with out removing it from the RF deck. Do not strike shafts. A proper diameter tube of good length should be placed over the shaft and gentle (this is steel to be bent gentle) pressure applied to remove the bend as best as can be judged with available resources. Feel free to use all the resources available to you when ever necessary.

The most common problem is the MC shaft binds. There are two sources to this problem. The detent spring is often seated with two much force against the detent stop ring or the MC shaft bushing needs service. Service may be cleaning or adjustment. Often removing all the front panel bolts and reinstalling them will shift the front panel and provide less binding of the bushings. These receivers are getting over a half-century old. If the bushing holes in the front panel needed filing, it likely has been done. Mostly getting everything aligned to operate smoothly is just a mater of persistence. Knowing that the front panel and decks can be shifted gives the maintainer insight into the problem. Also knowing the bushing may be eccentric and rotating the bushing may provide a better fit can help the maintainer achieve a smoother operating
receiver from a mechanical point of view.

Date: Sat, 24 Dec 2005 10:46:26 -0500
From: K2CBY-Optonline <k2cby@optonline.net>
Subject: Re: [R-390] Mechanical Alignment Part 01 Front Panel Bushings (start)

Although it may have been said before, I always retighten the bushings as the last step in front panel reassembly. I tighten all the panel to chassis screws hard to establish the orientation of the front panel. Then I slide the bushings forward on the shafts through the panel and attach the nuts from the outside. After making each nut finger tight I verify that the shaft turns freely and then dog down the nut, starting with the kilocycle shaft. I check the free movement of each shaft before going on to the next.

Date: Sat, 24 Dec 2005 15:03:23 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Mechanical Alignment Part 01 Front Panel Bushings (rev A)

Thank you for the additional paragraph. watch for it the next time I post the full text. Joe says I need to do these post in parts because the full post is two large for Yahoo mail to receive. I can do that for every one so watch these posts to come in parts.

Date: Wed, 25 Jan 2006 19:32:18 -0500
From: shoppa_r390a@trailing-edge.com (Tim Shoppa)
Subject: [R-390] Long skinny screwdriver for RF deck removal

The green screws on the back of the RF deck (between the back panel and the rear of the RF deck chassis) are #2 phillips, but it's nearly impossible for me to get a long #2 phillips screwdriver onto them (especially the one almost underneath the antenna relay).

In fact the only way I've ever gotten at them with a #2 is by removing the screws from the back panel so I can tilt it out of the way. Getting the next smaller size Phillips down there isn't so bad. Was the "official-on-the-back-of-the-radio" screwdriver a #2 or a smaller one, and was there something special about it (super-skinny shaft? offset?) that made it possible to do the RF deck screws, or am I so mechanically disinclined that I don't see the obvious trick?

Date: Wed, 25 Jan 2006 19:49:19 -0500
From: shoppa_r390a@trailing-edge.com (Tim Shoppa)
Subject: Re: [R-390] Long skinny screwdriver for RF deck removal

I've just gotten a few answers from helpful folks but it seems I didn't describe the situation adequately:

* The problem is not that my screwdrivers are not long enough.

* The problem is that the tip/shaft of a Phillips #2 seems way too fat to get on the head of the screws (especially the one adjacent to the antenna relay).

* A long Phillips #1 sort-of works but it's obvious that the screw itself is a Phillips #2. So either I'm using the wrong size screwdriver, or there's some trick I don't know! Like I said I can remove all the screws from the back panel and tilt it out of the way, but that is not a trick -
it's a rather long involved process.

Date: Wed, 25 Jan 2006 20:34:00 -0500
From: "Jim M." <jmiller1706@cfl.rr.com>
Subject: Re: [R-390] Long skinny screwdriver for RF deck removal

I found a long skinny flat head driver at Ace hardware that works fine. It's not phillips, but still small enough to fit into the screw.

Date: Wed, 25 Jan 2006 19:55:57 -0500
From: "Don Heywood" <wc4g@knology.net>
Subject: Re: [R-390] Long skinny screwdriver for RF deck removal

Here is the screwdriver I have used for years in the R-390 family. It is a Klein P-18
http://www.tselectronic.com/viewpage.php?filename=klein/phillipsdrvr.html&refpage=/vend_prod_list/klein.html&tse_Session=1d94fb7bf74cee0450063

Date: Wed, 25 Jan 2006 21:53:45 -0800
From: Buzz <muttman@charter.net>
Subject: Re: [R-390] Long skinny screwdriver for RF deck removal

A phillips screwdriver should have a flat point. I bought a 4-way phillips screwdriver from Asia that had a sharp point like a REED & Prince, and it didn't work too well until I ground a little of the points off.

Date: Tue, 11 Apr 2006 06:42:00 -0400
From: Ray <w2ec@bmjsports.com>
Subject: Re: [R-390] wow... the R-391A does exist - Video Update

Since there is some interest in what a working R391 looks and sounds like, here is a link to my web page. It includes videos for both a functioning R-391 and ART-13. The original version was without sound as I put it on my web page when most everyone was still using 1200 or 2400baud modems. I've put the original versions with sound out there now that high speed internet connections seem to be the norm.
"http://www.w2ec.com/Autotune.html

Date: Tue, 11 Apr 2006 09:04:29 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] wow... the R-391A does exist - Video Update

You've captured the essence of the thing. Make sure you turn up the volume on your PC's when you play it for full effect. Bear in mind - all that racket and grinding noise occurs when the autotune is working right. When it isn't -- stuck, damaged, or out of mechanical synch, it crashes into the ends of the ten turn stops and keeps on trying like a horizontal pile driver. It's a good idea to be ready to cut the 28vdc. There is no automatic

safety shutoff. Also notice when you play the video -- it does not seek the shortest path, so to speak -- it cycles through all or most of the way in one direction, then reverses.

A demo of the R-391A prototype or a regular R-391 ("It will work the same as this, sir.") might have gone a long way toward kaboshing the R-391A proposed contract. ("We recommend a full alignment every two weeks, overhaul of the RF deck every three months, and replacement of the PTO every six months.") Not consistent with "cost-reduced". "Y'know what? Let 'em change the frequency by hand."

The R-105/R105A (ARR-15) has a 10-channel autotuner and the technology (combination-locksmith w/pawls, locking keys, etc.) is nearly the same, but they don't make as much of a racket and the action is a lot smoother. You can tell why when you manually tune those.

Date: Tue, 11 Apr 2006 09:17:53 -0400 (EDT)
From: "Paul H. Anderson" <paul@pdq.com>
Subject: Re: [R-390] wow... the R-391A does exist - Video Update

They work fine when they're kept clean and lubed. His sounds the same as mine - the loudest noise is the squealing when the clutches are slipping at the stops (which they're supposed to do - that's how the unit 'zeros' itself). If you get the grinding, it is because the clutches are stuck, which forces the motor gear to jump teeth over the meshing gear on the auto tune shaft. I freed the clutches on mine by soaking the positioning heads in kerosene for a few weeks. I'm sure there are other ways as well.

Date: Tue, 11 Apr 2006 09:39:20 -0400
From: "Bruce Hagen" <b_hagen@sbcglobal.net>
Subject: RE: [R-390] wow... the R-391A does exist - Video Update

Wow! Thanks guys. I'd never seen or heard one before. Now I know why one should not let RF guys design machinery stuff!

Date: Tue, 11 Apr 2006 09:43:46 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] wow... the R-391A does exist - Video Update

As I recall, the motor is not on a spring loaded mount and doubt if there should normally be enough play for the motor gear to jump over teeth on the autotune shaft gear. For that to happen, the left-most bronze oilite bearing(s) have to be worn. I have one in which they were - -with little piles of bronze powder below. Not sure what happened first.

Date: 11 Apr 2006 13:58:58 -0000

From: "n4buq@knology.net" <n4buq@knology.net>
Subject: Re: [R-390] wow... the R-391A does exist - Video Update

Cool video. I can understand the mechanisms spin back to 0,0 (or 0, -0.9xx), but what stops each shaft at the desired frequencies? How do you "program" a new frequency?

Date: Tue, 11 Apr 2006 10:23:30 -0400 (EDT)
From: "Paul H. Anderson" <paul@pdq.com>
Subject: Re: [R-390] wow... the R-391A does exist - Video Update

There are repositionable locking pawls that stop the main shaft from turning. When the key is locked, it holds the pawls in place, preventing the shaft from turning, so the motor is free spinning a small clutch inside the positioning heads. When the key is free, the locking pawls can be changed to allow moving to a different frequency.

Date: Tue, 11 Apr 2006 10:35:53 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] wow... the R-391A does exist - Video Update

It's a bit difficult to describe how it stops -- Each of the MC and KC is linked to a positioning head that contains pawls -- spring loaded things with hook shaped ends which catch into notches in disks. Beyond that, maybe Paul can describe it. Bear in mind, all of this is external to the deck and PTO arrangement which are standard R-390 stuff.

To run the autotune, you have to tighten both locking keys on the MC and KC knobs by turning them clockwise until tight. The autotune should never be run without the locking keys tightened or it will un-synch the thing. When they're loose and you can manually tune, you are changing the setting of whichever channel position is showing through a little window on the front panel -- that's how you program. If you want to change another channel's frequency setting, you first tighten the locking keys and then turn the channel selector knob to one of the other 7 positions. The "difference condition" in the control module (couple of relays, rotary switch logic and the little wheel with the channel numbers that show through) . triggers the autotune to cycle and go to the other channel you just chose which will be the last frequency to which it was set. Then you loosen the keys and change frequency for that channel. Hope that part is clear. ;-)

Date: Tue, 11 Apr 2006 20:38:29 -0500
From: Robert Nickels <w9ran@oneradio.net>
Subject: Re: [R-390] wow... the R-391A does exist - Video Update

Can anyone explain how the R-391A auto-tuning is accomplished? Given the technology available at the time, I'm guessing it might counts pulses from a cam-actuated electromechanical contact, with one or more stepper relays as the memory element. But I know the auto-tune transmitters use a phase comparator and closed-loop analog feedback, so an all-analog design using a multi-turn pot would be another possibility. Either method could explain why it seems to drive to a "home" position and then reverses direction.

Date: Tue, 11 Apr 2006 23:05:43 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] wow... the R-391A does exist - Video Update

Not exactly. There are cams of sorts and relays, but no pulses in volved. It is totally electromechanical and has no electrical/electronic conneciton to the receiver, which is really a stock R-390/URR all respects. All the modules are the same. The unique components consist of two positioning heads -- one for the MC and one for the KC. They are identical except that the MC unit has the detent spring on it. There is a motor, a sealed relay, a drive shaft geared to the motor with three worm gears on it. There is also a control head that contains a couple (or three) rotary switch wafers and a one or two small relays (as I recall) ... and there's the channel switch. The mainframe/chassis is the same as a regular R-390/URR with a few exceptions -- the wiring harness behind the front panel, the 28 vdc supply connection (though I think R-390's have this too on the 4-pin power connector), and the front panel has three mods -- hole and markings for the channel switch and a peephole for the channel indicator which is a wheel/dial with 1 through 8 on it, mounted to the front of the control head. (The third thing is that plastic card for marking down which channel is what frequency.) The three worm gears drive the MC and KC positioners and the control head. All the autotune components are mounted on a cast frame that's behind the lower 1/3rd of the front panel.

The autotune doesn't even draw any power from the receiver -- an external 28 vdc supply (probably 7 amps or more) is needed. The KC and MC positioning heads are strictly mechanical, with a stack of spring-loaded pawls with hook-shaped ends which catch into disk-cams and there's a clutch affair. (Paul Anderson described some of this in an earlier post.) There are no electrical connections to these positioners. Wiring is involved in the motor, control head, sealed relay and the channel switch. To use the autotune, you first tighten the locking keys on both the KC and MC knob (or else!) and then change channels. As soon as the channel switchs changed from the channel shown in the window, it triggers the cycling. When you loosen the locking keys and manually tune the rig, you are changing the setting for the channel that is showing through the little window.

That's as far as I can go.

> But I know the auto-tune transmitters use a phase comparator and
> closed-loop analog feedback, so an all-analog design using a multi-turn
> pot would be another possibility. Either method could explain why it
> seems to drive to a "home" position and then reverses direction.

Has nothing to do with it. That much I can tell you. Beyond this, unless Paul A. is up to it ;-), I suggest you check out the R-391 manual which is on the Bama site. It has an explanation of the internal workings of the beast. I found some of that hard to follow. The explanation in the R-105/R105A (ARR/15(a)) manual is somewhat clearer and the design is very similar, though it is driving a much different rig -- and all R-105's are autotuned. The manual for that radio is also on Bama. The positioning heads look almost identical inside. They remind me of stuff you'd find in an old mechanical adding machine or calculator -- either that or a combination lock. Keep in mind that old technology. Remember the more complicated mechanical calculators that would multiply and divide - -I think they all had carriages, like typewriters that went back and forth? Remember doing division on them? It would take ten-15 seconds to get the answer to 4 over 2. Well maybe not that bad, but the consequences of all the stacked parts 'n pawls on common shafts was similar when the fine machine oil turned to glue or grit got into the works -- not only wrong answers, but they wouldn't stop going katchokity-katchokity and the carriage would keep slamming down one end. All you could do was pull the AC plug. With the '391, when the same thing happens and the autotune slams against the 10-turn stops, the same emergency action is called for -- except you have to cut the DC. So, after all that, in brief, Bob, it's not even up to "analogue" -- it's relay and mechanical "logic". And, as was the case with those electromechanical calculators, very often we'd reach for the keyboard and go "uh-uh -- nah" and do some long division with paper and pencil.

Date: Tue, 11 Apr 2006 22:43:41 -0500
From: Robert Nickels <w9ran@oneradio.net>
Subject: Re: [R-390] wow... the R-391A does exist - Video Update

Barry - thanks for the great explanation! I cut my teeth in the "logic era" when the gap between the conceptual and reality was bridged with wirewrap and TTL, a few years before "software" worked its way into the engineers vocabulary. So to me, the electromechanical and analog solutions of the past are understandable, albeit a bit before my time. But too many "sparkies" tend to overlook the elegant mechanical solutions that came before electronic controls were feasible - and have outlasted most everything else. I got into an argument with a mechanical engineer

one day about how much "better" my electronic controls made a machine, and he pulled down a book and opened it up to a pictorial of a sewing machine. I bought the Cokes that day! Sounds like the R-391A is another example, but like lots of bygone technologies, whatever has been lost in mechanical charm is probably more than made up for in reliability and maintenance!

Date: Wed, 12 Apr 2006 01:48:02 -0400
From: r391 <r391@worldnet.att.net>
Subject: Re: [R-390] wow... the R-391A does exist - Video Update

Enclosed link shows one of the R391 positioning heads partially disassembled for clutch tightening from a civilian assembled FRR-33 WA2NPL and I cobbled together some years back...http://mysite.verizon.net/vze4brdx/DSCF0033.JPG

Earlier than this pix, this particular head had been totally disassembled for cleaning and reassembled/installed in the r-391 shown below but during testing it became apparent that it was slipping... its supposed to slip in operation anyway but this one was slipping a bit too much and was removed for adjustment and photo op... Anyway you can see the eight individual cam pawls and the pawl selecting mechanism, each corresponding/mechanically linked to one of the 8 numbers on the round black dial under that little window that once activated, hold the selected pawl in the desired position for a given frequency... so in operation, its a matter of synchronized positioning heads which are also synchronized to the drive shaft as well as each other, counting turns from a zero point to individual points corresponding to the 8 individual stopping positions denoted in part by the rotary switch under the 8 position dial under that little window and re-zeroing to allow only the selected pawls in both heads to then find their individual slots in their associated tuning shaft washers stalling the individual heads with their individual clutches howling, at that selected numbered point during the final pull in for the frequency desired... hope I said that right... anyway its multiplied by three in the FRR-33... two R-391 radios and a CU-286 tuning unit... watching all three units spin up independently but yet land where they're supposed to is quite impressive...

This system is truly "THE" Harley Davidson of all the radios from that era... a radio man's radio and then some... Pix of the rig that head was from...

http://mysite.verizon.net/vze4brdx/DSCF0034.JPG

Pix of our civilian FRR-33

http://mysite.verizon.net/vze4brdx/DSCF0035.JPG

http://mysite.verizon.net/vze4brdx/DSCF0036.JPG Ott

Date: 25 May 2006 12:29:31 -0000
From: "n4buq@knology.net" <n4buq@knology.net>
Subject: Re: [R-390] PINS

> G'day... you know the pins/--rollpins we call them here- that hold
> the cams on to the rear of the RF module ?
> Well I've found one missing and don't have anything that size
> within 200 miles. even if available.<snip>.....

These are standard size pins, although not a size that's used all that much. They are generally called "roll pins" due to the way they are constructed. They can be bought from places like McMaster here in the U.S. (www.mcmaster.com), but you have to buy a box of 100 or so. I think they're a rather obscure size (5/64" or something like that) so that makes them harder to find. Someone on this list (I can't recall the name right now) was kind enough to send me a few when I needed them last year. Perhaps someone will volunteer to send you a couple.

Date: Thu, 25 May 2006 09:29:22 -0400
From: "Tracy Fort" <beerbarrel@cox.net>
Subject: RE: [R-390] PINS

Did you try your local NAPA?

Date: Thu, 25 May 2006 08:50:33 -0700
From: "David Wise" <David_Wise@Phoenix.com>
Subject: RE: [R-390] PINS

He's in Australia. Aren't they metric?

Date: Thu, 25 May 2006 13:21:36 -0500
From: Dan Arney <hankarn@pacbell.net>
Subject: Re: [R-390] PINS

They have to be inserted from the bottom to stay in, :>) Hank

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Date: Thu, 25 May 2006 21:12:21 +0200
From: "paolo gramigna" <paolo.gramigna@controllo.it>
Subject: R: [R-390] PINS

I'm from Italy, and McMaster is now refusing to sell overseas. Does somebody know of a similar online source of parts, hardware, bolts and screws still selling overseas?

Date: Thu, 25 May 2006 12:36:31 -0700
From: "Samuel Letzring" <sletz@msn.com>

Subject: RE: R: [R-390] PINS

You might try MSC their website is MSCDIRECT.com- I do a lot of business with them- alsmost as good as McMAster- so try their website and see if they will ship overseas.

Date: Fri, 26 May 2006 00:40:49 -0500
From: Tom Norris <r390a@bellsouth.net>
Subject: Re: [R-390] PINS

A local NAPA had them back long long ago when I needed them for an RF deck repair. They denied they had them, but after they dug for them, turns out they did. Best bet is to find and *older* auto parts or hardware store. Mind you, I'm not sure Pete has NAPA stores in OZ, so perhaps one of us can pick up a few for him???

Date: Mon, 19 Mar 2007 02:19:43 -0400
From: "Bob Young" <youngbob53@msn.com>
Subject: [R-390] Collins 390 zero adjust knob problems.

I picked up a nice Collins 390 tonight along with a nice Motorola 390A, On the 390 the zero adj. knob wasn't working right or the thing was out of range and I was turning it too far, not sure which, it would open the clutch when turned clockwise and close again when backed out but I couldn't zero beat an 830 KHz AM station with it, when I turned the knob back out after zeroing it at 830 it would spring back to about 833 where it was zeroed before for some reason, I then noticed that the knob and shaft would come right out if I turned it far enough, so I took off the knob and turned the shaft all the way in with some vice grips just thinking it was loose, now the clutch won't engage, when the knob is screwed in the clutch separates even farther but when I turn it back out it doesn't engage, so I think I screwed something up, I think I pushed something inside of the shaft(?) too far and jammed it. I have loosened the shaft up again and again it will screw right out. I have also noticed that the mechanism is different from the Motorola 390A which I haven't taken apart yet to see how it works and both seems different from my Capehart zero adj mechanism which I think may be missing something. Is anyone here familiar enough with the Collins 390 zero adj mechanism to have any idea what I did? And more importantly how I can fix it? Also both PTO's in both radios are approx 5 Khz off end to end, the 390 has a Cosmos and the Motorola has a Motorola (which I've never heard of before), are these within adjustment range or do they need surgury? (if they haven'e been adjusted before) I'll try to get directions on this later on, my immediate concern is the zero adjust, just wanted to know if extensive work needed to be done to the PTO's,

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Date: Mon, 19 Mar 2007 07:52:59 -0500

From: "Harold Hairston" <k4hca@alltel.net>
Subject: Re: [R-390] Collins 390 zero adjust knob problems.

I sure hope that you get an answer to this R-390A dilemma (And I am sure that you will) as I experienced a similiar problem over the weekend with my R-390A that I use every day. My problem is with both "Calibration Knobs" that worked ok last time I tried to calibrate the unit. Seems that I can not lock the unit mechanicallly so that I can put the PTO on the 100 KC point.
Let me tell you what I do know about this matter. My "Operator's Manual" Has a Hand-Written note (Change C-2 ?) that cautions the user not to force either the Dial Lock or the Zero-Adjust past their stops in either direction nor to turn the Kilocycle Knob if the Dial Lock is in locked position., else damage may occur to the unit. If you receive replies direct, please pass them on.

Date: Mon, 19 Mar 2007 12:21:22 -0700 (PDT)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] Collins 390 zero adjust knob problems.

Those PTOs may have enough range to fix them without surgery, depending on how much Uncle Sam used up. I'd try that certainly.

Date: Mon, 19 Mar 2007 12:24:45 -0700 (PDT)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] Collins 390 zero adjust knob problems.

If your panel screws are not tight, or the clutch is gummed up at all, you won't be able to disengage the clutch enough to make the calibration. Make sure all the panel screws are in place and tight, and check for gummed up works. I use a carb and choke cleaner to clean the clutch plates.

Date: Tue, 20 Mar 2007 21:37:26 +1100
From: "pete williams" <jupete@bigpond.net.au>
Subject: [R-390] Zero adjust R-390

I don't suggest I have the solution, but consider the way it operates..... gotta have the pictorial from the manual to fully appreciate. However,when you screw in the knob , the screwed shaft with knob, presses on a small bar that passes thru the main shaft which in turn bears on a washer that the presses on 3 pins of the spring loaded clutch mechanism . This allows the PTO to be temporarily disengaged from the Veeder Root indicator and then turning the kHz knob sets the frequency to zero beat or to what ever point you're calibrating.It is my opinion that the small bar mentioned above has broken or .fallen thru thus preventing disengagement..

I've just repaired one here after fully dissasembling but needed the manual.-- also strong fingers to compress the concave springs on reassembly. For the R-390, front panel screw tensions are irrelevant. --- my repair and checking done after the RF module out of the chassis and on the bench.... <snip>

Date: 20 Mar 2007 12:52:20 -0000
From: "n4buq@knology.net" <n4buq@knology.net>
Subject: [R-390] RF Gain Control and Antenna Trimmer

I seem to recall someone on this list having NOS (Allen Bradley?) pots for sale that are the correct replacements for the RF gain control. If that person is reading, would you please respond (or if someone knows who that was, would you please contact me as well)? I think I need one. I think mine has a bad area right at the endpoint of travel. The last 2 or 3 degrees before it hits the stop causes a nice dip in RF gain. I may try DeOxit, but I think I may already have done that so it may just need replacing.

Also, what's involved in removing the housing from the antenna trimmer? One of my R390As has a noisy trimmer and I figure I need to clean its innards. Is it very difficult to get to? I've had RF decks out many times, but never had to address the trimmer.

Date: Tue, 18 Sep 2007 12:04:26 -0400
From: wabate <wabate@verizon.net>
Subject: [R-390] Cam Synchronization

Hi. I'm working on a newly acquired 390A and I've started with the mechanical synchronization. I've worked on 390A's before but this is the first that is slightly off sync. Four of the cams were off no more than 1/8" so I decided to touch it up. The other two cams were OK. I adjusted three but I'm stumped on the 8-16MC cam. That cam does not have a non-mar clamp on it. Its riveted to the gear. How do you adjust that cam? The manual does not say anything specific about that cam. It appears that the MC shaft controls it but I don't want to guess wrong
and adjust something that I should not. The 8-16MC cam is off about 1/8" from where it should be. Should I ignore it? If I try to align that cam with the KC shaft, I get to the end stop before it lines up. Over ten turns stop readout of the KC shaft is within spec and the crystal osc. band switch is OK. The intermittent switch drive is off about one tooth from where it should be but the the six position RF band switch alignment is OK.

Date: Tue, 18 Sep 2007 12:29:13 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Cam Synchronization

You DON'T. You START with that one.. Set it to the correct spot. THEN adjust the rest. If the PTO or dial readout is wrong, then fix that after setting the set of cams right. I thought the manual (or some manual) talked about that, but maybe not.

Date: Tue, 18 Sep 2007 20:38:28 +0000
From: odyslim@comcast.net
Subject: Re: [R-390] Cam Synchronization

I would leave it alone. 1/8" is practically nothing. In fact, the person that last serviced the radio may have deliberately moved the cam a little to keep the slug screws from hitting the Utah plate after alignment. The slug racks can easily compensate for 1/8 on the cam.

Date: Tue, 18 Sep 2007 17:19:47 -0400
From: wabate <wabate@verizon.net>
Subject: [R-390] Re: [R-390A] Cam Synchronization

Thanks for the replies. I can understand starting with the 8-16 first but what do you do when you can't set that one? If you read my first post I said, "If I try to align that cam with the KC shaft, I get to the end stop before it lines up." So what do you do when you run out of KC change rotation? That's the real question. There has to be an adjustment somewhere. In the 1956 manual it does say to adjust the 8-16 cam first but it does not say how. In the 1961 manual it ignores the sequence entirely. It just states to adjust the cams. I think it is somehow linked to the intermittent switch drive adjustment or the MC change shaft adjustment. But I'm not sure. Someone must have gone through this before. Anyone?

Date: Tue, 18 Sep 2007 17:22:43 -0700
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>
Subject: RE: [R-390] Cam Synchronization

If the slug screws hit the Utah plate or almost fall out of the rack; there is a good chance some of the silver mica caps in that RF coil have drifted. Somewhere in the middle range of the adjustment has proven on my R-390A's to give greater sensitivity. I've had to replace some of these silver mica's. On Chuck Rippel's web site he describes how much sensitivity is lost if the mechanical alignment isn't correct. Get the mechanical alignment correct first, then tackle the IF, RF, etc. Follow the Y2K manual step by step, hard to go wrong. Scott Secal's (sp)
description of how to reassemble the gear train might help on getting the cams in their correct positions.

Date: Tue, 18 Sep 2007 21:44:57 -0400
From: wabate <wabate@verizon.net>
Subject: Re: [R-390] Cam Synchronization

Thanks to all for their input, especially Don. I understand now how to slip the KC shaft past the endpoint, which is what I had to do to align the 8-16. I reset the other cams and zeroed the Veeder Root counter and all looks well. I appreciate all the help.

Now on to filling in the lettering on the panel and then install it. Then I can align the beast. I'll save the Cosmos PTO for last (endpoint is way off!)

Date: Tue, 18 Sep 2007 19:02:50 -0700
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>
Subject: RE: [R-390] Cam Synchronization

No harm in going after the cosmetics, somewhat a break from the electronic side. When you get around to the PTO, adjusting the endpoint and linearity, go back and touch up the RF alignment. There is more sensitivity to be had after getting the PTO where it should be.

Date: Mon, 24 Sep 2007 17:57:36 -0500
From: Jim Green <jagreen3@sbcglobal.net>
Subject: [R-390] I may have located one BIG problem with my R-390 (not A)

<snip> Now on to the BIG problem. I guess I am going to get some practice working on the Geneva drive. The first IF can rack has a lifter arm on each end. One end of this arm has a roller that rides on a cam. When the mc setting is between 0mc and 8 mc. and as the kc knob is turned, this cam turns and gently lifts and lowers the first IF can rack. The problem is the roller on the end of the front lifter arm is missing. One end of the first IF can rack gently lifts as the kc knob is turned. However the front end of the first IF can rack is sagging much too low and doesn't move. I'm concerned this may have damaged either the slugs or the coil windings.

Date: Mon, 24 Sep 2007 16:17:33 -0700
From: "David Wise" <David_Wise@Phoenix.com>
Subject: RE: [R-390] I may have located one BIG problem with my R-390 (not A)

Where does the manual refer to Y201? I didn't see it on my skim-through. I have some spare slug racks for the R-390A (courtesy of a list member who I've forgotten), but I doubt they'll fit in an R-390. If you absolutely can't find a spare, you can have one of mine and cut the lifter off it. I'm thinking Dremel and JB Weld. An R-390A with your mechanical failure

would be inoperative but unharmed, because the slugs were suspended from springy wires. If I remember correctly, however, they were rigid in the R-390. You're right, if it's been cranked from one end to the other, it might have broken a couple of slugs or coil forms. It's not hard to check. I hope they're okay. Or am I screwed up and this is the spot where the coils themselves are lifted, not just the slugs? I don't know if even a bearing from the R-390A will fit, in that case.

Date: Sat, 03 Nov 2007 12:20:49 -0500
From: "Bob Young" <youngbob53@msn.com>
Subject: [R-390] R-390/URR

I found the Kilocycle Change control disc and split gears I needed for the play in the tuning mechanism, but before I put it in, is there any way of cleaning the gunk off the whole gear assembly in a 390 without taking it all apart?

Date: Sat, 3 Nov 2007 14:12:19 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] R-390/URR

There are a variety of things you can spray out the gear system with. The problem is that some of them are illegal these days. Other things have problems with electronic components. If you really want to try "far out" get a spray can of "plastic compatible" Gun Scrubber. It definitely removes grease and gunk. I have no idea what it will do to the components .... Kerosene or ethanol are safe for just about everything. They are both fairly easy to find. They won't pull out as much "stuff" but they are known safe. What ever you do, blow out the system with compressed air once you are done.

The problem with all of these is that now you have all of the lube out of the gears, and you are left with the sand and grit. Nothing is going to spray grit out from between the split gears.

Date: Sat, 3 Nov 2007 14:44:07 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] R-390/URR

I agree with Bob getting between the split gears is the big issue. I have shoved a knife blade down between them enough to allow a flush out with Gummout Carb cleaner. Be careful with that stuff though...it's potent. I've had good luck also with plain ole mineral spirits in a spray bottle and a tooth brush. Leaves behind an oily film which ain't all bad!

Date: Sun, 4 Nov 2007 08:05:14 EST

From: ToddRoberts2001@aol.com
Subject: [R-390] Cleaning Gearbox Assembly

>.....without taking it all apart?.....

When you say "without taking it all apart" do you mean the gearbox assembly itself or taking it out of the radio? If you can take the whole gearbox assembly out of the radio in one piece I have had good luck soaking the whole thing in a tub of kerosene for a few days, swishing around the gears and cams with a paintbrush from time to time and turning the bandswitch a few times. After soaking a few days the bottom of the tub will be covered with dirt and crud and the whole gear assembly will look like new.

One thing you do have to watch out for with the kerosene is to remove the RF transformers first. The kerosene seems to get into the rubber washers in the small ceramic trimmer caps and swells up the rubber - I found that out the hard way. Keep anything with ceramic trimmers out of kerosene. After soaking a few days let the unit air-dry for a few days. All this should be done outdoors if possible covered or in a ventilated workshop or garage. I have sped up the drying process by placing the unit directly in front of a dehumidifier and let it blow warm, dry air on the unit. When it is dry all the bearings or sleeves will be dry also. I have had good luck spraying everything with a light coat of penetrating oil then manually lightly re-oiling all the gears, bearings and sliding parts. Spraying the RF switch parts with some de-oxit is a good idea also before reassembly into the radio.

Date: Sun, 4 Nov 2007 11:15:00 -0500
From: "Jim M." <jmiller1706@cfl.rr.com>
Subject: RE: [R-390] Cleaning Gearbox Assembly

I would soak only the gear assembly in kerosene, but carefully. I would not soak any of the electronics - just my preference. I believe the tube sockets and switch wafers can absorb chemicals and oils, making them slightly conductive - in high impedance tube circuits, this may cause anomalies such as poor AGC, and can destroy trimmer caps. Getting oil into the phenolic insulator on the antenna trim shaft can also cause AGC problems or other strange things. Also when coil forms absorb liquids and oils, they can expand - this may be what causes some coil slugs to stick. I do not agree with extreme measures such as dishwashers, although it might work for some. Short of disassembling the gear train (which is the best method I believe), an acceptable way for me is to place the RF assembly on the edge of a bench with a pan under the gear assembly, and squirt kerosene down into the gears to wash them out. You will see the gunk collect in the pan. Then some compressed air, then more kerosene...then

some light weight "Marvel Mystery Oil" (I think that's the name). Big Bath spray also works well afterward to remove any oil residue that may have sneaked into the electronics compartments. Q-tips and elbow grease work well in the electronics compartments. Just my 2 cents worth.

Date: Sun, 4 Nov 2007 17:01:48 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Cleaning modules Gear Train Cleaning

You ask about cleaning the gear train. Back when (68 75) we hung the receiver off the edge of a bench. You can run lots of cleaner through the gear train and let it run out. Kerosene was the available solvent. Followed by compressed air.

Brush it in and blow it out.

Simple green is used a lot today but see Cecil's comments below.

Remember to do the small roller bearings on the rack slides.
And the back end cams. A little less solvents.

Make up a small hose wand for your vacuum cleaner and us it to suck up solvent as you brush it in. Use water base with the vacuum. I do not want to read about the vacuum cleaner flashing.

Mobile Synthetic oil is the lube of choice these days once you get it clean. Hang out at the local Mobile station and glean a few empty bottles out of the trash cans. You can drip a life time supply of oil out of a few bottles this way.

Date: Tue, 29 Apr 2008 05:10:07 -0500
From: "Phil M." <pmills7@comcast.net>
Subject: [R-390] Do I really need the green gear?

Although I have been able to mechanically align the RF deck on my R-390, by removing the xtal osc deck so I could view the marks, I may need to remove the RF deck for further work. Do I really need the green gear or is there another way to hold the alignment when removing the RF deck?

Date: Tue, 29 Apr 2008 07:42:09 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Do I really need the green gear?

Green gear is not necessary. I asked the same questions when going through my first R-390. I found it did nothing more than keep the counter in sync with the RF deck. If you follow the procedures in the book as far as

what frequency to dial up upon the start of disassembly...which basically aligns the marks on the RF deck you can set the counter and re-mesh the gears with no problem. Some think not having the green gear is the end of the world if you pull one apart and get it out of sync.

Date: Tue, 29 Apr 2008 12:05:22 -0400
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] Do I really need the green gear?

Though I have not done it yet (I will very soon), I believe the alignment can be done with out the green gear. Do read the manual for the mechanical allignment to become more sure than I am at present. I believe that the full mechanical alignment can be done without the gear, and at least part of it needs to be done if the deck has been removed without the gear in place.

Note: on some radios the gear is in place on the shaft it needs to be on down at the bottom of the gear train, but is reversed front to back for normal operation. The thing is slightly dish shaped so the periphery is either in front of or behind the end of the shaft it mounts on. One position is engaged and the other is disengaged. On some radios, it's been relocated to a place at the top of the front gear plate in plain view.

Date: Sat, 19 Jul 2008 18:56:41 -0400
From: "Bill Coleman N2BC" <n2bc@stny.rr.com>
Subject: [R-390] Gear train help needed

I'm having trouble getting the geneva drive in sync. For example: on the switch between 7 and 8 mHz, about 80% of the rotation of the bandswitch happens going from 7 to 8 mHz, another 20% going from 8 to 9 mHz. I'm just guessing at the percentage, the point is at the next higher (or lower) mHz position there's a bit of additional rotation on the bandswitch.

I've got he latest Y2K manual - great write-up. Just no joy as jet. When I took the gear train apart, I left the geneva assembly in place as recommended. Hints??

Date: Sat, 19 Jul 2008 21:03:29 -0400
From: "Bill Coleman N2BC" <n2bc@stny.rr.com>
Subject: Re: [R-390] Gear train help needed - GOT IT!

Re. My earlier cry for help...
I just needed to walk away from it for a while.

I got back to basics... I loosened the geneva drive gear and the bandswitch shaft. Then I manually operated the geneva fully CW and CCW observing

the intermittent drive. Worked perfectly. I then set the geneva fully CCW and the MHZ to "0" and tightened the geneva drive clamp. Placed MHZ to "7", manually rotated the bandswitch to it's proper place & locked it down. Worked like a champ, when the bandswitch needs to be moved it is getting a 'full twist' from the geneva drive at the correct time. In the immortal words of Emily Litella... "Never mind."

Date: Sat, 29 Nov 2008 21:57:15 +0000
From: wb3fau@att.net
Subject: [R-390] need help with390A RF dedk

Some helpful pointers on getting my 390a project running. I cannot hear any signals. I do see that it is out of mechanical alignment. Turning the MC. knob it will only run up to 26 mc at that point it seems to jam, will not turn any further. 10 turn stop is at zero CCW when display says 00MC. Any thoughts? Russ WB3FAU.

Date: Sat, 29 Nov 2008 17:56:00 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] need help with390A RF dedk

You are going to HAVE to drop the front and perform the mechanical alignment of the gear train. The veeder root counter will need to be set to 7000.0+. This will be with the KC at its 10 turns fully CW. Make sure the MC switch detent is set to 7. Align all gear lobe pointed portions to align with the marks on the front of the slug racks. It sounds as though someone just threw it together without paying ANY attention to the mechanical positioning. Have you got the Y2K manual?

Date: Sat, 29 Nov 2008 17:59:43 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] need help with390A RF dedk

Roger - Chime in here!
Oops! The MC detent will have to be set in the 6 position.
Old minds - they forget things.....

Date: Sat, 29 Nov 2008 19:05:20 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] need help with390A RF dedk

Check the MC clamp on the shaft just behind the front panel. Check ALL clamps in the gear train. Look to see if it or MORE are cracked. If there are multiple cracked or broken ones, I have a guy that is offering for you to ship him the RF deck and straighten it out. His Email is: mparkinson1@socal.rr.com I've dealt with him. He's certainly fair. I

bought a Collins St. Js blue striper AND a spare chassis from him. You are also close enough to WB2FCN that you can send him smoke signal for help.

Date: Sun, 30 Nov 2008 21:50:54 +0000
From: wb3fau@att.net
Subject: [R-390] 390A RF deck alignment

OK guys, thanks for the input. I have found several problems. [1] the MC shaft had about 1/4 inch of end slop as the retaining snap ring was out of its groove behind the front panel, this would allow the shaft to disengage from the gear. [2] on the 2nd xtal osc. deck, the shaft also had a good amount of slop, I was able to correct that by loosening the shaft clamp and slding it back closer to the chassis. [3] I did the mech alignment @ 7 000mc, not at 7+000mc. So I need to go back and do it again. [4] the problem with the MC stop solved the stopping at 26 mc. This is real frustrating to do. I give it a break and come back when I feel up to it. Again, will keep you posted on my results. I feel better about now, I am gaining some undrstanding of it. Shaft clamps- yes worked on another some years back, broken clamps. This one is good, just not assembled correctly. thanks Russ.

Date: Sun, 30 Nov 2008 16:59:37 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] need help with390A RF dedk

Take the time to down load a copy of the Y2K manual first. It is much easier to read for your introduction to the R390/A theory of operation,alignment, repair and adjustment. Also down load a PDF copy of TM11-5820-358-35. Put both of those documents on a CD for future reference.

Do not force anything.

The RF deck will run over and go forever on the cams and RF deck switch.

But the parts almost never get operated that way so they may not like to get
pushed.

The PTO will hit hard ends and can be trashed if the 10 turn KC stops and PTO
are out of "sync, alignment mechanical adjustment" The PTO will do about 11
turns plus and is normally set to the 10 turn KC shaft stops keep the PTO from
ever hitting an end point.

The RF deck clamps come loose, Clamps break. The dial counter bevel gears skip if not positioned well. Gears clamps slip and rotate on the shafts.

There is a 10 turn stop on the MC shaft.
Close your eyes do this by feel, ignore that counter.

Grab the MC now and run it either CW or CCW to a stop.
Then run it the other way and count off the 10 turns.
About 3 detents per turn or 30 MHz. at one Mhz per detent position.

If you do not get 10 turns you need to start inspecting for dirt, friction, and other binding problems. You can remove the RF octave slug carrier springs and pull the slug carriers for the six RF octaves and two variable IF slug carriers. One of these may be binding and causing problems. Do not mix your slug racks up. All RF slugs are not the same. Hanging the 0.5 to 1Mhz slug rack into the 16Mhz to 32Mhz position will fit but the receiver performance will suffer. IE, the receiver goes deaf but looks OK.

Full CW is 00 MHz. The knob should go a bit past the detent.
Go CCW seven detents. That's 7 Mhz.

Grab the KC knob and dial out some where a full turn off its 10 turn end stop.

Grab the zero adjust and engage it.

Grab the KC knob and find the kind of feels good center of the zero adjust.

Disengage the zero adjust.

Run the KC knob up to +000.

Run the KC knob to the stop.

Read the dial number.

Back the KC knob off 35 from the max number.

Your RF deck mech is set at 7.+000.

Eye ball the cams and alignment points.

There should be holes in the cams (near their high point) and black lines painted and over lacquered on the front of the RF deck.

Most of the cams should look good.
The .5 to 1Mhz may be off because the middle of the zero adjust is subjective.

You likely have a cam way off that is your clue you have a slipped alignment.

If the receiver dials the KC and MC a full 10 turns each then the dial counter gears may have just slipped. You drop the front and reset the counter. You can reset the counter through the front bezel but its a bit of a struggle to do so.

Read the Y2K and then the TM on the mechanical alignment.

The Fellows did a real good set of mechanical gear drawing for the Y2K manual.
That information really shines.

If you have a spline wrench you can reset the alignment your self in a few minutes. If you need a spline wrench ask about that here.

A short spline can be turned into a long spline with some long hex bit drivers
that have the allen hex bit removed and a length of spline key installed.

If you need a clamp you can ask for some help here on the reflector and see what gets offered. Part are available. They are not free.

Read about the anti lash springs and split gears. Inspect your RF deck and see that all your gears are loaded. Do not over load gears. Just get one tooth past slack on the springs. You may want to bend up some springs so you do not have to overload the gears.

Read the R390 page and Wei Li's Pearls of Wisdom for some good review and
coverage of taking care of your RF deck.

http://www.r-390a.net%2ffaq-refs.htm/
Then select tutorials
Then select Pearls of Wisdom

If all else fails by all means send it out to one of the Fellows to get it fixed. If you are with in a couple hour drive of an offer consider giving up a Saturday or Sunday to get it done. It only takes about 4 hours to go through a receiver. An afternoon watching a fellow walk through a receiver is an education that will stay with you for the rest of your life.

Every R390 owner should have the opportunity. The VCR tapes are also a great education.

Let us hear how the project is going. You do not know how many Fellows read
these pages just to share your hobby experiences with you.

Date: Mon, 1 Dec 2008 19:44:42 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] WB3FAUs R390A update

If you just have to loosen the clamp on the band switch and make an adjustment, I really encourage you to pull the RF deck and set that adjustment by eyeball. I know all the TM's and manuals say you can set the thing with a meter and such. But remember you are dealing with an old receiver and you know not how it has been treated in the past.

My rationale follows.

The band switch is six each six position wafer switches spaced over about 4 inches of switch shaft.

Not all the wafers are in optimum alignment.
Never were, and never will be.
In 50 plus years some of the parts have warped a bit.
In 50 years some of the parts are worn a bit (wafer hole to shaft).
In 50 years some of the contacts have oxidized a bit.
In 50 years some of the contacts have arced a time or to.
Pull the deck and set the shaft alignment by eye ball for optimum contact.

Check all the switch positions and all the switch sections.
Check the operation switching both up and down the band.
Then by best feel align switch shaft to gear for most best switch wiper to switch contact area in all 36 points. Best adjustment is still a judgment call. But better to do this by eye than with a blind meter reading.
Once you do this once you will not have to do it again until the clamp on the band switch slips (maybe never again).

But if you have to do it do it the very best you can.

If you have a switch wafer that's not exactly pristine and you do not set it the best you can then you are going to start burning some more metal off the edge of a contact and just make more maintenance nightmares.

Unless you have a contact that is just burnt bad. Just do the best you can to get things adjusted. Do not try to reset a wafer section or worry about

excess play in the shaft to wafer sections. As long as you can get the assembly to adjust you will be OK.

The objective is to just do the adjustment by eye the best you can rather than do it blind by meter.

Date: Tue, 02 Dec 2008 08:43:34 -0600
From: Jerry K <w5kp@hughes.net>
Subject: [R-390] RF Deck springs

Has anybody jotted down the Small Parts or McMaster-Carr part numbers for "exact replacement" RF Deck springs? I bought a sack of these years ago from somebody on this list who had made a bulk buy of them, but no way can I remember who... and I'm finally running out of them. Jerry W5KP

Date: Sat, 6 Dec 2008 11:03:10 -0700 (GMT-07:00)
From: "Richard W. Solomon" <w1ksz@earthlink.net>
Subject: [R-390] R-390A Lubricant ?

What is the right lubricant to use on the gear trains ?

Date: Sat, 6 Dec 2008 12:30:40 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] R-390A Lubricant ?

I use very light application of Mobil 1 Synthetic motor oil...

Date: Sat, 6 Dec 2008 13:36:23 EST
From: Flowertime01@wmconnect.com
Subject: [R-390] R-390A Lubricant ?

A long, old and honored subject, but happy you ask.
Mobil 1 synthetic motor oil.

You need not buy a quart unless you have some use for the quart. Stop by your Mobil station and raid the trash can for a couple empty containers. You can likely drip more than enough out of a bottle or two to lubricate your receiver. Other 10W-30W oil was standard military procedure in its day. The new synthetic collects less dust over time. Will not turn stiff and gunky as quick as regular oil (if ever). If someone were give you a small sampler needle oiler at a trade show, that oil is good.

Practice was to hang the receiver over the edge of the shop sink, Use diesel fuel to flush and air to blow dry the RF gear train. We also used the RTTY washer solvent if available. Just putting the whole deck in the RTTY

washer and "degreasing" the whole deck was frowned upon. But I have confessed that sin before and done my penance. Then oil and blow the oil into places and blow the excess out. The problem was not to contaminate the bushing in the antenna trim so that you get a short.

Never mind what we were running down the drain.

These days we wash decks in the dish washer and dry in the oven at (low heat)
220_F for an hour or so. A popular choice today is to wash them out on the lawn table and flush with the garden hose as part of the summer PM process. Let the decks dry for a day or two. SimpleGreen is considered to cause corrosion. Other "soaps" work well.

A problem is ground lugs within the deck growing an oxide over years and ground points developing opens. Its just a mechanical problem.

Mostly you recap your R390, At that time you just loosen and retighten all the bits of hardware. Give it all a bath. Reoil it, Realign it, and use it for several years. You blow out the dust from time to time with compressed air and wash the front panel with soap and water to remove the finger prints. Do signal to noise test and change tubes as needed. Realign when you change tubes. Tube life is 8000 to 9000 hours of operating time. Most R390 tubes will run twice that long or more. But that is all another subject.

Date: Tue, 09 Dec 2008 11:20:08 -0600
From: Jerry K <w5kp@hughes.net>
Subject: [R-390] Slug Rack Rollers

As a low-dollar winter project I've started rescuing an old high-mileage '54 Motorola R-390A from the grave--or at least from the nursing home. It's actually in pretty decent shape, but I have one little problem that has me stumped at the moment. Obviously this receiver was used as a band-cruiser, and all that knob-cranking combined with hardened grease resulted in flat spots on several of the slug rack rollers. I see the rollers are press-riveted units, so I presume they are not replaceable parts. Is there a known fix for this, or is replacing the racks the only option? I guess I've just been lucky, because the four or five receivers I've done in the past didn't have this problem. I'd like to get this question answered before I tear down the gear train, which would be a waste a lot of time and effort if there is no reasonable fix and replacement slug racks are not available.

Date: Tue, 9 Dec 2008 17:46:19 EST
From: Flowertime01@wmconnect.com
Subject: [R-390] Slug Rack Rollers

There are lots of good used slug racks out there.
Not free but at least low price.
You do not need the slugs or the slugs adjusting parts.
So just ask for slug rack carriers with good round rollers.
Then you have to do your own reassembly.
With a lot of machine shop you can make your own.
But good used parts are easier
Just count up what you need and ask for some here on the R390 reflector.

Date: Sun, 22 Mar 2009 18:20:04 -0500
From: "Bob" <rfay@charter.net>
Subject: [R-390] R-390A help needed

I have a S/W R-390A that I just purchased. This is my first R-390 I have had so I am new to this. I am currently disassembling the radio and cleaning the dirt out of it. I plan to replace the caps and try the alignment. I am trying to remove the RF section but the MHz knob jams after a few turns and won't let me zero it out per the instructions. My thought is to remove it as it is and deal with the problems after it is cleaned and lubed or is there a way to free up the mechanism?.

Date: Wed, 29 Apr 2009 21:50:15 -0500
From: "Bob" <rfay@charter.net>
Subject: [R-390] R390A RF deck rebuild

I have been trying to clean and rebuild the RF deck on my 390a and I have a
problem. The clutch on step 16 of Scott Seickels rebuild instruction was completely gummed up so like a dummy I took it apart to clean it. Is there any instructions on how to reassemble it and are there adjustments. I can't get it to compress enough to get the ring back on and lock.

Date: Thu, 30 Apr 2009 15:30:08 -0700
From: "Michael Hardie" <mike46@shaw.ca>
Subject: [R-390] Clutch Reassembly

I'm trying to remember how I did this long long ago. If you have the clutch assembly face down on a surface and you're pushing down on the shaft it won't work, the three pins sort of get in the way, your downward force is transmitted to the pins and the work surface and the clutch doesn't compress. The trick is to put something under the clutch so the pins don't hit the surface, then push down on the back of the clutch and slip the clip on. This is a somewhat hazy recollection - hope it helps. Good luck.

Date: Sat, 2 May 2009 12:46:20 -0500

From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] R390A RF deck rebuild

I did this to the clutches on two of my R390As. As I recall, it wasn't really all that difficult. What I do remember is that there are alternating hole patterns (one side is round, the other side is elongated). I reassembled these in alternating patterns. The other thing is not to apply any lubrication to the plates. It will make them too sticky. Dry worked best for me. As for the compression springs, they are a bit tricky but not all that difficult. Keep trying. I don't have any RF decks handy to look at the assembly but I recall that it's not all that complicated. Keep us posted. Perhaps others will chime in with more/better advice.

Date: Wed, 24 Jun 2009 09:47:58 -0400
From: Optonline <stevejxl@optonline.net>
Subject: [R-390] Bandswitch 7.000+ picture/position

I am making progress in re-assembling my '390A RF Deck, and need a favor from someone in the group.. I have an older ('55) Collins model and need to re-sync the band-switch to the 7.000+ MHz position. Does someone have a high-resolution photo of what the band-switch looks like at the MHz position? The pics I've found on the net so far appear to be from a newer and slightly different wafer configuration, and I'd love to confirm what I have is correct before proceeding.. Thanks in advance to anyone who can assist!

Date: Wed, 24 Jun 2009 07:52:57 -0700
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>
Subject: Re: [R-390] Bandswitch 7.000+ picture/position

Have you tried Scott Seickel's excellent,"R-390A Gear Train Repair Tutorial"? Use the following link, its towards the bottom of the page. I believe there is a good picture of the switch, etc. http://www.r-390a.net/faq-refs.htm

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Date: Wed, 24 Jun 2009 16:35:05 +0000 (GMT)
From: stevejxl@optonline.net
Subject: Re: [R-390] Bandswitch 7.000+ picture/position

Thanks for the reply.. Yes, I do have that link. Unfortunately, the bandswitch shown in the tutorial appears to be from a newer EAC unit, and my 1955 unit appears to be slightly different. The wafer screws on mine sit between the contacts.

Date: Wed, 24 Jun 2009 13:43:28 -0400
From: rbethman <rbethman@comcast.net>

Subject: Re: [R-390] Bandswitch 7.000+ picture/position

I have a Collins with a '51 Contract date. It looks IDENTICAL to the reference that Craig pointed you to. The exact Mfr of the unit pictured is NOT "EAC", but is clearly marked Teledyne. Perhaps you could make pics available of yours. Then the "collective" can sort through this and provide input/guidance.

Date: Wed, 24 Jun 2009 14:12:47 -0400
From: Paul Anderson <paul@pdq.com>
Subject: Re: [R-390] Bandswitch 7.000+ picture/position

Wouldn't it better just to do the continuity tests that the manual suggests, rather than eyeballing it?

Date: Wed, 24 Jun 2009 19:17:58 +0000 (GMT)
From: stevejxl@optonline.net
Subject: Re: [R-390] Bandswitch 7.000+ picture/position

Paul, LOL! Funny you should mention that... While perusing the manual for the xx'th time, I discovered that my library copy of the manual has a few more pages than the shop manual (the shop manual is just a ratty copy..). Talk about a hair puller... :) It appears that portions of section 6.2.4 are missing, and specifically, page 6-5 that describes the RF bandswitch alignment procedure (gee.. I wonder why!). And yes, Paul, you are correct. This was EXACTLY what I was looking for! Thanks again for the great help from the group! For the sake of curiousity, I'll try to post pics of the bandswitch later. And here are some pics from earlier this week...
http://www.flickr.com/photos/39242405@N06/sets/72157619411336026/show

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Date: Wed, 24 Jun 2009 17:33:05 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Bandswitch 7.000+ picture/position

You do not really want a picture of the band switch in one position. This is a simultaneous equation in 6 positions and six wafer per position. Look at all the switch settings going both up and down the Meg hertz. Look at where the band switch sets each time it moves over one switch position.

The goal is to get maximum metal to metal switch contact in each wafer and in each position. It is a best judgment call of all the wafers in all the positions. You can get it looking good on one band and completely be missing on other bands.

What happens is that if you do not eye-ball it all real good, you will have one wafer and position that just almost touches. Then this becomes a hot spot and starts to burn the corner off the contacts. Then that band stops working once enough metal is eroded. At 50 plus years almost all these switches have warped a bit. Have a burnt corner. Have a worn wafer.

The real solution is best look and lots of checking several times both up and down. Just a little bit of change in the shaft and clamp can make or break an alignment.

Date: Wed, 24 Jun 2009 20:24:38 -0400
From: Paul Anderson <paul@pdq.com>
Subject: Re: [R-390] Bandswitch 7.000+ picture/position

One additional thing I found was that not having the right shims in the Geneva coupler to hold it nice and square means the additional slop translates to more lash in this critical area. So make sure that when you are operating the MC knob that the coupler is not tilting slightly due to various forces on it.

Date: Mon, 29 Jun 2009 09:16:35 -0400
From: Optonline <stevejxl@optonline.net>
Subject: [R-390] R-390A Rebuild.. More Pics.

After a bit of work, I finally finished the re-build of the RF Deck this weekend, and I've attached a Flickr link to some photos. In retrospect, it really was not that bad at all. While I have no parts left over :), I did discover I am short one slug-rack spring. Arrgghh.

http://www.flickr.com/photos/39242405@N06/sets/72157620566596083/show/

The synchronization of the cam alignment, MHz detent, bandswitch, and crystal osc. is perfectly spot-on, with exactly 35kc over-run on each end of the dial.

The tuning is now incredibly smooth. Every Erie trimmer was disassembled and cleaned, and in some cases, replaced due to cracked ceramic disks.

This was the most time consuming effort. With most everything cleaned up, I will begin the electrical makeover with a massive re-cap session over the next few days as time permits. I'll post more soon..

Date: Mon, 29 Jun 2009 09:35:08 -0400

From: Jon Schlegel <ews265@rochester.rr.com>
Subject: Re: [R-390] R-390A Rebuild.. More Pics.

http://www.flickr.com/photos/39242405@N06/sets/72157620566596083/show

Wow! Looks great! The RF deck is my next task on my Motorola. The photos of your excellent work gives me more confidence to tackle the RF deck (all those gears!).

Good deal on cam alignment. I've heard that there's a lot of commonality in the 390A slugs so it seems scrounging one shouldn't be a problem. I have no spares otherwise I could offer to help out.

Date: Mon, 29 Jun 2009 09:52:05 -0500
From: Dan Arney <hankarn@pacbell.net>
Subject: Re: [R-390] R-390A Rebuild.. More Pics.

Steve send me your addy I have new springs.
Deck looks great. Hank KN6DI

Date: Mon, 29 Jun 2009 16:33:57 +0000 (GMT)
From: stevejxl@optonline.net
Subject: Re: [R-390] R-390A Rebuild.. More Pics.

Thanks for the kind words.. I had a few Erie trimmers in stock as spares for my Collins S line and KWM-2A, and the remainder I purchased from Surplus Sales (WAY pricey though).. Since I only needed the ceramic stator, rotor, or rubber washer for a particular value, I purchased the cheap coil-form mounted units and disassembled them as needed. Fair Radio Sales has a good assortment as well...

Date: Mon, 29 Jun 2009 17:11:40 +0000 (GMT)
From: stevejxl@optonline.net
Subject: Re: [R-390] R-390A Rebuild.. More Pics.

Rebuilding the RF deck was TOTALY worth it!
A couple of things I learned that I will apply to radio #2:

Before disassembling anything, take as many hi-resolution photos of the gear train from various angles in every stage of disassembly as possible. I referred to them many times to confirm the placement and location of the many small shims and washers.

When removing a gear/no-mar clamp/washer/shim assembly for cleaning, I used a short length of bailing wire and "threaded" the parts on in

assembly order, then twisted the wire ends together. Not only did this keep the assemblies together (especially the shims and washers!), but provided a way to easily dunk whole groups of small parts in the Carb Cleaner/De-greaser basket.

I also found that gently cleaning the center of the slugrack coilforms with q-tips and 90% isopropyl removed waxy dirt/grease allowing the slugrack to move much more freely.

Date: Mon, 13 Jul 2009 08:42:22 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] R-390A Rebuild.. More Pics.

> Rebuilding the RF deck was TOTALY worth it!
> A coulple of things I learned that I will apply to radio #2:
>
> Before disassembling anything, take as many hi-resolution photos of the
> gear train from various angles in every stage of disassembly as possible.
> I referred to them many times to confirm the placement and location of the
> many small shims and washers.
>
> When removing a gear/no-mar clamp/washer/shim assembly for cleaning, I
> used a short length of bailing wire and "threaded" the parts on in
> assembly order, then twisted the wire ends together. Not only did this
> keep the assemblies together (especially the shims and washers!), but
> provided a way to easily dunk whole groups of small parts in the Carb
> Cleaner/De-greaser basket.
>
> I also found that gently cleaning the center of the slugrack coilforms
> with q-tips and 90% isopropyl removed waxy dirt/grease allowing the
> slugrack to move much more freely. Good luck! Steve

Looks great... Not trying to be critcal but is there the recommended pre-load on those split gears...the springs all seem to be hanging fairly slack? If not now is the time to fix it. The tuning backlash probably wouldn't be noticed until the radio was on the air. The RF decks tune very easily without the pre-load but have noticable backlash when tuning a carrier for zero beat for example. May just be my eyes... Otherwise it looks really good.

Date: Sun, 19 Jul 2009 18:55:07 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] R-390A Rebuild.. More Pics.

It is not how it looks, it's how it feels, that matters. Conventional wisdom was to leave them springs loose. Just get one tooth over slop on any split gear and be good. Keep the gear train clean enough and lubed enough so that the small amount of spring tension is enough to keep the gears from lashing. You spin the knob fast enough to get whip lash in the springs and you deserve to over shoot the signal. You are supposed to find it, roll off it, and then come back on to it slow. Do this faster in the hand than it takes to read the text here. Over loading the springs just grinds brass off the gear teeth.

Date: Tue, 28 Jul 2009 05:53:08 +0000 (UTC)
From: odyslim@comcast.net
Subject: [R-390] clutch failure

I have recently replaced a clutch gear assembly as it was locked up. I now have 2 more that are seized. I have no more spares. They look easy to take apart and repair but there is one problem. I dont know where one would get the rivets used to hold the gear and clutch together. Has anybody taken one of them apart? Is there a source for the rivets or can the clutch gear be soaked for a few days in WD-40 to free it up?

Date: Tue, 28 Jul 2009 08:48:18 -0400
From: Paul Anderson <paul@pdq.com>
Subject: Re: [R-390] clutch failure

I haven't looked closely at my 390 geartrain lately, so I don't know the exact part you're talking about. However, if there is no corrosion, then most likely 50 year old grease is holding them together. Consider a variety of approaches, usually from least offensive to most offensive.

WD-40 is a good one, and is similar to kerosene. Stronger solvents, especially thin ones like acetone, might do well. You could try boiling the assembly in hot water to see if that would break it free. Once freed up, you need to flush the old grease and replace with new if possible. As far as the rivets are concerned... take a close look at the assembly and think if perhaps stainless steel bolts might do just as well.

Date: Tue, 28 Jul 2009 10:58:48 -0400
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] clutch failure

Is this a clutch for an R390 or R390A? Not sure of the differences, but in the R390A, there shouldn't be any rivets to worry about. Also, (and this may apply to both models) I found the clutch works best dry in the R390A.

Date: Tue, 28 Jul 2009 17:50:32 -0600

From: w9ya <w9ya@qrparci.net>
Subject: Re: [R-390] clutch failure

> WD-40 is a good one, and is similar to kerosene.....

Watch out using WD-40 because when the solvent finally evaporates you are
left with wax !!

Date: Sun, 2 Aug 2009 15:27:12 -0500
From: "Charlie Hugg - K5MBX" <k5mbx@hug-a-bug.com>
Subject: [R-390] Need R-390A Iron Core Slug

I was trying to adjust a sticky slug in my R-390A RF Deck and it broke. Does anyone have a parts receiver with a a powdered iron core with top adjustment screw and spring link for the 2.0-4.0MC Slug? The is the back slug marked Z203. Will any other slug core work from other parts of the RF Deck? How does one go about getting the bottom end of the old core out?

Date: Sun, 2 Aug 2009 16:30:05 -0400
From: "Gary" <xfrmrs@roadrunner.com>
Subject: Re: [R-390] Need R-390A Iron Core Slug

I have a complete RF deck with good slugs. Will take $50.00 plus shipping for it. If not, maybe some one else would want it for 50 bucks. Regards,

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Date: Sun, 02 Aug 2009 18:21:09 -0500
From: Tom Frobase <tfrobase@gmail.com>
Subject: [R-390] Need R-390A Iron Core Slug

I have some loose ones send me your address.

As far as getting the old one out: Pull the rack off, did the slug break or the spring wire that goes into it? I have been successful at soaking them with penetrating oil and then use a dental pick, drawing it out through the top.

The problem is the transformer in screwed into the chassis by a 4-40 screw that is under the slug. The other option is to completely remove the RF deck and back the mounting screw from the bottom, this is not an easy task either. I you accomplish this the transformer can be removed from the chassis to work on it. Not any easy options ... lot's of luck ... tom, N3LLL

Date: Sun, 2 Aug 2009 19:01:19 EDT
From: Flowertime01@wmconnect.com

Subject: Re: [R-390] Need R-390A Iron Core Slug

We though all the R390/A RF deck RF octave slugs (18ea) were the same. The RF deck variable IF slugs (6ea) were another flavor.

Under that bit of slug stuck in the tube is the screw that lets the RF can be released from the deck. Oh, unlucky is your stars this week.

Start easy and progress to destructive tactics as required to complete the repair.

Remove the slug rack to get it out of the way.

Turn the receiver on its side or up side down and blow compressed air into the tube to "flick" the core out of the tube. May or may not work well. If your air compressor allows you may consider a small vacuum line to suck an attachment to the slug and pick it out that way. You mite try a solder sucker bulb and small hose to pick the slug out that way.

Pull the RF deck and identify the very small bolt used to hold that can in place. Use a small cut off wheel to slot the base of that screw. Use a screw driver to get the screw loose and started back out into the slug tube. Glue a small stick to the screw to finish unscrewing the screw into the slug tube. Then you can unplug the RF can from the RF deck and just replace the whole can and slug if you still cannot get the slug out of the tube or the tube is damaged so you cannot use it.

Place a very small amount of super glue on the end of a cut off very small match stick. Let it almost dry. Place the tip of glue against the slug being careful not to glue the stick to the side of the tube. Let the glue dry and extract the slug.

You can push the tabs on the side of the RF can in with force. This will let the cover come off the RF can. You can destructively or gently remove the core tube from the structure. You can then remove the screw that holds the RF can structure to the deck. Then replace the whole can and slug. RF cans are more selective than RF slugs. Each of the front 6 cans are different. While the second and third can of each octave are the same.

Back when you just pealed the can open with a hammer and sharpened screwdriver to act as a chisel. Ripped the guts out with some long nose pliers.

Removed the retaining screw to get the last of the can out of the way. Put in a new can and slug. Tuned it all up and still went home on time. This implies spare parts were in the room next door.

Date: Sun, 2 Aug 2009 20:52:49 EDT
From: ToddRoberts2001@aol.com
Subject: Re: [R-390] Need R-390A Iron Core Slug

>....how does one go about getting the bottom end of the old core out?

You could try using a toothpick with a small drop of super-glue or quick-set epoxy on the end. Carefully place the end of the toothpick on the middle of the top of the broken slug, let the glue dry, then pull the broken slug out. If the slug broke cleanly you might be able to glue it back together with a tiny bit of super-glue. Spread a little bit of oil around the inside of the paper slug tube in the RF transformer to help prevent the slug sticking in the future before replacing the slug in the rack assembly.

Date: Sun, 02 Aug 2009 21:22:40 -0400
From: Glenn Little WB4UIV <glennmaillist@bellsouth.net>
Subject: Re: [R-390] Need R-390A Iron Core Slug

The oil can cause the paper coil former to swell, possibly jamming the slug. It could also possibly cause a breakdown of the wire insulation. A better lubricant would be dry lock lubricant or talcum powder.

Date: Mon, 3 Aug 2009 03:18:22 +0000 (UTC)
From: odyslim@comcast.net
Subject: [R-390] gear lube

Has anybody tried using chain saw bar and chain lubricant to lubricate the gears? There is an ingredient that causes the lube to become tacky and adhere to the gears. It seems like a good idea to me. I could not find the ingredients on Google but did find an article from bio-lube which is really neat as it is made from soy , vegetable oil and that magical ingredient to keep it tacky. Below is the link to Bio-Lube if anybody is interested. It is safe for the environment.

http://www.biobarchainoils.com/

I do know that sears sells a bar and chain lube that also has the " tacky " additive " but the trade ingredient is not given
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Date: Mon, 03 Aug 2009 07:38:55 -0400
From: Dave or Debbie Metz <dmetz@ntelos.net>
Subject: Re: [R-390] gear lube

While no expert here by any means, my gut reaction is NO! That "wax" that is in the oil tends to dry out with time and leave a very nasty residue. It is virtually identical to rock drill oil used in construction and I can personally attest to the buildup and nasty gooey nature. It would seem

like a better choice would be a synthetic 90-140 wt gear oil. The trouble with that is that it stinks. So, this comment probably doesn't really help answer the question.

Date: Mon, 03 Aug 2009 11:26:04 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] gear lube

The biggest problem I see with this is it will attract any dust or dirt that gets inside. Good old fashioned Mobil 1 works fine, it doesn't take much at all,, and you can usually get enough for free if you can get the can right after someone tosses it at the service station.

Date: Mon, 3 Aug 2009 11:59:21 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] Lubricating RF slugs

I would stay away from graphite as it will change the performance of the inductor. Oil also has a negative impact upon certain types of slugs and cores. Talc is a safe lubricant if it is used in extremely small quantities.

Try a loose fit of a single slug into the coil form to make sure that it does not bind or hang. If it does, then there is damage or contamination in the core. Clean out the coil forms with a dry Q tip until a clean Q tip comes out as clean. Then put a very light dusting of talc (baby powder) on a Q tip and give the coil form a dusting. If you can get a single slug to move freely with no binding but it binds in the rack then there is a misalignment problem or the slug rod is bent.

If the slug binds after all of the cleaning you can try to inspect it with a borescope or remove the coil from the radio so you can see all the way through the coil and look for galled up spots in the form. Some can be fixed, others will require the complete replacement of the can.

Date: Mon, 3 Aug 2009 22:25:44 -0400
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] Lubricating RF slugs

I suggest wax. Bowling alley wax or butcher's wax. Apply sparingly and buff to a nice shine. A Q-tip gets the inside of the core, and a soft rag gently used gets the outside of the slug. If you want to go the limit, spring for some Renaissance Wax. This stuff was developed by the staff at the Victoria and Albert Museum in London. You can imagine with the British penchant for thoroughness and correctness in all such work, their product is quite good. An 8 ounce tin of it will last you a lifetime, and cost you more than any other similar quantity of wax you can find. It's also good

for antique clocks, wood articles. leather bound books and such, and whatever else you might want to use it on. Such as silver tank coils. Two sources are: Light Impressions, suppliers of archival photographic materials: www.LightImpressionsDirect.com; $24.80

and Woodcraft supply, woodworkers supplies:
http://www.woodcraft.com/Product/2003235/462/Renaissance-Wax.aspx
On sale now for $20

Date: Tue, 4 Aug 2009 09:15:33 -0700 (PDT)
From: "Drew P." <drewrailleur807@yahoo.com>
Subject: Re: [R-390] gear lube

The high pressure additives seem to have been changed in contemporary gear oils such that they no longer bear the distinctive smell of the gear oils of yore. T'would always be best to perform the sniff test before applying.

Date: Tue, 4 Aug 2009 17:43:30 -0500
From: "Les Locklear" <leslocklear@cableone.net>
Subject: Re: [R-390] Lubricating RF slugs

I use Renaissance Wax on my wooden radios, two Zeniths and a Philco. Gives them that "WOW" appeal.

Date: Mon, 14 Sep 2009 20:27:08 -0500
From: <ka9egw@britewerkz.com>
Subject: Re: [R-390] [KA9EGW] progress

My parts washer has regular kerosene in it, think that'd hurt the RF deck? I mean, all the gears will get cleaned separately from the deck, obviously, I found a good tutorial or two disassembly/reassembly and mechanical alignment on kk4df's site and another on militaryradio.com. I'm loath to mess with the guts of the rf deck beyond the geartrain...the 10-turn stop may be out of sync but the cams all look lined up at 7+000. so I don't see disassembly of hte slug racks as necessary... This radio isn't showing any corrosion, just the effects of years in a shack that shares space with a machine shop and the attendant oil mist in the air...

Date: Wed, 4 Nov 2009 01:46:40 +0000 (UTC)
From: odyslim@comcast.net
Subject: [R-390] clutch repair

Does anybody know how to repair a deceased zero adjust clutch? I have been soaking one for months in penetrating oil, banging on it etc. It can be

taken apart but it has to be riveted back together. I dont have the right rivets. They are not pop rivets. Any thoughts Regards, Scott

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Date: Tue, 03 Nov 2009 20:57:03 -0500
From: jcoward5452@aol.com
Subject: Re: [R-390] clutch repair

I got a replacement from Fair Radio some years ago.I installed it and it worked fine.Now it does not work but I have yet to investigate why.What is wrong with yours?How is it seized?My knob turns but does not "grip" when attempting to "lock". Jay KE6PPF

Date: Mon, 21 Dec 2009 15:00:43 -0800 (PST)
From: Mark McNulty <noggie1999@yahoo.ca>
Subject: [R-390] Autotune

I have a power supply, 28vdc 5.3A. What I see from the schematic is hook up?DC to pins D and E of the remote control connector (J105), and tighten the locking keys down on kilo and mega cycle knobs. Does the sound right? and is there any advice other than dont do it? Thanks

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Date: Mon, 21 Dec 2009 23:16:10 -0500
From: Paul Anderson <paul@pdq.com>
Subject: Re: [R-390] Autotune

There are slip clutches on the inside of the autotune units that need to turn free with the right amount of torque. If the 50 year old grease is not cleaned out, they will not turn free, and the motor will tear up the line shaft pretty bad.

If you haven't already, take the KC and MC tuner units off the chassis, soak them in appropriate solvent for awhile (I used kerosene for more than a week each). At least then, the clutch should turn freely.

If you choose not to clean the old grease out of the tuning units, then I strongly suggest not applying power.

You also want to make absolutely certain that the tuner turns without any crunching whatsoever, as well, turning the lock pins slowly should produce no grinding, hangup, or other signs of dirt in the mechanism.

As long as the end stop clutches can turn, then I don't think applying power to the motor will hurt or break anything unless you plan to use the tuning very much and don't lube it according to the manual. It's a neat mechanism when it works!

Date: Thu, 24 Dec 2009 23:49:58 -0500
From: "Richard Spargur" <k3ui@comcast.net>
Subject: Re: [R-390] Autotune

Is the Autotune you are referring to the AN/TRD-1465 system used to remotely tune R-390/URRs remotely? The project name was "AUTOTUNE". I believe only 11 of these systems were built and I would be supprised to see one had survived. I would like to know if any survived. Sprocketed pulley, wheels/ gears were attached to the MC and KC change shafts and they were both tuned by belt fed servo motors to a frequency sent via teletype. Odd to see
work. If not what type of autotune was this version.

Date: Wed, 20 Jan 2010 21:56:15 +0200
From: "Paul Galpin" <galpinp@absamail.co.za>
Subject: [R-390] Out of the closet!

<snip> What does this tell us? The 390A I worked on long ago had the gears smothered in grease, put on by the handful. These two sets that I have just got have very clean gears, with a trace of oil only. Which is correct? Which is typically original?

Date: Wed, 20 Jan 2010 16:40:34 EST
From: flowertime01@wmconnect.com
Subject: Re: [R-390] Out of the closet!

<snip> The lube of choice these days is a synthetic motor oil. Time was when you hung around a Mobil gas station and garbed an empty quart bottle out of the trash can. The empty bottle had enough lube in it to do a gear train very well. This story should give you an idea of where you need to go. Your new gear trains should be nice and smooth. Watch the little rollers on the cam frames and make sure they are all clean, lubed and rolling.

Date: Wed, 20 Jan 2010 16:09:03 -0600
From: Ben Loper <brloper@gmail.com>
Subject: Re: [R-390] Out of the closet!

How do you apply the oil to the gears, I'm lubing a completly dry R-388 and don't want to make a mess of it. How about the slides, no grease there either?

Date: Wed, 20 Jan 2010 17:33:39 -0600
From: "Les Locklear" <leslocklear@cableone.net>
Subject: Re: [R-390] Out of the closet!

Syringe or toothpick, sparingly.
I used oil on the slides on my R-388's and 390 series.
A little bit of synthetic oil goes a long way.

Date: Fri, 22 Jan 2010 16:29:39 EST
From: flowertime01@wmconnect.com
Subject: Re: [R-390] Out of the closet!

Easy does it. Remember the antenna trim bushing is insulated
Do not get it wet, soaked or oiled.

Go off to the hobby shop and buy some small glue syringes.
The tip come separate and are cut square.

Pull the slug racks off the deck and oil separately.
While the slug racks are off, conduct the following exercise.

Hang the receiver off the edge of the picnic table.

Blast the dust out with compressed air.

Drip some rubbing alcohol through the gears.

Roll it in good by spinning the KC or MC dial.

Blast the gears dry with compressed air.

Drip oil into the gears.

Roll it in good by spinning the KC or MC dial.

Blast the extra out with compressed air. Either drip some oil into the bearings or blow some oil into the bearings.

Date: Fri, 22 Jan 2010 20:43:02 -0800 (PST)
From: "Drew P." <drewrailleur807@yahoo.com>
Subject: Re: [R-390] Out of the closet!

> How do you apply the oil to the gears,.....

An artist's paintbrush works well. Makes you think you are a master with the palette...

Date: Tue, 16 Feb 2010 07:47:41 -0500
From: "rbaldwin14" <rbaldwin14@nc.rr.com>
Subject: [R-390] R-390 Oldham Springs

Working on an R-390, I find that a prior owner seems to have omitted the tension spring on the Oldham coupler that connects the RF deck to the crystal oscillator chassis, How important is this item to the performance of the receiver and what might be a good source of such a spring? The appropriate spring is on the Oldham coupler on the PTO shaft. Are they the same spring?

Also, on replacing the RF deck with the dial set to 2.000 Mhz, it seems that the Mhz tuning shaft cannot be set completely counter clockwise. Is there a process for setting the Mhz shaft correctly? Thanks for any guidance you might be able to offer.

Date: Thu, 08 Apr 2010 01:25:12 -0400
From: wa3frp@aol.com
Subject: [R-390] R-390A RF Bandswitch Gear Alignment Question

I'm working from The Hollow State Newsletter Number 29 on an alignment of an Amelco R-390A. I've been able to successfully get the Veeder Root counter aligned. With the front panel removed and the R-390A tuned to 07+000 I've been able to make slight adjustments to each cam tip except for one. I cannot seem to locate the non-mar clamp that is associated with the cam for 8 - 16 Mc. I'd appreciate help from anyone on the list.

Date: Thu, 8 Apr 2010 20:11:32 EDT
From: Flowertime01@wmconnect.com
Subject: [R-390] R-390A RF Bandswitch Gear Alignment Question

A couple things you need to know What you find is true. I cannot seem to locate the non-mar clamp that is associated with the cam for 8 - 16 Mc. I'd appreciate help from anyone on the list.

Two problems here. You start with Band switch Gear Alignment Question and then ask about cam alignment.

I take this as two separate maintenance actions.
First some words on the band switch.
Then some words on the cams
Then an alignment procedure.

The band switch adjustment is separate from the cam adjustments. You will do the band switch adjustment after the cam adjustments. Most time you can do the cam alignment and not need to do a band switch adjustment. The band switch moves on a change of the MHz from octave to octave and not related to cam position. You can move the cams a lot and

not impact the band switch position. That is all an advanced (day three topic) lecture on the R390 gear train and its step wise function of the band switching scheme.

If you need to do a band switch adjustment, the proper method is to remove the RF deck and do that adjustment by eye ball of the switch. The band switch is six sections of wafer switch with six positions each. 6 x 6 is 36 contacts and they make both going up and down. You want an adjustment point that provides the most metal to metal contact on each wafer at each of the six positions. By eye its about a 30 second adjustment and 6 minutes of shaft turning and eye balling to make sure you are very happy. You may do this once in the ownership of your receiver. Twice if a clamp slips. (You will know it that clamp slipped.) It takes longer to pull the deck than to do the inspection and adjustment.

There is no adjustment for the 8 - 16 (fifth octave) cam. Just like you find.

Cams counter, VFO alignment goes in the following order. After all this you would do a band switch alignment if necessary (some / all octaves do not work at all. Or some octaves only work when dialing up or only down or by rocking the knob around It just is not smooth and automatic and seam less as expected and should be.)

The help starts here.

1 Find the zero adjust knob and set it to its center. (This is a feel thing and couple marks on the KHz knob and front panel with a pencil may help.)

2. Dial up on 7+000 MHz.

3. Move the KHz knob any where you need to so the 8 - 16 MHz cam aligns with its mark. (This should be close. If not you have a major clamp and gear misalignment. If this is true please send more mail and say so. This can be fixed. It is not normal unless there has been a real clamp come loose and things are out of "sync" by a whole lot. It got this way on a loose clamp and so can be fixed by loosing a clamp. Just like a rubic cube it can be all backed out to the start position.)

4. This is now at the zero point.

5. Run the dial lock down on the KHz knob and lock the KHZ shaft. (OK so you may want to unlock the shaft so you can spin some other shafts around to get to the clamps with the spline wrench. If it looks like the clamps can be reached at this time things are close.) This is where you want to be in zero.

6. Open the dial cover bezel and reset the counter to 7 +000. and close.

7. Adjust any of the cams as needed to get to them aligned with their marks.

8. Be careful as the VFO may be far enough off to hit and end point.

9. Release the dial lock and run the KHz knob to the top end. Over run should be 27 to 33. A little more or less is not a worry. This is not an exact value.

10. Dial the KHz knob all the way to the bottom end. Feel that you do not hit the VFO end point but come to the end of the 10 turn stop on the KHz shaft. Under run should also be -30 again any value is OK. These are not exact but do tend to be equal on both ends.

11. If you receiver is not balanced with almost equal over run on each and you feel compelled to make it so, you start disassembling gears and slipping things over a tooth and see if you went the right way. Not some thing you likely need to do unless things really were taken apart in the past and not exactly reassembled. This is an advanced topic but can be cured if necessary.

12. Set the receiver to 7 000 or back to 7+000 and turn it to the Cal position. Loosen the VFO clamp and adjust the VFO to zero on the cal tone.

This completes the mechanical alignment of the cams, zero adjust, dial counter and VFO.

Now inspect the band switch operation by getting a Cal tone on each MHz and at least each 100KHz of one of the MHz. Ensure the band switch makes contact on each transition of the octaves (.5 -.999, 1-1.999, 2, 3.999, 4- 7.999, 8-15.999, 16-31.999) As you go from 1, 2 on the MHz you expect the band to change smoothly. Each of the five transition points going both up and down. This is simply a mechanical inspection and listen to the cal tones. If this works the band switch is OK and needs no adjustment. If this does not work, understand the difference between a MHz or several not working and a band switch needing adjustment problem.

Now having moved a cam clamp the dial counter and the VFO, a full electrical alignment is in order. But you should never again need to perform any mechanical adjustment of the gear train until dome thing breaks or comes loose.

Good luck with this mechanical problem and enjoy. Roger 33C4H

Date: Sat, 10 Apr 2010 08:38:28 -0400
From: wa3frp@aol.com
Subject: [R-390] An Update - now called R-390A 8-16MHZ Cam Alignment

First of all, thanks to those who responded with that was information very useful in resolving this Cam Alignment issue. I agree that the title of my subject line was incorrect. It should have read R-390A 8-16MHZ Cam Alignment or R-390A RF Deck Cam Alignment Question or something similar.

Second, it is interesting to note that the detailed information that I got about how to align this cam does not appear to be present in the Y2K R-390A/URR Technical Reference. So maybe, it should be added. This was my problem. I had always assumed that the cam alignment was not in issue with my R-390A. I had not, until this week, ever removed the front panel. The top cams which as easily visible with the front panel installed were OK. And, I was not chasing a cam alignment issue when I removed the front panel. But, I quickly noted that the cams associated with 8 - 16 Mc and 2 - 4 MHz were both out of alignment by 10 to 15 degrees.

One solution offered, was to move the KHz knob to a point where the 8 - 16 MHz cam aligns with its mark and make that the new center point. But, that would not work in my case as the 8 - 16 MHz cam needed to rotate clockwise by 10 to 15 degrees which would have put the KHz dial well past 7+0035. So, I started to look at what was needed to remove a minimum number of gears to leave my Veeder Root counter properly centered with the end stops at xx-965 and xx+035 and the 8-16 cam in alignment. This is when I noted a novel solution that I have not found in the literature on hand here nor in any comment I received online. I found that by simultaneously releasing the clamps 16-32, 4-8 and 2-4 the four slug racks, associated with 16-32, 8-16, 4-8 and 2-4, all fell. This meant that the cam for 8-16 MHz was now free and available for adjustment without having to remove and reset any gears nor jiggle with the ten-turn stops. Could it be that easy? I can't find any negative effect and all of the cams are now aligned. So, please take a look at this and tell me if the documentation should be changed to indicate that (1) the adjustment of the cam for 8-16 MHz should always be made first and that this is accomplished by releasing the above mentioned three clamps and by hand rotating the gears until the 8-16 MHz cam is in its proper position, (2) temporarily locking the 8-16 MHz cam in place by tightening the clamp associated with the 2-4 cam without regard to the 2-4 cams position, (3) then individually adjusting the 16-32; 4-8; 2-4; 1-2 and 0.5 -1 cams.
I have to note that the gear I used to hand rotate the 8-16 cam into position was the large gear closest to the no-mar clamp for the 16-32 MHz cam. Also, note that this is a split gear and that care needs to be taken to

assure that both sides of this gear remain in place and in contact with its associated gear on the 8-16 MHz shaft. Otherwise, the split gear will lose tension and you will be looking to reset both springs that hopefully are still attached to the split gear. (This did happen to happened to me). Comment?

Date: Sat, 10 Apr 2010 19:54:49 EDT
From: Flowertime01@wmconnect.com
Subject: Re: R-390A 8-16MHZ Cam Alignment

Two good jobs well done.
First and foremost you fixed your receiver and got it in operation.
Second you shared it with us and we get to learn a bit.
Thanks for posting all that detail.

Date: Sat, 28 Aug 2010 21:48:45 -0500
From: <ka9egw@britewerkz.com>
Subject: [R-390] RF Deck done

Long hobby day. 6 hours start to finish. Complete geartrain disassembly, cleaning with various nasty solvents, giving up [running out of brake cleaner, carb cleaner and diesel starting fluid] and soaking all the gears in a 1:3 solution of green cleaner followed by a toothbrush and compressed air, label and pull the slug racks, green cleaner and a hose on the rf deck [after taping the transformer tops], 2 hours in the oven, dry trial-fit reassembly, everything turns, the only leftover parts are a stack of .003 [approx] shim washers I have to look at the army manual to figure out where they go, and as it is now you can cruise the 10-turn range with one finger on the thingy that goes on last right behind the kc-change knob. Of course, that's without the counter or the pto hooked up. Next is disassembly and judicious lubrication, followed by retiming all the cams. Only fly in the ointment is I'm guessing this set got dropped on the kilocycle change knob at some point--the shaft has about .030 runout. Just enough to be really annoying. Most of the binding was coming from the disc rubbing on the clutch gear. V-blocks and the arbor press will fix it. Unless anyone has a spare they'll part with?

By the way, what's the deal with the taper pin on that shaft? the end of it that sticks out interfered with the clamp ever seating square. 2 minutes with a jeweler's file fixed that.

Still trying to figure out the alignment of the geneva mechanism at 7000[+]. [7999+1 in other words]. Not clear on what it does. I know Jan Skirrow says there's only one alignment of that mech will roll the bandswitch over when changing from 7Mc to 8Mc...tomorrow's another day.

Also, on the back of the RF deck, not visible until it was removed, was a red hang tag with no writing. Any ideas what that was about? I'm expecting to have the deck back in the radio by quitting time tomorrow. <snip>

Date: Sun, 29 Aug 2010 00:20:33 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] RF Deck done

>Still trying to figure out the alignment of the Geneva mechanism.....

Do this by eye ball of the band switch with the deck out. There are six sections and six positions. You are looking for the adjustment point that gives your deck the maximum switch contact mesh area at all those contact points. It is an eye ball call. Check all the contacts both running the gears up and down. Repeat the inspection more than once.

Date: Sun, 29 Aug 2010 20:00:38 -0500
From: <ka9egw@britewerkz.com>
Subject: [R-390] Veeder-Root counter

Man, this counter mechanism is junk. Without it the RF deck tunes with one finger. Put the counter on, and it's rough, it binds hard in spots...back the bevel gear off to full disengagement and the rest of the geartrain's smooth again. I don't know if this indicates a very new Veeder-Root, or a very old one, or if this is just a bad example.

I have no idea what I might get away with for lubing it, so I haven't. I'm not sure lube would help; it feels like it's full of burrs somewhere in it's mechanism. Anyone else ever run into this, and what did ya do to fix it? How do you even get the @#$% thing apart?

Date: Sun, 29 Aug 2010 20:01:23 -0500
From: <ka9egw@britewerkz.com>
Subject: [R-390] RF Deck

Well, after having the front panel of the RF deck on and off a couple dozen times, and the plantary drive mechanism in and out ditto, I come to the inescapable conclusion that the drawing of the geneva mechanism at 7+000 in the Y2K manual is in error by something less than 1/3 tooth. I now have no bandswitch movement on the 6-7 upshift, bandswitch indexing on the 7-8 upshift, and barely perceptible movement on the 8-9 upshift. I mean you really gotta look close to see it. I'm thinking that's about as good as it's going to get.

Date: Mon, 30 Aug 2010 10:50:04 -0500

From: <ka9egw@britewerkz.com>
Subject: [R-390] RF Deck redux

Now that I have my RF deck back together and apparently everything is in time, I have a sanity-check question...the two lowest-range slug racks appear to only be affected by the kilocycle change control, whereas all the others turn when you rock the kilocycle knob AND index when you rock the megacycle change knob. This is normal, right?

From: Perry Sandeen [mailto:sandeenpa@yahoo.com]
Sent: Monday, August 30, 2010 11:49 AM
Subject: Tooth Error

I come to the inescapable conclusion that the drawing of the Geneva mechanism at 7+000 in the Y2K manual is in error by something less than 1/3 tooth. If you could please write up the problem and solution along with a reference to the drawing I'll try to post a supplement or give to to W. Li to add to his "Pearls" info.

Date: Mon, 30 Aug 2010 12:41:47 -0500
From: <ka9egw@britewerkz.com>
Subject: Re: [R-390] Tooth Error

In my R390A required complete disassembly and cleaning of the RF geartrain. Per accepted practice, I put it back together with the cams indexed for 7 +000.

Aligning the Geneva mechanism [which was cleaned in-place and hence not removed from the RF deck] per the illustration in the Y2K manual, page 6-8, shows the Geneva Drive intermittent gear and it's associated pinion set with one tooth of the pinion at exactly 9 o'clock [and other pinion teeth at 7:30 and 6:00], with the clockwise of two teeth on the intermittent gear immediately below the 9:00 tooth on the pinion. When assembled according to this drawing, the majority of bandswitch indexing took place on the 7-8 uppshift but there was also a significant amount on the 6-7 upshift with corresponding issues with slug rack cam timing.

After numerous disassemblies and reassemblies, I was able to ascertain that for my rf deck [YMMV], the proper indexing of the geneva drive intermittent gear is as follows:

[1] Meshed with the respective teeth exactly as shown on page 6-8 of the Y2K manual. What I'm trying to say here is page 6-8 does NOT show these gears improperly meshed **to each other**.

[2] The Geneva Drive intermittent gear, however, needs to be <1/4 tooth

counterclockwise of the position shown, and the pinion needs to be <1/4 tooth clockwise.

How this was accomplished, was multiple removals and replacements of the differential and the large brass double gear [installed in Step 10 of Scott Seickel's excellent photo tutorial] to facilitate indexing clockwise by one tooth the idler shaft large gear [installed in step 2 of Seickel's] that is driven by the aforementioned "Step 10 double gear". This will set the Geneva drive's interrupted gear very slightly [we're talking something probably best measured in minutes of arc here] CCW of the position shown on page 6-8. I really hope I explained that right. When finished, the tooth of the Geneva drive pinion shown at 9:00 on page 6-8 of the Y2K manual, ends up at a couple minutes after [clockwise of] 9:00 at 7 +000 Mc. This is nowhere near a full tooth on the Geneva Drive. With this minor correction, 90+% of all movement of the rf bandswitch takes place on the 7-8Mc upshift and the remainder on the 8-9Mc upshift.

Date: Mon, 30 Aug 2010 12:49:17 -0500
From: <ka9egw@britewerkz.com>
Subject: Re: [R-390] Tooth Error

Another, clearer way to say it, is "Set everythin up exactly as shown in Scott Seickel's tutorial, then, before performing Step 10, rotate the idler shaft installed in Step 2 clockwise by one tooth of the idler's larger gear."

Date: Mon, 30 Aug 2010 13:06:36 -0500
From: <ka9egw@britewerkz.com>
Subject: Re: [R-390] Tooth Error

Even clearer: Another, clearer way to say it, is "Set the Geneva drive as shown on page 6-8 of the Y2K manual, assemble everything exactly as shown in Scott Seickel's tutorial, except, before performing Step 10, rotate the idler shaft installed in Step 2 clockwise by one or two teeth, as needed, of the idler's larger gear. Verify after assembly that 90+% of the bandswitch's indexing takes place on the 7-8 upshift." This is what I had to do on my RF deck, which had a blank red hangtag attached that was not apparent til the deck was removed from the radio. I question if the geartrain being mis-assembled at the factory or in a depot, was the reason for the red tag to begin with. Electrically the deck seemed fine.

Date: Mon, 30 Aug 2010 18:54:51 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Veeder-Root counter

>.....Veeder-Root counter mechanism binds hard .....

The counter should run just as smooth as the rest of the RF deck. If after clean up and lube it does not run smooth, then it's time for a replacement. You can give them a bath in soap and water. Then lube with synthetic oil. The paint mostly will stay on with soap and water. A round in the dish washer may or may not remove all the paint.

Look for bent parts that may be binding. Back when the device was considered not repairable. It clean and lube did not get it then it was replaced. Today you may have to invest the time to save the device.

They did go bad. The plastic wheels would wear so bad on the shafts, you just could not get the device to dial smooth. They would also break a tooth and thus not dial. Some would then jam on the broken tooth and lock everything up.

Date: Mon, 30 Aug 2010 19:13:22 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] RF Deck redux

>...the two lowest-range slug racks appear to only be affected by the kilocycle change control, >whereas all the others turn when you rock the kilocycle knob AND index when you rock the >megacycle change knob.....

True statements.

P.S. Remember in the low two octaves (.500-.999, 1-1.999) the range is under or equal to 1MHz. The Megahertz knob is a step bigger than the range of these two octaves. In the upper octaves (2-3.999, 4-7.999, 8-15.999 16-31.999), you must also add some small change across 1Mhz of VFO range. so you get some small cam motion with VFO range. On the 1-1.999 the cam is one to one with the VFO. On the.500-.999 the cam is also one to one with the VFO and rolls over again from .000-.499. As the whole set is tied together, the RF deck has no idea what Mhz you are on. You see the bottom two octaves go through the full range of motion every time you run the VFO from end to end no matter which Megahertz you are using.

The upper octaves also make the required range of motion with the VFO. But as this is a small adjustment compared to the 16 Mhz of the top octave. You do not even notice the change in the slug rack as you run the VFO from end to end, but you do see the index steps of the Megahertz changes and the small rocking motion of the Kilohertz changes.

Date: Mon, 30 Aug 2010 19:29:36 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Tooth Error

Next time I have a deck apart, I will try to get us some good crisp photos of the Geneva gears and pass them around. We can then likely get them on some web sites for reference. Lets keep the photos out of the Y2K manual on line. A lot of visitors and Fellows use slow dial up service. I like the Y2K manual in part just because you can get it in parts from the web site as you need it. If we start imbedding photo's in it then it will start down loading slowing like photo's. Put a reference in the Y2K manual to one photo in a set and put the set index on the same page as the Y2K manual. Then we can select a needed photo and wait for a needed photo to down load. Bundle the whole bunch for those with the high speed access. Just my thoughts. Roger

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From: Joe Foley [mailto:redmenaced@yahoo.com]
Sent: Monday, August 30, 2010 7:05 PM
Subject: Re: [R-390] Veeder-Root counter

I hate to sound like a broken record but that sounds like a bent shaft,...

Date: Tue, 31 Aug 2010 03:16:05 -0500
From: <ka9egw@britewerkz.com>
Subject: Re: [R-390] Veeder-Root counter

Take the veeder-root off and turn the kc input shaft [the one that gets the little bevel gear] by hand and you can feel the binding and roughness...the rest of the rf deck i'm quite satisfied with how it turned out...

Date: Wed, 1 Sep 2010 18:07:06 -0400
From: "Dennis" <w4den@mebtel.net>
Subject: [R-390] Ten Turn Stops Detail : R-390A

Probably easy for all the pros out there on this one. I do not have a breakdown on the mechanical ten turn stop. It seems while working on the radio with my bad hands I have come across some strange things. Decided to clean both ten turn stops up while everything else was tore down. There is one , KC control with one detent tab facing to the rear and the rest are facing front. But the other, Mc control has two detent tabs facing rear, rest face front? Both have brass washers inbetween metal tabs, starting AFTER the first or front tab. And , also two brass and one metal washer at the very back. Here again, both have these washers reversed with metal at the back on one and brass at the back on the other? If I had a diagram, or a correctly built unit, I could figure it out. It appears one tab facing the rear would be right but I am having problems finding my glasses these days so guessing probably wont work. Like most of us today , a bailout sure would be wonderful. Grateful for suggestions.

Date: Wed, 1 Sep 2010 17:29:41 -0500
From: <ka9egw@britewerkz.com>
Subject: Re: [R-390] Ten Turn Stops Detail : R-390A

Shouldn't all the tabs face the same direction, towards the rear of the radio, that is, away from the front panel of the rf deck? I probably need to know this too before I finish putting the front panel back on my rf deck
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Date: Wed, 1 Sep 2010 20:35:12 -0400
From: "Dennis" <w4den@mebtel.net>
Subject: [R-390] Ten turn stops

Tnx Brian for feedback. You are in good shape it appears. I tried several ways and stops work fine with all detents facing rear. Not positive about the washers but they may only be on this unit. The stops did not work correctly when I bought this radio. Also, there are many other issues which little information is available.

Tnx to all for help with gear clamps. I found a company that makes the same type of clamp. They are WM Berg MFG. but having trouble with any small quantities so far. I will share info if I track down a local supplier, etc.

Date: Thu, 2 Sep 2010 18:45:07 EDT
From: Flowertime01@wmconnect.com
Subject: [R-390] Ten Turn Stops Detail

These are ten turn stops plus that 3/4 turn over run on each end.
Does you assembly run 10 and 2/3 to 10 and 3/4 turns from end to end?
Take a look at the tabs. You need something to have the tabs stop against.
There is a back brass color washer that is "engaged" and does not rotate.
It has a stop.
The turn stops / washers / butterflies / do dads all have tabs and face backwards.
The "collar" on the shaft has a pin that hits the front tab and stops.

All the spacers between the tabs have three functions. They fill the space between that front collar on the shaft and the back plate. They reduce friction between the tabs. They form bearing to hold the tab plates more squarely on the shaft.

You own a receiver not an erector set. Put your toy back together before you loose some of the parts and enjoy it as a receiver. Arrange those parts in any order that gives you a nice smooth 10 plus turn operation. If you have to move some of those spacer washers around or swap them for a better operation so be it. You may want to rub the stop washers with some files or stones to remove burs. Any extra filling on the tabs will just

increase the range from 10 plus turns toward 11 turns. So be it. Split the difference in over run to be equal on both ends. There should be nearly a one to one ratio of spacers and tabs. With N - 1 spacer washers.

You need to fill the shaft between the bearing plate and the collar staked on the shaft via a pin just to reduce mechanical slop. There are just so many tabs washers needed. You need to fill the rest of the space with any thing. Not to much to get tight. Not to big to get in the way of the tabs. Not thicker than the tabs. Not too sloppy, Not to wishy washey. A whole bunch of
thin washers lets you get to with in one thin washer clearance.
Distributing shim filler washers through the stack lets them have other functions like reduction of friction.

Simple engineering that was adjusted at time of assembly and left like that forever.

Date: Thu, 2 Sep 2010 20:25:31 -0400
From: "Dennis" <w4den@mebtel.net>
Subject: [R-390] General Info R-390A

Thanks for the input from all. And Roger, good details on the mechanical stops. I did some filling, cleaning, and moving some of the brass shims around and all seems to perform well now. The shims were in rough shape causing tuning to be fairly rough. Hopefully, this will smooth out the bad spots.

On another note: gear clamps, I am waiting to hear back on some numbers and info. A distributor in Raleigh, NC said that Berg makes many different types and sizes, as well as gears for other applications.

Great group here for such a large part of history!

Date: Wed, 8 Sep 2010 19:34:31 -0400
From: "Dennis" <w4den@mebtel.net>
Subject: [R-390] Rf Deck MC Change Gear

Just finished rebuilding a RF Deck for 390A, (I thought). I calibrated the mechanics and everything seemed to be going smooth, until I noticed the split gear clamp on the MC ten turn stop.(Gear that advances detent on diff gear and osc switch. It is the gear , # 115/116 fig 84 p145 / 146 of the y2k manual I have. The photo, as well as another one show the gear clamp mounted to the front.

I looked at pictures I took before breaking down for cleaning and it shows the clamp mounted to the front. It also shows wear / rubbing on the clamp.

I remounted this gear / clamp with clamp facing front of radio. However, it is clearly rubbing the back of the front panel when the gear is properly engaged. It appears that it should be reversed or mounted with the clamp facing the rear so as not to bind . There is also a article describing rebuilding the deck and it says to mount this gear clamp facing the rear. (even though the pix with it shows it the other way) ????

So, has the clamp style changed, thicker than .200in, or the manual wrong, or things just wore somehow that there is less clearance than original?

At any rate, looks like I may need to take front panel back off and turn gear/ clamp around backwards from the diagrams and the way this thing was set up before I started?

I just can't believe the metal on metal could be correct. Tnx to all for listening

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Date: Wed, 8 Sep 2010 19:48:08 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Rf Deck MC Change Gear

Nothing magic here. Put it in back wards if you need to.

In my receiver the clamp sets against the front bushing.

Loosen the split gear clamp on the Mhz shaft

Slide the split gear back off the brass gear (only one split needs to slide off)

Load the split gear on tooth of spring tension (no need to over load)

Slide the split gears to about center on the brass gear so they do not on

load when the back split gear runs off the brass gear.

Leave just a little oil space between the clamp and the plate.

You gear pair may not be tightly together thus the clamp sets a bit forward and rubs. You should be able to get the split gear to run on the brass gear and not have the clamp run against the front plate. If not then turn it around and run it that way

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Date: Wed, 8 Sep 2010 20:13:23 -0500
From: <ka9egw@britewerkz.com>

Subject: Re: [R-390] Rf Deck MC Change Gear

Yeah, when I did my RFdeck recently I puzzled over this too...finally put it on "backwards" and it runs in the middle of it's mating gear, no rubbing, no binding, so I called it a fait accompli and left it be.

Date: Sun, 19 Sep 2010 12:39:42 -0500
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: [R-390] Question about the Y2K manual... (or how Randy can be dumb as a rock)...

I'm confused (nothing new)... so please someone set me in the right direction and give me a swift kick. I'm putting my gear train back together (I'll post about some VERY big "surprises there another time"... and using the Y2K manual.

On pages 191 - 195 is the zoning chart for the exploded gear train shown in 6-36. Great. should make getting the shims, spacer bushings, etc. in the right place(s) much easier. Uh-huh. I start trying to use the chart - and find that what seemed obvious a short time ago - now has me totally confused. I look at the diagram - there is a gear set with "call out" (index?) 41.

I look at the chart - Index 41 = 1/4 inch retaining ring. Two shims and bushing on the shaft of 41 marked 42 & 43 - but the chart lists them as No. 8 riveted gear and 4-40 square nut.

What am I obviously overlooking????

Date: Sun, 19 Sep 2010 11:08:43 -0700
From: "Craig C Heaton" <wd8kdg@att.net>
Subject: Re: [R-390] Question about the Y2K manual... (or how Randy can be dumb as a rock)...

Once again; check out Scott Seickel's excellent " R-390A Gear Train Rebuild".
http://www.r-390a.net/faq-refs.htm Scroll down the page, good references! The hard part for most is organization. When taking this beast apart, lay the parts out in some type of order. Fasteners for each part should remain with that part, etc. Could put screws back into the hole from which they came until time to put it all back together.

If you are cleaning the gears, clean one at a time, then place it back in the correct location per Scott's instructions. Worked for me.

Date: Sun, 19 Sep 2010 14:38:32 -0400

From: Glenn Little WB4UIV <glennmaillist@bellsouth.net>
Subject: Re: [R-390] Question about the Y2K manual... (or how Randy can be dumb as a rock)...

I noted the same thing. It looks like the exploded view is from one manual and the call out is from another. This may have been a problem with the original documentation.

Date: Sun, 19 Sep 2010 15:01:09 -0500
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Question about the Y2K manual... (or how Randy can be dumb as a rock)...

>Exploded diagram and Index chart do not match in the Y2K manual...

First - Thanks to all who responded with suggestions. Yes - the gear train was (is mostly) in several hundred pieces - after being cleaned in carburetor cleaner, then mineral spirits, then a final wipe down with alcohol - it looks like new.

Yes, it would have been nice to have "cleaned in place" - i.e. remove a part - clean it - put it back. but 1) too filthy; gritty, grimy, nasty and 2) too many parts missing - that need to be replaced (parts decks are inbound - thanks to another list member!!!!).

Second - the mystery solved - yes - as Glenn Little had postulated- it appears the diagram is from one manual - with the chart from another. Fortunately - I do have some resources here (from a place far, far away and a zillion years ago - i.e. our time in Guam) - and found that the chart does match the exploded diagram (fold out pages 145/146) in the army manual TM 11-856A which I still have a photocopy of. Knowing how TMs work - later versions probably have the same (or similarly useful) diagram.

Third - I'm trying to scan the diagram I have - since it's bigger than my scanner - I'll have to scan it in sections and stitch it. When I get something useful - I'll post a link to it on my server. Thanks to all who replied!!!

Date: Sun, 19 Sep 2010 15:12:03 -0500
From: <ka9egw@britewerkz.com>
Subject: Re: [R-390] Question about the Y2K manual... (or how Randy can bedumb as a rock)...

+1 on Scott Seickel's tutorial. Good stuff! I think the entire disassembly, cleaning and reassembly took me less than a day start to finish, plus a bunch of time figuring out the much-less-than-1/3-tooth incremental error in the y2k manual's description of the 7+000 position of the Geneva

machanism...which I've already written up at the request of "Perrier". Also there are several manuals, including TM-11-5820-358-35 [field and depot maintenance], available as .pdf's also from r-390a.net.

Date: Sun, 19 Sep 2010 16:51:22 -0500
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Question about the Y2K manual... (or how Randy can be dumb as a rock)...

OK - I have uploaded three versions of the "correct" exploded gear train diagram to go with the index chart in the Y2KR3 manual... the three files are all the same -except resolution and size.

http://www.comcents.com/geartrain web.jpg 1800X1077 72dpi 305KB Prints 25X15"

http://www.comcents.com/geartrain print.jpg 4050X2424 300dpi 2.8MB Prints 13.5X8.5"

http://www.comcents.com/geartrain source.jpg 17043X10200 1200dpi 30.1MB Prints 14.2X8.5

My server is pretty fast - so download the whichever one suits your purpose best. - the web version is good for on-screen viewing, but doesn't enlarge too well; the print version prints virtually identical to my copy (quite good) - enlarges OK a small amount - the source version is very sharp - can be enlarged to nearly 10X20 feet and hold resolution quite well.

Date: Sun, 19 Sep 2010 21:26:20 -0500
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Gear train exploded diagram and index...

"On further looking into this - we found that the published index in the Y2K manual doesn't fully match the diagram I have either... So much for a quick fix. That doesn't mean a fix isn't in the works, though. I've OCR'd my index - and as soon as we've had a chance to error check it against the original - I'll put it up as well - then we'll have at least one complete "set"..."

Here is the link:
http://www.comcents.com/public_html/Gear_Train_Index_Chart.pdf

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Date: Mon, 20 Sep 2010 07:35:50 -0700
From: "Craig C Heaton" <wd8kdg@att.net>
Subject: Re: [R-390] Gear train exploded diagram and index...

Great Work! Needs to be added to the Y2K (R?). The gear train exploded diagram was/is too small for my old eyes, so I went on a search. Google was my friend and found Scott's stuff.

Date: Mon, 20 Sep 2010 10:10:08 -0500
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Gear train exploded diagram and index...

We're not done - and yes - we're looking into incorporating some "corrections" to the Y2K manual (I'm in touch with Perrier) - but not until we're sure we have it completely right.

Size - the 30MB file - while admittedly obscenely large - it can be blown-up to roughly 10 X 20 FEET and still hold good detail (that's why it's so large - 1200dpi resolution). Printing that size isn't real practical - but on-screen (and scrolling about as needed - one can see the detail VERY well... Using the Windows Picture and Fax viewer (i.e. the default "preview" program from Explorer) - one can blow it up until a single gear fills a 19" screen - one can see the "split" in the lock washers, etc.; scroll around and see the assembly details VERY clearly.

Date: Mon, 27 Sep 2010 07:04:51 -0500
From: <ka9egw@britewerkz.com>
Subject: [R-390] saga cont pt 11

Oh, joy...swapping out that RF can the 2nd time, when I pulled the slug rack straight up after unhooking the springs, the slug body stayed in the coil but the little coil spring came up with the rack. I'm guessing at some point it was bent right there and straightened which caused a fatigued spot. It's right at the end of the core it broke, with maybe 1/4 turn sticking out of the core. I'm open to sidea/suggestions on how to fix this, or should I just look for a replacement slug?

Date: Mon, 27 Sep 2010 08:41:33 -0400
From: k2cby <k2cby@optonline.net>
Subject: [R-390] saga cont pt 11

The springs for the coil slugs can be readily soldered end-to-end. It's an easy fix. Just clean and tin the broken ends before joining them.

Date: Mon, 27 Sep 2010 19:46:00 EDT
From: Flowertime01@wmconnect.com
Subject: [R-390] Broken Slug Spring

With good acid solder the spring stuff can be soldered. Good for fixes at the top end. Some good 5 minute epoxy will also make a good bond. Good for

fixes at the slug end. Long term find a good used core. Worry not if the exact length changes in the process, unless it gets very much to short or to long.

Date: Sat, 18 Dec 2010 13:01:24 +0200
From: "Paul Galpin" <galpinp@absamail.co.za>
Subject: [R-390] Gearbox .avi

Somewhere I have seen an .avi (or .mov?, .mp4?) movie about dismantling and re-assembling the R390A gearbox. Now that I need it, I can't find it, of course. Can anybody help?

While we are on the subject, how free-running should the kc/s tuning be? Mine needs a definite firm grip to get it rotated.

Date: Sat, 18 Dec 2010 12:15:10 +0000
From: Graham Baxter <graham@delphe.co.uk>
Subject: Re: [R-390] Gearbox .avi

I've often wondered about the optimum tuning torque too. I have two EACs, one of which I have given a full strip and cleaned, the other just a cotton bud and relube type of service. The one which has been completely stripped I can turn with just my little finger in the flutes of the knob. The relube one needs an index finger. I used ISO 68 machine tool slideway oil on both.

Date: Sat, 25 Dec 2010 13:57:18 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Gearbox

Even here you have two EACs which we would think were of equal quality parts. We would think that after a good cleaning one way or another and relube that they would act equally good.

All it takes is one sorry gear set, and who knows what pair it will be in any receiver. It could just be a miss punch in a bearing location from some dust in the index jig.

Pull the VFO out of the stiff one and see how the gear train feels. Often as not the bearing in the front of the VFO is a stiff point. Pulling that item apart and cleaning it is more work than most of us want to take on. But some "dry cleaning" will often reduce the friction.

Often just one bearing point not cleaned well will increase the friction. This is why often the full tear downs with carefully eye ball for grime produces a better low friction gear train than just the bath over the edge of

the bench produces.

Date: Wed, 12 Jan 2011 17:17:13 +0200
From: "Paul Galpin" <galpinp@absamail.co.za>
Subject: [R-390] Drawing and parts list

I am in the middle of re-building my Amelco gearbox. Wanting to be sure of where bits go, I printed out the "Zoning for RF Gear Train Assembly Fig 6-36" list, and Fig 6-36 itself. Nothing seems to make sense!

For example, in the drawing, No 60 is clearly a gear assembly, but it is listed as a 2 - 4 MHz cam o313-1. In the Sect 7 Parts list, o313-1 is also a cam, Index No 60. It seems that the Zoning list and the Parts list agree, but the index numbers were put on the drawing at random - or am I completely misunderstanding the system? Are the numbers on the drawing the Index numbers - or what? Can anyone explain?

Date: Wed, 12 Jan 2011 10:08:17 -0600
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Drawing and parts list

Yes, we're aware of that. I'm in the process (along with Perry Sandeen) of "redoing" those drawings, parts lists, etc. - though several minor "disasters" have interrupted my efforts for a time. To help you out right away - I'll post what I have currently - though be advised - we're still adding details (bushing thickness specs and such) - and of course I'm sure one or two "oops" have slipped into my work as well. Here is the "revised" figure 6-36: <http://comcents.com/geartrain%20print.jpg>

And here is the parts list to go with it:
<http://comcents.com/Gear_Train_Index_Chart.pdf>

Again - these are preliminary - and subject to revision. Eventually - I'll get the last of the additional illustrations and photos done (such as the clutch mech. breakdown and assembly, etc.) and they'll be added to the Y2K manual.

Date: Wed, 12 Jan 2011 11:02:27 -0600
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Drawing and parts list

Sorry guys for the "mis-step"... I decided that getting yet another "non-conforming" set of "info" in the wild wasn't a good idea... So here are more "up to date" drawings - that SHOULD be the final form (i.e. ID / Index numbers of parts), etc. This index also has some of those "missing" measurements I mentioned. So let's try this again (and if anyone

downloaded the version I posted earlier - *Please* delete them and get these... again sorry for the problem... New Figure 6.36 (sans exploded view / parts of clutch, etc.):
<http://comcents.com/geartrain-prelim.jpg>
And here is the correct index / parts ID sheet:
<http://comcents.com/index%20for%206-36.pdf>

Date: Wed, 12 Jan 2011 12:19:55 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Drawing and parts list

You might look here: http://www.r-390a.net/Y2K-R3/10_Chapt_10.pdf
Down a few pages are some nice photos of the geartrain rebuild.

Also look here: http://militaryradio.com/R390A/R390RFDeck/
These don't clarify the mismatches in the documentation, but they certainly will help with a proper rebuild.

Date: Wed, 12 Jan 2011 11:53:47 -0600
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Drawing and parts list

> I take it that your list is the same as the original, but with more info in. Is that correct?

No, None of the lists "out there" are 100% correct (not even in the Government documentation).

> Thanks again for a heroic effort.
No big deal - just takes time.

Any idea how the "official" 6-36 drawing got so wrong? Yes, - the "error" was that the illustration from one source was used - with an "index page" from a different source. According to Perry - it was an "accident" that happened as a result of trying to find the "clearest" illustration - (from the several sources available) and not realizing that different books used a different "index" scheme. I do a bit of technical writing and photography now and then - so it's not a big deal - esp. when I can con – er - beg Sherry into helping. (I did an article for the Summer 2002 Issue of the US Navy's "UnderSea Warfare" - and one of my photos was used in the December issue of Carstens Publications "Railroad Model Craftsman" magazine as a "reference", for instance).

Date: Wed, 12 Jan 2011 13:48:00 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Drawing and parts list

Am I the only one having problems with the picture?

> <http://comcents.com/geartrain%20print.jpg>
Whenever I try and open it with several programs, it comes up as "Invalid Format".

Date: Wed, 12 Jan 2011 14:10:44 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Drawing and parts list

I think that link is supposed to be: http://comcents.com/geartrain-prelim.jpg

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Date: Wed, 12 Jan 2011 13:39:06 -0600
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Drawing and parts list
>
Again sorry for the confusion - I did post links earlier that now will not (intentionally) work... the correct links are:

New Figure 6.36 (sans exploded view / parts of clutch, etc.):
<http://comcents.com/geartrain-prelim.jpg>

And here is the correct index / parts ID sheet:
http://comcents.com/index%20for%206-36.pdf

Date: Wed, 12 Jan 2011
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Drawing and parts list

Yup... it happens. When you think about when most of that documentation was done - and think about the "tools" we have today they didn't have (spell checkers, data bases, XL, etc.) it's a wonder they got them as close as they did... considering how complex the radios are...

Date: Sat, 15 Jan 2011 19:55:33 +0000 (UTC)
From: bavarianradio@comcast.net
Subject: [R-390] Cam pins

Hello all, I am in the process of rebuilding my R-390 RF deck and have it mostly disassembled.(don't panic, I'm a clocksmith by trade) I have come to a stumbling block, the brass rack cams are held onto the shaft by what look like tapered pins. I have been unable to extract these by ordinary means, is there a trick to them?? This is necessary as my radio was a mouse condo for a while before I acquired it. I also have a spare RF deck

on the bench to answer any synchronizing questions upon reassembly. Any info would be greatly appreciated! 73's Ross

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Date: Sat, 15 Jan 2011 15:34:41 -0600
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Cam pins

Depending on manufacturer (and era) - the pins can be a bit different. Most "stick out" of the shaft a little more on one side than the other. On those most (99+%) can be "punched" back through from the *short side* of the pin. I.E. the pin is driven in until in binds - (they're tapered) and usually they bind BEFORE they get 1/2 way through (the part "going in" stands "more proud" than the part "sticking through" - punch the short side "back through"). I use a drift-pin punch just slightly smaller than the hole. If you need to know what the hole "usually" is - I can measure one for you (I have several decks apart).

Date: Sat, 15 Jan 2011 15:38:29 -0600 (CST)
From: nryan@mchsi.com
Subject: Re: [R-390] Cam pins

I've disassembled R-390 and R-390A RF decks, but have stopped short of driving out the cam pins lest I do something irreversible to them. Leaving the cams on the rods makes for awkward handling to be sure; however, with care you should be able to get everything as clean as you like.

From: "Drew P." <drewrailleur807@yahoo.com>
Subject: Re: [R-390] Cam pins

Note that for reinstallation of the taper pins, they must must be driven until they seat, so that there will be no relative motion between cam and shaft. They will otherwise elongate the holes in the soft brass of the cam, and no amount of driving the pin in will correct this. I had a cam/shaft assembly with such a malady. I drove out the pin and removed cam and shaft. I reassembled the "bad" cam to the shaft with the pin (to the extent possible) and Loctite 271. I laid the assembly on a machinist's surface plate such that the cams' "valleys" were facing down, and twisted the bad cam to alignment with the good. After the Loctite had cured, I then drove out the pin from the "good" cam and reassembled cam/shaft assembly into the RF deck with the pin.

Date: Sun, 16 Jan 2011 20:55:42 +0000 (UTC)
From: bavarianradio@comcast.net
Subject: Re: [R-390] Cam pins

THanks Norm and Drew, I appreciate all of the tips!! My ultrasonic is just

a smidgen too small to submerge the whole thing, I wouldn't do it anyway, you just can't be sure of the condition of the bearings unless you take it apart. Granted, unlike a clock, this assembly is not in constant motion, but is moved occasionally and with no real torque applied. I'm sure the simple green is much less intrusive than the ammoniated stuff I use on clocks as well. I am intending to only do this one RF deck and possibly the spare I have, so I don't want to invest in a new ultrasonic cleaner. (although it would be a tax deduction for the business!) I'm off to make a jig to tap out the taper pins... wish me luck!

Date: Mon, 17 Jan 2011 03:40:27 +0000 (UTC)
From: bavarianradio@comcast.net
Subject: Re: [R-390] Cam pins

Just a progress report...After 3 hours and releasing only 1 lousy taper pin from the cams, I studied the beast again and realized that with much less trepidation, I may be able to unbolt the front and rear plates from the chassis and clean the mechanical elements without the electrical chassis. I was able to do this and satisfy my need to "clean" the bearings. I was able to get most of it in the ultrasonic cleaner and work it with steel wool pads and brushes. In doing this, I was able to move the bearings toward the center and clean/polish the actual bearing surfaces on the shafts.As a bonus, the brass parts are also shiny and clean as well. I have been photographing this operation and will have a link to the photos when I get finished (about July, I'm guessing hihi) Thanks for all of your support and ideas, 73's Ross W1EKG

Date: Mon, 17 Jan 2011 13:55:18 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] Cam Pins

I imagine that even the cleanest looking geartrain will leave a bunch of gunk behind in an ultrasonic cleaner tank after that baptism. As you do clockworks there probably is a big urge to get in there and make those bushings, bearings and shafts spotless.

Thank goodness for shaft clamps. At least we are not sitting there with little files, trying to remove the set-screw burr. I had a older piece of gear where someone decided to use a hammer to drift the burred up shaft through a brass bushing.

Measuring geartrain drag is so subjective. I am surprised that someone has not made a jig using a spring tension scale to measure the force.

Those miniature bearings on the ends of the slug racks look suspicious to me. It is not as if they are running on a mirror smooth, finished surface

(same with the cams) When you add up a half dozen of those things, gear backlash, slight misalignments, dirt and maybe corrosion in a bushing ther ends up being drag.

I went through that with an SP-600 and it was amazing how smooth the tuning became. I stopped just short of taking the cad-plated front panel and pressing out the bushings and putting in something synthetic like teflon.

Date: Mon, 17 Jan 2011 14:25:11 -0600
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Cam Pins

The geartrain I'm going through right now- those cleaned up nicely and all are very free. What surprised me was something I'd not seen before: this geartrain was made by Capehart, and the "bearings" on the "plates" that guide the rack "fingers" - aren't bearings - they're "rubbing blocks" rather than bearings. All of the RF decks I'd worked on before had "real" bearings for those... Granted – there can't be a lot of friction created by those - as they are just a "stop" guide - but still - seems odd - and yet one more "well - isn't this special" to note in the manual...

Date: Mon, 17 Jan 2011 23:08:10 +0000 (UTC)
From: bavarianradio@comcast.net
Subject: Re: [R-390] Cam Pins

Hi Tisha, Yes, I'll be changing the ultrasonic fluid right after this job for sure!! What a mess... You're right, putting something even partially assembled in the tank gives me the creeps, but as I said previously, there's virtually no torque and no constant motion like we see in clock movements. I was taught that EVERYTHING must be disassembled before cleaning, and it sounds like I did way more disassembly than R-390 folks are accustomed to, But I take clock movements apart on a daily basis and am confident about reassembly (especially since I have another one here to look at) I need to put an E. Howard banjo clock back together before I can play with the 390 deck again, So it's off to the clock bench for now.

Date: Thu, 03 Feb 2011 15:47:49 -0600
From: Richard <theprof@texoma.net>
Subject: [R-390] Benchmark - R390A odd-ball cleaning and lubrication

Once upon I time I had an article published in the 1998 Summer-Fall Hollow State Newsletter on R-390A cleaning and lubrication. That was before this mail reflector was running full tilt and the collective wisdom prevailed. Without starting a major upheaval I wanted to post the results. To preface this I started with a 1968 Dittmore-Freimuth unit from Fair

Radio. It wasn't badly gunked up but did have a broken clamp that required complete disassembling of the gear-train. I cleaned everything with Hoppe's #9 Solvent and lubricated with Hoppe's Gun Oil and Gun Grease. After reassembly the KC change know would spin with a little finger. I caught a lot of flack for my choice of solvents and lubricants. I'm still not sure why people thought it wise to argue with someone who also uses the same materials on firearms. After over 12 years of frequent (several hours/day three or four days/week) operation in my nice air-conditioned and heated workroom it still not time to lubricate the gear-train again. I realize it is not 24/7 in the desert but then neither am it:) However next time Mobile-One is it...

Date: Fri, 4 Feb 2011 08:09:57 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Benchmark - R390A odd-ball cleaning and lubrication

Can't be any worse than carburator cleaner...that's what I use for the tough spots.....

Date: Fri, 04 Feb 2011 08:59:26 -0600
From: Jerry K <w5kp@hughes.net>
Subject: Re: [R-390] Benchmark - R390A odd-ball cleaning and lubrication

Hoppe's #9 also gives the shack a nice smell, brings back memories from my childhood of cleaning my .22 after a day's squirrel hunt. For REALLY gunky situations, go to the gun shop and bring home a can of Birchwood Casey's "Gun Scrubber" degreaser--but make sure it's the one with 1,1,1 trichloroethelyene (sp?). However, make sure you use it outside only and keep it off your hands.

Date: Fri, 04 Feb 2011 09:33:19 -0600
From: Jerry K <w5kp@hughes.net>
Subject: Re: [R-390] Benchmark - R390A odd-ball cleaning and lubrication

Ok, I think I have it right now: 1,1,1 Trichloroethane!

Date: Fri, 04 Feb 2011 10:39:14 -0500
From: Ron Hunsicker <ronhunsi@ptd.net>
Subject: [R-390] More chemicals from the dark side

Since the introduction of the mostly-polymer Glock pistols in the mid-1980's many other firearms manufacturers have introduced firearms with the grip and lower frame manufactured from polymer chemicals and the barrel and its frame from steel and aluminum.

Apparently, some of these polymers react badly to some traditional

firearm-cleaning chemicals. Shooter's Choice "Polymer Safe Quick-Scrub Action Cleaner" is said to be "safe for polymers, plastics and metals" and is also said "...not to harm delicate optics, sights, paint, or camouflage finishes." As with most gun cleaners, it is "extremely flammable." Remember, there are many types of plastics and paints, many that are not used to manufacture or coat firearms. Try it in an out-of-the-way place before general application.

Also, firearm cleaning chemicals are used to remove products of combustion, lead, and brass. Many do this by reacting chemically with the lead or brass. Be careful what you dunk stuff into. It is my understanding that Hoppe's #9 is a primarily cleaner and not a lubricant or preservative. Once you are done cleaning with #9, Shooter's Choice Quick-Scrub, or Gun-Scrubber, wipe the gun or radio part with a soft rag, and then apply a suitable lubricant or preservative.

Date: Fri, 04 Feb 2011 11:02:15 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Benchmark - R390A odd-ball cleaning and lubrication

That's the one (1,1,1 Trichloroethane) that's been BANNED since sometime back around 1979 or 80! We used to get it in the Military to use as a de-greaser. It came in one gallon, 5 gallon, and 55 gallon drums. That stuff even takes the rubber coating off of a wire loom!

Hoppe's #9 is one HELL of a lot safer! The military even got rid of "RBC", (Rifle Bore Cleaner).

The environmental issues, along with other safety issues took place. In lieu of Mobile 1, I use a very light "sewing machine" oil. I haven't had it attract a lot of dust and the like.

Date: Fri, 4 Feb 2011 11:08:49 -0500
From: "Shoppa, Tim" <tshoppa@wmata.com>
Subject: Re: [R-390] More chemicals from the dark side

My limited experience with automotive chemicals applied to non-automotive mechanisms:

* Kerosene is far and away the best parts wash solvent given some working time (e.g. overnight).

* Brake cleaner is a very fast-acting degreaser/solvent. It dries skin out real fast too. Smells like cleaning fluid? It also can take off many paints and probably not good to get it on synthetic rubber. I have used it near plastics without any obvious problem.

* Carb cleaner seems to have acetone and toluene in it. It doesn't dry skin out real fast like brake cleaner, but I've also seen it damage plastics.

My conclusion with respect to 390/390A geartrains, with my experience rebuilding yellow stripers, is that kerosene soaking is far and away the way to go but does require tearing down/rebuilding.

Date: Fri, 04 Feb 2011 10:12:36 -0600
From: Barry Williams <ba.williams@charter.net>
Subject: Re: [R-390] More chemicals from the dark side

Break Free!!!! That's all you will ever need.

Date: Fri, 04 Feb 2011 11:21:20 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] More chemicals from the dark side

The kerosene method is also highly suggested by our good friend Roger, AI4NI, Ruszkowski. It's one of those good tried and proven things. It's probably safer then a whole lot of other things.

Date: Fri, 04 Feb 2011 11:26:00 -0500
From: "Stephen M. Murphy" <murphys@comcast.net>
Subject: Re: [R-390] More chemicals from the dark side

Like some others, I've had good results cleaning mucked-up gear assemblies with Hoppes #9, then lubing things very sparingly with synthetic grease and light machine oil, as appropriate. Works fine, lasts a long time.

Date: Fri, 4 Feb 2011 10:53:26 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Benchmark - R390A odd-ball cleaning and lubrication

Trichlor is back in spray cans...

It's a great cleaner/degreaser and as long as you don't go swimming in it probably as safe as any other cleaner/degreaser that works. Note I mentioned works. Lots of the so called "Green" cleaners now days don't really get the job done that great..

Date: Fri, 4 Feb 2011 10:56:22 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] More chemicals from the dark side

Another good one not mentioned that I have started using as a degreaser on
engine parts because it's much cheaper than the typical degreasers sold for that purpose is good ole Mineral Spirits. Followed up with dilute Simple Green to remove the oily residue it works great.

Date: Fri, 4 Feb 2011 11:00:39 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Benchmark - R390A odd-ball cleaning and lubrication

Something overlooked is when doing a geartrain teardown and rebuild is to deburr any gear-teeth. It is referred to in the addendum douments of Y2K to
remove any burrs on the sides of the gears with a fine file.

I use an ammonia based jewelry polish to remove the dull oxides from brass
gears and to make them shine. Polishing is with a lambswhool rotary wheel,
it quickly finds burrs on gears that I touch up with a fine file. The polish also works really nice on the metal baseplate where the gears mount to but
it will remove the indexing lines so I use a spring loaded center punch to make a permanent index for gear alignment. The bushings get cleaned out with
the jewelry polish and a cotton swab.

I do use grease (tungsten disulfide with a synthetic carrier oil) (MK Impex Canada, MK-WS2-HT) on bushings and bearings as it's coefficient of friction
is 0.015. For sliders and gearteeth I use Mobil 1 (Mobil 1 contains ~70 ppm
of moly). Looking into one of my radios you will not even see the grease. It is exactly where it should be, between metal pieces in close contact.

Date: Fri, 4 Feb 2011 12:21:47 -0500
From: "Shoppa, Tim" <tshoppa@wmata.com>
Subject: Re: [R-390] More chemicals from the dark side

Didn't we discuss here in the past year, something about keeping Simple Green away from aluminum chassis or at least making sure it was very thoroughly washed off afterwards to prevent long-term corrosion from residues? When you gotta clean off the cleaner that you used to clean off the cleaner it starts sounding like "the old lady who swallowed the fly".

Most of the geartrain parts are steel but I wonder if some parts might be

aluminum?

Date: Fri, 04 Feb 2011 12:30:11 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] More chemicals from the dark side

It may well have been discussed here, as is just about anything and everything. The Karcher Corp. that makes pressure washers, makes the pump out of Aluminum and Brass. They are very picky as to what should or should not be run through them. When directly contacted, they said Simple Green was just fine. I've been using it for over 8 years now. No damage or issues. I don't even
have to run clear water through it, although I do anyway. If it was so detrimental to aluminum, then why is it so highly recommended and used by General Aviation owners?

Date: Fri, 4 Feb 2011 11:36:10 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] More chemicals from the dark side

I've not found Simple Green to be a problem. I does need to be washed off well but most of this work is done in the yard with a garden hose anyway. I wouldn't recommend using it full strength on aluminum parts for sure but I don't think it's a problem. I'm also a pilot and there have been many discussions about it's use for cleaning aluminum parts in an aircraft. It is generally not recommended but there are many things that are generally not recommended when it comes to how you do things to an aircraft where your life may depend upon it. Cleaning a radio is not going to kill anybody down the road.

There are lots of places where chemicals sprayed into the belly of an aircraft can migrate to that you can't get it out easily...and may not want to stick a garden hose. Not so much a problem in an R-390A chassis. I can't say I have ever gone back into a chassis at a later date, that I have cleaned and rinsed with Simple Green that has shown signs of corrosion.

I also use 409 and have no problems with that. Heavily rinse everything...and dry in the sun...

Date: Fri, 04 Feb 2011 12:38:14 -0500
From: Bill <bmarx@bellsouth.net>
Subject: Re: [R-390] More chemicals from the dark side

It may not be appropriate for the 390/A but for light oil lubrication I like Mineral Oil...cheap as the dickens and you buy it at the drug store. Very light similar in feel to sewing machine oil.

Date: Fri, 4 Feb 2011 11:38:49 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] More chemicals from the dark side

It's not recommended here by the majority of General Aviation owners I frequent... We have an A&P on the field and most of the owners do their own Annual inspections under his watchful eye before being signed off on by the certified Inspector.

Date: Fri, 04 Feb 2011 11:38:40 -0600
From: Barry Williams <ba.williams@charter.net>
Subject: Re: [R-390] Benchmark - R390A odd-ball cleaning and lubrication

I used to carry a small bottle of triclor when I rode 2 stroke motorcycles. Fouling plugs was a major problem and a few drops of triclor fixed them right up. My dad had an unlimited supply of it at home.

When I mentioned using Brake Free for metal parts like guns, I meant to lube and protect the surfaces, not clean them. I learned about this from a serious gun collector I worked with. He had 400+ 9mm pistols on display at home and I asked him how he kept up with oiling them. He uses Brake Free. It seems to last almost forever.

For cleaning parts, I sometimes clean small model airplane engines. They get hard, baked on castor on the aluminum and steel surfaces. A crockpot with antifreeze set to the lowest temp setting works like magic when left for 10 hours, or so. You have to do this outside and mark the crockpot in some way so the wife won't put it back to service in the kitchen.

Date: Fri, 04 Feb 2011 11:42:13 -0600
From: Barry Williams <ba.williams@charter.net>
Subject: Re: [R-390] More chemicals from the dark side

A member informed the list some years ago that the Air Force had prohibited the use of Simple Green for exterior aircraft cleaning because it corroded metal when not washed away thoroughly. A thorough washing was meant as when parts were disassembled.

Date: Fri, 04 Feb 2011 13:04:00 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] More chemicals from the dark side

The "Flying Circus" here in Bealton, VA use Simple Green every day they do their Aerobatic routines. They use it on props, leading edges, and struts. They use it to clean all the bugs and bug entrails after all the low altitude

routines. They don't shower the entire aircraft with it. They too have an A&P in the group that oversees their annuals and other work that they are allowed to do. There is also an FAA representative on the field for every show. It seems to be an issue of how mad one is about overuse.

Date: Fri, 4 Feb 2011 12:16:12 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Benchmark - R390A odd-ball cleaning and lubrication

What would really help would be a heated ultrasonic cleaning tank. Of course, when dealing with flammable or combustible materials you need to make certain that the flash point temperature is not exceeded and you have
adequate fume control. I would set the thing up in the yard and run it outside. It is amazing what an ultrasonic cleaner will do for some of the gear packs like the clutch mechanism that is usually filled with 40 year old grease. With any water based cleaning solution you need to be aware of electro-galvanic corrosion due to dissimilar metals. Some solvents react badly with alkali earth metals (aluminum) and others react badly with lead (some of the trichloro... solutions).
Light oils like kerosine, mineral spirits, etc.. are usually inert to the metal but may take time to soften and remove built up deposits. I have used "white gas" (Stoddard Solvent, Coleman fuel) as a cleaning solvent. It is not as volatile as gasoline (that has lots of light ends and additives) and a little more aggressive than kerosene. Usually I put the parts in a sealed container with the solvent and shake the container around.

The bad rap that Simple Green had came from a few instances where it was used in too strong of a concentration and the residues were allowed to build up in an enclosed space. Then you will get corrosion or a strong reaction due to dissimilar metals. (note: even changing the temper of a metal by drilling, heating or bending can cause a local electrgalvanic reaction between that area and another section on the same part.

Date: Fri, 04 Feb 2011 13:29:49 -0500
From: "Jim" <jbrannig@verizon.net>
Subject: Re: [R-390] Benchmark - R390A odd-ball cleaning and lubrication

I used diluted Simple Green to clean my S-line and a few other BA's... Granted, this is not the challenge of the R-390A gear train...but Simple Green with artist brushes for agitation and a through rinse with distilled water worked wonders... Compressed air to clear off the standing water and a day or so in the bright hot sunshine did the trick... (Does anyone remember bright, hot sunshine?)

Date: Fri, 4 Feb 2011 16:29:19 -0600

From: Francesco Ledda <frledda@att.net>
Subject: Re: [R-390] More chemicals from the dark side

Simple Green should no be used on airplanes or aluminum structures. It will corrode rivets etc. I may be used if heavily diluted and the surface is washed with water afterward. Corrosion is the biggest enemy of airplanes. I don't understand why anyone would want more corrosion. I also know from personal experience that not all A&P are the same. Old timer pilot and aircraft owner...

Date: Sat, 5 Feb 2011 01:55:52 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] More chemicals from the dark side

The Army published a prohibition against Simple Green in one of it's mechanics magazines quite some time ago.

Quoting: "Never use an cleaning product on your aircraft that has not been approved by the Army. SIMPLE GREEN has not been approved and is not authorized for use as an aircraft wash. It is highly corrosive on aircraft aluminum. It also makes high-strength aircraft alloys brittle. If your unit is using SIMPLE GREEN as an aircraft wash, STOP!" from a publication called PS 573, AUG 00. I had not heard that General Aviation owners use it.

Date: Sat, 5 Feb 2011 12:28:05 -0500 (EST)
From: bonddaleena@aol.com
Subject: Re: [R-390] R-390 Digest, Vol 82, Issue 9

The company 'Sunshine Makers'" produces "Simple Green".

Good News: They also make a product called 'Simple Green Precision Equipment Degreaser'. It "WAS" sold right next to the familiar SG green bottle. It came in a BLUE bottle. This stuff has a label stating "meets Boeing spec D6-17487P". The label also states "NON_CORROSIVE safe on aluminum and carbon fiber!" I restore boatanchors and old test equipment. I have tried literally EVERY type of cleaner and this stuff was flat the BEST.

Bad News:

Home Depot discontinued it. It was right next to the green bottled SG. Every time I (or a close friend) would visit the store, we would pick up a few bottles. Alas, the last time I found it was on the "discontinued" rack. I bought every bottle they had. I am down to my last bottle..... Got some funky cigarette stained knobs? Put them in a jar of the 'blue' SG, shake it,

and they look brand new. If they are REALLY disgusting, you might have to use a soft toothbrush. It will NOT remove lettering, white marker lines, etc. It leaves Dakaware knobs shiney. Some cleaners will dull the bakelite type knobs. Everytime I use it, I am just amazed. I'm gonna contact the company and see if I can buy a case or two. It's THAT good, and I'm pretty tight with a buck! ha ha

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Date: Sat, 05 Feb 2011 14:17:00 -0600
From: Barry Williams <ba.williams@charter.net>
Subject: Re: [R-390] R-390 Digest, Vol 82, Issue 9

I sometimes restore little radios and those are notorious for having nicotine and cooking grease coating all of the exterior of plastic radios. I just put whatever in a bath of very strong dishwashing detergent and water. I usually soak this overnight and they always come out looking new and shiny. This is guaranteed safe with Bakelite and I wouldn't hesitate on using it on catalin. A lot of what I work on means one of a kind knobs and cases nowadays as you can't find substitutes easily.

Date: Mon, 07 Feb 2011 11:22:53 -0500
From: Gord Hayward <ghayward@uoguelph.ca>
Subject: [R-390] Benchmark - R390A odd-ball cleaning and lubrication

White gas is hexane - really light end stuff. Its a great solvent but is volatile and very flamable. If you use an ultrasonic cleaner, watch out for sparks. I haven't seen one yet that's rated as explosion proof so I will not use that solvent in a sonicator.

The can for Coleman fuel also says it has some corrosion inhibitors - I have no idea what these are made of. The bottom line - be careful when using solvents. As I said to one of my grad students - No Kabooms!

Date: Fri, 11 Feb 2011 08:14:17 -0800 (PST)
From: Steve Toth <stoth47@yahoo.com>
Subject: [R-390] Extreme Simple Green sources (blue label) from the dark side

I was just out on the Simple Green website. Per the site they distribute through W.W. Grainger, Fastenal, and Sherwin Williams paint outlets as well as McMaster Carr (if you don't mind paying shipping) to mention just a few common sources. Available in a variety of sizes up to, and including, 55 gallon drums.? They even recommend it for engine cleaning which is kind of interesting to me since I also restore cars.

Date: Fri, 11 Feb 2011 11:53:55 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>

Subject: [R-390] Simple Green from the Dark Side

Back in the old days when I worked in the oil industry the mechanics used to use Simple Green and run it through the "Steam Gennie". It would cut through the worst grease (and paint and primer....) The Steam Gennie was supposed to burn #2 heating oil and had an AC blower fan and a continuous feed of fresh water from an outdoor faucet. They had a blending tank to mix the Simple Green with the feed water.

One day they "ran out" of #2 heating oil and since we were a pipeline operation they pulled a batch of turbine fuel from one of the sample taps (turbine fuel just happened to be going through the station at the time). It was quite a fiasco, the steam gennie no longer made the nice humming sound, as it heated the water coils and made a fairly low pressure steam. Instead that thing howled (you could hear it everywhere) as it gulped in large quantities of water and Simple Green. The discharge pressure was so high that they kept blowing up steam hoses (you know, the kind with the 90 degree twist lock). They used a drill to bore out the nozzle (thinking it was plugged or something) and finally the steam gennie would howl away while very high pressure steam and Simple Green was blasted everywhere. (it took two people to control the cleaning wand, the pressure was that high).

It would cut through the oil, the caked on grease, stripped off the white, lead based paint and even tore into the red lead primer paint, leaving behind bare steel. The live steam, combined with Simple Green was a wicked combination.

After a half day of them playing with the jet fuel powered steam gennie the coils finally ruptured in the machine. Boy, that place was spotless. We had to have the painters come in the following week to repaint the steel.

Being funny (or maybe just misinformed) they also whipped the steam gennie wand across the area manager's car to give it a good cleaning. It stripped off the wax finish and left a permanent foggy, etched look to all of the windows.

For that day it should have been called "Mean Green". Safe for the environment, lethal on human flesh. BTW, to rupture a 250 PSI hose means that the steam temperature was at least
400 F

Date: Fri, 11 Feb 2011 13:10:19 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Simple Green from the Dark Side

Funny thing about "Steam Gennies"! They are a bit picky about what they get fed where! Burning diesel in them usually lets them play "nice". Feeding them JP-4 or JP-5 would be interesting to watch from AFAR! It is like watching a run away diesel..... best seen from a nice distance! One mechanic had a connecting rod pass between his knees. He never stood as close again under ANY conditions!

Date: Sat, 26 Feb 2011 13:41:46 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] R-390 Digest, Vol 82, Issue 41

>.....when cleaning and lubricating the gear train.....KC 10 turn stop

When you get all those bushings cleaned, lubed and aligned along with the gear train, you can rest a finger in the detent on the kc knob and use it like a spinner knob."

I have run across that too. When it is clean you should hear the tink-tink-tink of those detents ticking down as you spin the dial real fast with your finger.

I often wondered why they did not go for a ten turn brass worm gear for that mechanism.

I think some folks do not understand what "light lubrication" means. I would swear that some of the stuff I have run across is as sticky and nasty as Cosmoline. BTW, if you are ever looking for new Cosmoline I have a source of one pound containers. Works wonderful on aluminum mast sections where they slide together. Goes great on toast too... maybe doubles as a denture cream.

Date: Sat, 5 Mar 2011 00:20:10 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Gear Lube

Mobile 30W synthetic motor oil.

Some of the new gun lubes, watch your mail for some specific brands from the Fellows.

There are now other brand of synthetic oil besides Mobile.

Apply a lot, work the gears, and then wipe, blow, rub off as much as you can to just leave a thin film.

Date: Thu, 10 Mar 2011 10:13:50 -0500 (EST)

From: wa4aos@aol.com
Subject: [R-390] My 2 cents regarding cleaning RF decks

I have a Sharper Tec 5 gallon Ultrasonic cleaner. One of those $1500 commercial units that will take the solvent temp up to 140F. When I bought this cleaner I had hoped to dunk the nose of the entire RF decks from R 390 and R 390A's into the bath and clean without removing the gears. I had several badly damaged RF decks that were NOT candidates for resurrection to test with. I tried Purple Power first and had disastrous results. At 140F the Aluminum face plate on front of an R390A RF deck turned black in less than 20 minutes. The brass gears became tarnished and Hash marks for alignment as well as the serial number info disappeared..

Next I tried Simple Green and had similar results but not as bad. The gears did start to tarnish and the Aluminum plate did start to turn dark. The hash marks held up a little better but were starting to fade. I have not checked the PH of those cleaners but my guess is they are alkaline and that probably accounted for the Aluminum reaction. Not being a chemist, I am not sure what happened with the brass.

Now I use a Toluene based cleaner called RS 8 that I bought from Sharper Tec, the company that made my cleaner; It cost $200 for 5 gallons. I heat the tank up until it reaches 100F and put my basket of gears and parts in the soup with gears removed and the RF electronics chassis removed from the RF frame of a 390A RF deck. Yes, with a little work, I remove the gear frame from the chassis containing the electronics and put the frame in the cleaner.. It would be difficult if not impossible to take the frame completely apart since the hash mark cams are pressed onto the frame and provide the alignment foundation of the entire deck.

Even though I still remove the gears I am additionally able to clean all of the shafts, cams and fittings that are permanently attached to the frame. I have done this enough times that I can take the RF deck apart down to the frame and put it back together in about an hour and a half, less cleaning time, Once I have pulled the RF deck from a 390A. It is more work but afterwards, I know ALL of the grime and crud is fully removed from places on the frame that are impossible to reach otherwise; just because it's difficult to reach parts of the RF deck
does not mean there is not crud there as well First time I pulled the 390A deck apart, down to the frame and re assembled it, I spend about 6 to 7 hours figuring out how to do everything; that was with many digital pics I took to help reverse my steps.

I have had no reactions with the toluene product but I don't leave the parts in the cleaner more than 30 minutes at 100F.That seems to be the

maximum time required for a very good cleaning with my cleaner.

Date: Thu, 10 Mar 2011 10:01:16 -0600
From: Barry Williams <ba.williams@charter.net>
Subject: Re: [R-390] My 2 cents regarding cleaning RF decks

It may be time to try an old crockpot with antifreeze. Set the temp to the lowest setting. Do this outside for 8-12 hours. It is safe for aluminum too. Just remember the fumes are toxic, and so is the crockpot after you do this. If you stole it and plan to sneak it back into the kitchen- don't!

Anyway, the crockpot method will remove a lot of seemingly impossible to remove crud. It isn't corrosive like Simple Green that people still think is magic juice.

Date: Thu, 10 Mar 2011 10:12:33 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] My 2 cents regarding cleaning RF decks

I am not surprised by the discoloration of the brass gears or the aluminum plate during a soaking in any solution that does not have a neutral pH. Brass and Bronze are more cathodic than aluminum (.4 V compared to .9 V). Since the parts were soaked together you will get a current flow (~.5 V) between the dissimilar metals and it will show up as discoloring at first and eventually at wholesale corrosion (pitting, ultimate dissolution) if left that way for any time. With any sorts of acid of alkali cleaning solutions you should only wash components of a similar chemical make-up together. Even the bronze bushings in an aluminum panel will begin to react and eat away at the aluminum as aluminum is "sacrificial" to a more noble metal (gold, silver, nickel, copper, bronze and brass). Alkali earth metals (anodic) like magnesium, zinc, aluminum, etc... will go into solution and plate out on a noble metal. This can be an acidic, alkali or salt solution. As you mentioned we do not know if any of the cleaning solutions are at a perfect pH of 7.0 or if they stay there as contaminants build up in the bath.

Date: Thu, 10 Mar 2011 11:18:53 -0500
From: Curt Nixon <cptcurt@flash.net>
Subject: Re: [R-390] My 2 cents regarding cleaning RF decks

As a model airplane engine cleaner, many of us have used the crockpot with antifreeze. It will indeed clean up the worst cases of baked on castor oil which acetone, lacquer thinner, etc will not even touch. I HAVE had it turn aluminum engine castings dark however. It seems that parts like 6061 material (machined parts) are ok and come out bright..castings that are alloyed with ? sometimes react and turn dark.

Date: Thu, 10 Mar 2011 11:21:01 -0500 (EST)
From: ToddRoberts2001@aol.com
Subject: Re: [R-390] My 2 cents regarding cleaning RF decks

I have always had good results over the years by soaking an RF Deck in a tub of Kerosene for several days. Periodically I will swish around the gears and shafts with a paintbrush or toothbrush if needed to help loosen the dried up grime. Let the Kerosene sit for a day without disturbing it at the end so the sand and grime will settle to the bottom of the tub. A fresh rinse with clean Kerosene at the end will insure no sand or dirt remains. The Kerosene can be recycled by pouring it through a good filter. Always be sure and remove the RF Deck transformers before soaking in Kerosene. The transformers have the small ceramic trimmers inside. The trimmers have some kind of rubber or plastic gasket inside that will swell up if soaked in Kerosene for several days. I found that out the hard way! Otherwise the Kerosene appears to be harmless to all other electronic components like inductors, capacitors and resistors plus the Kerosene is non-conductive so it will not short out anything or cause corrosion like traces of water could do if left behind.

After a good soaking I place the cleaned RF Deck on a towel in front of a dehumidifier for a few days until it is bone dry then be sure to lubricate all moving parts, shafts and bearings with Mobil 1 Synthetic before and during reassembly and before use.

Date: Thu, 10 Mar 2011 11:23:26 -0500
From: Mike Carroll <mike@lacperdu.com>
Subject: Re: [R-390] My 2 cents regarding cleaning RF decks

I'll add my one cent. LRultrasonics.com ; Application bulletin #46 covers television tuners, whatever they are. They recommend 3-5 minutes cleaning time, followed by a cycle in their "Instrument Rinsing Solution" No recommended cleaning cycle seems longer than 10 minutes. If anyone chooses to go this route, Follow their directions explicitly. I skimmed, rather than read their directions, and stuck my favorite 1911 slide solidly to the frame. Much weeping and gnashing of the teeth.

Date: Thu, 10 Mar 2011 11:32:27 -0500
From: "Shoppa, Tim" <tshoppa@wmata.com>
Subject: Re: [R-390] My 2 cents regarding cleaning RF decks

"Me too" for the Kerosene, especially for blue/yellow stripers. (Not sure what level of cleanliness others are aiming for but removing the layers of grimed up sand was my priority.)

Date: Thu, 10 Mar 2011 12:32:07 -0500 (EST)

From: wa4aos@aol.com
Subject: Re: [R-390] R-390 Digest, Vol 83, Issue 29

I am not surprised by the discoloration of the brass gears or the aluminum plate during a soaking in any solution that does not have a neutral pH. Brass and Bronze are more cathodic than aluminum (.4 V compared to .9 V) Since the parts were soaked together you will get a current flow (~.5 V) between the dissimilar metals and it will show up as discoloring at first and eventually at wholesale corrosion (pitting, ultimate dissolution) if left that way for any time.

With any sorts of acid of alkali cleaning solutions you should only wash components of a similar chemical make-up together. Even the bronze bushings in an aluminum panel will begin to react and eat away at the aluminum as aluminum is "sacrificial" to a more noble metal (gold, silver, nickel, copper, bronze and brass). Alkali earth metals (anodic) like magnesium, zinc, aluminum, etc... will go into solution and plate out on a noble metal. This can be an acidic, alkali or salt solution. As you mentioned we do not know if any of the cleaning solutions are at a perfect pH of 7.0 or if they stay there as contaminants build up in the bath.

Date: Fri, 11 Mar 2011 14:23:29 +1100
From: "Pete Williams" <jupete@internode.on.net>
Subject: [R-390] RF deck cleaning

G'day list------- I'll support the kerosene cleaning technique ----- done it a couple of dozen times or more with nil side effects .. Apart from the personal satisfaction (doubtful) of complete tear down and dousing in favorite brew, the results are fine and any discolorations imperceptible and probably no worse than when first assembled .

Procedure ----- remove all xfmrs, slug racks,---Take the bare chassis out on the back lawn where the weeds are , and with a container of kerosene --- I use mineral turpentine (similar) used for paint thinning which is non oily or corrosive - lavishly and enthusiastically brush and slosh the liquid around and thru the mechanism .Having done that to ones satisfaction, a prolonged high pressure hosing from the domestic water supply completes that part of the exercise. Usually I dry it out in the hot sun or put in the kitchen oven on gentle heat if weather inclement !---done on Wednesdays as missus out that morning.

Reassemble----------. Deoxit on RF switch, clean pins on coils ------ fine oil - ex sewing machine grade on gears etc having freed up rollers and reoiled. Loosen up trimmers on RF coils and careful not to crack-- a little heat from solder iron works if stuck With nearly 2 dozen refurbished over the years and including my own. there's been no complaints or obvious side effects

We're not about to use in military environment so apart from the satisfaction aspect, there's little trade off benefit from exuberance in spotliness.

Date: Tue, 15 Mar 2011 23:05:29 -0400
From: "Ian Gallimore" <iangallimore@rogers.com>
Subject: [R-390] Reduced 500-1000KHz sensitivity

My 390A was purchased from Fair five or six years ago. I've recently noticed a significant decrease in sensitivity in the 500-1000KHz band. Other bands appear to be OK. Just before this occurred, I noticed that the sensitivity could be dramatically increased by turning the MHz knob a little toward the 01 setting and back, but this no longer helps. Has anyone else noticed this? Any suggestions gratefully received.

Date: Tue, 15 Mar 2011 22:44:17 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Reduced 500-1000KHz sensitivity

Sound like you may have either a slug rack sticking or you have dropped a slug. Sometimes they come loose from the adjusting screws and fall down into the coil causing a misalignment.

Date: Wed, 16 Mar 2011 08:32:28 -0400
From: "Jim Temple" <jetemp@insightbb.com>
Subject: Re: [R-390] Reduced 500-1000KHz sensitivity

One thing that is universal about the Fair "massacre" radios is that they sat in the elements for months, if not years. I bought 2 of them and upon refurbishing, found many inexplicable faults that was taking a long time to correct.

Finally, my solution was to redo each and every mechanical ground. That included the ground under can and tube socket tabs. You need to actually lift the tabs and clean between the frame and component. That did the trick, and the rest was a lot more straightforward.

Date: Wed, 16 Mar 2011 12:50:37 +0000 (UTC)
From: bavarianradio@comcast.net
Subject: Re: [R-390] Reduced 500-1000KHz sensitivity

I would be tempted to look for a broken or loose shaft clamp on the slug rack for that frequency band. I believe it's the second one from the right if it's a 390 and not a 390A.

Date: Wed, 16 Mar 2011 13:14:27 -0500

From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Reduced 500-1000KHz sensitivity

I had the same problem with the 2-3 MHz band, it would have reduced sensitivity (more like deaf) and I could jiggle the MHz knob and it would come back.

I am not certain exactly what fixed it as I had to pull the RF deck but I checked the alignment of the multi-stage rotary switch under the RF deck and the multi-stage rotary under the crystal deck.

I cleaned up everything (Q-tips and DeOxIt) and jiggled the alignment some, checking what contact tabs were closed at each rotary position and when I reassembled the receiver the problem "went away".

Not very scientific, not very definitive but it worked. Took about a half day to pull the deck, flip it on it's back and roll through all of the positions, cleaning as I went and to put it back together again.

I did not have the satisfaction of pointing at a specific part or connection and saying "aha!".

Date: Wed, 16 Mar 2011 15:58:56 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Reduced 500-1000KHz sensitivity

The quickest thing to check is to see that the slug racks are not hanging up and that the cam followers are in fact following the cams tightly. there could be crud built up on the cams or rollers. Also, check that all of the springs are attached to the slug racks. Check the slides for lumps of crud, etc. Clean, clean, clean, oil.

Date: Wed, 16 Mar 2011 19:53:07 -0500
From: Barry Williams <ba.williams@charter.net>
Subject: Re: [R-390] Reduced 500-1000KHz sensitivity

One of mine has a slug that will hang up infrequently when changing mHz settings. I'm now in the habit of rocking the MC knob a little to settle the slug.

Date: Wed, 16 Mar 2011 21:00:06 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Reduced 500-1000KHz sensitivity

Don't misread the instructions...DO NOT OIL THE SLUGS!
Clean them and their coil form bores with Q-tips and dust with Talc....

Date: Wed, 16 Mar 2011 21:00:52 -0500 (CDT)
From: nryan@mchsi.com
Subject: Re: [R-390] Reduced 500-1000KHz sensitivity

A hanging slug should be easy to fix as follows:

1. Unhook the hold down springs and remove the rack. At this time clean any dried on grease or crud from the ways. Examine the slugs and see if they are vertically oriented. Gently straighten the spring wires without stretching them. These are very fragile, so be careful.

2. Replace the rack, but don't hook the hold down springs yet. Check that the rack ends are 90 degrees, pull rack and correct as necessary and lubricate. Rack should have a some play from front to back.

3. Turn KC and/or MC Change knob so rack is at its lowest level. Loosen all six of the screws that center the slugs over the coils. Work the rack so that slugs orient with minimal friction in the coils, then snug up the screws.

4. Lift the rack and let it drop into the coils. It should fall without assistance from the hold down springs. Dust slugs sparingly with talcum if needed, but never use anything else. Once satisfied all is well, reattach the hold down springs.

Alignment may need to be checked after this procedure. Do it carefully and sensitivity likely will improve as most receivers need alignment anyway, in my experience. Have fun!

Date: Thu, 17 Mar 2011 08:57:14 -0400
From: k2cby <k2cby@optonline.net>
Subject: [R-390] Reduced 500-1000KHz sensitivity

I can't remember whether this thread related to an "A" or "non-A" question, but: on the R-390A, the two holes through the little triangular plate that attaches the plate to the slug-rack are oversize. In the past when I've had sticky slugs, I just loosen both screws a little, move the rack up and down a couple of times to let the slug find its own center in the coil form, and tighten the screws.

Date: Thu, 17 Mar 2011 12:55:34 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Reduced 500-1000KHz sensitivity

> 4. Lift the rack and let it drop into the coils.....

AHHH! Be careful with that line! Don't ever let the rack drop with the springs attached, it can break the slugs, or knock them loose from the springs. I know, you said take the springs off first, but it just makes me nervous.

Date: Thu, 17 Mar 2011 13:00:58 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Reduced 500-1000KHz sensitivity

Mmm, that sounds like a mechanical mis-alignment to me. Again, maybe some crud somewhere. Make sure the rollers actually roll, I have an RF deck in a R-390A that was improperly assembled and the "rollers" aren't in the right place so they are more like sliders. It's the way they were pressed onto the shaft.

Date: Thu, 17 Mar 2011 17:56:09 -0500 (CDT)
From: nryan@mchsi.com
Subject: Re: [R-390] Reduced 500-1000KHz sensitivity

Thanks for that. The point is that the rack should not hang up -- even with the springs detached.

Date: Fri, 18 Mar 2011 00:09:34 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] You are all a bunch of COIL SLUGS!

I learned many valuable lessons by messing up coils;

1. Paper form coils should not be oiled. The oil swells up the paper and eventually the slug will not turn or it will tear the coil in half while trying.

2. It is probably one of the only uses of talc in the radio. The slugs should work free with absolutely no binding. Do not be afraid to un-spring a slug rack and remove it for cleaning and/or inspection. Note do not lose the little springs down inside the radio. Hemostats are your friends and a few of us have the very old tool sets with the picks and probes for removing and reinstalling springs (mine came from an old teletype service kit).

3. Do not remove all of the racks at the same time. Some of the slugs in the IF racks are quite different than those in some parts of the RF deck.

4. Buy a junker RF deck for the parts.

5. Have fun, do not go into this with too much "reluctance".(pun intended)

Date: Fri, 18 Mar 2011 01:43:33 -0500 (CDT)
From: nryan@mchsi.com
Subject: Re: [R-390] You are all a bunch of COIL SLUGS!

I unhook the springs with paper clips bent so that they hook onto the springs and can be hooked onto the upper edge of the RF deck frame, maintaining tension on the springs so as to avoid them getting away from you. The clips are bent into something resembling a lower case "h."

By all means, number racks with Magic Marker so as to keep them in order if you remove all of them during, say, an RF deck overhaul. The same goes for the cans. Clean off markings with a paper towel lightly dipped in mild solvent such as paint thinner.

Date: Fri, 18 Mar 2011 13:27:00 -0500
From: "Ron.K3PID" <ron.k3pid@sbcglobal.net>
Subject: Re: [R-390] You are all a bunch of COIL SLUGS!

I have also found that a gentle warming with a hair dryer can help break a stuck slug! Just an observation!

Date: Thu, 30 Oct 2008 13:11:48 -0700 (PDT)
From: David Elsea <dkelsea@sbcglobal.net>
Subject: [R-390] Zero adjust

Can someone lead me to the repair or adjustment of the zero adjustment mechanism? Mine appears not to be working and the manual I have is vague on this subject. If I understand correctly there is somewhat of a clutch action to allow the knob to adjust to a known frequency. When I turn the knob it bows the front panel of the receiver and the tuning mechanism stays locked up. You might mention how easy od difficult the job is. Thanks in advance for all responses. Dave w6dke

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Date: Thu, 30 Oct 2008 18:36:11 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Zero adjust

The zero adjust shaft is a threaded bolt through a threaded nut bushing. Turning the knob screws a bolt through the nut and pushes a clutch assembly. That assembly works just like an old manual auto transmission clutch, except the slip range is just part of a KC knob turn (30 degrees or rotation). You can see the operation if you turn the receiver up on end and look in behind the front panel from the bottom. You are looking for a big (1 inch dial) flat washer on the end of the zero adjust shaft. This washer pushes three pins in the clutch assembly that allows the adjustment to be performed. That washer is sort of "riveted" to the end of the zero adjust

shaft. The rivet wears off and the washer falls off. You can get good replacement parts. If you need them ask here and see what you get offered in direct mail. If you are good at it. you can file / machine / grind the shaft back and make a new nub to hold a new washer. You will likely be better off getting a new zero adjust shaft with washer in good shape, only because you do not have a good model to use in fabricating a replacement unit. If that washer is on the end of the shaft and engages the three pins and releases the clutch and you still have no zero adjust, then you likely need to just clean the clutch. This is not hard to do. You just may wait until spring. You pull the front panel, it hangs down from the wire harness. then you can flush the whole RF gear set on the front of the receiver. You sort of do this out side on the picnic table on a sunny after noon. You hand a plastic sheet over the hanging front panel to keep the crud being cleaned out of the gear train from collecting on the front panel switches/meter and parts. Further work is very doable if required. Set into it on level at a time to see how far you really need to go t fix the problem. Good Luck with this.

Date: Thu, 24 Mar 2011 13:33:58 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] RF Deck, Module Washing (dishwasher)

While reviewing the latest draft of the R-390A inspection process I found a few references to cleaning the RF deck in a dishwasher (Page 9, Section 4, activities 8,9). This brings up an interesting point for discussion and I wanted to share with the reflector on my experience with cleaning a radio in the dishwasher.

I have a bunch of ARC-5 stuff, one item that joined my collection was one of the ARC-5 transmitters that was in pretty rough condition as far as being loaded up with dirt. Worried about things like Haunta-Virus (from rodent droppings) or the many other things that can go wrong I decided to give this thing it's own cycle in the dishwasher. I pulled the tubes and the crystal reference plug-in and set it all by itself in the dishwasher. Since it IS a dishwasher you cannot use detergents that foam up so I dropped a Dawn dishwashing packet into the machine and let it run through a cycle. This was set to the most aggressive cleaning cycle on the dishwasher (heavy) with heat drying at the end. What came out looked really nice, the aluminum was even shiny. I had pulled off the bottom plate so the soap and water could get up inside, below the tube sockets and removed the tube removal plate on top and left open the front IF coil adjustment window and the little flip-door at the back top of the radio. The antenna tuner worked really nice and it even cleaned up most of the tarnish on the contact wheel and the turns. Not thinking much more about it, and wanting the thing to sit for quite a while before I applied B+ to wiring that still had some moisture in the cloth I left it to sit on top of a heating register in my office for a few weeks.

When I got back to it the aluminum had taken on a terrible, tarnished look (greyish-black in appearance). It seems that the aluminum did not like the dishwashing method. Strange since my kitchen cookware is also aluminum and it does not seem to mind.

The point I am trying to make is that a dishwasher is probably not the best way to wash radio modules or the RF deck. Any kind of detergent that is rated to run in a dishwasher (non foaming) is fairly aggressive. I do not think you can run Simple Green in a dishwasher, at least not MY dishwasher.

Can other folks elaborate upon their attempts to clean modules in a dishwasher? (if you have tried it) What were your experiences?

It is one thing to mess up an ARC-5 (that I have almost a dozen of), something completely different to put an RF deck or R-390/A module in there.

Maybe it is best to stick with the Simple Green, parts brush, garden hose, followed with distilled water routine. If the dishwasher is a bad idea we may want to remove references to that technique from the R390A Inspection
Process guide.

Date: Thu, 24 Mar 2011 13:42:19 -0500
From: Ben Loper <brloper@gmail.com>
Subject: Re: [R-390] RF Deck, Module Washing (dishwasher)

Someone told me to drop a dishwasher tablet into a crock pot and let it sit for a few hours to loosen up the food. Sure enough in a few hours it rinsed right out that when I realized dishwasher (not dish washing) fluid, granules, tablets are a lot stronger. Ever since that I have resisted using the dishwasher for anything other than dishes.

Date: Thu, 24 Mar 2011 15:00:12 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] RF Deck, Module Washing (dishwasher)

I haven't tried the dishwasher idea/method. One reason is that it is pretty new, and I *REALLY* don't think my wife would be overly "enthused" with this idea.
I/We use dishwashing liquid. There is also the wetting agent that is used in another reservoir. I haven't wanted to trust these cleaners to a St. J's 1951 Contract Collins. However, the ONLY part of this particular radio that I *might*

have considered for this treatment, would have been the empty chassis. I tossed out that as even useful when the riveted finger-stock on the chassis was corroded away. I procured an empty chassis to replace the original. Seriously, I would "second" your idea to *REMOVE* this from the manual! The dishwashers are significantly MORE aggressive than they "used" to be. Not to mention what the wetting agent would do to things.

Date: Thu, 24 Mar 2011 15:28:17 -0400
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] RF Deck, Module Washing (dishwasher)

I try never to run aluminum-handled untensils in the dishwasher for that reason. I don't know if the recent change to dishwashing detergents have stopped this, but it really made a mess out of one of my knives.

Date: Thu, 24 Mar 2011 16:05:05 -0400
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: Re: [R-390] RF Deck, Module Washing (dishwasher)

I think part of the enthusiasm for dishwashing was the wonderful story from Dave Medley about how he took his favorite Tek scope to the factory for repair and the first thing they did was put it into something that looked for all the world like a dishwasher. Although horrified at first, he was delighted with the results. Of course, there is some unspoken back-story here - the commercial electronics washers use special cleansers and rinse with distilled water, so there are no nasty residues.

Date: Thu, 24 Mar 2011 14:08:37 -0600
From: "Kurt" <tem14me@usa.net>
Subject: Re: [R-390] RF Deck, Module Washing (dishwasher)

I have washed several 390A modules in the dish washer with good results. Most have been quite dirty. I use the delicate/crystal cycle with a reduced amount of powdered soap and heat dry. After the dishwasher I blow off the excess water with canned air and place it in the oven at about 150 degrees (the lowest setting) for about three hours or so. Please note that I have a VERY understanding wife. I learned to blow off the excess water rather than wiping the hard way. On one module the lettering started to come off while it was still wet but not when it was dry. I have also used the same method with Collins receivers with good results.
I have not had anything turn black. I do remove tubes, crystals, pto's, etc before washing. I have not tried this with lesser brands of radios or anything from Japan. This method is not for everyone and I don't do it on every radio.

Date: Thu, 24 Mar 2011 18:24:54 -0300

From: "Francisco Viegener" <fev@ciudad.com.ar>
Subject: Re: [R-390] RF Deck, Module Washing (dishwasher)

Hi, I guess that there is a simple solution and we can keep using the dishwasher idea. It had to be with the PH of the dishwasher cleaner, it is Alkaline and the remanent of it make surface dark after a while if there is not a good rinsing and neutralization with a lot of water. Tray to put the aluminum in a solution with acetic acid, Vinegar (the one you use for you salad) and water, this will neutralize the alkaline detergents remanent on the surface of the chassis and parts.

I work in a factory were we chrome plate brass, and if we did not neutralize after the cleaning were we use strong cleaners (detergents and caustic soda (alkaline), the parts will get dark or brown in minutes this is normal, this did not happens if parts are neutralize after the cleaning with a 5% h2so4 solution and then it is important to rinse all with neutral water (water of the tap). Instead SO4H2 solution I suggest to use water with Vinegar of your salad dressing (acetic acid). Rinse all with water after that and later maybe you can put in a previous warm oven, at a low temperature or dry it with hot air from a hairdryer machine (so low temperature as possible,thinking in caps.

All metals will oxidize after cleaning them, with the acid solution you are neutralizing and taking out the small surface oxide that also stop the oxidation specially in a aluminum. The small oxidation of the surface protect the aluminum and stop the oxidation (this is not true en steel because the oxide of ferrous parts is like a sponge (esponja) that absorve water and the corrosion keep going).

Maybe it will work. I did it, but not in a dishwasher. I will try to do it with one of my audio 390A module that I have for discard.

It is possible to start trying this with a old aluminum chassis before doing it with any module of the r390a.

There are products to pasivate metals, in case of brass is a solution of water and chrome, what I don't suggest to use because chrome solution should be carefully treated after discarding them. I don't think Aluminium need to be passivated it will create a small amount of oxidation over it after the acetic acid and cleaning and rinsing with water.

I will ask our engineer in the galvanic and came back on this topic if still is a issue.Until Monday we have holiday here in Argentina. That's why I can not ask him earlier.

Date: Thu, 24 Mar 2011 17:28:16 -0500

From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Aluminum Cleaning

While I do use the dishwasher for most everything (not the cats) I had not really thought of the pH. Thanks to Francisco and others for pointing that out. Without applying it to "radio" and more to "kitchen" I have used "Cream of Tartar" (tartaric acid) to polish up aluminum. Normally it is used for making meringue as in lemon meringue pie.

I am reticent to deliberately doing alkaline <-> acid things to electronics. That is probably one of the top benefits of things like Simple Green and distilled water.
'long time ago I was tasked with figuring out the potential for corrosion on circuit boards we fabricated. They had solder masks but we did not do conformal coating. What brought it to management's attention was after the folks in the panel fab area left an entire tray of circuit boards immersed in the boiling side of a solvent cleaning tank all night long. (trichloro type solution). We had other issues where the circuit boards were installed in an enclosure, sealed with silicone RTV that releases acetic acid as it cures (vinegar smell), those corroded as well*.

Date: Thu, 24 Mar 2011 18:42:24 -0400
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: Re: [R-390] RF Deck, Module Washing (dishwasher)

The "standard" industrial aluminum cleaner is phosphoric acid (gloves required!). It works really, really well, but I wouldn't advise putting a whole circuit in there. BTW, that is also the same stuff in soda pop, but I wouldn't recommend cleaning your R-390 with Dr. Pepper either.

Date: Thu, 24 Mar 2011 20:42:03 -0300
From: "Francisco Viegener" <fev@ciudad.com.ar>
Subject: Re: [R-390] Aluminum Cleaning

Tricloro etileno solution , what I hate, because I was forced to use it many years ago by my chief at that time(27 years ago) is risky also, because when you did not work it carefully , what is very difficult, when is warm, it get acid (because the CL what with water convert in H2CL)(I am not at all strong in chemie). (Also is terrible for human and the environment (At that times that was not
take in consideration). The use of tricloro ethylene was a very hard experience in my work like a new engineer, after powder painting with polyester a brass surface cleaned with tricoloro ethylene , I began to have nice ugly brown points under the painting after several weeks or more , this happened with the first run of production of faucets (my job) at that time.

Later I started to clean all with alkaline and acids water solutions , and coating with gold that did not corroded so easy prior to the transparent powder painting over it. Now we do all that with PVD (physical vacuum deposition),that looks like gold but is not and is very hard and don't need to be painted and did not corrode after 200 hours in a salt atmosphere.(Buy the way a Pvd mashine is like a vacuum tube were the parts that receive the coating (less than Micron) are the anode of the tube).

Powder coating (polyester, epoxi, pulieritano) are hygroscopic , all of the absorb water and with time corrode the base of the metal. One solution for white power coating was a nickel plating before the powder painting.....it helped to prevent oxidation of the base. Cars had those problems also at that time...

I agree with Tisha, It is very important to rinse with neutral (PH7) water (if exist), normal water, very carefully, but I would prefer after cleaning in a dishwasher, what I think is a good idea, rinse with water, then put all in a solution of water and vinegar (acetic acid) to get all the alkaline residues out, and again rinse with water very carefully and many times. Acetic acid is not strong and in a low % solution will eliminated all alkaline residues and then rinsed with water I think will work. Also problems in metals are holes that we don't see, and if this holes are filled with alkaline or acid spots will appear later.... That's way is good to clean with hot water and good mechanical help, to instead to have acid or alkaline residues in this hole we have water, that when they dry did not really affect the surface to much.

You can clean also aluminum with the juice of a Limon (it was mentioned earlier in this forum). It is a good way to clean a metal surface also; it is acid...but not strong at all.

Cleaning is still a very difficult process in galvanic! And every metal you clean what you are doing is taking out not only oils or dirty thinks you are taking out part of the surface that was corroded, this corrosion help to stop the corrosion in the case of aluminum and brass, it is not the case like I mentioned first for normal steel.

I am still working in a faucet company and all what is new nice looking surface gave us a lot of problems, the best is the Chrome finish... but if we think in the environment we should accept that metal corrode and then they keep in that way for years without problems for nobody.

I have here 4 R390a, sitting to be improve.
No more storrys, sorry, It happen today that my wife is not home....

Date: Thu, 24 Mar 2011 19:03:38 -0500
From: "Bill Hawkins" <bill@iaxs.net>
Subject: Re: [R-390] RF Deck, Module Washing (dishwasher)

Very interesting.

I made powdered dishwasher detergent one time because all commercial products were perfumed. IIRC, it was equal parts of TSP and a powder for chlorinating pools. The book "Oscilloscopes" by Stan Griffiths contains a chapter on washing Tektronix scopes that has worked well for me:

Take the scope outside. Remove tubes or they will have no markings. Hose it down if you have soft water, else use bottled de-ionized water. Do not immerse the scope in a tank. Do not spray an open transformer (problems with HV arc tracks) if the water isn't really deionized. Variations in results have been traced to the degree of deionization. What works in one part of the country may not work in another

Use an industrial detergent. In 1992, that meant Simple Green or Breeze, but both have been reformulated for higher profit and various environmental protection laws. Stan sprayed a liquid detergent solution with a spray gun. I made a bucket of dilute Simple Green and used a medium brush or a tooth brush. Sprayed SG from the bottle on tough spots. Once you've done all that, go back and do it again, rinsing off the dirty solution with clean solution. Stan set
his spray gun to 100 PSI and held the nozzle within a few inches of the area to be cleaned for the second time.

Keep moving during the washing. Don't let the detergent dry. When done washing, rinse it thoroughly. You are trying to remove anything that might become conductive after you're done. When you are satisfied with the rinse, use an air nozzle or cans of "air" to remove as much water as you can. Turn the equipment over 90 degrees at a time and blow the water out at each turn. Maybe one 180 degree turn is enough.

When no more drops of water come out, start drying. Stan recommends a box heated by a light bulb to 120 to 130 degrees F. I used the warm sun and low humidity of a Minneapolis late fall or early spring. There's no such thing as too much drying, particularly if there are crevices that the compressed air couldn't reach.

Note that a Tek scope of tube vintage was laid out with ceramic terminal strips, so that most of the components were out in the open. I wouldn't try to clean the underside of the IF module with a tooth brush, but the 100 PSI spray gun might work. And I would never clean electronic equipment in a dishwasher, especially not with unknown stuff in the detergent and

unknown ionization of the water supply (and unknown heat from the drying cycle.

YMMV, as we ad-aware folks say.

Date: Fri, 25 Mar 2011 12:58:14 +1100
From: "Pete Williams" <jupete@internode.on.net>
Subject: [R-390] DISHWASHERS

List...get the XYL/missus to have you read the MANUAL that came with the dishwasher..mine said (and the missus said) 'do not wash aluminium utensils
in the washer '---- reasons have been given on this list. Like I've also said for cleansing. - kerosene, strong flush with tap water. and good dry in the hot sun or moderate oven until tender !

Date: Fri, 25 Mar 2011 12:51:06 -0500
From: "keller family" <kellerfamily01@charter.net>
Subject: [R-390] Aluminum Cleaning

For cleaning the aluminum in radios I use plain rubbing alcohol, the 95% alcohol version, not the 70%. It removes all the crud you want to take off and leaves only the patina that shows the radio's age and character. And it's completely safe to use. If you can't find the 95% alcohol, go ahead and use the 70%. It works almost as well.

Reconditioning the Veeder Root Counter Mechanism

by Nolan Lee

Note: The following article was posted by Nolan Lee on the R-390 list on 1998-May-18. Nolan's technical writing style is unique and can be best described as the language of 'Redneck Engineering'. Translations are available for those who are techno-colloquially challenged.

"rippin' apart the counter..."

The hammer I used for this was a 2oz one. This is one case where a "bigger hammer" ain't good bubba. Put that 4lb maul DOWN!.....NOW! Also, your counter may be a different part/casting number and assembled differently. It's also been 20 years since I took mine apart.

My memory might be faulty and your milage may vary.....I accept no responsibility. I don't think they were made to be taken apart, but I liked the challenge. I used a small punch to remove the small counter shaft. At least that's what I called it. It was the one with the little "10X" multiplier cogs on it. It was pressed in from one side and then the casting was peened

over the end of the shaft.

Oh, as you slide the shaft out, all of the little cogs will fall off. Watch where they come from. Some of them were different. I then bored a couple of holes to intersect the bottom of the two rivets that held the cover to the body. This was the little cover plate that covered the gaps between the digits when viewing the counter from the front. I then drove them out with a small punch.

The cover is real soft and will bend/kink/distort real easy. While I had mine off, I stripped it and repainted it and baked it in the oven. Finally, the primary digit counter wheels of both the MC and KC segments are pinned to each of the drive shafts (the shafts that have the bevel driven gears attached).

These pins were driven out. It's been a hell of a long time and I don't remember for sure but I'm pretty sure that those pins were tapered and had to be driven out from ONLY one direction. You'd want to inspect them VERY carefully and see if they ARE tapered before driving them out. If they are tapered and you attempt to drive them out from the wrong direction, you will probably bend the shafts and total out the counter assembly. After pulling the two shafts, the entire assembly should "fall apart", either in your hands or into the shag carpet. Oh, watch where the little thrust washer/spacers fall from.

They'll need to go back in the same spots. Don't ask, I don't remember..... I cleaned everything while I had it apart and actually waxed the counter wheels with automotive paste wax. I then reassembled it using an untra-fine powdered graphite as a lubricant. Keep the graphite off of the digits or it can stain them.

Suspecting that this could happen is the reason that I waxed all of the counter wheels BEFORE adding the graphite. 20 years ago, the paint on my counter wheels had more than enough adheasion to survive the waxing. I don't know about yours..... Best of luck and may the force be with you.

Send Comments to the FAQ-Meister: (r390a-faq@mindspring.com)
Version: 1 - - Last revision: 1999-Jun-13

Date: Tue, 27 Mar 2001 10:47:02 -0500
From: "Gary Franklin" <franklin@net-link.net>
Subject: [R-390] Excessive Main Tuning Drag - Collins 51S-1

I have made a couple of posts about excessive main tuning drag when my 51S-1 has been turned off for sometime in my cold basement radio room.

So much drag you can barely change frequency! After a warm-up period tuning drag decreased greatly - big improvement in performance! My first thought was old stiff lubricant in the PTO. I seem to recall an article or thread on the subject some time ago. Theorizing that after warm up the lubricant became less viscous. Well through a process of elimination I have discovered the culprit to be the COUNTER. When I disengage the counter drive gear on a cold radio the tuning is as smooth as silk! Throw a little heat on the counter with a hair dryer and she smooths right out. The first drive disk turns the kc count one digit every 100 kc. The disks and drive shaft do not appear to be lubricated. Perhaps some of you on the R-390 list have had a similar problem with your R-390 counters? Has anyone solved this problem before? Any ideas?

Date: Tue, 27 Mar 2001 11:03:18 -0500
From: "Paul Bigelow" <pbigelow@us.ibm.com>
Subject: RE: [R-390] Silence the counter thread...

Try Fargo Enterprises -- a camera repair supplier.

>Where do you find this?
> Use Nye Oil damping grease on the counters.

Date: Thu, 27 Sep 2001 08:39:20 -0500
From: Gary Lee <tiresias@prodigy.net>
Subject: [R-390] counter questions on r-390a

I am currently doing an experiment with attaching braille numbers to a counter for a 390a. I have a junk counter bought from fairr radio. But now I have some questions.

1. is it mounted with the plate with the screw holes horizontal or vertical?

2. there is what looks like a metal shield on the front wi little fingers sticking up. where do you see the numbers in relation to these fingers?

3. Is this shield really necessary?

4. I notice two wheels on the left end, I presume megahertz. Then 4 wheels. Is the last one numberd 0-9 for tenths of a mhz just like the others? This should get me started. If I can get braille on this thing, I will make up another set of labels and give this one to fair to use as a model for the 390 I plan to purchase.

Date: Thu, 27 Sep 2001 09:48:45 -0500
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] counter questions on r-390a

> 1. is it mounted with the plate with the screw holes horizontal or vertical?

The counter as a whole is mounted horizontally. I haven't taken one apart, and so don't know about the plate w/screw holes.

> 2. there is what looks like a metal shield on the front wi little fingers
> sticking up. where do you see the numbers in relation to these fingers?
>
> 3. Is this shield really necessary?
>
> 4. I notice two wheels on the left end, I presume megahertz. Then 4
> wheels. Is the last one numberd 0-9 for tenths of a mhz just like the others?

The first two are MHz, yes. The next one is used to indicate below-the-beginning of a band (red "-" on ---my R-390A), in-band (solid black), or above-the-end of a band (red "+").

Date: Tue, 14 Aug 2001 10:09:28 -0400 (EDT)
From: "Paul H. Anderson" <pha@pdq.com>
Subject: Re: [R-390] Sticky IF slugs

The Veeder Root counter dials are fragile - don't wash them any more than you need to, either (in addition to other warnings about the crystal deck and PTO). Also, I'd strongly suggest not using a auomotive parts washer, as they use caustic chemicals that attack the aluminum in the various components. Some dishwasher detergents are also caustic and can do the same thing, which winds up discoloring the finish of the aluminum.

Date: Thu, 27 Sep 2001 09:59:56 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] counter questions on r-390a

1. The screw holes are horizontal (perpendicular to the front panel).

2. The shields cover the "gear" fingers and provide a marker on the right-hand side for a witness line.

3. The shield is primarily for cosmetics, although the witness line is pretty much needed for sighted people if you want to get right on a kc position.

4. The wheel third from the left is only a +/- indicator. The last wheel on the right is marked in 1 kc increments with 5 smaller divisions

between each major marking yielding 200 cycle resolution.

Date: Fri, 15 Sep 2006 18:58:08 EDT
From: ToddRoberts2001@aol.com
Subject: Re: [R-390] RE: Spinner knob for R-390

Have you tried oiling the odometer counter wheels and assembly? I use a pinpoint oiler and get in-between all the wheels and shaft and index wheels. Also make sure the right-angle drive gears are oiled. It almost sounds like your odometer counter is dry and rattles or squalls when it is turned fast. Try lubricating it. It won't hurt the plastic wheels if you get oil on them, just lightly wipe off the excess. On several sets that I have taken apart, cleaned and put back together and thoroughly oiled the counters they are quiet as a mouse when turned fast. I use Mobil-One Synthetic 30W.

Date: Sun, 4 Mar 2007 15:48:45 -0800 (PST)
From: "Tom M." <courir26@yahoo.com>
Subject: [R-390] Veeder-Root Patent

http://www.freepatentsonline.com/4054986.html

From R390rcvr@aol.com
Sat Feb 8 22:07:22 2003
Subject: [R-390] R-3909(non A) - ten turn stop question

Good evening all! A rather sad R-390 followed me home last night. One of the oddities is that it won't go onto band one. The megacycle shaft hits the ten turn stop before it will allow the gearing to drop into the detent. Its close, but won't quite make it. It seems to go a bit too far on the high end of the range. I have looked through the manual for this radio, and the R-390A, and although the stops are discussed, how to adjust them isn't. I am not going to do a complete gear train dismantle at this point, and wonder it just that adjustment can be done, without upsetting synchronization?

There is a clamp on the gear driven by the MC shaft, so perhaps by locking the dial lock, loosening that clamp, and rotating the shaft just enough to allow it to drop into the detent will work? The radio is working, kind of, so I would like to not disturb too much until I have a good baseline performance check.

Thanks Randy Stout

From courir26@yahoo.com Sun Feb 9 00:09:21 2003
Subject: [R-390] R-3909(non A) - ten turn stop question

Randy, I've never had to adjust the ten turn stop on the Mcs Change shaft, but there should be nothing
wrong with doing what you suggested. You're not going to break it. Make sure you tighten it up well, as
this is probably how it got whacked in the first place. 73 Tom
----------From redmenaced@yahoo.com
Sun Feb 9 00:15:29 2003
Subject: [R-390] R-3909(non A) - ten turn stop question

Better check the stop pin on the Geneva drive on the bandswitch under the RF deck, too. That may be where the stoppage really is. Joe
---
From R390rcvr@aol.com
Sun Feb 9 01:44:49 2003
Subject: [R-390] Ten Turn Stop adjustment

Thanks guys: I deceided to just go ahead and try it. I forgot that the dial lock doesn't lock the MC knob, but it really isn't needed. I had visually checked the stop, and there was no doubt that in this case, it was the stop limiting the travel.

I loosened the clamp slightly, turned the large MC gear that the clamp holds, until the veeder root registered between 00 and 99 when just off the detent, all the way to the stop. That is the position specified in the manual. Snugged the clamp, and I now have full range. I had never had any problems before with a ten turn stop either, but this poor radio has been rather roughly treated, and I suspect someone had slammed it against the high end of the stop, and it shifted slightly. I think to the casual user, they see there are higher numbers on the Veeder Root, and try to keep turning beyond the end of the normal range!

This rig has a Cosmos PTO, which I don't recall seeing in a non A. I have only seen Collins or Motorola PTOs. Some of the wiring for the PTO is cobbled together. Could you adapt a R-390A PTO to the non-A. The bracket is definitely for the non A. Thanks again folks. I will have a few more questions, as I get
into it more. Randy Stout

Date: Fri, 06 May 2011 12:00:14 -0400
From: Curt Nixon <cptcurt@flash.net>
Subject: Re: [R-390] Removing RF Deck? 390A

I did just remove the RF deck from my 390A while leaving the geartrain intact.

Date: Fri, 6 May 2011 09:19:05 -0700
From: <w7apm@mtaonline.net>
Subject: [R-390] Retry Removing 390A RF Deck

What does it take to remove the RF deck? I bought a bunch of replacement caps to recap the 390A but removal of the RF Module is not obvious to me...

Date: Fri, 06 May 2011 12:58:11 -0400
From: Curt Nixon <cptcurt@flash.net>
Subject: Re: [R-390] Retry Removing 390A RF Deck

I am sending you direct a copy of the RF-Deck_Mechanical section from the Y-2-K manual and the Electric Radio Article I used to seperate the RF deck from the geartrain without dis-assembly of the gearsets. Works fine. This is not a quick process however and be certain you have the space and patience to deal with removing the slug racks, front panel, etc. You might actually decide to hold off on the RF deck cap replacement :)

Date: Fri, 06 May 2011 13:18:28 -0400
From: Curt Nixon <cptcurt@flash.net>
Subject: Re: [R-390] Retry Removing 390A RF Deck

If I recall now, you only have to remove the front panel and gear panel with the RF Deck attached to get to the bottom of the RF Deck. You can leave all the slugs, etc in place and lift out the entire gear/rack assembly. Just disconnect the PTO coupling and remove the gear panel. Seperating the RF Deck from the gear panel is possible but not necessary for cap replacement.

Hope this helps. Detail in what I sent direct PM. I'm sure others will chime in as well.

Date: Sat, 07 May 2011 09:55:59 -0400
From: Curt Nixon <cptcurt@flash.net>
Subject: [R-390] Weak Signal Work with R-390A??

I have been considering an approach to utilizing my R-390A for something other than the typical 80 and 40M AM, wideband Rx role.

The idea is to utilize the impressive dynamic range and sensitivity of the 390A with a low-noise receiving converter for 144MHz EME Duty. The detection duties would be performed via a simple Softrock 455KHz IF SDR block.

Is there anyone on the list doing anything in this regard?

Is there some reason this might not be a reasonable approach?

I already have the antenna, TX and Amp in place for this but even using the SSB 2000 Mast preamp, my rx chain is inadequate.

Date: Sat, 07 May 2011 12:46:54 -0400
From: "Jim" <jbrannig@verizon.net>
Subject: Re: [R-390] Weak Signal Work with R-390A??

If memory serves....The earliest (60's) EME work from Aerocibo (sp?) in PR used an R-390 for the IF

Date: Tue, 17 May 2011 02:03:01 -0400 (EDT)
From: Paul Dulaff <pdulaff@embarqmail.com>
Subject: [R-390] RF Module Adjustable Slug Separated from Adjusting Screw

I have an R390 which I got working over the weekend. On the 16-32 Mhz slug rack, the front most slug has mechanically separated from the adjuster screw. I took the slug and adjuster screw out of the set. It appears that the small spring shaft between the slug and the adjuster screw was soldered to the inside of the adjuster screw. Do I just push the small spring shaft into the bored hole in the adjuster screw as far as it will go and solder then back together ? Is there a dimension I need to control to as far as placement of the small shaft spring in the adjuster screw ?

Date: Tue, 17 May 2011 04:41:41 -0500 (CDT)
From: nryan@mchsi.com
Subject: Re: [R-390] RF Module Adjustable Slug Separated fromAdjusting Screw

You're better off gluing the spring shaft into the adjuster screw rather than soldering it. If you do, heat may damage the slug. For dimension control, try pushing the spring all the way in and see how it compares with its neighbors. If all seems well, then go ahead and glue it in. For glue, I think I would use an epoxy such as JB Weld. Hoping this helps, Norman KG4SWM

Date: Tue, 17 May 2011 07:31:47 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] RF Module Adjustable Slug Separated from Adjusting Screw

Yes on reinserting and soldering and no on the dimension.(not usually, see

below) You will have to realign that stage for top performance. It may have been loose and not aligned optimally anyway...

Do make sure it's not substantially shorter than the others on the same rack...I guess it is possible that the spring supporting the slug might have had the end broken off in which case you may have to find a way to make up
for the lost distance as it may be out of adjustment range.

Be aware that the slugs in the R-390\URR and the R-390A\URR are not interchangeable nor are they within different positions of the R-390\URR RF
deck. Should be the same within the same color coded group though.

Date: Tue, 17 May 2011 14:14:00 -0400 (EDT)
From: Paul Dulaff <pdulaff@embarqmail.com>
Subject: [R-390] Fwd:RF Module Adjustable Slug Separated from Adjusting Screw

Got several responses to the question regarding the slug problem. Just after I wrote the e-mail to the list, I went ahead and soldered the spring shaft to the inside of the adjuster screw. Looking at the slug assembly carefully, this is how it was manufactured in the first place. This agreed with the responses I later received. It appears that the solder connection had a fatigue failure after 56 years.

I found 2 other slugs in the same condition and repaired them the same way. I did a quick alignment of all affected sections with success. Rig is now working on all bands. All the heterodyne crystals appear to be within 1.0 Khz of their spec.

This particular R390 appears to be a low mileage Collins original, still has its original green gear!. It had a short on the audio pre-amp plate circuit. To get it going, I swapped the audio module and the set started working. Needed a ballast tube (I'll replace with 12BA6's for PTO/BFO and short the ballast tube socket) and had 3 weak tubes also. Has anyone tried keeping the 6BA6 PTO/BFO tubes intact and used a diode to replace the ballast tube ?

The PTO has a total 12 Khz error end to end. I know that the ferrite changes over time and thus the error, but is this amount typical ?

Also, I can't get the calibrator adjusted to get to zero beat on WWV. Its close (within 0.5 Khz at 15 Mhz) but the adjustment runs out of range. The oven for the 1.0 Mhz calibrator crystal doesn't feel anything like 75C when I touch its case. Is it possible the oven isn't working and causing the

crystal to run low ? Also, the calibrator signal is light at the low freq. end and gets stronger from about 5 Mhz on up. Is this normal ?

Date: Sat, 21 May 2011 20:09:18 -0500
From: "Robert Sisco" <rsisco@stx.rr.com>
Subject: [R-390] Megacycle Knob slips

Friday, I ordered the PD-2 product detector for my R390A. Wouldn't you know it. Saturday, the next day, the Megacycle knob slips/spins. I found the clamp in front of the Megacycle gear loose, but I tightened it all the way, until it's lips closed. The Megacyle knob still turns, without moving the Megacycle gear. I can move the Megacycle gear with my fingers. All the gear mechanisms work properly. What do you think needs to be replaced, the horizontal shaft. the Megacycle gear, or the clamp? What holds the shaft in there? Is there any way to avoid taking the front panel off? (I have the Bristol wrenches.)

Date: Sat, 21 May 2011 21:34:48 -0700
From: "Dan Merz" <mdmerz@frontier.com>
Subject: Re: [R-390] Megacycle Knob slips

Robert, sounds like the clamp is broken, in light of the fact that you can tighten it until the lips close. I had one stay in place and look ok but in fact it was cracked on the thin part of the clamp. You should be able to tip the radio onto its back and see the clamp as you rotate the knob or the gear. If broken, I would guess on the side opposite the tightening screw and maybe not immediately apparent. You can replace the clamp by pulling out the knob and shaft, replacing the clamp and re-inserting the knob and clamp. I don't remember whether the shaft is retained or just slips out the panel bushing. I think it just slips out once the clamp is loosened. That seems consistent with what I read in the manual. I made a replacement clamp for the one that was broken on my radio, not this one but another one on the other side of the set I was not impressed with the stoutness of the original. I'm looking at a R-390 but I think the R-390a is similar, except
it's in a cabinet and not so easy to view as the R-390. Dan.

Date: Sat, 21 May 2011 21:43:31 -0700
From: "Dan Merz" <mdmerz@frontier.com>
Subject: Re: [R-390] Megacycle Knob slips

Robert, a typo on my part, change to "reinserting knob and shaft" , not "knob and clamp". There's only one clamp... Hi, hi. Dan.

Date: Sun, 22 May 2011 06:55:59 -0500
From: Dave Merrill <r390a.urr@gmail.com>

Subject: Re: [R-390] Megacycle Knob slips

Could also be broken finger(s) on the knob itself, a common problem.

Date: Sat, 11 Jun 2011 16:22:44 -0500
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: [R-390] Request help in making a survey...

I've finally been able to get back to working on some of the updates I'm doing for the 390A Y2K manual (weather and work issues combined such that I haven't had much spare time for a couple of months... we're still seeing some thunderstorms, etc. - but NOTHING compared to April)-

Anyway - one of the things that I can't find documented anywhere - is the color coding of the ferrite slugs. Seems in most of the radios I have looked at lately - "A" radios have RF section slugs with a Red and White mark, IF section slugs with a Green and Brown mark. However - I've also come across slugs with just a green mark, some with just brown - and of course slugs that don't appear to have any marks at all.

The 390/1s are another case altogether - seems like the RF input has Red/White - 2nd RF another color, third and forth yet other colors (orange and yellow IIRC). The IF is also a mix (blue and green mostly). As old as they are - it's sometimes hard to tell whether there is a color – or discoloration on some...

So here is my request:

Next time you get an opportunity - note the manufacturer of your RF chassis, and note any color dots / marks on the slugs. For those that may not have noticed them - the dots (or blob/s of paint) are usually on the top end of the slug
- around or either side of the "spring" that holds it to the adjustment screw.

It's pretty easy to tell the "A"s from the 0/1s by the extra colors - but if you do have an "0/1" with a "standard set" - please be sure and note that (i.e. all RFs Red/White & all IFs Green/Brown).

Please send your responses either via the list -- or if you prefer - directly at comcents@bellsouth.net . Again – these will be documented and added to the 390A Y2K manual (and a separate table for inclusion with a manual for the 0/1s).

Date: Sat, 11 Jun 2011 20:39:00 -0500 (CDT)
From: nryan@mchsi.com
Subject: Re: [R-390] Request help in making a survey...

Here is what I found in two Motorola RF decks and one EAC R-390A RF deck:
Color dots are just as you state -- green dot for IF slugs, red-white dots for RF slugs.

However, the EAC R-390A had no dots on its RF slugs (IF decks had green dots). Instead I found the following inscription printed on each RF slug: the Collins logo 526-5006-003 SM-C 249245 6642

I also looked at two R-390 RF decks and one R-391 RF deck and found the slugs scheme to be more involved. Makes are Collins and Motorola. Order shown is as viewed from above with the receiver front facing you -- rearmost coil to frontmost coil, then proceeding left to right:

Z222 red
Z223 "
Z224 "
=======
Z221 blue
Z220 "
Z219 "
=======
*Z218 blue
*Z212 "
*Z206 "
T206 red-white
=======
Z217 blue
Z211 "
Z205 "
T205 blue-white
=======
Z216 red
Z210 "
Z204 "
T204 "
=======
Z215 yellow
Z209 "
Z203 "
T203 "
=======
Z213 yellow
Z207 "
Z201 "

T201 orange-white
=======
Z214 yellow
Z208 "
Z202 "
T202 orange-white

Please note: Coils marked with * have slimmer slugs.

I hope this helps. 73 de Norman, KG4SWM

Date: Wed, 29 Feb 2012 15:53:15 -0600 (CST)
From: Jim Haynes <jhhaynes@earthlink.net>
Subject: Re: [R-390] Oldham Coupler

> Afternoon: Looking for an Oldham Coupler (or at least 1 of the metal sides of >one) from the PTO to Front panel shaft of an R-390. Need for friend who >removed PTO from a parts unit but failed to remove shaft side of coupler >before I discarded it. Please e-mail me at LASavidge@aol.com

www.smallparts.com

Date: Mon, 14 May 2012 08:38:53 -0700 (PDT)
From: Terrence Harvey <terrencelharvey@yahoo.com>
Subject: [R-390] R-390A Teledyne '63 contract with broken/slipping clamp on 4-8 mhz cam shaft.

Recently developed a problem with subject unit which has been basically my daily driver hf receiver. Noticed the MC change knob/veeder root display moves (comes out of detent) when tuning KC knob on some bands. Also, upper frequencies of some MC bands (specifically 3.93-4.0 mc, 7.45 - 8.0 mc, 15.3-16.0 mc and possibly others) goes deaf as kc knob tuned up in frequency. Upon observing the cam alignment marks at 7+000 I noticed that the 4-8 mc cam was off align mark on face of gear train cover. Loosened 4-8 cam clamp and repositioned it to align with mark on gear train cover and re-tightened clamp. Tuned the kc control and observed the 4-8 gear turned but cam shaft did not. Both open ends of the clamp are butted against each other and thus will tighten no further.

Can not see that the clamp is cracked or broken, but that is my assumption. I have some good replacement clamps to replace this one with, but don't know method of removing old clamp and replacing it. Have researched y2k rf deck/gear train sections of the documentation, but yet to find a section addressing just the replacement of the 4-8 mc shaft clamp.

Any help or suggestions regarding the band segment deafness and

replacement of the 4-8 mc shaft clamp would be very much appreciated.

Date: Tue, 15 May 2012 19:00:05 -0500
From: "KA9EGW" <ka9egw1@britewerkz.com>
Subject: Re: [R-390] Fw: Fw: R-390A Teledyne '63 contract with broken/slipping clamp on 4-8 mhz cam shaft.

You know, if you don't want to disassemble the geartrain, an appropriate size two-piece clamp on shaft collar, somewhat along these lines:
http://www.mcmaster.com/#split-shaft-collars/=hjuil5
Although I doubt McMaster-Carr has one in the bore size you need, whose exterior dimensions are small enough. But I'm confident someone makes such
an animal...Small Parts Inc or Stock Drive Products or...?

Date: Tue, 15 May 2012 21:44:13 -0400
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Fw: Fw: R-390A Teledyne '63 contract with broken/slipping clamp on 4-8 mhz cam shaft.

One thing to watch for on replacement clamps is the thickness. I had an R390A that someone had replaced the original clamps with "homemade" two-piece clamps. They worked very well but as I recall there were places where the width of the clamp just barely cleared the cams/gears/plates on either side.

Date: Wed, 16 May 2012 10:27:49 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: [R-390] R-390A Teledyne '63 contract with broken/slipping clamp on 4-8 mhz cam shaft.

It looks as if you will need to do a major disassembly to change that clamp.

The Y2K manual and the gear train drawings in the Y2K manual are the best reference we have. One of the major points that got the Y2K manual project going was the lack of detail on the gear train.

Think a Saturday 8 hour project with a full RF deck cleaning, relube, mechanical alignment and electrical alignment. As long as you need to get into it, do it all so you can forget for another yew years. Pull the RF deck. A chance to look for black things that need to also be replaced. It looks like you will need to also pull the front RF deck gear plate.

This stuff is not complicated or real complex.
It just takes forever to get it done.
You spend more time hunting up the best tool to get the fasteners loose

and reassembled with.

When reassembling the split gears, do not over reach, just slip the gear pair to tension the springs one tooth.

You can get two or three teeth on some of the gears. Do not do that. The extra tension just causes the gears to chew on each other.

The split gears do not take enough lash out of the drive train to really matter. When properly meshed, they do run with less mechanical noise.

Gears that are not over loaded also run with less friction, thus less effort to spin the knobs. The split gears do add benefits to the gear train but in lots of other ways than to just reduce mechanical lash when changing tuning direction.

Date: Mon, 4 Jun 2012 14:37:42 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Latest update on the EAC R-390A

Since you have the RF deck out I would give the gears a nice bath in a solvent to remove grease/crud and re-lubricate with a high quality synthetic (I use Mobil1 that is mixed with tungsten disulphide and dispensed with a syringe, one drop per gear shaft)

If you are not afraid of pulling off the slug racks (held in place with springs so be careful) maybe use a Q-tip wetted with alcohol to swab out the slug bores. Gently wipe down the slugs with a piece of tissue paper wetted with alcohol. Using a different Q-tip, and after everything is dry, swab in a very slight amount of talc (baby powder) into the bores. Clean off the cams, using your fingertip on every cam to look for a rough spot (if a cam cuts your finger, you found a rough spot). Make sure the slug rack end bearings are clean and spin freely, give them a drop of synthetic lubricant and carefully re-install the slug racks. (the springs are very sensitive to any sort of sideways abuse, even being banged about by their own weight so be careful and do only one rack at a time so you do not mix them up (different core materials are in use, you cannot just use any core on a particular slug).

Maybe take the clutch mechanism off the front (complex set of gears in a pack, right at the front) and let it soak overnight in penetrating fluid, give it a few blasts with an cleaner (like brake cleaner) to drive out the penetrating fluid and then use synthetic lube and re-install [that gear pack has been a continual source of headaches for me, on three restores each one of them would not engage the dial lock so I could re-zero to odometer and they all needed "good luvin"]

Try to clean up the aluminum base plate that is under the RF deck. Carefully clean up the long ceramic rotary switch decks with De-Ox-It (more cotton swabs). Do not bend or break anything. Make sure that the rotary switch mechanism lines up exactly when you do the MHz dial turns and that the little MHz indicator telltale, odometer dial and rotary switch decks are all happy through all 30 positions.

I did a few additional (and some will say unnecessary) additions before I dropped the RF deck back in place. I added conductive elastomer (U shaped rubber gaskets) to the bottom of each aluminum compartment under the RF and IF decks (held in place with a dot of super glue every few inches) to give better isolation between sections. (there is a little known mod out there for adding finger-stock under the IF deck). The conductive elastomer is about 20 years newer technology than the finger stock alternative and I had a big spool of it (use it on all sorts of test equipment and radios for gasketing).

Hopefully you will never need to pull the RF/IF/crystal deck assembly out again as it is a Pain in the A.. to do. Since you have gone this far, spend the extra evening taking these minor steps.

Date: Tue, 5 Jun 2012 12:19:29 -0700
From: "Chris Kepus" <ckepus@comcast.net>
Subject: Re: [R-390] Latest update on the EAC R-390A

Thought I would show some initiative by following up on one of Tisha's interesting custom mix lubricant formulas... in this case, Tisha intrigued me by the "nice bath..followed up with a re-lub....Mobil 1 (got that) mixed with tungsten disulphide.." (WHAT??!!). OK, so I Googled TD and found out
that it is: "Tungsten Disulphide (TD) is generally immediately available in most volumes. Ultra high purity, high purity, submicron and nanopowder forms
may be considered. American Elements produces to many standard grades when applicable, including Mil Spec (military grade); ACS, Reagent and Technical Grade; Food, Agricultural and Pharmaceutical Grade; Optical Grade, USP and EP/BP (European Pharmacopoeia/British Pharmacopoeia)and follows applicable ASTM testing standards. Typical and custom packaging is available. Additional technical, research and safety (MSDS) information is available as is a Reference Calculator for converting relevant units of measurement."

Oh Boy!! Am I in trouble! I knew if I entered "Tisha Land", it wouldn't be easy... so then I picked out Brycoat, a company extolling the lubrication properties of TD. Sent them an email: Where does one buy WS2 (code for

TD)?
Got this reply: "Thank you for your inquiry. We do not sell the raw material, tungsten disulfide (WS2). We use our proprietary high velocity impingement coating process to achieve the best possible adhesion. If you would like a price for coating your parts, we will need the part dimensions, the critical surfaces that need coating and the quantity."

OK, so I then called ACE hardware, Home Depot, Safeway and Walmart! Yep,
same answer. They don't sell tungsten disulfide, either.

Bottom line: TD sounds like the ultimate lubricant. So, please, Tisha, where do you find the stuff?

Date: Tue, 5 Jun 2012 15:22:55 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] Latest update on the EAC R-390A

MK Impex out of Canada. www dot lowerfriction dot com

They call materials based on tungsten as WS2 (Tungsten used to be known as
wolfram so it's atomic symbol is the letter W)

They sell powders, oil additives and greases. look at 8.pdf for specifications. It will work with any metal or plastic.

I got into this through sharpshooting and hand reloading ammunition. I wanted something that would not score the barrel, kept velocities high and
had minimal fouling.

I have canning jar full of powder. ($54 a pound, enough to last several lifetimes) What I use the powder for is on firearms. mixing a tsp of powder with a few oz of methanol and then applying it internally on a pistol or rifle and then rubbing the rest into the exposed metal, it takes on this crazy luster after you hand polish with a dry cloth. Realize that you want to use surgical gloves with this "stuff" as when it gets onto your skin it is a semi permanent tattoo. After a firearm is polished the stuff does not rub off.

After cleaning the barrel I pull a cotton patch through the barrel soaked in the methanol/ tungsten disulphide and do not rub it off. The first round through is going to swab this stuff even tighter into the surface of the barrel (my ammunition is coated in it as well).

I used the oil additive in my Mercedes, immediately after I purchased it I went with the liquid additive. Now I just blend a tablespoon full into a half a container of Mobil 1 and drop that in during an oil change.

The grease, that is some sort of magical stuff. I would almost say it is as amazing as liquid helium II that can flow uphill (analogy there). I bought a five pound tub and it is glittery grey/black and must be one of the smoothest substances I have ever seen. I made a small gift of an corked vial to a friend who does all sorts of restoration. it so reduced the coefficient of friction between the plastic cork and the glass vial that the darned cork will not stay in. When transferring some grease from the tub to the vial I ended up with a very tiny amount on my fingers. Cleaning it off was a nightmare, no soap had enough surfactants to break down the bond between my skin and this grease. I just had to wait for my skin to wear off over the next week or so to make it go away.

What I pay attention to is the Coefficient of Friction (CoF) and Load Bearing capacity. Another handy benefit with the lubricants I have been working on is that they are extremely hard and actually embed themselves
into the base metal in an almost alloyed state a few atoms thick. In other words, once it has been on there and been between items sliding or compressing together it permanently binds to the base metal.

Here are a few comparisons;

Tungsten Disulfide	0.044 CoF	400,000 PSI load
Hexagonal Boron Nitride	0.15 CoF	300,000 PSI load
Molybdenum Disulfide	<0.1 CoF	250,000 PSI load

With nearly every lubricant when you increase the load pressure the Coefficient of Friction will increase. Tungsten Disulfide actually does the opposite, the more pressure, the lower the Coefficient of Friction.

For the naontech based powders (smaller grains) you need to be careful as the powder can practically go right between the cells of your skin and right into your body. It behaves just like a solvent and is absorbed.

Date: Tue, 5 Jun 2012 18:03:48 -0500
From: Jim Green <jagreen3@sbcglobal.net>
Subject: Re: [R-390] R-390 Digest, Vol 98, Issue 2

<snip> I have found a potential gear lube. I have used it with success in the repair of watches and other fine mechanisms. I pick it up at my local health food store. It's Jojoba oil. Very slick and tenacious at clinging to the gear teeth and bearing surfaces. Oh, and it's non-toxic. I lubed my R-390/URR with it about 5 years ago. I can still spin the Kc knob with one

finger. I got this tip from an old watch repairman I know. He said you can buy it in miniscule quantities from watchmaker suppliers for big bucks or from the health food store 8oz for $9.00.

I'm going slow on this project. a little bit each evening. Gives me time to think before I do something dumb.

Date: Tue, 5 Jun 2012 18:09:07 -0500
From: Jim Green <jagreen3@sbcglobal.net>
Subject: [R-390] Latest update on the EAC R-390A

Thanks for all the advice. I'm moving slow with this. I'm a little reluctant to soak the whole RF deck in solvent. Will this not damage the coil forms? Is it safer to just submerge the front geared section? What solvent do you use?

Date: Tue, 5 Jun 2012 20:55:55 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Latest update on the EAC R-390A

The practical thing to do is remove the RF slug racks with slugs and the RF coil cans. Then you hang the gear train of the RF deck off the edge of the picnic table on a warm sunny afternoon and then proceed to clean. An air line from the compressor and several spray bottles are in order. After the bath, you leave the deck setting in the sun on the table until sun down to dry. The next available sunny day you do the lube job and let it drip dry also.

Date: Wed, 6 Jun 2012 07:37:33 -0500
From: "chacuff" <chacuff@cableone.net>
Subject: Re: [R-390] Latest update on the EAC R-390A

I would pull all the slug racks, coils (screw down at the bottom through the
coil form) and springs.

I usually start by soaking the whole chassis down with original 409 and work it over with a tooth brush. (usually the wifes) and then rinse off with the garden hose. You can go back then and spray down the gear train if you need to with something stronger..anything from mineral spirits (a great inexpensive cleaner) to gumout carb (be careful and wear skin and eye protection) cleaner and again the tooth brush trick followed by the garden hose.

Then I let it lay out in the sun and turn it from time to time...then a few days in the shop where the A/C is running to pull any remaining moisture

out. During that time I disassemble each coil and clean the cover in the same way...one at a time...looking for and cleaning out any critters that have been inside.

Cap and resistor replacement then reassembly and lubrication.
Usually comes out nice and I've never had a problem with the procedure.

Date: Wed, 6 Jun 2012 08:05:10 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] RF deck, points of clarification

I should of clarified. When I mention the gear train it is only in regards to the front portion of the deck. There is no way I would give the entire deck a bath with carb cleaner. Those little coils would respond to that by unravelling or something equally bad.

For the cans the most I resort to is unplugging them and giving each a wipe-down with the aircraft grade of simple green. Then hand cleaning the baseplate underneath and maybe a dot of De-Ox-It into each electrical pin socket.

My original intent was to the question of what I would do as a quickie type operation. Not a full fledged strip-down.

Date: Wed, 6 Jun 2012 09:46:32 -0500
From: Tom Frobase <tfrobase@gmail.com>
Subject: Re: [R-390] RF deck, points of clarification

My procedure is as follows:

With a little effort the entire mechanical section can be removed. From memory, there are few screws holding it to the main chassis and a few 1/4" hex screws and nuts under the chassis holding to the faceplate, I use a small 1/4" box end wrench to remove these, you will also have to disassemble the antenna trimmer assembly and unhook the band switch shaft. It sounds difficult but the results are much better this way.

Once this is complete separate the mechanical chassis from the electronics section. I also remove each of the ferrite slugs from the rack and sean them as well, be sure not to mix up the RF deck and intermediate IF slugs, they are different.

There have been a number of methods discussed on the list to clean the mechanics, my current approach is to degrease the assembly in a large ultrasonic cleaner first using a water based degreaser, alter that is complete I use cheap sudsy ammonia cleaner to brighten up the brass and

aluminum, make sure this is done at room temperature.

Rinse thoroughly with clean water and dry, I use the hot Houston sun. I use a similar concoction as Trisha to re-lubricate. I also revisit each of the cam rider bearings to make sure they are free and lubed well.

When this is complete I remove each of the coil cans in the RF deck they are held in place by a captive 4/40 screw. I pull each of the cans apart and clean the tops first with a tooth brush to remove the loose stuff and then a rag with a small amount of denatured alcohol.

Once all the coils are off it is a simple task to clean the deck since there to impede the cloth. I use a cloth with denatured alcohol and a pair of straight hemostats to clean inside the non removable cans and sockets as well as using a deox cleaner on the plugs and sockets.

I have good success with this approach and have been using it since the '70's. When you button it back up only you will know what kind of effort was spent doing the job and that is what counts! tom, N3LLL

For the cans the most I resort to is unplugging them and giving each a wipe-down with the aircraft grade of simple green. Then hand cleaning the baseplate underneath and maybe a dot of De-Ox-It into each electrical pin socket.

Date: Wed, 06 Jun 2012 11:44:12 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] RF deck, points of clarification

I think - and correct me if I'm wrong - BUT the methods presented so far will make it smoother to operate - BUT - absolutely will not resolve the issues of an old RF Deck with many years of use. The instance that I have is one of the first Collins Contract R-390As. The wear on the front panel said a lot. I did NOT find this in my '67 EAC.

The issue that first bites anyone, is the wear on the sides of the gears. Chuck please chime in on this!

I feel the sides of the gears, and I can feel that very slight "edge" on the sides of the teeth of the gears. You can clean, degrease, and lube with any concoction you so desire. The reality is, unless you take the gear train apart, gently hone the sides to remove that edge, then you'll never get that spin by one finger smoothness of the gear system.

I've worked on gears of many types and cuts. When you have "split" gears with a spring to take up the backlash, and they have and edge on the sides

of the teeth, you have to fix the real issue before all this lubrication.

Date: Wed, 6 Jun 2012 12:41:21 -0400 (EDT)
From: chuck.rippel@cox.net
Subject: [R-390] Worn RF Deck ??

I've not seen a worn out RF deck as yet. There are several keys to sucessfully correcting the mechanical portion of the deck.

1- Cleaning
2- Lubrication
3- Mechanical Alignment

Even if the split gears have worn teeth (within reason), if they are tensioned correctly the split gear will compensate for wear.

Date: Wed, 06 Jun 2012 13:06:27 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Worn RF Deck ??

The Y2KR3 Chapter 10 has its section on the gear train. Scott Seickel has a very good write up on the complete dis-assembly and reassembly of the entirety.
He makes note of using 220 grit on the sides of the gears to remove the "edge" i'm referring to. I am NOT implying that I have a worn our set of gears. I was simply saying that "I" would gently hone the sides during this process in lieu
of something like 220 grit.

The gears are not worn out, but I believe that this "edge" would be better taken care of by a gentle honing to remove this "edge" before putting it all back together. I am looking simply trying to get the sides of the gears smooth. The cleaning goes without saying, along with the lubrication.

Date: Wed, 6 Jun 2012 16:38:04 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: [R-390] Deck Cleaning

Once you get the RF cans loose from the deck, the covers will come off. Push the two tabs in. Use a screwdriver down the slug tube to push the inner frame out of the can. Watch which cover comes off which coil. The coils do not mix well.

With the covers off the cans you can give the covers a bath.
Easy cleaning is good.
Aggressive cleaning will leave you with a shiny metal can.

Date: Wed, 6 Jun 2012 16:48:29 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] RF deck, points of clarification

I agree with you on the gear wear and the need to hone off some of the sharp edges if needed. But first you must determine if needed is needed. A good cleaning and re lube goes a long way.

Maybe only a few gears need dressing and can be taken care of one at a time in the cleaning process. Also look to see if any of the split gears are over loaded and need to be adjusted.

There are a lot of details to address in the gear train care, adjustment, lube and alignment.

Date: Wed, 6 Jun 2012 22:03:42 -0500 (CDT)
From: nryan@mchsi.com
Subject: Re: [R-390] RF deck, points of clarification

It's true, no amount of whatever lubrication can overcome the effect of burrs on the split gears. The fix is to take them apart and gently, ever so gently, dub the gear cogs. Don't round them, just concentrate on eliminating the burr.

When reassembling the gears and loading their springs, engage the teeth sufficiently to get the gears to be slack-free. Usually one cog's worth will suffice.
Mobil One 90W Synthetic, sparingly applied, is a good all-round lubricant for R-390* mechanisms.

Date: Thu, 7 Jun 2012 20:42:53 -0400
From: John Wendler <wendlerjrv@gmail.com>
Subject: [R-390] WS2 vs. MoS2

I have been enjoying your posts on WS2 and noted the comment on using it in
sharpshooting.

It has been awhile since I have participated in that activity; at the time, Moly grease dip or powder coated bullets were all the rage.

Do you have any insights on the differences between Moly and Tungsten down
the bore? Checking out the wiki article on WS2, it seems like it converts to something else in a hot oxygen atmosphere.

For the list - I once came across some Moly grease in the strangest place - used as a lubricant in projectors where it would need to withstand a very high temps. I don't think this was your average axle grease.

Date: Fri, 8 Jun 2012 13:18:37 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] WS2 vs. MoS2

In theory, tungsten is more chemically neutral than moly. Some moly materials can become corrosive and contribute to fouling. For a radio the corrosion part would matter as we are mixing bronze, aluminum, steel of different grades, etc... (electro-galvanic reactions)

I fiber scope the bores on my rifles and have seen absolutely no build-up. Even copper fouling in the chamber has gone away and lead in the barrel comes out with a little bit of Hoppes and a patch. Scrubby brushes are not used by me any more.

Date: Mon, 23 Apr 2012 13:28:20 -0400 (EDT)
From: chuck.rippel@cox.net
Subject: Re: [R-390] Y2K Manual and the dishwasher

Actually, its a really BAD idea. If for no other reason, a number of the coil forms are paper.....

> 1st. In chapter 9 there is this statement:
"Ok so you have run all the subassemblies through the dishwasher."
> This whole section is written in a rather tongue in cheek style. Is
> the author serious? Is it really a good idea to run the sub-assemblies
> through a dishwasher? If so, any recommendations concerning
> temperature settings & detergent? My XYL is away for a week. Now would
> be a good time to strike if this is an approved procedure.

Date: Sat, 1 Dec 2012 21:25:31 -0600 (CST)
From: nryan@mchsi.com
Subject: Re: [R-390] starting 390A restoration

<snip> Use extreme care tearing down and reassembling an RF deck geartrain. Take photos and make detailed sketches as you go. Having another working geartrain handy is helpful. I have found, despite my best efforts, that even my pics and sketches may have omitted something and have had to look at the working unit.

If you take extra pains, the geartrain should turn silky smooth. Gently

debur the split gear faces. Load gear springs lightly, just sufficiently to eliminate backlash. Lube lightly with Mobil One synthetic oil.

Both those links are worth clicking onto as their content is very well written and profusely illustrated.

Date: Sun, 2 Dec 2012 07:26:06 -0500
From: frank hughes <fsh396ss@gmail.com>
Subject: Re: [R-390] R-390 Digest, Vol 104, Issue 2

I found these R-390A training videos to be very helpful, sold by Electric Radio:
http://www.ermag.com/index.cfm?v_link=catalog&v_product_type_id=26

Date: Tue, 11 Dec 2012 21:28:12 -0500 (EST)
From: ToddRoberts2001@aol.com
Subject: [R-390] R-390A Crystal Osc Deck Removal

I was wondering if anyone here has tried to remove the R-390A crystal osc deck without dropping the front panel? It looks like one could do it using a close-clearance right-angle philips-head screwdriver to loosen and remove the three green-headed screws.
There are times when I would like to remove the crystal osc deck for service or band switch cleaning without having to pull the whole front panel which would probably save me one or two hour's time at least and simplify the project.

From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R-390A Crystal Osc Deck Removal

Some days aggravation exceeds return on investment. Consider that OK it is a 2 hour ordeal to drop the front panel and pull the RF deck and then put it all back to gather. So put a Saturday on the honey do list and get ready for the event. Round up the required fortifications and rations to geterdone. Then jump in early and put a whole 8 hours into it. Clean every thing up nice, get it lubed and realigned. Then be done with it for at least a year. Do not nickel and dime your way through it. Do it all. Do it right and get over with for a long time.

Date: Wed, 12 Dec 2012 10:21:09 -0800 (PST)
From: Joe Connor <joeconnor53@yahoo.com>
Subject: Re: [R-390] R-390A Crystal Osc Deck Removal

How tough is it to remove the Crystal Oscillator deck without removing

the RF deck? I see that the Y2K manual describes the process in some detail. I think I will be faced with this task right after Christmas.

I have an EAC blue-striper that I got working very well about 10 years ago. A couple of years ago, I turned it on, there was a small wisp of smoke from the crystal oscillator deck and the radio stopped receiving. I noticed that the 6AK5 in the crystal osc. deck did not light even though it tested good. I have avoided the repair for several years but now I think (hope?) that I am going to get a new crystal osc. deck as a Christmas gift. Undoubtedly, I will be asking you all for help when I tackle that job. Working on that set is going to be a whole lot different than working on the Hammarlund Comet Pro that I am currently restoring.

Date: Wed, 12 Dec 2012 14:24:24 -0500
From: <chuck.rippel@cox.net>
Subject: [R-390] (no subject)

You might be able to get at 2 of the screws but as I recall, there is one behind the gear train. Not enough clearance for a right angle screwdriver I've ever seen.

Thanks for your notes on reaching the green-headed screws that hold the crystal osc deck in place.
Look what I found recently on eBay :

http://www.ebay.com/itm/ST-TOOLS-AIRCRAFT-CLOSE-CLEARANCE-RIGHT-ANGLE-PHILLIPS-SCREWDRIVERS-/181039269574?pt=LH_DefaultDomain_0&hash=item2a26c806c6
<http://www.ebay.com/itm/ST-TOOLS-AIRCRAFT-CLOSE-CLEARANCE-RIGHT-ANGLE-PHILLIPS-SCREWDRIVERS-/181039269574?pt=LH_DefaultDomain_0&hash=item2a26c806c6>

Date: Thu, 13 Dec 2012 02:44:16 +0000 (GMT)
From: chuck.rippel@cox.net
Subject: Re: [R-390] Crystal Deck Switch Alignment

It might work and thanks for the links !!
Here is one issue you may not have thought about. Timing.....

With the crystal and RF decks assembled and upside down, I change bands up one then down one. F"instance, the switch wiper is on the 9 kc selection, I'll go "up" to 10 kc then back to 9 and well where how the switch wiper aligns to the 9kc contact. Then, will go "down" to 8 kc then back to 9 again and again note how the switch wiper centers up in the 9 kc contact. Will then loosen the clamp on the grea driving the xtal selector switches and adjust it so the switch lands in the center of the contact,

regardless if the band switch is being turned down in frequency or up. If you go in only one direction to mechanically align the switch, you'll find there is a bias one way of the other and the switch wipers will not squarely engage the contact. There are also 4 screws on the corner of each board on which the contacts are mounted. These can loosen up and need to be checked.

You may very well be able to time it looking through the "window" and matching the KC markings with the band on which the radio is set. If I have one torn down, the method above assures its right on the money.

Date: Fri, 21 Dec 2012 13:17:05 -0500
From: Mack McCormick <w4ax.mack@gmail.com>
Subject: Re: [R-390] R-390 Digest, Vol 104, Issue 36

> Date: Thu, 20 Dec 2012 14:27:03 -0500
> From: Bob Young <bobyoung53@hotmail.com>
> Subject: [R-390] R-390A gear train cleaning
>
> A few weeks ago I asked about pulling the gear train apart to clean it,
> common concensus seemed to be that it was too much of a PITA and/or it was
> too tricky of an undertaking for a newbie and to just soak them in some
> solvent (kerosene?) for a period of time. Do I need to pull the RF deck to
> do this?

I found the following method best to clear the gear train without disassembly. I've completed two R-390a's with the following method.

1. Remove the RF deck from the receiver.
2. Take it outside and hang just the gear portion of the RF deck off a table or other suitable object.
3. Use a FULL large can of WD-40 to spray all the gears until most of the grease and gunk is removed. WD-40 is mostly Stoddard solvent. Keep WD-40 off painted surfaces as it will remove some paints/stamps.
4. I then use a full can of carburetor cleaner including scrubbing with a brush or rag to clean stubborn spots.
5. Relubricate with Mobil One synthetic oil. Use a long spout oiler to reach inside the gear train.

I've previously posted pictures to this group but will send you a picture if you'd like to see the results. It's not difficult and takes less than an hour. The gears turn smoothly after this process.

Date: Fri, 21 Dec 2012 12:20:32 -0600
From: Raymond Cote <bluegrassdakine@hotmail.com>

Subject: Re: [R-390] R-390 Digest, Vol 104, Issue 36

I have five R/390A's to do and other like-minded Collins gear. May I see a picture?

Before I came here I was confused about this subject. Having listened to your lecture I am still confused. But on a higher level. Enrico Fermi

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Date: Fri, 21 Dec 2012 13:17:05 -0500
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3. Use a FULL large can of WD-40 to spray all the gears until most of the grease and gunk is removed. WD-40 is mostly Stoddard solvent. Keep WD-40 off painted surfaces as it will remove some paints/stamps.
4. I then use a full can of carburetor cleaner including scrubbing with a brush or rag to clean stubborn spots.
5. Relubricate with Mobil One synthetic oil. Use a long spout oiler to reach inside the gear train.

I've previously posted pictures to this group but will send you a picture if you'd like to see the results. It's not difficult and takes less than an hour. The gears turn smoothly after this process.

Date: Fri, 21 Dec 2012 12:20:32 -0600
From: Raymond Cote <bluegrassdakine@hotmail.com>
Subject: Re: [R-390] R-390 Digest, Vol 104, Issue 36

I have five R/390A's to do and other like-minded Collins gear. May I see a

picture?

Before I came here I was confused about this subject. Having listened to your lecture I am still confused. But on a higher level. Enrico Fermi

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Date: Fri, 21 Dec 2012 18:10:06 -0500
From: Doug Massey <dougmassey@masseyradiolabs.com>
Subject: Re: [R-390] R-390 Digest, Vol 104, Issue 36

Carburetor cleaner???? Or engine cleaner???? Foam engine cleaner and wd40 same action..... It's mineral spirits(paint thinner) Carburetor cleaner is good but be careful. It's rough on the lettering and decals not to mention chassis itself if left on too long. It is sure strong. If I take apart partial or full gear train I still use mineral spirits to clean parts in a bath. It's also cheap. Then i wipe gears down with lacquer thinner to finish up to get any remaining crud before reassembly. I am too scared of carb cleaner near the decals, lettering etc.

Date: Fri, 21 Dec 2012 18:20:16 -0500
From: Mack McCormick <w4ax.mack@gmail.com>
Subject: Re: [R-390] R-390 Digest, Vol 104, Issue 36

I'm careful to only spray carburetor cleaner inside the gear train. When I've accidentally sprayed it on the stamps on the front of the gear train front plate there was no effect. I've had great results. I've never sprayed it around the front panel or any painted areas.

Date: Fri, 21 Dec 2012 19:27:50 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R-390A gear train cleaning

Standard leaning practice is to pull the RF deck and all the other decks while you are at it. Prop the receiver front edge up on a couple 2 x 2 blocks as you drop the front panel onto the bench. Pull all the tubes. Unhook the slug rack springs and remove the slug racks.

Mostly in the summer-time, you hang the gear train off the end of a table in the yard.

Then run lots of solvent through the gear train and follow up with compressed air until you have every thing flushed out. Mostly it is not necessary to disassemble the gear train.

Once eery few years keeps the gears clean. Relube with synthetic oil blow that in and work it around. Do not over-load the split-gears if you need to rework some of them.

That said that's the easy way and it works. But !!!! for the real smooth drive..
Pull all the gears apart then pull all the split pairs apart.
Then flat lap all the gears on a good stone.
The idea is to take the edges and burs off the sheet metal punched gears.
Clean that all up and put it all back together.

Once you have spun the dial on a gear train that has been properly lapped this way you will always remember what a R390 gear train can really feel like.

Date: Sat, 22 Dec 2012 00:57:07 +0000 (GMT)
From: chuck.rippel@cox.net
Subject: [R-390] Gear Cleaning OMG!!!!!!

I read the gear cleaning procedure quoted below and found it very troubling. Wanna clean the gear train, here's how: carburator cleaner has its place in the process when used properly and safely. Buy a 1 gal pail of GUNK carburator cleaner. There will be a
small parts basket in the can.

1- Tear down the RF deck, remove all the gears.

2- Separate the stainless steel from the brass gears.

3- Put the stainless steel gears in the parts basket and put the basket in the carburator cleaner over night. Orient the handle on the parts basket so you can get to it without putting you hand into the chemical. Put the lid back on the can.

4- Several times during the soak, remove the lid, grab the handle and move the basket up and down so that the parts cleaner can wash the gears and get in between the rotation stops on the KC change and MC change shafts.

5- After the soak, remove the parts basket, take it over to your out door hose and begin rinsing the parts in the basket.

6- When the water runs clear from the basket (its milky white when mixing with carburator cleaner) put a couple drops of Dawn dishwashing detergent in the basket, rinse again letting the soap foam up around the gears. Continue to rinse until the soap foam is gone.

7- Let the gears drain a bit in the basket. While you are waiting, warm up you oven to 250 degrees and let it sit there for 30 minutes of so.

8- Put the basket of gears into the oven, close the door and shut the oven off. Let them sit in the oven 8-12 hours. The object is to drive any moisture from between the split gears.

9- Repeat with the brass gears BUT, only soak them 4 hours. The chemical MAY/will probably discolor the brass.

10- Perform steps 4 through 8 but modify the oven temperature much lower. Say... 150 degrees (no split gears here) Too hot and the brass WILL change color.

11- Lubricate the split gears (between the mating surfaces) with 70W synthetic gear oil.

12- Re-assemble, set the split gear spring tension, correctly time, and set the over-run on the gear train (If you cannot do this, do not proceed from step #1)

Not to step on anyones toes but..... please do not do the below ! There are so many reasons to alter this procedure, I'm not going to list them. Soak the gears in carb cleaner while they are still mounted on the radio and not able to be properly rinsed will net you a radio that will smell so bad, you'll be running it in your garage for a year. Especially when it gets hot. There will be carburator cleaner in between the faces of the split gears. Even synthetic oil will break down when it comes into contact with carb cleaner. Carburator cleaner will eventually pit the brass gears; it HAS to be rinsed off !

WD-40 is not a lubricant, it was actually developed to be a Water Displacement..... "W - D" Fourty.... Its an ok cleaner. After cleaning up a main chassis, I'll put some WD 40 on a rag and wipe down the whole thing. Drives any water out and cleans up any last bits of krud.

Cleaning up the gear set = re-timing the rig. That process makes up 80% of making your R390A play to its potential. The timing can't be "close," "Ok for government work," "just a bit off," etc... If its not right, the radio will not perform to its potential.

With the above sermon, I can understand and appreciate trying to clean one up without having to go through the timing trials. Unfortunately, "there ain't no short cuts" that work. I've tried 'em and am still looking.

Date: Sat, 22 Dec 2012 11:24:08 +1000
From: Ken Harpur <igloo99nz@yahoo.co.nz>
Subject: Re: [R-390] R-390A gear train cleaning

I've just finished my first gear rain re-build a couple of days ago. I took the plunge and disassembled it, soaked everything in mineral turpentine for a few days, removed the stubborn grease with WD-40, a tooth brush and lots of paper towels and with the excellent reassembly pictorial on the web http://militaryradio.com/r390a-rfdeck-geartrain.html ..... put it all back together.

My gear train is very well worn and although it is much better than it was...some gears show signs of very heavy use and after breaking the first two circlips for the split gears regardless of how careful I was, I didn't risk pulling apart the others. So on my deck I have three split gears that badly need to be lapped with a stone as Roger suggested as they feel very gritty when the gears are rubbed together as opposed to the nice smooth feel they are supposed to be.

Loading up the split gears can be a challenge on some gears...but with patience and perseverance success awaits. Also, be aware that there are some very thin washers that go either side of the gear that drives the khz readout bezel. On my one there were two at the back and two on the front.

I decided to pull apart the differential assembly...cleaned it with WD-40 and reassembled. I found the way to load the split gears on it was to rest one gear on the gear it mates to, then load the remaining half of the gear and using my fingers as a clamp wiggle the gears slightly until they come together.

I created extra work for myself though because I removed the geneva drive and the gear on the bandswitch...it took me a long time to get that set up again and for the other 390A radios I have I think I'm going to leave the geneva drive alone.

I learned a lot by doing mine. When I find a source of suitable circlips I will be getting back into it to smooth up the gears that are catching. The point is...a newbie can do it! As long as you take your time, work in a logical fashion and keep referring to the pictorial.
I suppose it depends on what you're comfortable with. There was so much caked-on grease on my one that I felt disassembly was the best option.
Good luck with it.

Date: Fri, 21 Dec 2012 21:08:34 -0600
From: Dan Osborne <wb5afy@wb5afy.net>
Subject: Re: [R-390] Gear Cleaning OMG!!!!!!

I have rebuilt three R-390a's using your recommendations as to cleaning and re-assembly of the RF deck. Works like a charm but NOT for the faint of heart !! I have found that this is at least a 12 pack job if not more. Thanks

for all your advice, instructions and help over the years.

Date: Sat, 22 Dec 2012 09:56:09 -0500
From: bill kirkland <kirklandb@sympatico.ca>
Subject: Re: [R-390] R-390A gear train cleaning

Not sure what a circlip is but try McMaster Carr. Unfortunately they refuse to ship to Canada (unless you are a business). It wouldn't surprise me if there are a number of shims in the gear assembly. There certainly are in the 51j series gear boxes. The Collins Quality Manual (http://www.jptronics.org/radios/Collins/) indicates how well the gears were supposed to mate/overlap - which required the use of shims You are encouraging me to start on mine collection but I still have to get through the 51J series first.

Date: Sat, 22 Dec 2012 10:30:26 -0500
From: Curt Nixon <cptcurt@flash.net>
Subject: Re: [R-390] R-390A gear train cleaning

Then they will feel like a Racal gear train!! :) Just kidding Roger!. It does work well. Take a while but all those small hangs add up. Just got my Racal RA1217 working....not near as many gears as my 390A but man is it nice work!

Date: Sat, 16 Mar 2013 16:45:58 -0400
From: k2cby <k2cby@optonline.net>
Subject: [R-390] R-390A Zero adjust

The disc attached to the zero adjust shaft on my R-390A (a 1954 Motorola)
has always been loose and rotates freely, but it works fine. As the zero adjust knob is rotated clockwise, the disc at the end of the shaft bears on three pins projecting from the clutch. The disc doesn't turn anything; it imparts pressure, not rotary motion. So long as the pins are depressed the clutch will disengage.
Miles B. Anderson, K2CBY

Date: Sat, 16 Mar 2013 16:55:11 -0400
From: Bob Young <bobyoung53@hotmail.com>
Subject: Re: [R-390] R-390A Zero adjust

Yeah, my disc is fine and presses on the three shafts, it seems like on side of the clutch is binding someplace as it is pushed away from the mating surface on the other gear.

Date: Sat, 16 Mar 2013 17:09:06 -0400

From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] R-390A Zero adjust

Yes, the disc on the end of the zero adjust knob SHOULD turn.
The clutch is what should NOT turn freely.
They are two separate entities.

The zero adjust plate pushes on the clutch to allow movement of the PTO *without* moving the geartrain. That's why the Veeder root counter does NOT move when making a zero adjustment.

Date: Sat, 16 Mar 2013 17:16:33 -0400
From: Bob Young <bobyoung53@hotmail.com>
Subject: Re: [R-390] R-390A Zero adjust

I'm looking down between the clutch and the gear in front of it towards the back of the radio and there is what appears to be a bent washer thin enough to compress when the clutch is turned in, I wonder if there is a problem with that? I'm not sure of the name of it but I think it's called a spring washer. That gear moves forward a bit when the clutch is turned in also, I don't think it's supposed to do that.

Date: Sat, 16 Mar 2013 17:30:00 -0400
From: Bob Young <bobyoung53@hotmail.com>
Subject: Re: [R-390] R-390A Zero adjust

Does anyone know if this clutch assembly is all one piece? it appears that way.

Date: Sat, 16 Mar 2013 17:06:31 -0500
From: n4buq <n4buq@knology.net>
Subject: Re: [R-390] R-390A Zero adjust

No, it is not. There are several (6?) discs that are compressed by a few (3?) compression washers. If anything isn't working freely, it can cause these symptoms. There are several little holes that have to align, etc. It can all be taken apart, cleaned, examined for proper movements/sliding, and reassembled. Reassembly is a bit difficult, though, as I recall, as you have to compress the spring washers and get a grip ring in place and into a groove (I think). It has been a long time since I did this... Barry - N4BUQ

Date: Sat, 16 Mar 2013 18:25:29 -0400
From: Bob Young <bobyoung53@hotmail.com>
Subject: Re: [R-390] R-390A Zero adjust

Good, then it won't be a waste of time to take the assembly out, the three holes seems to line up right but again it's difficult to see in there but something is stopping the clutch from moving out freely.

Date: Mon, 18 Mar 2013 15:50:07 +0000 (GMT)
From: chuck.rippel@cox.net
Subject: [R-390] Zero Adjust Clutch Repair

In reading the thread, I haven't really gotten my mind around exactly what is broken/not working with the clutch.

Generally, I find that at one time, the clutch was oiled and that oil had hardened. You can turn the "ZERO ADJUST" knob all the way in but the clutch plates do not disengage and no adjustment can be made. Is that what we're talking about ?

If so, 80% of the time I find that the radio can be put on its side, the "ZERO ADJUST" cranked in and a few generous squirts of WD-40 sprayed into the gaps in the clutch plates. Sometimes, a very small screwdriver needs to be worked in between the plates to open a gap. Once that's done, with the Zero Adjust still fully engaged, rock the KC Change knob back and forth and try to break the clutch loose. Once its loose, give the plates another shot of WD40 while rocking the KC Change knob back and forth. The idea is to soften and flush out some of the hardened lubricant.

If not, the clutch can be taken apart but its no picnic. There is a "C" clip that needs removed then the clutch discs, springs and plates need to be individually cleaned. Do NOT oil them !! Getting it back together is also a chore.

Date: Sat, 27 Apr 2013 12:22:20 -0700
From: Gordon <gordon@n6wk.com>
Subject: [R-390] Loaded gear tension

After cleaning all the gear assembly, How much load do I set the loaded gears for? Is 2 teeth load correct? I am getting ready to disassemble and clean these gears, But I want all my ducks lined up before I do. I have the instructions with the step-by-step, but I don't see the load figure.

Date: Sat, 27 Apr 2013 15:46:49 -0700 (PDT)
From: Norman Ryan <nnryann@yahoo.com>
Subject: Re: [R-390] Loaded gear tension

I load the gears lightly, just enough to take the backlash out of the gear assembly. You'll get silky smooth action this way.

If you have the gear assembly apart already, this is a good time to check that the gear faces glide smoothly past each other by taking them apart (mind you don't lose or break the circlips!) and gently filing off any burrs, then lightly oiling the gear faces.

Take your time and make sketches as you go so you don't get in over your head. Here's a link to a helpful site to guide you through reassembly: http://militaryradio.com/R390A/R390RFDeck/

Date: Sat, 27 Apr 2013 16:29:28 -0700
From: Gordon <gordon@n6wk.com>
Subject: Re: [R-390] Loaded gear tension

Thanks Norman, that is exactly the info I was looking for. I carefully looked at how much load is on the gears before disassembly, So I have a pretty good
idea how much is needed. Thanks for the tip on sanding the sides of the gears. I have my Nikon camera all setup and am taking literally HUNDREDS of pictures of everything as I go. Remove a gear.. take a picture or two, then on to
the next one and repeat! I also had already found the link on the net, but thank you for sharing it. I AM having fun.. LOL

Date: Sat, 27 Apr 2013 19:15:58 -0500
From: Raymond Cote <bluegrassdakine@hotmail.com>
Subject: Re: [R-390] Loaded gear tension

Thanks for the link Norman. I have never seen this pictorial and it will come in handy.

Date: Sat, 27 Apr 2013 23:05:10 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: [R-390] Loaded gear tension

Just enough to get both springs in the split gear pair to have a little tension and not fall out of the gear. Do not over-load the gears. The anti-lash aspects of the
split gears is over-rated. They are good and work well. You need a lot more test equipment than one human body of normal capability do determine if a split gear has a lash problem. Two teeth is about right. One may work well. Less is better.

Date: Sun, 28 Apr 2013 17:11:59 -0700 (PDT)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] Gear Rebuilding

> http://militaryradio.com/R390A/R390RFDeck/

This is the same material that is in the Y2KR3 manual Chapter 10. There is more information for the gear reassembly in the Y2KR3 manual than on the above mentioned site.

D

Date: Mon, 15 Jul 2013 16:29:39 -0500
From: Don Reaves <donreaves@gmail.com>
Subject: [R-390] Y2K Manual Question

In the y2k manual, there is mention of two lubricants for the gear train and slug racks. One is MIL-G-7421, which is a grease and is easily identified on the net. But the other is MIL-L-7970, which is likely a typo and should be numerals 7870. MIL-L-7970 is a specification for mahogany plywood, whereas MIL-L-7870 is a general purpose, stable at low temp., instrument oil with anti-oxidation properties. That part number is superseded by part number MIL-PRF-7870. 7870[D] seems to be the last available revision and Royco lists that oil as commercial part 363. Anyone disagree with my conclusion that 7870 is the proper citation? The reason I ask is I am engaged in a discussion with a friend about the merits of not applying any lubrication to the R-390A gear train after cleaning up a dirty mechanism. He likes dry, I like a little Mobile-1. I was reading through the TMs on the subject and discovered the mention of these two specific lubricants and wondered what they were.

Date: Mon, 15 Jul 2013 19:44:25 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Y2K Manual Question

I think your post is correct. (re MIL-PRF-7870)

We would like a little coat of something on the metal. It is better that some replaceable renewable stuff be on the surface to oxidize and get attacked by nature rather than the metal itself. Better that we have some

additional lube in the gears. A clean gear train is not a high friction device but a little lube will help more than running bare metal on bare metal..

As gears wear, the lube will hold worn loose bits in place just out of the line of friction and keep them from getting back into pressure points and producing more wear.

Some of the dry lube gun stuff is considered a good choice for lube. It is thought to collect less dust over time. But hands down the Mobile-1 is the 2013 lube of choice. It's not what we think is good in an R390. It is what science tells us about rubbing to chunks of metal together lots and lots of times.

Date: Mon, 15 Jul 2013 20:11:43 -0400
From: "Charles P. Steinmetz" <charles_steinmetz@lavabit.com>
Subject: Re: [R-390] Y2K Manual Question

>MIL-L-7870 is a general purpose, stable at low temp., instrument oil with >anti-oxidation properties. That part number is superseded by part number MIL-PRF-7870. 7870[D] seems to be the last available revision and Royco lists that oil as commercial part 363 <snip>

Good detective work!

>He likes dry, I like a little Mobile-1

I have used both light oil and dry graphite with good success (when I use graphite, I apply it dry, not in a solvent carrier -- I found that the graphite left after the solvent evaporated did not lubricate nearly as well as graphite applied dry). The primary application for graphite is in very dusty locations (sandstorms, etc.), where the dust can get caught in oil to form an abrasive paste. This may be why your friend doesn't use oil. If so, he should consider keeping the radio room cleaner (if dust getting caught in the oil is really a problem for him) or using graphite. You can get by with an unlubricated gear train, but it is not the preferred solution. (I have only once or twice seen a 390/390A used by a ham or SWL where dust in the oil was a problem, out of several hundred units.)

When using oil, the lubricity demands are not high -- the tuning mechanism is very lightly loaded -- so you don't need extreme pressure or high-speed additives. The most important criterion is that it be non-gumming over long periods of time and at somewhat elevated temperature. Second is some corrosion inhibitor, given the different metals used in the gear train. I'm sure there are many oils that fit this description. I've been using and recommending Mobil 1 for 390/390A gear trains (and many other uses) since the mid-'70s and it is well-proven.

I have generally avoided grease of any sort, because until very recently there weren't any that were as gum-resistant as a fine light synthetic oil. There are some specialized greases available today that meet the requirement (e.g., some of the DuPont Krytox products), although the ones that do are quite expensive and I see no benefit generally to grease over light oil.

Date: Mon, 15 Jul 2013 22:28:57 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: [R-390] Gear lube suggestions

Amen, good stuff Charles

Date: Mon, 15 Jul 2013 23:20:06 -0400
From: "Charles P. Steinmetz" <charles_steinmetz@lavabit.com>
Subject: Re: [R-390] Gear lube suggestions

I was curious, so I looked up Royco 363 and found the following:

>Being a highly refined mineral oil based lubricant ROYCO 363 is
>formulated with modern additives to provide rust inhibition,
>oxidation and corrosion protection, good resistance to evaporation,
>and low temperature fluidity. ROYCO 363 has limited use at high
>temperatures - unless provisions are made for frequent relubrication.

It is probably a good choice based on its low viscosity and anti-corrosion properties, but perhaps not the best choice for hams and SWLs, who are less likely to do regular cleaning and relubrication of the gear train like the military did because of the need for frequent relubrication when used at elevated temperatures. This is likely a consequence of being a natural (not synthetic) mineral oil, so its resistance to evaporation and anti-corrosion properties are not as good as an equivalent synthetic oil would be.

Date: Tue, 16 Jul 2013 01:34:01 -0500
From: Don Reaves <donreaves@gmail.com>
Subject: Re: [R-390] Y2K Manual Question

Thanks, all, for the followup comments. I will have a few extra arrows in my quiver for making my case about putting something, anything, on that dry, squeaky clean RF train. But my friend will counter that his R-390s aren't in heavy duty service, just occasional light SWL duty and certainly no band sweeping. So long term there is little friction to overcome. I tried to find the thorough maintenance list our missing but not forgotten contributor, Nolan Lee, once posted to see what he mentioned about

lubrication but I can't seem to locate it at the moment. If anyone has a copy of that, could you email it to me? Tnx.

Date: Tue, 16 Jul 2013 09:58:20 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Gear lube suggestions

I believe Mobil One is the preferred lube by many.

Anhydrous Graphite works very well, as it is simply graphite with a water carrier. The water carrier evaporates and leaves behind a film of graphite on the gears. It is indeed a lubricant used in firearms. I have several tubes put out by "Gunslick". I know it works under very harsh conditions in a .45 ACP during 100s of rounds launched downrange. It does fine in very cold and very hot. With no petroleum based carrier, it doesn't attract dirt, dust, or crud. Then again I do not have documents to refer to. So there is that caveat.

Date: Tue, 16 Jul 2013 15:27:43 -0400
From: "Charles P. Steinmetz" <charles_steinmetz@lavabit.com>
Subject: Re: [R-390] Gear lube suggestions

The little tubes from Gunslick marked "anhydrous graphite" are Gunslick product 83012, "Graphite Lube." http://www.gunslick.com/products/chemicals/lubricants_oils/graphitelube.aspx This is a lithium-based grease filled with graphite. The Gunslick web site does not appear to show any other products containing graphite. If graphite is available in a water carrier, it probably would not be a good thing to put on a 390 gear train. If it wicked between the plates of a dual gear, or into the small clearance between a shaft and its bearing, the water might cause corrosion before it could evaporate from the confined space. Graphite is available in volatile hydrocarbon carriers, both as a liquid and as an aerosol. However, as I said in an earlier message, I found that the graphite left after the solvent evaporated did not lubricate as well as graphite applied dry.

Date: Tue, 16 Jul 2013 18:28:49 -0400
From: "Charles P. Steinmetz" <charles_steinmetz@lavabit.com>
Subject: Re: [R-390] Gear lube suggestions

I should have added that if one is going to use grease on a 390/390A gear train, this would be a pretty good one. I would prefer that it had a synthetic base, but long experience has shown that its lithium base does not gum or harden in reasonable time frames.

Date: Tue, 16 Jul 2013 20:19:57 -0500

From: Gary Pewitt <garypewitt@centurytel.net>
Subject: Re: [R-390] Gear lube suggestions

Since the unavailability of whale oil, which was totally non gumming, the only substitute is Jojoba oil, which is also non gumming. It's really good stuff.

Date: Tue, 16 Jul 2013 23:16:59 -0500
From: Don Reaves <donreaves@gmail.com>
Subject: [R-390] Nolan Lee's 1998 EAC overhaul narrative

I asked if anyone had a copy of this, and Don Heywood responded. Thanks, Don!

Here is Nolan's original post, only slightly modified for format by me for a little better readability. Text and typos unchanged. For you newcomers to the list, Nolan has been absent from the list several years due to health issues so we can only preserve his amusing, yet informative stories and pass them along from time to time.

Nolan Lee's EAC R-390 Overhaul Description, 1998

I've had a couple of requests for the list of items I did when I went thru my EAC last year so I'm reposting my original message on it to the list. The EAC has been running 24/7 since October of last year and I have no complaints. I've been wanting to pull it out of the rack and do a "visual" of it and check the tubes and the alignment but haven't had the time. Maybe this Fall. Your mileage may vary... nolan

-----snip from Oct 1998-----

Well, after spending months slowly going thru my two R390A's, one is finished. Below is an outline of the steps that I took during my overhaul. This was probably one of the more evolved R390A "overhauls" done in the South. The other, will take longer, I'm probably going to replace all of the bushings in the RF deck amoung other things that I didn't do with this one.

The victim:

I started with a cherry 1967 EAC contract model that was the "lowest mileage" R390A I've ever seen. All of the original modules, meters, covers, etc. were still on it. In addition, all of the tubes in it had date codes within a two or three month period of each other in 1968. Even with clean gears, there wasn't even a hint of a wear pattern in any of the gears and all of the aluminum finish in the tracks on the RF deck was still intact. The green

paint on all of the module hold down screws was even 100%. I'd be surprised if this thing saw more than a few hours operation after the burn in period. There's no diode load hole in the front panel or adjustment hole in the top dust cover for the meter adjustment. Jerk all of the modules out of it and rip it's gizzard out and scatter and toss the parts around! I tried, but I managed to not loose any of the parts and didn't even have any extra ones left over.

Chassis:

Tested the dial lamps, checked the value of all of the resistors, the diode, the 2 capacitors, the meters, tested the selenium rectifier, and the antenna relay and inspected the contacts in the relay. Verified function of the main power micro switch, it's placement, and measured the resistance of it. Measured the resistance of all of the front panel switches and potentiometers, and very lightly lubed the
shafts of each, checked the ovens switch, verified the values of the fuses, checked their resistance, replaced one of the fuse holders that I didn't like the look of with a NOS one, and replaced the rear panel IF connector, the center terminal was missing. Checked the line filter, and checked the tightness on all of the screws holding the whole damn mess together. I removed all of the knobs and inspected and lightly lubed the set screws. Also verified that the index washers
were installed in the two big knobs that prevent the clamps from turning. The next step ate up a lot of time. I removed all of the hoods of the chassis connectors to inspect and then measured the resistance of EVERY damn wire in the chassis. Then I installed a NOS military 3 wire 8 foot rubber 16 gauge power cord with a molded plug. Nice and flexible SJ. The original strain clamp for the cord was still
there. First one I've ever seen. :-)

Power supply module:

Visual inspection, resistance readings of the transformer windings, and wiring, inspected the solder connections, verified 115 volt setting, stuffed two new 26Z5W's in it. Checked all of the screws and nuts for tightness.

PTO:

Why bother? Chunked it in the R390A parts pile and installed an Army rebuilt Cosmos that I've been sitting on for about ten years, sealed in the box, to replace the Cosmos that was in there. It turned out that the endpoint was out a little less than 2 KHz, and linear within a little less than 200 Hz across the spectrum. I don't know what the specs on it where when it left their hands in Feb. of 1984 but it sure aged well. :-) I guess that I'll let it run a few weeks and then adjust the endpoint. I did power up

the oven and verified that the thermostat worked, measured the resistance of the transformer, and tested the tube. I like the Cosmos PTO's. That blue label sure is pretty, bubba! On a side note, I probably use a bit more complicated method than most people do when fitting a PTO to a receiver. If you're going to do it right, it might as well be done right the first time. Both halves of the oldham coupler should be perfectly parallel to each other and the centerline of both shafts should be perfectly in line with each other on both planes. I only spent about an hour adjusting the position and height of the PTO in the chassis, but spent several hours measuring the components and setting up the fixtures to measure other aspects of the components. I first measured the run out of each half of the couplings while installed on their shafts. The one on the PTO was true within .001. The one on the KHz shaft of the RF deck was machined improperly. he rib was .003 off to one side and wasn't square
with the bore either. I tossed it and pulled a few others out of spares. It took several before I found one that was square with the bore and only had a little more than 0.001 run out. The next step was to check the center section. The width of the two groves seems pretty consistent, but I was curious if the two groves were machined at exactly 90 degree angles to each other. The groves were of a dimension that I didn't have any key stock for so I used two 12" long pieces of 1/4" ground steel rod. I centered the two pieces of rod, lengthwise,
one in each of the two grooves, clamped the three pieces together. Then by measuring and comparing the distances between the four rod ends, I could determine the exact angle that the grooves were from each other. This part of the process was a wasted effort, the coupling center piece from the EAC was 90 degrees like it should be and so where the ones in spares that I checked. When I finally assembled the receiver and physically aligned the PTO to the chassis, mechanically and electrically, the dial indicator measured a total movement in the center section of the oldham coupling of .003 when the KHz knob is turned. Close enough! Put that spring on! Oh, I used a little dab of Penzoil wheel bearing grease to lube the coupling. It's red and contrasts, in a pleasing fashion, the blue label of the Cosmos PTO. :-)

Crystal Oscillator Module:

Tested the tube, and tightened the screws holding the tube socket to the chassis, they were loose. Checked resistor values, transformer windings and crystals. Bad 10 MHz crystal, throw one in it from spares. Most are still on the money, the few that are "off" are well within 1 KHz or maybe a shade more. I decided against spending ~250 dollars on new ones. Measured the resistance of all of the wiring and switch contacts and tested all of the fixed capacitors and spun all of
the trimmers a couple of turns. Powered up the oven and verified function of the thermostat. Also, "timed" the two switch bodies. They were "off" a bit.

Then when thru and re tested everything on it's underside just to make sure. I figured that anything that was a pain to remove, I double check everything. Audio module: One of the original plug in electrolytic caps showed signs of leaking, tossed it in the trash, installed another one from spares. Reformed both, leakage at 50 volts over the rated voltage was less than 1 ma. per section after reforming. I fused them and ran them for a couple of weeks at full rated voltage on one of the HV supplies, they didn't explode and leakage declined even further. Good enough, bubba! (yeah, I know, Doc, but the power factors were good, I even checked that. :-) Ripped all of the paper capacitors out of the module, and tossed them n the trash. Installed two new .022 400V orange drops in the location that Chuck likes, and NOS Vitamin Q's in the other locations. I have the orange drops on hand and could have used them thru out but didn't like the way they sit on the circuit board. I did use an Orange Drops to replace the one on the chassis under the circuit board. All of the new caps were tested for leakage at their rated voltage and tested to verify their value before installing. Checked all of the resistors for value, replaced a couple. Tested the mica cap, no problem there.
Tested all of the tubes, they all passed but tossed the 0A2 and stuffed a new 6626 in it's place. I don't trust used 0A2's, had some weird problems with them. Tested the relay and measured the resistance of the wiring, the chokes, and the transformers. I left the 800 cps filter alone. Probably not a whole hell of a lot of R390A's out there that still have their original 6AK6's. All of the tubes are original except the rectifiers and the regulator. :-)

IF Module:

Tested the tubes and the 3TF7. Measured the resistance of the wiring, the transformers, the switch contacts, and the resistors. I replaced more than a half a dozen resistors that were out of spec. Checked the capacitors and resistors inside the IF transformer cans, that could be tested. Some could not be tested in circuit. I tested the big above chassis oil filled capacitor for leakage and value. Tested all of the mica capacitors for leakage and value and then ripped all 18 or so of the axial lead paper capacitors out of the module and tested them just for kicks. EVERY "brown beauty of death" tubular capacitor that was in it leaked like hell and a good percentage had microscopic cracks in the bodies within maybe .020 of the seams and paralleling them. Most of these caps leaked at voltages below 50 volts when tested. Only one of the metal can axial capacitors leaked when tested. I replaced all 18 of the capacitors with Orange Drops. For the .1 and the .033 values I used 400VDC rated ones and for the .01 values, I used 600VDC rated ones. The reason that I didn't use 600V rated ones thru out was their size. It was a pain in the ass to the fit the ones that I used in there properly. If I'd have used the 600V ones everywhere, I'd have had to move the locations of some of the capacitors and a bunch of them

would have had excessively long leads. I didn't think that this was such a hot idea in the IF section and figured that the best placement of the parts was in the original locations. ;-) Let's see, other than checking all of the screws and nuts, I think that was it for the IF deck other than lightly lubricating the shaft extensions where they passed thru the front of the IF module chassis. I didn't test the mechanical filters. I tested the blocking cap before I tossed it and it had tested good even at 100 volts over it's 300V rating.
Whew!

The last one, the RF deck:

After removing it, the first step was to take it apart. I removed all of the tubes and tested them, the crystal oven and tested it, all of slug racks and springs, four of which (for the variable IF slug racks) were really weak, so I installed NOS ones in that location when I put everything back together. The geometry for those 4 springs suck, they're stretched a lot more than any other location. I removed all of the RF coil assemblies and measured the resistance of all of the windings and checked what capacitors I could. The bridge wouldn't work on some, so I kept track of those in case I had some weird assed problem when I tried to align it later. I disassembled the gear train and tossed all of the parts, except for the counter, in a coffee can and sprayed a mess of gunk in there and let them brew. They weren't really dirty, but the original lube had mostly evaporated and what was left was stiff as hell and I don't really find the gear train much of a mechanical challenge so I ripped it apart. About the only thing I didn't take apart was the 6 camshafts and the antenna trimmer can. I worked a few drops of penetrant into the bearings of the cam shafts and kept lubing and wiping them until only clean oil would come out. Oh, I used 10W30 Mobil 1 synthetic oil for the RF deck except the detent where I used Penzoil wheel bearing grease. Two of the cams appear to have been stamped, I guess, with cracked dies, leaving a couple of sharp burrs on the surface that the rollers ride on. I stoned these down while maintaining the original cam profile. :-) When you take the split gears apart, tie them together, with a bit of soft wire in the orientation that they were originally assembled with. I suspect that the halves were matched. While all of the stuff soaked, I replace the three paper capacitors, with Orange Drops, and replaced close to ten resistors that were out of spec, checked all of the other capacitor and found a cracked .005 1KV ceramic disc. And yes, I measured the resistance of all of the wiring and of the band switch. ;-) I found an odd thing. One of the tube sockets only had one screw holding it to the chassis. When I attempted to install a screw there, it turned out that the little "C" shaped piece of metal that curves all of the way around one side of the socket had an unthreaded hole in it for the screw. I'm surprised that an inspector didn't catch this at the factory. I tapped the hole and moved on. Most of the gear clamps were either viably cracked or showed cracks when

dye checked. I guess that they must have been over tightened when it was built. I replaced all of them with NOS clamps to be safe. I found that several of the roller retainers had been over staked on on a couple of the slug racks. This prevented the rollers from turning. In addition, a few of then ends were not square and had to be straightened. Burrs and gouges on the end surfaces had to be stoned down and polished. The fit and finish of mechanical portion of this EAC RF deck didn't impress me at all. The old Collins decks were much more finely finished mechanically. I wiped each of the RF cores out with a pair of damp Q-tips, wiped the slugs off, and eye balled them. The Collins part numbers on all of the RF slugs are all the same EXCEPT the six variable IF slugs. They are different from the RF slugs. So, they aren't interchangeable. I assembled the RF deck and mechanically aligned it and put the receiver back together. For what it's worth, the repeatability of the RF slug racks averages about .001, the repeatability of the variable IF slug racks averages .004 on one and .005 on the other. I suspect that this could be improved upon by relocating the location of the attachment point on the chassis of those four springs. This would require either shorter springs or possible just creating spring "wells" that extent slightly below the chassis so that standard RF deck rack springs could be used. I fired it up and let it cook a while in Standby mode, at 7+000. None of the magic smoke escaped so I switched over and set the PTO to 2455 KHz and tightened the clamp. I stuck a VTVM lead into the unbalanced antenna connector and cranked it down to WWL on 870 and let it run more than a day before I did the first alignment. I always like to align a receiver twice. I go thru it and then when I'm finished, I start all over again. I've been playing with it for about a day and a half since the alignment. This is the most sensitive receiver I've ever owned. It kicks ass. I did a few sensitivity tests using my URM-25F. I questioned the results so I dug out the URM-25D and tried them again. REAL close. I started with a receiver that hadn't been abused and tried to do the best job that I could going thru it. I wanted something that I didn't have to screw around with every few weeks. Something that wouldn't wake me up at night with a burst of light like a Romulan disrupter (I've had R390A's do that before). Something that would sit there and run for month after month and need nothing but tube and dial lamps like my R-1051B's. Hopefully, this will do that. Many of the of the steps that I took, were "over kill", but I had fun doing it and learned a few more things. The numbers you ask? Lets just say that they're as good as the best sensitivity levels that I've ever seen posted or in print on the R390A. Numbers, that up until now, I always had my doubts about. Guess I better feed the critters and make me a mess of grits for breakfast, nolan

-----snip-----

If an infinite number of rednecks riding in an infinite number of pickup trucks fire an infinite number of shotgun rounds at an infinite number of highway signs, eventually they will produce all of the world's great literary works in Braille.

Date: Wed, 17 Jul 2013 06:50:33 -0400
From: Bob Camp <ham@kb8tq.com>
Subject: Re: [R-390] Gear lube suggestions

In order for an oil to not degrade at all you need to have two things going on:

1) The oil does not cross link (polymerize) in the environment
2) No dirt at all in the environment

The first one is a lot easier than the second one.

Practically you need one more feature

3) It does not evaporate

A lot of the stuff that meets rule 1, fails rule 3 (it's a light weight oil with a low(er) vapor pressure).

Date: Wed, 17 Jul 2013 20:49:58 +0000 (GMT)
From: chuck.rippel@cox.net
Subject: Re: [R-390] Gear lube suggestions

This is easy and demonstrated in both the R390A and SP-600 videos. Do not use petroleum based lubricants, for anything on the R390xx. They will harden and you'll be doing it all over again. Go to your local auto parts store or buy it off the net, a quart of Mobil 1 or AMSOIL 70W GEAR Lube. Lubricate with that. GEAR Lube, NOT motor oil, its too thin. It does not harden and is very very slick.

Date: Wed, 17 Jul 2013 17:32:49 -0400
From: "Duffy Floyd" <duffyf56@verizon.net>
Subject: Re: [R-390] Gear lube suggestions

I'll throw this out for consideration. In a prior life I worked for a Circuit Breaker manufacturer. In multiple applications on the breakers which were close tolerance parts where we did NOT want lubrication hardening issues we employed a dry film lubricant called Poxylube 420 made by Sandstrom Products. It was a molydeum disulphide based lubricant in an alcohol base. Parts were dipped and either air dried or force hot air dried. Looking at Sandstrom's current product offerings they no longer offer that particular product but have alternates using PTFE (Polytetrafluoroethylene)that can be air dried or hot air dried depending on which product is selected. Here is what they claim for their air dried product.

RECOMMENDED USAGE Sandstrom POXYLUBER #820 is an excellent in-plant or field solution to the problem of lubricating parts:

. Where application of a baked-on lubricant is not possible
. Which may be operated in corrosive atmospheres
. That may be stored for long periods
. Which are seldom lubricated once they leave the factory and
where permanent lubrication is desired
. Where easy release is desired (such as threads of all kinds)
. Where "clean operation" is desired (POXYLUBER #820 will
not collect dirt and debris as do grease and oils)
. Where parts may be subjected to frequent disassembly
. Where a protective coating and sacrificial break-in lubricant
is needed
. Where fretting and galling is a problem (such as splines,
universal joints and keyed bearings)

It is available in clear and black and obviously would be applicable when doing a rebuild where disassembly of the geartrain is being performed.

Date: Wed, 17 Jul 2013 17:37:08 -0400
From: "Charles P. Steinmetz" <charles_steinmetz@lavabit.com>
Subject: Re: [R-390] Gear lube suggestions

Note that gear oil and motor oil are measured on different viscosity scales. 70W gear oil is actually very thin -- thinner than 5W motor oil. See chart at: <http://www.torcousa.com/1-pix-tal/innovations/lub-101/viscosity-grade-comparisons.jpg>

Quote from the site:

>One important thing to point out with gear lubricants is that they
>are not classified on the same viscosity scale as crankcase motor
>oils, and their viscosity relationship . . . may be approximately
>summarized as follows, 75w90 gear oil = 10w40 motor oil ...

Thin synthetic oil (0W or 5W motor oil, or 70W gear oil) is absolutely what you want for the 390/390A gear train -- the only possible reason for using higher viscosity oil (on a 390/390A gear train) would be if you're trying to over-oil it and hoping that the higher viscosity will make the extra oil stick (it won't, for any length of time -- it's a matter of molecular forces internal to the oil and between the metal and the oil, which do not change materially with viscosity grade of the same type oil).

If one doesn't think that the right amount of thin synthetic oil (very, very little -- not enough to see) will provide sufficient lubrication or last long enough, then use grease -- not thicker oil. (However, one would be wrong about the right amount of thin synthetic oil not providing sufficient lubrication or lasting long enough.)

Date: Fri, 19 Jul 2013 19:54:14 -0400
From: "Charles P. Steinmetz" <charles_steinmetz@lavabit.com>
Subject: Re: [R-390] Oiling techniques [WAS: Gear lube suggestions]

The best way I have found to lubricate 390/390A gear teeth is with a sable artist's brush, such as: <http://www.micromark.com/4-piece-red-sable-brush-set-flats,6779.html>

Dip the brush about halfway into the oil, then squeeze out all the oil you can so you can't make it drip anymore and "paint" a paper towel with it until it doesn't leave an obvious oily spot soaked clear through a clean area of the paper towel. Hold the brush parallel to the gear axis and dab the brush sideways into the gear teeth all the way around the gear. You should not be able to see any oil welling or collecting in the roots of the teeth -- just a slight sheen on the teeth. You want to keep oil off of the sides of the gears (except between the faces of the dual gears -- see below). If oil runs, wells, collects, or pools anywhere, the brush is WAY too wet.

It helps to oil the brush a day or two before you are going to oil the gear train, let it sit wet, then squeeze it out and paint the paper towel just before you use it. I wet the brush again when I'm done, wrap the tip up in aluminum foil for storage, then re-oil, squeeze, and wipe just before the next use.

For the dual (anti-backlash) gears, use a fine oiler with a hypodermic-type tip to put the merest drop of oil on the seam between the gears, where it will wick in. For example:

<http://www.brownells.com/gunsmith-tools-supplies/shop-accessories-supplies/liquid-squeeze-bottles/needle-oiler-bottles-prod44434.aspx>

Hopefully, you already dressed the mating sides of the anti-backlash gears to remove any burrs from the teeth, with something like this:

<http://www.woodcraft.com/product/2000226/17935/dmt-diasharp-6-x-2-bench-stone-extra-fine.aspx>

Alternatively, use a piece of 600-grit wet-or-dry paper taped to a piece of glass. You can graduate to 1200 and 1500 grit if you like. Don't get too crazy -- the point is to deburr, not make mirror surfaces. You want a little tooth to hold the oil.

(If you have the patience, it is not a bad idea to dress both sides of all the gears and then inspect them with a magnifier to see if there are any burrs on the pressure faces of the teeth. If there are, remove them with a needle

file, brass brush, or razor blade.)

Use the same needle oiler on the shaft bearings. You should not see a "fillet" of oil between the shaft and bearing after it has wicked in. If you do, use some lint-free absorbent paper to wipe off and wick out the excess. (Do not use cotton swabs, because they shed fibers that can be trouble if they get caught in bearing clearances or on gear teeth. Instead, if you prefer swabs, use the lint-free kind – for example: <http://www.micro-tools.com/store/P-SWPX-25/Swabs-Small-Precision-Swabs-Foam-18-x-12-x-234in-25ea.aspx>.)

A dry sable brush is also a good way to apply dry graphite. Dip the brush into graphite and swirl it around to get it thoroughly coated, lightly knock off the excess, then apply to the gears as described above. (Use a clean, dry brush that has never been oiled.)

Date: Sun, 22 Sep 2013 11:49:31 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] TD Lubricant Straw Poll

Further comments on the long term use of Tungsten Disulphide;

I have been using the TD compounds for +4 years on radios, precision machinery and even in the engine of my Mercedes. No problems yet.

The powder/alcohol combination is great for things like sliding surfaces like in a pistol or the bolt of a rifle. It applies like a thin paste and once it dries it takes on a dull grey sheen. I use an old white cotton sock turned inside out to buff down the surface after it has dried and the metal takes on this iridescent grey color (like an oil sheen on water). It gets EVERYWHERE so you want to really buff down surfaces if your hands are going to come in contact. I also use that technique on things like the little rails on the R-390A RF deck and with a dab on the load surface of the cams.

You can mix it with a light oil like sewing machine oil or Mobil 1 synthetic. When I add it to my car it is two tablespoons to one quart of Mobil 1 and I swap in one quart during an oil change with this stuff. It makes the oil look black as sin but affords some lubricating properties to the oil that I think would be most useful on a cold start (those first few seconds when the oil pump has not begun its work). I have seen no fouling or problems with this addition. (you are entirely on your own taking on this risk).

For a radio, the powder in oil might be good in a pen oiler with one drop for shaft bushings (LET ME REPEAT THAT, ONE DROP!).

The greases are very strange. (Perry is not offering that). It is difficult to contain and I was giving away small amounts in little glass apothecary bottles with the plastic friction plug. Just the pressure of the air inside of the bottle, the extreme friction reduction of the grease and the plugs meant that the caps kept being pushed out of the bottles. I ended up friction taping the caps on because it was taking on a mystical ability to escape.

Coefficient of Friction (COF) is a measurement of lubricity. Here are some comparisons;

.02 ice-ice
.03 Tungsten Disulphide (this powdery stuff)
.05 teflon-steel
.10 diamond-diamond
.10 tungsten carbide-steel
.12 carbon-carbon seals (high speed shaft seals on pumps)
.13 sintered bronze and steel, lubricated (sealed bushings)
.19 bronze and steel, lubricated (bushings)
.20 sapphire (watch jewels)
1.0 dry tires on dry asphalt

COF is easy to explain. If you have a 100 pound weight it would take 100 pounds of pull to make an object slide if the COF=1, that 100 pound weight would only need 3 pounds of pull if the COF=.03

I have no financial interest in what Perry is offering. I provided him with a few little sample containers of the grease at the Huntsville hamfest. He made a bulk purchase from the manufacturer.

I have also been using tiny amounts of the grease as an anti-seize compound on stainless steel antenna brackets where the bolts AND the nuts are both made of 316 SS. If you know anything about metallurgy it is generally a bad idea to make parts out of the exact same alloy as if a gall starts on a threat it will completely gum up and lock the connection. You will be getting out the hacksaw or torch to remove those parts.

Date: Sun, 22 Sep 2013 17:01:49 -0400 (EDT)
From: bonddaleena@aol.com
Subject: Re: [R-390] R-390 Digest, Vol 113, Issue 14

Hi, I also purchased 1 lb of the TD (or WS2) and at the same time, from a different vendor, purchased a lb of HBN (Hex Boron Nitrate).

I use both to coat bullets used in high power rifles. I prefer the HBN as it is

'almost' as good a lube, but MUCH cleaner to use. I mix both powders with both alcohol and thin oils, like Kroil. Oh, and the HBN is much cheaper/volume basis....

Date: Sun, 22 Sep 2013 17:16:52 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] Lubes

I've been using Lee's case lube for decades.
I reload my own.

Date: Fri, 4 Oct 2013 12:30:07 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] How NOT to lubricate R390A gear train

You know how those pesky gears fall out of place. Maybe that is used like assembly glue to hold things in place. LOL Ironically with all of that grease packed in there the drag INCREASES as now the faces of the gears are trying to shear through the grease interface as they turn.

I wish I could use a microscope to show folks just how little of contact area there is on gears as they mesh. Lubricants are only needed in those super-tiny little spots.

Date: Fri, 04 Oct 2013 13:45:28 -0400
From: rbethman <rbethman@comcast.net>

The basic issue is the lack of education regarding gears and how they really work. Mounting points, and the gear teeth are about all you need to lube. Certainly NOT with lithium grease! All it will do is attract dust and crud over time.

Hope Perry gets his scale soon.

Date: Fri, 4 Oct 2013 14:48:31 -0400 (EDT)
From: Glenn Scott <wa4aos@aol.com>
Subject: [R-390] What happened to the Brylcreem rule?

Just a little dab will do ya!!! That one looks good compared to some of the ones I get with axle grease, dog hair, dead bugs and little brown pods, believed to be rat droppings..Want to trade receivers Chuck R? Thank God for deep cycle ultrasonic cleaners and $200/4ltr toluene based go go juice, solvents; makes em all look as pretty as a new bride,,,,, well... maybe not but the gears are clean!

Date: Sat, 05 Oct 2013 11:42:31 -0600

From: Robert Moses <rhmoses@earthlink.net>
Subject: Re: [R-390] What happened to the Brylcreem rule?

$50.00/L ? If you have an ultrasonic cleaner that is up to flammable solvents why not just use diesel with detergent (Tide (solid) laundry detergent) in it?

Date: Wed, 9 Oct 2013 20:31:46 -0500
From: "Thomas Frobase" <tfrobase@gmail.com>
Subject: [R-390] Current thoughts on washing

<snip> One last question: are the R-390 RF deck cans socketed and can they be removed similar to the R-390A?

Date: Thu, 10 Oct 2013 14:01:12 +0000
From: <chacuff@cableone.net>
Subject: Re: [R-390] Current thoughts on washing

Yes...R390 RF Deck cans are socketed.

Date: Fri, 11 Oct 2013 09:41:04 -0400
From: frank hughes <fsh396ss@gmail.com>
Subject: [R-390] R-390 rack slugs question

I am still working on bring an R-390 back to life. (Hamfest basket case find) http://i180.photobucket.com/albums/x257/fish1_07/R-390/hamfest_R390_zpsee45b7ab.jpg

It now has B+ regulated and stable, and can sort of receive a signal on some bands (but the signals sound like "white noise" instead of a clear tone – more work to do) Found one broken slug this morning.

http://i180.photobucket.com/albums/x257/fish1_07/R-390/broken_R390_slug_zps1fed091a.jpg

Am I correct that the R-390 slugs are not interchangeable within the R-390 and not at all with the R-390A? Probably not with the R-392 either? Should I be able to find any kind of color codes or identification bands under all the dirt? In my
R-392, as it is sealed up, the color codes on the slugs are easy to see. I don't see anything in TM 11 5820 357 35 to show how to tell the slugs apart. I'll try to glue it, and if necessary, proceed on a treasure hunt through the piles, as I know there is a spare R-390 RF deck around here somewhere....

Date: Fri, 11 Oct 2013 21:06:08 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>

Subject: Re: [R-390] R-390 rack slugs question

You are right slugs do not mix and match well.

Put a request up here for the slug and or other parts you need.

Some of the Fellows have some spare parts and will get back to you as direct mail and make you an offer.

The RF deck has 8 octaves. as
.5- .999 1.00 - 1.99 2.00 - 3.99 4.00 - 7.99 8.0-15.999 16.00 - 31.99
plus two IF slug sets. Each slug set has a front middle and back can.

Just ask for the slug you need by the RF band octave and position (front, middle, back)

Actually there are only a few types of slug in each receiver.
But rather than worry about it at this time just keep it simple.

Divide that receiver in half.

Inject 455 into the IF deck at about 150 uv. 0.00015 volts. CW

You set the receiver band width to .1 KHz and rock the signal generator into
the crystal used for the band pass. No exact signal generator of level needed here.

Set the RF gain adjust on the IF deck for -7 volts on the DC load.
With no modulation and no BFO.

Turn on the generator modulation at about 30%.

You should get almost 1/2 watt of local output on the back panel across a 600 ohm resistor (2 ea 1200 ohm 1/4 watts work as a load.)

There is a check list on the R390.net page that will step you through all of this.
There is a Y2K manual there that will help a lot even though you have an R390.

The original TM's are there also as PDF files. R390 TM 11 5820-357-35

You need a 30 :1 difference through the IF deck and Audio deck with the 455Hz injection between CW and modulation.

There is stuff on the R390.net page and in the Pearls of wisdom that will walk you through all of this with an AC volt meter and 600 ohm resistor with tables that convert all the power levels to AC voltages if you do not have an AC meter with DB scales. If you can not get the 30:1 in the IF audio chain you will never get 20:1 through the receiver.

You can have lots of tubes test good on the tester but still have a high noise level that will be unacceptable.

Once you get the IF audio up to par you can start on the RF deck.

In the RF you can loose under over 8, one two three 1 mega hertz bands due to a poor crystal in the second oscillator, or loose an octave due to slugs, cans, plug in contacts on the cans a bad / dirty cap in one of the cans.

You get to use some logical deduction to decide the frequency span of the problem and what small number of parts could be involved.

You can save this receiver and restore it to full sensitivity and enjoy it for years to come.

Please do tell us what you find in your receiver that needed fixing.
Ask for help if you need it.

We do not live on line so it may be days before we read your mail and get back to you. Who ever happens on you mail first and several others will jump in with help. Some will come direct some will be reflected. It's just the personal choice of the Fellows. Make your request for parts public here on the reflector. The responses to sell you parts will be direct and private.
Roger Ruszkowski 33C4H AI4NI

Date: Tue, 15 Oct 2013 11:22:39 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] More cleaning tools.

Ooh, I am going to stay away from suggesting appliances for heating up radios. I had "an unfortunate incident" when I was a QA engineer on a transceiver while we were doing accelerated aging tests. "Someone" was surreptitiously using the Russels GB-32 as a pizza-cooker during all-nighters and they used the menu to change the temperature scale from F to C.

I did not check (who assumes that people mess with your test gear? I was young and naive) and punched it up to cycle repeatedly from -40 F to +149 F, instead it was going -40 C to +149 C. (300 F). It did the cycle a few times

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Date: Tue, 15 Oct 2013 13:06:21 -0500
From: Mike A <mikea@mikea.ath.cx>
Subject: Re: [R-390] More cleaning tools.

You owe me a new keyboard and cleaning costs for a pair of pants. That ... that is a *wonderful* story, though I doubt it was a lot of fun at the time, and I am fairly sure someone got out the *BIG* reamer after the meeting.

Date: Tue, 15 Oct 2013 21:07:17 -0500
From: "Bill Hawkins" <bill@iaxs.net>
Subject: Re: [R-390] Current thoughts on washing

If you don't live in Texas, a drying oven can be made from a cardboard box and a 60 or 100 watt light bulb. A circulating fan would be good, but the box has to be closed. Use whatever air source you can, even canned "air" to get any water that has wicked into socket pins or other tight places. It isn't going to boil out, and evaporation takes a while. Rinse it enough to remove any electrolytes from the cleaner that could leave conductive paths. You may need a final rinse with distilled water. I didn't see Simple Green listed as a cleaner, but that worked for me ten years ago. Remember that the markings on tubes will dissolve in water, because counterfeiters used to re-use tube envelopes. The tubes should be removed anyway to get water out of the sockets. Hope that's useful.

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Subject: Re: [R-390] Current thoughts on washing

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Date: Sat, 21 Sep 2013 10:27:12 -0700 (PDT)

From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] TD Lubricant Straw Poll

I purchased a one pound bag of the Tungsten Disulphide grease powder that Tisha Hays described in several posts in previous months from Canada. This would last me several lifetimes of BA lubrication and more. If there is enough interest I will do this:

1. Supply 15 grams of TD, a 1 cc TB syringe (yes it's legal) mailed in a soft mailer Post Paid for $10. OR

2.Send you 10 grams of TD powder for $5 in a SASE envelope you supply. Mix and match as much as you want. With the syringe one places a small amount of TD inside and then fills the remaining space with alcohol, shake the mixture up and then applies it extremely sparingly to the part to be lubricated.

With just the powder one uses a Q tip that was dipped in alcohol then dabbed in the TS powder and applies it to the desired surface. Please read Tisha's and others posts before making your decision as this requires some special handling when using. If there is enough interest I'll be able to ship the probably the second week of Oct.? If you live outside of the USA I'll ship for the additional postage required. This offer is for everyone one the list. It's business, as they say. Regards, Perrier

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Date: Sun, 22 Sep 2013 11:49:31 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] TD Lubricant Straw Poll

Further comments on the long term use of Tungsten Disulphide;

I have been using the TD compounds for +4 years on radios, precision machinery and even in the engine of my Mercedes. No problems yet.

The powder/alcohol combination is great for things like sliding surfaces like in a pistol or the bolt of a rifle. It applies like a thin paste and once it dries it takes on a dull grey sheen. I use an old white cotton sock turned inside out to buff down the surface after it has dried and the metal takes on this iridescent grey color (like an oil sheen on water). It gets EVERYWHERE so you want to really buff down surfaces if your hands are going to come in contact. I also use that technique on things like the little rails on the R-390A RF deck and with a dab on the load surface of the cams.

You can mix it with a light oil like sewing machine oil or Mobil 1 synthetic. When I add it to my car it is two tablespoons to one quart of

Mobil 1 and I swap in one quart during an oil change with this stuff. It makes the oil look black as sin but affords some lubricating properties to the oil that I think would be most useful on a cold start (those first few seconds when the oil pump has not begun its work). I have seen no fouling or problems with this addition. (you are entirely on your own taking on this risk).

For a radio, the powder in oil might be good in a pen oiler with one drop for shaft bushings (LET ME REPEAT THAT, ONE DROP!).

The greases are very strange. (Perry is not offering that). It is difficult to contain and I was giving away small amounts in little glass apothecary bottles with the plastic friction plug. Just the pressure of the air inside of the bottle, the extreme friction reduction of the grease and the plugs meant that the caps kept being pushed out of the bottles. I ended up friction taping the caps on because it was taking on a mystical ability to escape.

Coefficient of Friction (COF) is a measurement of lubricity. Here are some comparisons;

.02	ice-ice
.03	Tungsten Disulphide (this powdery stuff)
.05	teflon-steel
.10	diamond-diamond
.10	tungsten carbide-steel
.12	carbon-carbon seals (high speed shaft seals on pumps)
.13	sintered bronze and steel, lubricated (sealed bushings)
.19	bronze and steel, lubricated (bushings)
.20	sapphire (watch jewels)
1.0	dry tires on dry asphalt

COF is easy to explain. If you have a 100 pound weight it would take 100 pounds of pull to make an object slide if the COF=1, that 100 pound weight would only need 3 pounds of pull if the COF=.03

I have no financial interest in what Perry is offering. I provided him with a few little sample containers of the grease at the Huntsville hamfest. He made a bulk purchase from the manufacturer.

I have also been using tiny amounts of the grease as an anti-seize compound on stainless steel antenna brackets where the bolts AND the nuts are both made of 316 SS. If you know anything about metallurgy it is generally a bad idea to make parts out of the exact same alloy as if a gall starts on a threat it will completely gum up and lock the connection. You will be getting out the hacksaw or torch to remove those parts.

Date: Sun, 22 Sep 2013 17:01:49 -0400 (EDT)
From: bonddaleena@aol.com
Subject: Re: [R-390] R-390 Digest, Vol 113, Issue 14

Hi, I also purchased 1 lb of the TD (or WS2) and at the same time, from a different vendor, purchased a lb of HBN (Hex Boron Nitrate).

I use both to coat bullets used in high power rifles. I prefer the HBN as it is 'almost' as good a lube, but MUCH cleaner to use. I mix both powders with both alcohol and thin oils, like Kroil. Oh, and the HBN is much cheaper/volume basis....

Date: Sun, 22 Sep 2013 17:16:52 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] Lubes

I've been using Lee's case lube for decades.
I reload my own.

Date: Thu, 3 Oct 2013 13:25:11 +0000 (GMT)
From: chuck.rippel@cox.net
Subject: [R-390] How NOT to lubricate R390A gear train

This is a shot of the current radio/patient on my bench. What you're seeing is a small sample of the lithium grease that was applied to the gear train. As the owner noted, "looks like it was restored by Jiffy Lube." This and not a single capacitor, including the infamous C-553 or resistor in the AF or IF decks replaced. Some of the resistors in the AF deck had gotten so hot, the color bands are unreadable. What is interesting, this radio had been previously professionally
restored.....

Date: Thu, 3 Oct 2013 10:08:25 -0700 (PDT)
From: Joe Connor <joeconnor53@yahoo.com>
Subject: Re: [R-390] How NOT to lubricate R390A gear train

The picture didn't come through, Chuck, but I know what you mean. I'm working on a Breting 12 where a prior owner used so much of that lithium grease that it looks like he sprayed it with expanding insulation. What a mess! I think it took longer to clean that than to restore the rest of the set.

Date: Thu, 3 Oct 2013 20:06:18 +0000 (GMT)
From: chuck.rippel@cox.net
Subject: Re: [R-390] How NOT to lubricate R390A gear train

Whoops..... I'm guessing that my including the link to the picture would have probably been helpful. Must've "slipped" my mind. (You'll get that joke when you see the picture :-))

https://app.box.com/s/wph7rdbqu9drlfkpcdwj

Date: Thu, 03 Oct 2013 17:41:17 -0400
From: k2cby <k2cby@optonline.net>
Subject: [R-390] How NOT to lubricate R390A gear train

That's not lubrication. That's butter cream frosting !

Date: Fri, 4 Oct 2013 12:30:07 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] How NOT to lubricate R390A gear train

You know how those pesky gears fall out of place. Maybe that is used like assembly glue to hold things in place. LOL Ironically with all of that grease packed in there the drag INCREASES as now the faces of the gears are trying to shear through the grease interface as they turn.

I wish I could use a microscope to show folks just how little of contact area there is on gears as they mesh. Lubricants are only needed in those super-tiny little spots.

Date: Fri, 04 Oct 2013 13:45:28 -0400
From: rbethman <rbethman@comcast.net>

The basic issue is the lack of education regarding gears and how they really work. Mounting points, and the gear teeth are about all you need to lube. Certainly NOT with lithium grease! All it will do is attract dust and crud over time.

Hope Perry gets his scale soon.

Date: Fri, 4 Oct 2013 14:48:31 -0400 (EDT)
From: Glenn Scott <wa4aos@aol.com>
Subject: [R-390] What happened to the Brylcreem rule?

Just a little dab will do ya!!! That one looks good compared to some of the ones I get with axle grease, dog hair, dead bugs and little brown pods, believed to be rat droppings..Want to trade receivers Chuck R? Thank God for deep cycle ultrasonic cleaners and $200/4ltr toluene based go go juice, solvents; makes em all look as pretty as a new bride,,,,, well... maybe not but the gears are clean!

Date: Tue, 8 Oct 2013 13:00:05 -0500
From: Tom Frobase <tfrobase@gmail.com>
Subject: [R-390] Current thoughts on washing

I was fortunate to pick up a Motorola R-390 at the Belton Hamfest last weekend. That is the good news the bad news is that the radio looks as if it was stored in a barn. Mud dabbers nests in the coax sockets and lots of dirt, good news is no mouse droppings or blood hi hi !

Although I have restored numerous r-390 and r-390a's, I have never totally immersed anything but the chassis plates and the gear assembly after removal. I have a large ultrasonic cleaner that I use to clean the gears. I usually clean the chassis with ajax or other mild cleanser and of course the normal paint and powder coat refinish on the knobs and other parts

So if I were to immerse the modules would I use a mild dish washing detergent in the ultrasonic cleaner and use DI water in the ultrasonic to rinse? What about the IF covers and BFO, do I remove the covers to keep from trapping moisture, RF cans are removable they can be cleaned otherwise.

I would be tempted to try it with this radio, I know this has been covered a million times before but I would like to hear the current thoughts ... tom,

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Date: Tue, 8 Oct 2013 16:24:07 -0500
From: Cecil <chacuff@cableone.net>
Subject: Re: [R-390] Current thoughts on washing

I'm usually not too wild about submerging any part that has coils or inductors in solutions. I prefer to clean those parts by hand in a gentle manner. The remaining module parts I don't worry too much about. Dunk them, scrub them, hose them off whatever. I would be concerned about pots and switches so I continue to clean the bare chassis by hand with minimal solution and water to those parts...same for trimmer caps but maybe to a lesser degree...

I still use 409 for scrubbing with a tooth brush and lots of rinse. I've had no problems with my tap water...it's really soft...little mineral deposits. I sun dry and then put in an A/C environment for a week or more before Deoxit work and reassembly.

Date: Tue, 8 Oct 2013 17:48:36 -0400
From: "Ed Tanton" <n4xy@comcast.net>
Subject: Re: [R-390] Current thoughts on washing

Granted I haven't done anything significant lately, but -FWIW- I'm with you Cecil! Back in the early 70s, I was a Calibration Tech for Tectronix in Atlanta. When we would get in a really dirty 547 -or the like- I would pressure wash it, with spray soap and regular water (using a wand.) You had to be careful not to directly spray the power transformer, but even after a 24-48 hour (I forget exactly) bake you still lost maybe 50% of 'em. While I was still there, we pretty much cut that out, and went to blow out with air, and hand-cleaning using something like 409.

I have a JRC NRD-515 that was in a broken kitchen drain (sink, garbage disposal, dish washer) deluge for several months unbeknownst to me (I had heart surgery in DEC 2005 and did not go down into the basement for 2-3 months.) It was VERY caustic, and I consider the receiver a total loss... but one of these days, I might just try and resurrect it. I'll do the cleaning by hand-not spraying.

If anyone would like to give it a try, for $$$ of course, let me know. I really liked that receiver (I even have the extra memory & the matching transmitter) but-being retired-will probably never have the $$$ for another one.

Date: Tue, 8 Oct 2013 19:23:13 -0400
From: Bob Camp <ham@kb8tq.com>
Subject: Re: [R-390] Current thoughts on washing

I've been down this road before. It's not pretty.

If you soak it in anything like water, you discover all sorts of things that you never thought would rust do. Neat things like the inside of resistor leads. You also discover that coils are a real wonder to (eventually) dry out. I once spent a *lot* of time working on radios that went under water. If you go this way, you will need *lots* of very clean water and a good bake oven.

Solvents (freon / tri-chlor / nerver gas) might work better. They all seem to be on the same sort of list these days.

That gets you down to things like petroleum based solvents or alcohols. Fire / explosions / death by vapor come to mind there. At least you wouldn't be breaking any laws. Being sure that you haven't found a solvent that dissolves some part of the radio could be tricky.

Date: Tue, 8 Oct 2013 19:23:40 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Current thoughts on washing

I had this belief that radio baths were anathema, watching Chuck's videos gave me the courage to try it out. It is not an immersive sort of process and I imagine things like transformers and panel meters would not take too kindly to it. Since then I pretty much follow his routine. I know that Chuck will not take advantage of this forum to hawk the videos but I have absolutely no fiduciary interest with what Chuck has done but I can say, if you have never really gone through a radio from top to bottom, see if you can find the DVD's (legally).

Date: Tue, 8 Oct 2013 17:42:07 -0700 (PDT)
From: Joe Connor <joeconnor53@yahoo.com>
Subject: Re: [R-390] Current thoughts on washing

Amen, Tisha. Chuck's video on the SP-600 gave me the courage to tear mine apart. He shows a lot of tricks that you would probably never think of.

Date: Tue, 8 Oct 2013 21:01:27 -0400
From: "quartz55" <quartz55@hughes.net>
Subject: Re: [R-390] Current thoughts on washing

I have this stuff called '8070 Electrical 88' made by 'Crown'. It must be really ancient, and there's not much left in the can. But I use it on anything that needs cleaning, water displaced, etc. It says on the can 'displaces water and moisture, improves electrical properties, prevents corrosion, protects metal, lubricates'. I've got no clue what it is, but it works wonders on switches and even slug tuned coils. I wish I could find some more of it. Comes out of the spray can and seems to sort of foam up and then evaporates and leaves a slightly greasy/silicone feel to it. It hasn't melted anything yet.

But I'm sure that's not going to be much help. I just thought I'd relate.

Copyright 1969
Crown Industrial Products Co
Hebron, IL 60034

Date: Tue, 8 Oct 2013 21:08:27 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Current thoughts on washing

I would not put any of the coils in the sonic cleaner. You could shake the varnish loose, and then some wire turns lose their place, then things are just not the same.

Pull the covers and run all the knobs, covers, loose what not's through the

sonic's.

I have not actually run a module in a dish washer.
Lots of soap, tooth brush and running water.
Lots of sun dry time (days).

Date: Wed, 9 Oct 2013 01:14:10 +0000
From: <chacuff@cableone.net>
Subject: Re: [R-390] Current thoughts on washing

Picked up a can recently of ZEP Aerosolve II which has been pretty good in the absence of Tri-clor. Its active ingredient is Tricloroethyene as opposed to Tricloroethane. I?m not a chemist and the difference between the ethyenes and ethanes is not clear to me but it does a good job of degreasing and cleaning electrical/electronic stuff. May be tough on some plastics and paints....but I?m sure Tricloroethane did some of the same.

As with anything like this...use it outdoors where there is plenty of ventilation.

Date: Tue, 08 Oct 2013 18:45:40 -0700
From: Frederick Bray <fwbray@mminternet.com>
Subject: Re: [R-390] Current thoughts on washing

Looks like this stuff -- or something similar -- is still legal to use
in India. A Google search brought back several references, all in India.

Date: Tue, 8 Oct 2013 19:51:53 -0700 (PDT)
From: Johnsay Johnsay <groundwave@yahoo.com>
Subject: [R-390] re. Current thoughts on washing.

What I use as a general chassis wash is 92% isopropyl alcohol USP. This should be done outside with a soft bristle brush with adequate time for drying. It's available at almost any pharmacy at about $3.00/qt.

For cleaning gear trains I used the WD-40 approach followed by Tri Flow and silicone dielectric grease, sparingly applied with a small acid brush.

Date: Wed, 9 Oct 2013 20:31:46 -0500
From: "Thomas Frobase" <tfrobase@gmail.com>
Subject: [R-390] Current thoughts on washing

Reading through the responses a majority of the respondents share my concern about total immersion of the 390 radio parts. As for cleaning materials there was a wide variety of choices. The most exotic was sending it to India and using fluorocarbon spray which are still available

there and I guess legal to use. Other choices were as follows: Ammonia / 409 Mix, 409, ZEP Aerosolve, as well as soapy water and a tooth brush.

This radio has lots of dirt, so I think my approach on the latest radio will be 409/ammonia mix with a tooth brush with a water follow up to limit any corrosion from the ammonia. As well as lots of elbow grease.

To follow up on Tisha's comment I have scrubbed a SP-600 down with soap on the driveway and sprayed it down with a hose. Let it bake in the Texas sun for 2 days and set in my shop to dry for a month. Got the radio back together tipped on its side to align it and water ran out from somewhere, even though I tipped the radio every which way during the drying process. I want to thank you all for the comments . tom, N3LLL

One last questions: Do the R-390 RF deck cans socketed and can be removed similar to the R-390A?

Date: Wed, 9 Oct 2013 21:52:02 -0400 (EDT)
From: larrys@teamlarry.com (Larry Snyder)
Subject: Re: [R-390] Current thoughts on washing

Tom, I was also a Tek tech, in the Dayton svc ctr 1975-1986. One step Ed left out was before throwing it in the drying oven blow out as much of the 'loose' water as you could with the air hose. The oven ran around 125 F and had a big honking blower in it. Even so, you wanted to get as much of the H2O out as you could ahead of that. Then give it a couple days baking.

Date: Sat, 12 Oct 2013 14:48:46 -0700 (PDT)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] More cleaning tools.

Some additional items that may be useful when washing/cleaning equipment. Orange cuticle sticks. You can clean with them and not scratch. 100 for $6, ebay. Stainless Steel cuticle stick. Good for moving components and de-soldering. About $6.

An old Electrolux canister vacuum cleaner with the back air outlet. Sucks out the dirt and reversed blows out the water without too much pressure but high volume. The crevice tool seems to be the most useful for both sucking and has a nice laminar flow for drying. Check thrift stores or a vacuum cleaner store for one. They are cheap but take a bit of scrounging to find

The last tool is a ladies hair dryer. Tisha, chime in here with some model suggestions! The one I borrow from my wife has variable heat as well as several flow settings. Works like a champ BUT be careful to watch the heat.

It can start to melt some plastic parts or damage coils. When you use one after a short time you will develop finesse for how hot to get things. I would still use a warm oven or hot sun drying if available, but the blowing and hair dryer method can shorten the drying time needed considerably.

Date: Tue, 15 Oct 2013 11:22:39 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] More cleaning tools.

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Date: Fri, 25 Oct 2013 15:11:39 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Slippery stuff

Any of the usual alcohols should be fine -- the only difference is whether one or another of them would attack what you want to put the WS2 on. Ethanol is the gentlest alcohol in this regard. However, since you will almost certainly be using it on metal, attack is unlikely as long as there is no more than a minimal amount of water in the solvent. In this regard, note that whatever high concentration of ethanol you start with, it will become an azeotrope of about 95% alcohol and 5% water very shortly, because the hydroscopic nature of the alcohol will pull water out of the atmosphere. This will be true even in a sealed container, because there is always some atmospheric exchange. I once worked in a lab where we used absolute ethanol, and the precautions necessary to keep it that way are extraordinary.

Common denatured alcohol (hardware store "solvent alcohol") is generally 95% ethanol with about 5% methanol mixed in. Isopropyl alcohol is available in 99%, although the drugstore variety has settled on 91% over the last 20 years. Honestly, I don't see any reason why 91% isopropyl wouldn't be perfectly fine. If you put it somewhere you worry that the water will not evaporate out, heat it with a hair dryer for ten minutes.

Date: Fri, 25 Oct 2013 16:57:10 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Slippery stuff

Your suggestion is the direction I have just taken. In lieu of a hair dryer, I have a heat gun. They are simply a hotter heat blower. I got very frustrated with obtaining the Ethanol. I'd have to get a permit and license to order it on-line. It is astonishing that I can walk into a firearms dealer and buy black powder or 7lb containers of WW 348 and no one bats an eye. That sort of thing can be used in very undesirable manners. Yet simple Ethanol requires all this nonsense. I probably would have been better off

simply driving to North Carolina and buying a pint!

Date: Fri, 25 Oct 2013 20:36:16 -0400
From: frank hughes <fsh396ss@gmail.com>
Subject: [R-390] TD chemicals

I received my TD (Thanks Perry!!), opened the first bag, sneezed for about 10 minutes, had hallucinations of Jimi Hendrix on SSB, subsequently returned to my normal operating parameters. Anyway, I missed the posting about Ethanol as a vehicle to apply the TD. Makes good sense, I'll get some, test the purity, and use the rest for the lube project.

Date: Sat, 26 Oct 2013 11:07:06 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Slippery stuff, tips on applying

Sorry I cannot write too much about this, I am driving back from Fort Worth today;

The Tungsten powder is a nano-material, the individual particles are about the size of red blood cells (microscopic). These types of materials work because they create a ultra-thin layer between the two metals so they are not directly in contact but end up with a small layer of tungsten molecules between the pieces.

Alcohol is merely a way to carry this powder to the metal. You get a little bit of solvent action to help the tungsten fill into the voids on the metal and the alcohol helps clean off any goo that was already there.

You are applying a very small amount of material on the wear surfaces. When I apply the stuff I wet a cotton swab (Q-tip) with alcohol and then dip it into the powder (just the tip) and apply it like you would with a thin liquid like WD-40. The wetted powder will quickly dry and turn a dull grey in color. Assemble things and you should be good to go.

We do not need to give things a bath or soak them, in fact if you gooped this stuff there it would probably *increase* friction as now you would be trying to shear through the caked on material.

I had made a mistake when applying a bit to the slide of a semi-automatic pistol and had the cotton swab too wet with alcohol. It had gotten on the outside of the slide and I wiped it off. It created this swath of iridescent black-grey-green-blue spot of tungsten on the outside of the gun. I tried to wipe it off and it spread everywhere. I ended up taking an old gym sock and turned it inside out and rubbed down the entire pistol until it was a uniform color. The finish is unique looking, super thin and very resilient.

The steel on the slide and receiver is very slick feeling (tough to explain, if you have the powder and get any on your skin you will know exactly what I am saying). This is a nano-material, as such it can get into everything. You do not want to be breathing the powder (don't blow into a pile of it) and try to keep it off of your skin as it is small enough to get right into your pores and your skin would be looking grey for a week.

Do not throw away the used cotton swab. There is still plenty on there so you can reuse it multiple times.

Date: Sat, 26 Oct 2013 19:48:55 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Slippery stuff

Just buy a pint of the highest proof stuff you can find. The little bit of flavor and 20 % water will not hurt anything.

Date: Sun, 27 Oct 2013 00:18:14 +0000
From: <chacuff@cableone.net>
Subject: Re: [R-390] Slippery stuff

Yup...a pint of Everclear...that will get the job done.. So much talk about this stuff..I?m wanting to pick up an envelope of the stuff for my firearms if nothing else...

Date: Sun, 27 Oct 2013 10:40:01 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] Slippery TD

1) Everclear isn't to be had here without a License and a specific Permit issued by the state Alcohol Beverage Control Board.

I've had numerous offers from folks out of state to obtain and send to me. DON'T! I've responded to most off-line. This insane state WILL take action.

2) I did obtain 91% Isopropyl. It will essentially do the job. (Although I will only go that route if it becomes a necessity.)

Since I'm not in a "big" hurry, the receiver is still torn apart and with the entire Den/Shack not complete in its renovation, (XYL's agenda), I'm not going to push it.

I have a Wedding to attend next month. I can either pick up the Everclear enroute or at the destination. Then all legal issues are strictly on me.

One of the first applications will, as Cecil is interested in, will be my concealed carry piece.

Patience is plentiful for me.

I appreciate all the ideas and offers. I'll get there. I'll just be patient and wait.

Date: Sun, 27 Oct 2013 11:01:49 -0400
From: Bob Camp <ham@kb8tq.com>
Subject: Re: [R-390] Slippery TD

99.9xxx% "electronic grade" Isopropyl is a fairly common item. You can get it in fairly small containers. It's not (as far as I know) likely to run you into trouble with the ABC or the hazmat guys. If you have it ignite it could create an issue with the fire marshal?..

Date: Sun, 27 Oct 2013 11:38:58 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] The Slippery TD

I have spent an untold number of hours researching this on line. I didn't look just for Ethanol! I will say that I have never seen anyplace like this. It was NOT this way when I retired here. The latest suggestion to look for electronics grade Isopropyl, [sic] is something I have already run down in this research. Somewhere during the period since I retired here from Uncle Sam, Everything has REALLY changed.

The Electronics Grade Isopropyl Alcohol has become another one of those that requires a license and a specific permit. Only it is from a different division of this State Government. I can walk into a State ABC store and pick up a bottle of 151 proof Rum. I can also walk into a Firearms Emporium and pick up a 7lb can of gunpowder and no one bats an eye.

Things have become very convoluted here for reasons that I can not find out or get questions replied to. Everyone just relax. As I stated in my earlier post, I will deal with it. Roger and Charles both pointed out that simply getting the highest percentage of alcohol and using it will work. I've prepared for that *IF* that is the only available option. I've already been planning how to get what "used" to be at hand in the laboratory environment that I was once in. I'm not hyper or anything even remotely close to it. I'm just rolling with what is, and will resolve it.

Date: Sun, 27 Oct 2013 12:30:23 -0400
Subject: [R-390] The Slippery TD Addendum

From: rbethman <rbethman@comcast.net>

There is one very simple solution that is readily available. All I have to do is go into any one of a number of Emporiums and procure a quart of denatured alcohol. It is also significantly cheaper than all the other items. I even have one on the shelf. I obtained two of these within the past few months. One hasn't even had the seal broken. I don't believe that the TD will know or care. In any event, I still have to get the Den/Shack back into a useful condition. That would provide a working area. That is the one thing that I don't currently have.

Date: Mon, 28 Oct 2013 12:41:45 +0000
From: Bill Kulze <wak9@cornell.edu>
Subject: Re: [R-390] The Slippery TD

Google unicorn electronics in johnson city, ny. They have various sizes of the hi-test isopropyl. About $13 for a litre. I wound up looking for it because one of my radios, an eton E1, had/had a rubberized finish which became real tacky over time. The high proof stuff worked real good on it, and it cleans up your soldering real nice, too.

Date: Mon, 28 Oct 2013 15:01:14 -0400 (EDT)
From: bonddaleena@aol.com
Subject: Re: [R-390] R-390 Digest, Vol 114, Issue 35

As Tisha said, keep this stuff off of your skin. It goes into your pores and has 'staying power'... Not only that, it is very dense, so if you buy a pound (like I did), it will be in a really small package. It's messy, to say the least. I use both WS2 (TD), and HBN on my firearms and reloading equipment. Recently, I have switched to HBN as it is 'almost' as good a lubricant as the WS2. I impact plate ALL of my jacketed bullets with the HBN and it make cleaning the varmint rifles super easy. I have yet to see any copper fouling in the bores of my rifles. If it's good enuf for David Tubb (National Champ), it's gud enuf fer me....

Date: Mon, 28 Oct 2013 19:32:23 -0400
From: Bob Camp <ham@kb8tq.com>
Subject: Re: [R-390] The Slippery TD Addendum

Just for fun I went to Mouser and ordered a pint of 99.8% isopropyl. They were happy to ship it UPS ground. If there is some sort of permit required, they don't seem to know about it??

Date: Mon, 28 Oct 2013 18:08:59 -0700 (PDT)
From: Mike Bracey <mikebracey@att.net>
Subject: Re: [R-390] The Slippery TD Addendum

I just ordered a 32 oz. bottle for $7.99 + shipping from Amazon.

Date: Tue, 29 Oct 2013 10:54:48 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] The Slippery TD Addendum

I replied direct to Bob Camp. I'll summarize it here.

He lives in Pennsylvania. This puts it into the class of Apples vs. Oranges. In a nutshell, the idiotic license and permit *requirements* are in place by the State of Virginia. I've made note of this in numerous posts. If you aren't HERE, then this issue does not apply. That is the short of it. Reality is that there are about three or four states that have some restrictions. I paid no attention to restrictions other than Virginia. Those are the ones that *I* have to deal with and live within. We begin to waste effort and energy when a number of folks either send me a message direct off-list, and even on-list. I've contacted at least a dozen suppliers with regard to either Ethanol OR Lab Grade 99.8% isopropyl. Every single time, when they determine my location, I am informed of the Virginia restrictions and requirements. I will take it in stride and resolve *MY* problems. If it had been so easy to begin with, I'd have solved this long time ago.

Date: Sat, 21 Dec 2013 10:11:48 -0600
From: "Phil Mills" <pmills7@comcast.net>
Subject: [R-390] R-390A gear train help/advice needed (long)

I've been working on my R-390A with an apparent 1st mixer problem for almost 2 months now. I finally concluded that the first mixer isn't working because the output tuned circuit (aka first variable IF) is way off and therefore the mechanical alignment was highly suspect. So, I removed the Utah plate from a workng R-390A that I'm keeping for a friend and compared the two units. My radio's slug rack levels are way different from band to band as compared to the working unit. The comparisons were made with the KC dial set to +000 and I also watched the 1st variable IF rack not move much at all as I tuned from 7.000
to 7.500 which is not correct.

As an aside, when I first started work on the radio, I discovered that the clamp on the shaft to the crystal oscillator was loose and I had to set the oscillator switch to the correct position and tighten the clamp. Therefore, I suspect that someone has "overhauled" the gear train and perhaps did not get it back together correctly or left another clamp loose.

I have verified that the slug rack cam lobes are lined up as shown in the manual. I have also verified that the bandswitch itself is correctly

positioned in reference to the MC dial. It just appears that something in the gear train has got the "starting point" for the slug racks way off as you go from band to band. It seems like the MC indicator says "7" and the bandswitch is in the 7 MC position but the gear train and slug racks are positioned for some other band.

Can anyone off advice as to where to look in either the manual or geartrain itself to resolve the problem?

Date: Sat, 21 Dec 2013 12:51:12 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] R-390A gear train help/advice needed

>Can anyone off advice as to where to look in either the manul or
>geartrain itself to resolve the problem?

Scott Seickel's excellent photo tutorial at
<<http://militaryradio.com/r390a-rfdeck-geartrain.html>http://militaryradio.com/r390a-rfdeck-geartrain.html>
should give you everything you need.

Date: Sat, 21 Dec 2013 13:11:01 -0600
From: "Phil Mills" <pmills7@comcast.net>
Subject: Re: [R-390] R-390A gear train help/advice needed

Charles, thanks for the link. It helped me discover a major problem right away. It seems that this radio is 7+xxx all the way to the high end of the band and then rolls over to 7.000. Now all I have to do is figure out just how to fix this..... Unfortunately, this very nice rebuild tutorial that you pointed me to appears to be based on a properly functioning gear train at the start.

Date: Sun, 22 Dec 2013 11:41:55 +1000
From: Ken Harpur <igloo99nz@yahoo.co.nz>
Subject: Re: [R-390] R-390A gear train help/advice needed

I have rebuilt two RF decks using Scott's tutorial and there have been no issues...the most time consuming part for me was getting the bandswitch correctly setup. I don't think having a non-functioning gear train would be and issue because if you tear down your RF deck all the way to the start of the reassembly pictures, you're basically starting with a blank canvas...

On my second rebuild I found numerous broken clamps but...prior to the rebuild the deck did actually work. I think there was still just enough clamping force to keep the gears turning as I was tuning around. Maybe on your deck you have some loose or broken clamps and the gears are

slipping. Also, I had to remove some washers on some of the cams because someone in the past had installed too many, making some cams very difficult to turn. This meant driving out the small pin, removing required number of washers/spacers, refitting the cam and pressing in the pin. Apart from the two issues I had, following Scott's rebuild instructions and studying the photos makes the rebuild quite a painless experience.

If you have checked and confirmed cam alignment at 7+000 the next thing I would look at are the clamps followed by checking the gears are correctly meshed with their correct counterpart...

Date: Sat, 21 Dec 2013 19:46:14 -0600
From: "KA9EGW" <ka9egw1@britewerkz.com>
Subject: Re: [R-390] R-390A gear train help/advice needed

Isn't the + and - a separate display roller? Sounds like it got out of sync is all...

Date: Thu, 26 Dec 2013 08:41:06 -0600
From: "Phil Mills" <pmills7@comcast.net>
Subject: [R-390] Gear train rebuild help needed.....

I have put my R-390A's gear train back together using the tutorial on www.militaryradio.com but have one problem.

I have everything lined up on megacycle position 7+000 so that the cam lobes are aligned, the xtal deck is in the correct position, and the bandswitch itself is in the correct position. However, something is out of whack in that the bandswitch does not rotate in going from megacycle position 7 to position 8 as it should. It seems to be around megacycle position 14 that the bandswitch finally rotates. What do I need to do to get it back in sync?

Date: Thu, 26 Dec 2013 07:49:23 -0800 (PST)
From: Norman Ryan <nnryann@yahoo.com>
Subject: Re: [R-390] Gear train rebuild help needed.....

I wonder if the problem is in the geneva gear.? Might it be missing its ball bearing?

Date: Thu, 26 Dec 2013 10:14:17 -0600
From: "Phil Mills" <pmills7@comcast.net>
Subject: Re: [R-390] Gear train rebuild help needed.....

Norm, I did not take the geneva gear apart. The gear train was MC switching normally before I did the rebuild which I had to do because it

was badly out of sync cam lobe wise. The rebuild tutorial said nothing about having to sync or position the geneva gear.

Date: Thu, 26 Dec 2013 08:52:52 -0800 (PST)
From: Norman Ryan <nnryann@yahoo.com>
Subject: Re: [R-390] Gear train rebuild help needed.....

Hi, again, Phil, So the geneva gear is fully intact, then? Ball bearing where it should be? There is a possibility the gear(s) that engage it may be out of whack. I can't remember exactly how they look, but IIRC, there is a fancy four-toothed pinion that may be mispositioned. I would see if a thorough eyeballing of that part of the gear train reveals the problem.
Best of luck finding the solution. Keep us posted.

Date: Sat, 28 Dec 2013 13:49:25 +1000
From: Ken Harpur <igloo99nz@yahoo.co.nz>
Subject: Re: [R-390] Gear train rebuild help needed.....

It certainly sounds like the Geneva drive could be mis-aligned with the bandswitch. In your Y2K manual, assuming you have it (if not it is freely downloadable) chapter six, page 8 in the 'Corrective Maintenance' section there is a drawing showing the correct setting the the Geneva Drive at 7+000 MC note that it is called "Intermittent Switch Drive" in this Manual.
Also, in the rebuilt instructions you followed at
http://militaryradio.com/r390a-rfdeck-geartrain.html
Scott makes mention of the correct setting of the Geneva drive and describes how to adjust it further down the page.

Date: Fri, 27 Dec 2013 22:09:30 -0600 (CST)
From: ka9egw1@britewerkz.com
Subject: Re: [R-390] Gear train rebuild help needed.....

Yes, getting the intermittent drive aligned right can be a challenge...I'd have been totally lost without Scott's tutorial.

Date: Sat, 28 Dec 2013 12:48:07 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Gear train rebuild help needed.....

Phil and I were off list yesterday.
Here is what he wrote:

> I appreciate your helping me. I've received a lot of different
> suggestions and none of them are the perfect solution to say
> the least.
> Part of the problem is that the manual picture of the "geneva"

> gear or "planetary gear" as I would call it or the "segmented
> gear" as others have named it does not match the gear that is
> shown in the maintenance manual. It looks exactly like the planetary
> gear that is shown in the www.militaryradio.com rebuild
> tutorial. I'm going to go search the Y2K manual
> to see if it shows something that looks like what really exists
> in my receiver.
> At this point, I've just about decided to strip the gear set down and
> start all over again and just maybe I can find out where
> I left off a bushing..,

So he is looking very hard at the entire gear assembly.
It is indeed very easy to get a washer or spacer in the wrong place.

Date: Sun, 12 Jan 2014 09:42:51 -0600
From: "Phil Mills" <pmills7@comcast.net>
Subject: [R-390] need help with intermittent gear aka Geneva gear

I just can't seem to get this one right....I've got all the rest of the gear train set up and aligned but I can't seem to get the intermittent gear on the bandswitch to work correctly and the drawing in the manual is not much help. I know that some of the teeth on the little gear between the intermittent gear and the bandswitch gear are longer than others and I suspect that these are not in sync with whatever on the intermittent gear. I have been told that these longer teeth are supposed to run up/down with the bandswitch in the 7 mc position but I've tried this in conjunction with what I think is the correct setup for the intermittent gear according to the manual drawing.

I've been working with this so much that I can go from complete RF deck on the bench down to the intermittent gear and back fully reassembled in less that 15 minutes which shows that I've had a lot of practice :-) Can anyone offer any help or instructions on how to get these gears positioned so they work correctly?

Date: Sun, 12 Jan 2014 11:18:07 -0800 (PST)
From: Norman Ryan <nnryann@yahoo.com>
Subject: Re: [R-390] need help with intermittent gear aka Geneva gear

It's safe to say we all feel your pain! Have you verified that the Geneva gear has its single ball bearing inside? There is just one of them in there.
I don't recall if it is at all visible with or without the RF deck attached. I would hate for you to have to take the Geneva gear apart to verify, but it likely will give peace of mind if the ball is there. If it isn't -- well, you will know the story. Without the ball bearing, the Geneva gear will not work right even if it and its mating gears are correctly placed. Let us know what

you find, OK?

Date: Sun, 12 Jan 2014 15:07:27 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: [R-390] need help with intermittent gear aka Geneva gear

Pull the RF deck one more time and do not put it back in until you get it aligned.

Stage one of two.
You want to see the intermittent gear move the band switch as the megahertz shaft is rotated. Going up the range you need a shift from .5 to 1, 1 to 2, 3 to 4, 7 to 8, 15 to 16. Five shifts for six octaves. Going down the range you need a shift from 16 to 15, 8 to 7 , 4 to 3, 2 to 1, 1 to .5

This will be right or wrong.

Start in the mid range to avoid the bottom end stop on 0.5. As you change the megahertz shaft and move the dial counter between 7 and 8 you need the band switch to shift positions. You need a nice clean start, shift and rest of the switch as the shaft goes from detent stop to detent stop.

The R390A TM and the Y2K manual show the same gear train drawing and part numbers. Looking in from the bottom of the RF gear train right behind the dial counter is a short shaft. From front to back is a small gear a big gear (66) a clamp (71) and small gear (79).

If the switch is not moving at the right time and centered in motion between the megahertz detent stops.
If the motion is not quite centered going both up and down at all the switch points, turn the megahertz shaft until the intermittent gear completes its motion. Then loosen the clamp (71) on the small gear. Dial the megahertz shaft over to where it needs to be in a detent stop and tighten the clamp.

You may need several shots at this to get the operation smooth and well centered at all five of the switch points going both up and down the range of the gear train.

This adjustment is just to get the intermittent gear switching at the correct points.

Stage two of two.
Adjusting the band switch position.
The band switch has 8 wafers with 6 positions each this is 48 contacts that must make well.

There is a spot between the band switch gear and the band switch shaft where all is well. This is an eye ball value. Do it by sight and not with a meter like it says in the TM. Each wafer and contact will be a bit different and not exactly centered.

Run the gear train from end to end both up and down. Watch the switch settings as the intermittent Geneva gear settles after a shift. You may need to loosen the switch shaft gear clamp and nudge the shaft a bit one way or another to better insure each switch wafer contact makes at all the points. You will eye ball 48 contacts coming and going and then try for a best fit where everything works when needed.

Once you get the Geneva gear moving at the right octave change points and the band switch shaft timed for good switch contacts on each wafer point your good on this part of the alignment.

Phil, Just because I think this reads well does not mean that it does.
If you have questions please put up another post.

Date: Sun, 12 Jan 2014 17:59:08 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] need help with intermittent gear aka Geneva gear

Knowing when and where you need the intermittent gear aka Geneva gear to move is half the problem. Once you understand when it needs to move and to what band position it needs to move to, getting it aligned is easy.

There were some other posts pointing to some other things to also look for. If you are not finding the proper intermittent movement you may need to follow up on those points. If the intermittent movement is just at the wrong place as you dial through the megahertz then that's an easy adjustment.

Ten turns on the MC shaft gets you from end to end on the counter dial. It drives a set of cams through their travel range. It drives the intermittent gear aka Geneva gear through its range. Setting and timing the intermittent gear aka Geneva gear is like setting a cam shaft alignment. But you do not get a timing mark. You do have to watch the operation of the RF band switch. You want that switch to move as you change the MC shaft between megahertz. You want the RF band switch to complete its operation as the MC shaft drops into a detent position. You want the RF band switch to complete its operation while tuning up or down one megahertz and at the proper change points. Roger

Roger, thanks for the reply.

Your info on getting the mega heartz detent set so that it is between bandswitch changes is something that I did not know about. I will have to think about how to accomplish that as the planetary gear is the last thing I put in place before putting the front plate on. At this point, I'm not even sure I'm getting the Geneva gear to go through six changes but I will look into that.

As for aligning the bandswitch itself, that is no problem for me as I've done it before and it is clearly illustrated in the gear rebuild tutorial in the Y2K manual. thanks again, Phil

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Date: Sun, 12 Jan 2014 20:06:01 -0800 (PST)
From: Norman Ryan <nnryann@yahoo.com>
Subject: Re: [R-390] need help with intermittent gear aka Geneva gear

Glad to learn the bearing is there and eliminated as a problem.

Roger's advice should help get you squared away. Can't imagine this list functioning as well as it does if it weren't for him.

Getting the contacts to make properly involves treading a fine line. There is lost motion in the bandswitch wafers, so you have to check in both directions; i. e., going up past the band, then going down past the band to see if you've got it right.? Slack needs to be taken up at one of the pinions that is adjustable for that purpose.

It's important that the gear clamps be snug enough. However, there is a danger of breaking the clamp's splined bolt or the splitting the clamp itself from over tightening. Clamps gripping surfaces should be clean of oil or grease, but the teensy bolts will tighten with less torque if you put the smallest amount of oil on the bolt shoulders and the thread where the nut goes.

It's really hard to know how far to tighten the clamps, but the above oiling tip makes a difference. Mobil One synthetic SAE 90 works for me -- it behaves well and tends to stay where you put it.

Getting this RF deck problem sorted out will qualify you for a black belt in R-390/R-390A overhaul.

Date: Mon, 13 Jan 2014 19:56:53 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] need help with intermittent gear aka Geneva gear

Amen brother, But what a way to earn it. Roger.

Date: Mon, 13 Jan 2014 10:17:26 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] need help with intermittent gear aka Geneva gear

Is is possible the Geneva mechanism just isn't clocking the way it should? I seem to recall that when I rebuilt one I used to have, someone made the comment that if that ball/track isn't just exactly the right size, the mechanism just wouldn't clock.

Date: Thu, 27 Feb 2014 11:51:54 -0800 (PST)
From: Chris Farley <kc9ieq@yahoo.com>
Subject: [R-390] RF geartrain screws

Well I finally nailed down what is seemingly the one and only realistically priced* source some of the .096 spline/bristo/bristol screws used on the r-390a shaft collar/clamp screws.*(Still not what I'd call cheap, but then again I had one supplier quote me $35 EACH!)?

These are the 4-40 x 9/16" long ones,? 4-40 x 1/2" are also used on some of the smaller clamps.? 9/16" being 1/16" longer than necessary for the smaller clamps, they can be left as-is or cut down 1/16" if preferred. It was discovered that these screws are basically unobtanium, as the "standard" spline drive size for a #4 cap screw is .111-6, not .096-6. These screws were a specially made item for these (and probably other) radio equipment.? The square nuts and washers are much easier to source.

This screw purchase will likely be a one time buy due to the price and minimum order requirements. Thus this is an email blast to see how many of you might also like some, so I can order the appropriate quantity.

These are the same national stocking number that crosses to the original Collins part: 4-40 x 9/16" cap screw with 0.96" 6 flute spline drive, Spec'd to be zinc or cad plated steel, MIL-F-14072, yada yada yada. (Surprised these weren't originally stainless steel, but indeed they are not upon a closer look).

For fellow list members interested, my final cost will be about $2.00/ea. With a quick count 13 screws appear to be used per unit, including the two main tuning knob clamps. Cost for a set of 13 with CONUS shipping in a padded envelope would be $28. I may also put "kits" together with the washers and square nuts required, but haven't gone there yet. If some of you wanted much larger quantities, say 100+, I can offer a slightly better price per unit.

If you would like to be a part of this purchase, please let me know ASAP and I will place the order. Note this is for the R-390A geartrain, I have not done research for the R-390 to see if they use the same hardware.

Date: Fri, 28 Feb 2014 17:27:32 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] RF geartrain screws

The same bolts will work fine in the R390. The total part count may be different. 13 a bakers dozen would be a life time spare supply for a receiver. But please put me down for 26 of the critters.

Roger Ruszkowski
104 Arintha Drive
Westminster SC 29693

Please post an address where I can send you a check when every thing gets firm. I know about the #4 cap screw is .111-6, not .096-6. bolts.
Some times the wrong part would get ordered. Back in 73 - 75 we were using the .111 not the .096 as we could not get the .096 You picked where you stuck one in and swapped a .096 out to the needed places. Never put a .111 in the IF and bandwidth switch extensions or the MC KC knob clamps. I can believe many Fellows have a couple .111 's in their receivers and just think they are living with a striped out spline.

Date: Sat, 1 Mar 2014 06:47:28 -0500
From: Paul Anderson <paul@pdq.com>
Subject: Re: [R-390] R-391 Set-up

Be aware that the grease in the autotuners turns to glue after a very long time. I'd be extremely cautious apply 28VDC motor power to them without significant cleaning and re-lubing effort.

The main thing is that there is a slip clutch that allows the motor to spin when the tuner is at an end stop. If the slip clutch doesn't slip, you break fragile irreplaceable stuff inside.

If you have the tuning knob locking pins loose when autotuning, you lose autotune synchronization, not the rest of the RF geartrain. The process for re-synchronizing the autotune is in the manual and is confusing, but is doable. You also need a different spline wrench - maybe .111 instead of .096 to do the line shaft adjustments.

In normal FRR-33 use, the C-974 controls the R-391's in parallel, so you dial in a new channel, and it puts out the right signal on the autotune cable.

IIRC, the cable has a common ground, and one of the other pins is grounded, indicating that channel is selected. So you should be able to do an external rotary switch to control it. Check the wiring diagram to be sure.

My R-391 had bad brushes in the motor, which were hardware store items (though probably the HW store brush material was harder than original and thus harder on the commutator). After replacing those, cleaning the tuner units carefully (soaking in kerosene for a week), etc, then re-aligning the autotune mechanism, I was able to make it all work. It is a sight to behold. The brush caps on the motor are fragile – be very careful with them.

You can think of the autotune mechanism is sort of an overlay on the base R-390, and has nothing in common mechanically or electrically with the RF/IF/LF decks. The sole mechanical exception, IIRC is that the RF deck has a megacycle indent mechanism that I think is different for the R-391 (I could be wrong about this - searching this list may get more details on that). I seem to remember it was so the motor could turn the megacycle shaft a little easier.

Date: Sat, 1 Mar 2014 13:53:46 -0800 (PST)
From: Chris Farley <kc9ieq@yahoo.com>
Subject: Re: [R-390] RF geartrain screws

Thank you to those who have responded to this "screwy" deal, you have all been marked down. Due to a larger than expected response, further reservations are CLOSED as of now- I only have 300 available to me at this time, and they are all spoken for. I WILL continue the search for more, and will advise the group as to their availability. I will update you all next week, as (due to popular request) I will also be getting some square nuts and possibly lock washers to go along with the screws. (Can anybody tell me WHY they used split lock washers under the nuts on later units? They aren't even shown on the earlier Collins mechanical drawing. It would be impossible for that nut to loosen, as it is kept from spinning by the nut). I should have everything here and ready to mail out in about two weeks, hopefully sooner. Thanks again for helping out. Our radios (and future service technicians!) will thank you.

Date: Sun, 2 Mar 2014 18:55:36 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] reply to Chris's loose screws

>Can anybody tell me WHY they used split lock washers.....

A lot of R390's were mounted in mobile vans and got shaken down the road. The idea was the tension of the lock washer in the stack would keep the bolts from vibrating loose. Time after time I would ship racks of stuff from San Diego to Fullerton California (100 miles) or cross country to Lynchburg Virginia and back. The stuff would work in San Diego, but arrived in many loose pieces. Get put back together again. Operate through shock and vibration tests just fine. Get shipped home to San Diego and arrive in parts again. Get put back together and work again. When you put things in trucks even air ride and setting on shock mounts they fall apart. How our autos stay together for ever amazes me every day.

Date: Sun, 2 Mar 2014 18:54:54 -0600
From: Chris <kc9ieq@yahoo.com>
Subject: Re: [R-390] reply to Chris's loose screws

By conventional wisdom, that split washer should be be under the head of the screw, not the nut as it is held captive and not allowed to turn more than a few degrees by the clamp.

By more modern knowledge, that split washer does basically nothing to prevent the joint from loosening- Point in case, how many split lock washers are used on that new car that mysteriously doesn't vibrate apart? VERY few washers of any kind are used, with exception of electrical grounds.

For those integrated in the real facts about lock washers, and hardware in general, below is one of many very interesting an enlightening articles out there:

http://www.boltscience.com/pages/vibloose.htm

Date: Sun, 02 Mar 2014 20:26:32 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] reply to Chris's loose screws

If "we" really worry about vibration, then I would suggest what we used for R/C Helicopters. We used the Blue Loctite. It resolved the loosening issue. Also, it DOES come undone when using normal hand tools! A single drop or slightly less on the threads WILL do the job. I never had a helicopter come apart. I have observed two that did NOT heed the advice! They became a kit once more, requiring many parts to be replaced. This is important - as the purple and others "may" require heat to be added. I use either one when the situation dictates.

Date: Mon, 3 Mar 2014 16:34:27 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>

Subject: Re: [R-390] reply to Chris's loose screws

I quite agree we went to a red Loctite for Navy ship systems.
I do not know who picked the red stuff or why that flavor was chosen.
But Loctite has got to be the best stuff since a double knot in your shoe-laces.

But the question was why in 55 did they added lock washers.
Because in 55 Loctite was not yet invented.

Date: Mon, 3 Mar 2014 16:36:45 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] reply to Chris's loose screws

You are so right.
Just one more case of almost getting the science correct.
They added the part but in the wrong place.

Date: Mon, 03 Mar 2014 16:48:52 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] reply to Chris's loose screws

The little tidbit of knowledge that I passed on is the very least that I can contribute to this list. Such little things can really make a significant difference. The Blue is indeed the ONE to use. The other colors start into the realm of more force to remove, and the greater probability of *requiring* heat to be applied to allow it to loosen. I use the Purple ONLY in specific places where I know I will not have to take it apart. It WILL come loose, BUT the force factor starts entering the picture.

I reserve it for those things that get purchased and get assembled.
They come loose even with lock washers in place.

<Sigh> It then gets brought to me to resolve. I get out the Purple simply because I do not wish to repeat the fix. I can't say that I have used the Red. I haven't had a need.

Date: Mon, 03 Mar 2014 20:35:49 -0500
From: Mark Richards <mark.richards@massmicro.com>
Subject: [R-390] RF subchassis separation

Now finally doing a rebuild of my R-390A. Gear train has been disassembled, cleaned, and now in the re-assembly process I hit a snag: there's a post which hosts the Differential Gear Assembly, and it is very loose. It cannot be screwed down tightly. I suspect that this post is press-fit into the gear backing plate. As the post is loose, I think this is

accounting for the fact that the Differential Gears are not aligning properly with adjacent gears, nor with the front gear cover. There is considerable mechanical friction when the front plate is attached.

So, my questions:

1. Can the RF Subchassis be separated from the gear assembly plate and...
2. Can the Differential Gear Assembly post be repaired?

A photo of the offending post:
http://kumichan.net/private/03-03-2014 20-28-04.png

I have another complete gear/RF Subchassis that is of dubious electrical condition, but is mechanically sound. If I can separate gears from chassis, then maybe an option is to swap out the RF Subchassis with the good gear set?

Date: Mon, 03 Mar 2014 21:26:19 -0500
From: Mark Richards <mark.richards@massmicro.com>
Subject: Re: [R-390] RF subchassis separation

Roy, sorry. This will work:
http://kumichan.net/private/03-03-2014-20-28-04.png

Date: Mon, 03 Mar 2014 21:40:51 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] RF subchassis separation

I've looked at the post you showed in the pic. Since it was highly likely a press fit, it can be "staked" to fix it back in place. It won't be a simple task. I'd seek out someone with machinist skills. That would be someone that can help with this.

Application of something very like the metal bonding tube that for the life of me that I can't remember right now. The combination of "staking" and that compound should make it tight once more. By golly! I think it is JB Weld. It finally popped into the old noggin as I began to sign the end!

Date: Mon, 3 Mar 2014 19:25:35 -0800 (PST)
From: Norman Ryan <nnryann@yahoo.com>
Subject: Re: [R-390] RF subchassis separation

Here's the link again for those who could not open it:
http://kumichan.net/private/03-03-2014-20-28-04.png

Copy and paste it to your browser if clicking on it does not open it.

Date: Mon, 3 Mar 2014 20:01:29 -0800 (PST)
From: Chris Farley <kc9ieq@yahoo.com>
Subject: Re: [R-390] RF subchassis separation

I was looking through the drawings to see how that shaft is supposed to be pressed/crimped into place. It appears there may be a drawing missing from the set (SM-D-178900 missing, as referenced to on SM-B-178901), but here is info gleamed from drawings of the shaft, the RF gear train assembly front plate, and the gear train assembly:

The pressed-in portion of the shaft is .219" +.001" -.000" by .040" deep. That end also has a hole drilled into it, which strangely is shown without specs, aside from being 1/4" deep and tapped at 8-32.

The hole in that front plate is complicated. .2187" +.0005" -.0000" hole. Countersunk at 82.3 to .343" on the front, and countersunk at 82.3 to .248" on the rear.

Now I'm no machinist, but that sure seems like it must be a temporary "hold it in place" plan given the approx .0001" press-fit and overlapping tolerances, and then probably flared out from the rear for a more solid fit. Question is, why does the shaft drawing show the rear hole to be threaded? Is there actually the possibility of using a screw to hold that shaft in place? One is not shown on any of the drawings I have seen thus far. BUT if it IS indeed threaded and they aren't messed up from whatever pressing or staking took place, or the ID is such that you COULD drill/tap it, sticking a truss head screw (or a screw with a <shudder> FLAT WASHER) in there would seemingly be a pretty easy fix, assuming there is clearance behind the plate.

Date: Mon, 3 Mar 2014 22:09:56 -0600
From: Chris <kc9ieq@yahoo.com>
Subject: Re: [R-390] RF subchassis separation

Well I just happened to think, and went to look at a crusty RF deck I have for parts. That plate sits flush against the RF coil assembly chassis, so if a screw is used it must be countersunk and not sit above the surface of the plate. I don't really want to separate mine at the moment, but perhaps someone with a gear train assy separated from the rest can chime in.

Date: Mon, 3 Mar 2014 23:14:36 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] RF subchassis separation

Instead of pressing that shaft in place, perhaps the threads were used with

a screw to pull the shaft in instead and then the screw was removed.

Just a thought. I doubt that's the case but who knows...

Date: Mon, 3 Mar 2014 20:35:29 -0800 (PST)
From: Chris Farley <kc9ieq@yahoo.com>
Subject: Re: [R-390] RF subchassis separation

Light bulb moment... The normal angle for an Imperial countersunk screw is *ding* 82*.* Now, a normal #8 countersunk screw has a head diameter of .359" exceeding the max .343" specified OD of that hole. However his isn't to say a special screw couldn't be used, or WAS used but omitted from all the drawings for some reason.

With your RF deck already being assembled that far, it would be worth separating the plate and see what things look like from the rear. Odds are you'll end up taking it off either way to repair. OR, if that shaft is loose enough and you haven't much to lose, try pulling on it slightly while turning clockwise. If there IS a screw hiding back there, you might be able to tighten it up that way.

Either way I agree that sloppy shaft should be addressed.. But with the whole assembly together with 5-40 screw installed from the front, it *shouldn't* move at all, unless that hole is badly wallowed out.

Date: Mon, 3 Mar 2014 21:51:42 -0800 (PST)
From: Chris Farley <kc9ieq@yahoo.com>
Subject: Re: [R-390] RF subchassis separation

Ok, ok, I couldn't take it. Dang instant gratification mentality... After about a liter of Kroil, some elbow grease, and aome quick n dirty disassembly I won't share here for the fear of being banished, the answer is clear. There's a screw.

Yes, there is a "Phantom Screw" holding that shaft in place.

Tear it apart, apply some Loc-Tite, and pinch it down to be forever forgotten about.

Of course, I did all this BEFORE looking at the Collins RF gear train assembly drawing again. I skipped a number, and ta-da a screw is listed. About 30 seconds later, here are the specs:

AAJD THREAD CLASS 2A
AAJF THREAD DIRECTION RIGHT-HAND
AASA THREAD LENGTH 0.312 INCHES NOMINAL

AASB FASTENER LENGTH 0.312 INCHES NOMINAL
AASK HEAD STYLE FLAT COUNTERSUNK
AASL HEAD DIAMETER 0.300 INCHES MINIMUM AND 0.332 INCHES MAXIMUM
ABQZ INTERNAL DRIVE STYLE CROSS RECESS TYPE 1
AHYM NOMINAL THREAD DIAMETER 0.164 INCHES
CMLP THREAD QUANTITY PER INCH 32
CRSQ COUNTERSINK ANGLE 80.0 DEGREES MINIMUM AND 82.0 DEGREES MAXIMUM
CYAU SCREW MATERIAL STEEL CORROSION RESISTING
CYBA SCREW SURFACE TREATMENT PASSIVATE

Date: Tue, 4 Mar 2014 07:41:35 -0500
From: "Bill Riches" <bill.riches@verizon.net>
Subject: Re: [R-390] RF subchassis separation

Could a hole be drilled in the RF coil asssy to allow the head of the screw to fit into it?

Date: Tue, 04 Mar 2014 08:03:03 -0500
From: Mark Richards <mark.richards@massmicro.com>
Subject: Re: [R-390] RF subchassis separation

To Chris, Bill, Barry, Norm, Roy, Bob... thank you! I am overwhelmed with the number of replies and excellent thoughts.

In summary, the shaft is held in place with a countersunk screw (possibly philips head?) screw. It is possible to gain access by separating the chassis. Question is: how? It appears removal of the cam assembly (as a start) is required, and this seems a frightening proposition. Chris, can you give us some hints on how you got these apart?

Tried to tighten the shaft by rotating.. even with some pulling tension to friction-lock the screw, allowing the threads to take. No joy. My guess is that whatever corrosion or chemical bond exists has formed with the shaft in the loose position.

Date: Tue, 04 Mar 2014 10:37:51 -0500
From: Mark Richards <mark.richards@massmicro.com>
Subject: Re: [R-390] RF subchassis separation

Possible solution found - and without panel separation.

1. Drilled a small hole adjacent to the base of the shaft and at an approx. 45
degree angle.

2. Inserted steel pin material through the hole and (hopefully) into the screw head.
3. Hold the pin steady, rotate the shaft carefully, and hope that nothing slips.
4. When tight, cut off excess pin material.

Photos here:

http://kumichan.net/private/03-04-2014-10-22-24.png
http://kumichan.net/private/03-04-2014-10-22-43.png

It seemed to me that the screw was binding and I was of course terribly concerned that, already weakening its soft metal with a hole, it would simply snap off. But the screw appeared to stay put while the shaft turned (I treated with some penetrating oil first).. either that or the pin material and slight rotation of the shaft bound up behind the panel in sufficient quantity to pull the pin tighter to the aluminum plate.

Whatever.

The result is not pretty, and certainly not stock, but the post appears to be steady (gear assembly will test this).

Date: Tue, 04 Mar 2014 12:03:58 -0500
From: Mark Richards <mark.richards@massmicro.com>
Subject: Re: [R-390] RF subchassis separation

Thank you for the generous offer.
May I hold it in reserve?

Let me see if my repair works. So far with gears installed and front plate attached, things seem fine.

I noticed some awful mechanical rubbing noise when bandswitch is rotated. Looking at the differential gear assembly, and specifically at the outer steel ring, it seems to have been ground down quite a lot with some of the steel material actually separating in small threads (or strings). My guess is that the megacycle change detent plate was improperly adjusted with way too much tension and over time the damage was done. I filed off the excess disk material and adjusted the detent to be effective but not overly so, and the grinding noise is lessened,
although I see that the disk, apparently because the bandswitch was operated repeatedly within a certain range, is slightly out of round!

It would be sweet if this R-390 spins like a swiss watch.. instead of a cheap timex. Further assembly, lubrication, and adjusting will tell.

Date: Tue, 4 Mar 2014 10:30:48 -0800 (PST)
From: Chris Farley <kc9ieq@yahoo.com>
Subject: Re: [R-390] RF subchassis separation

To answer the disassembly question-

First off NO do NOT attempt to remove the cams/shafts. If you look at the rear (and middle) ones, they are pinned in place. Tearing these apart would be a mini-nightmare to straighten back out.

That entire gear train assembly comes out as a unit- Look at the picture from this completed eBay listing- This whole thing comes out as one piece:

http://www.ebay.com/itm/COLLINS-R-390A-please-verify-GEAR-TRAIN-W-MILITARY-INSPECTION-TAG-/141203550647?pt=US_Ham_Radio_Transceivers&hash=item20e06331b7&nma=true&si=6mEUC20wSuT0ZP3Z55xr8VjD5Gk%253D&orig_cvip=true&rt=nc&_trksid=p2047675.l2557

Now before you go "holy crap!", It's not as daunting as it looks.

First if you haven't already, remove the slug racks and springs. Remove the gear from the bandswitch shaft, and slide the shaft rearward enough so that the retaining clip may be removed. Then remove the bandswitch shaft by pulling out through the front. Pull it out straight, don't turn it and misalign the wafers. The antenna trim control shaft and 2 screws holding that bracket must also be removed. Now it gets easy. From the rear, remove the 3 screws holding the back plate to the chassis. Remove the two downward facing screws from the two brackets holding the center plate down, right behind the RF coils. There are nuts and washers under the chassis on these two screws. Then turning the unit upside down, remove the three hex head screws holding the front plate to the chassis with a 1/4" wrench. That entire assembly as seen in the link should now be free and lift straight up from the chassis.

It's possible I forgot a screw or step somewhere, but if you're mechanically inclined it's not hard to figure out.? I had mine separated in under a half hour, and that was the first time doing so.

Date: Tue, 04 Mar 2014 15:10:09 -0500
From: rbethman <rbethman@comcast.net>
Subject: [R-390] The R-390 gear train issue

The 82 degree of countersink IS a standard for said application and falls into what you can find easily at either one of the Home Improvement

stores. They will have them in packages.

TIP #1 - If you go there, write the specific description on paper and take it along with you.

TIP #2 - In lieu of purchasing a package that would cost a bit more, and leave you with extra ones lying around, look for the SAE/METRIC drawers. They are in the hardware dept. This allows you to buy only the number that YOU decide. You have to make the decision whether the package of some number like either ten or twelve is appropriate, or to go for buying smaller numbers.

My specific experience has been going to Lowe's.

TIP # 3 - Do NOT go with the "staking"! The single screw of the correct size will do.

_To resolve the loosening possibility. Do as I posted regarding the Blue Loctite.

_Just a little dab will do. A HobbyTown would most likely carry the smallest size and better fit the wallet. <snip>

Date: Tue, 4 Mar 2014 13:38:52 -0800 (PST)
From: Chris Farley <kc9ieq@yahoo.com>
Subject: Re: [R-390] The R-390 gear train issue

1) Mark is the one with the loose shaft, not me. I was just curious, started digging, and shared my findings with the group... Obviously a bit prematurely, as evident by the two follow-up posts required for a solid conclusion. From them you will see that there is indeed a screw hiding back there from the factory, and Loctite was suggested to be sure it doesn't ever loosen up again. Also thanks for the Loctite post the other day, it was interesting to read- I haven't really looked at the different flavors very critically before.

2) Yes as mentioned in one of the subsequent posts, 82 degrees is the standard for Imperial countersunk screws. BUT if you look at the specs I found for that screw, max OD of the head is smaller than what is spec'd for a "normal" 8-32 hardware store screw. This jives with the specs for that double countersunk hole. A "normal" countersunk screw would stick out and not be flush with the surface, as it needs to be.? You would need to either find the correct oddball screw, or machine/grind/file the head down until it seats flush with the surface.

Either that or as someone else suggested, chop a hole in the RF deck

chassis, which really shouldn't be necessary unless that screw is totally trashed and you absolutely can not find a proper replacement.

The latter options shouldn't be necessary though. If that screw was totally missing for some reason (how could it escape!), the shaft would just come right out along with the gear assembly.

Date: Wed, 5 Mar 2014 11:09:42 +1100
From: Pete Williams <jupete@internode.on.net>
Subject: [R-390] Differential post

Mark... I may have missed something but the exploded gear train shows the differential shaft.post is held to the back of the rear plate with a 8 - 32 X 5/16" screw.---. Flat head..

Date: Tue, 4 Mar 2014 21:22:17 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] RF subchassis separation

Wonderful, Know we know.
Wait till W Li get this one into the Pearls Of Wisdom.
I had to read that whole string of posts because I did not know.
What a way to make your stripes Chris.

Date: Tue, 4 Mar 2014 21:29:06 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] RF subchassis separation

Happy you have saved another great receiver. Ah, the things we have to do to keep our toys in good repair. After this level of work on just that shaft, I hope the rest of the receiver goes better. May the gear train clean up and run smooth for the next 50 years or so.

Date: Fri, 7 Mar 2014 00:14:06 -0600
From: Chris <kc9ieq@yahoo.com>
Subject: [R-390] R-390A RF gear train clamp lock washers

While cleaning off the bench for a different project, I took a closer look at my crusty EAC RF deck. What I saw surprised me!

From the earlier thread regarding gear clamps and associated hardware, the split lock washers and their use/misplacement was brought up. At some point during or after the Stewart Warner drawings were made, a split lock washer was added to each clamp screw. On my '62 contract Amelco unit, these washers were under the square nut which seems to be the norm. This would seem to be the wrong location, as the nut cannot

turn more than a few degrees by design of the clamp. Conventional logic would say that washer should be placed under the screw head to prevent it from turning, rather than beneath the square nut.

On this EAC RF deck, I discovered the split washers are indeed placed under the screw head instead of the nut! Not only that, but there is a dob of green thread locker on every nut! It's probably impossible to tell where or when this changed, but it seems they are out there in all three configurations- No washer, washer under nut, and washer under screw.

This RF deck is order number 23137-PC-60 with a sn of 1159, if that tells anybody something.

Just though this to be rather interesting, and wonder if anyone else has noticed this same arrangement on any other decks.

Date: Wed, 12 Mar 2014 15:17:59 -0400
From: Mark Richards <mark.richards@massmicro.com>
Subject: Re: [R-390] RF subchassis separation

After all of the excellent suggestions, I took a gamble and decided to leave the RF chassis in place and as is. I managed to pin the loose shaft in place, and this took some of the pressure off. Perhaps not a good move.

My focus switched to restoring the gears to much better condition than when I began (accomplished!), re-cap the AF and IF subchassis, and have at an alignment.

Unfortunately, it appears that the RF deck will indeed need to be removed after all.

The crystal calibrator is not working properly at all (the calibrator signal drifts wildly and sounds like there's 60HZ FM modulation on it); the bandswitch needs cleaning. Likely a re-cap here will also help, too.

The receiver functions, with some bands turning in a tremendous performance (as compared to my FT-900 on the same antenna.. not at a point where I can make S/N measurements). So overall I've got a good unit here, with hope.

Questions:

1. Must I disassemble all the gearing to remove the RF chassis assembly? Would be nice if it could be left as is, but looks to be non-possible. Raises the question why the design of the RF deck is not as modular as the rest of the receiver. Maybe compromises...

2. Why are one of the green headed philips screws that hold the RF chassis to the main chassis partially obscured? Even with a proper size screwdriver I can't get a grip on the screw head. Is this expected? Looks as if I have to remove the rear panel and dig a bit...

3. Is is possible to mix and match the slug racks? Faint memory of someone mentioning the materials of these slugs may have specific qualities for each position. Unfortunately these were removed from their original locations without reference to where they came from. Not by me :)

Date: Wed, 12 Mar 2014 15:31:08 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] RF subchassis separation

> 1. Must I disassemble.....

No, the gears, slug racks, and the 2nd oscillator all can come out together. You don't have to separate the gears from the RF deck to work on the RF deck.

> 2. Why are one of the green headed philips screws.....

I don't know "why", but it is. You'll need an extra-long screwdriver to get that one out.

> 3. Is is possible to mix and match the slug racks?

You can mix the RF or the IF slugs; however, you cannot successfully swap an IF slug with an RF slug.

Date: Thu, 13 Mar 2014 13:04:45 -0400
From: Mark Richards <mark.richards@massmicro.com>
Subject: Re: [R-390] RF subchassis separation

Removal of the entire RF and Crystal Oscillator section was a lot easier than it first appears. Simply a few green-headed screws, remove some cabling, and it comes out as an entire unit. It looked intimidating, which caused me to believe that it was... like a schoolyard bully.

Now that the RF deck is removed I was able to clean up the bandswitch, replace a few capacitors, and poke around in the crystal oscillator section.. as mine doesn't work properly. No issues found in that area (with components that are testable in circuit); no signs of overheating or stress. So it's either tube/s or crystal. <snip>

Date: Fri, 25 Jul 2014 09:19:09 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: [R-390] Synthetic Oil

Anyone tried this stuff? Looks like it would be handy to apply and would be a good synthetic oil. http://www.liquidbearings.com/
The reason I found this one is there's a knock-off synthetic on eBay and I started looking at that and found this (apparently the "Liberty Oil" is a knockoff of this).

Date: Fri, 25 Jul 2014 09:39:46 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Synthetic Oil

I have not used this. However, I wonder if this is a reincarnation of the years ago "Dura-Lube" that made all of the same type claims. That particular product ended up with more holes shot through it than a sieve. It died on the vine, thankfully!

Date: Fri, 25 Jul 2014 14:48:52 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Synthetic Oil

>Anyone tried this stuff.....

You can buy the needle-tip bottles anywhere. As for the oil, I want my lubricant to come from a major chemical company with a billion-dollar research budget, not some fly-by-night operation that puts oil up in generic bottles with labels printed on a laser printer. If you're lucky, you're getting 1 oz of Mobil 1 (or another big-name synthetic oil) for $7, poured out of quart bottles by hand. If not, who knows what kind of concoction some bathtub chemist has mixed up? If you buy Mobil 1 by the quart, it is less than $0.30 per ounce.

Date: Fri, 25 Jul 2014 15:02:12 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Synthetic Oil

I have a small bottle (maybe 2 oz.) of Mobil 1 that has lasted me for years now. Just thought this stuff might be a better lubricant. I'd never heard of it before today, though, and that's why I asked.

One thing I notice in some of their FAQs is it apparently doesn't have a very high viscosity as it is not recommended for use in damping tone arms so it might be pretty thin.

Date: Fri, 25 Jul 2014 15:08:30 -0400
From: Bob Camp <kb8tq@n1k.org>
Subject: Re: [R-390] Synthetic Oil

Before you put *any* goop in a radio, make sure you can get it back out again.

1) Do normal solvents dissolve it when new?
2) Does it gum up after a few days ? Can you still remove it?
3) Does it go silly when combined with a little grease, moly powder, or normal oil? Can you still remove it?
4) How fast does it evaporate? Does it leave a film on everything within 20 feet?
5) What's it smell like?
6) What happens when it gets hot?
7) How runny is it? does it get all over everything and anything?
8) What does a little of it and a lot of grease do?

The basic idea here is do no harm. There have been a number of super duper ultra neat lubes over the years that failed one or more of the above. You *do not* want to deal with a radio afterwards.

The major auto oil's have been through enough testing that they are a pretty safe bet. The same problems that are a pain in a radio are a disaster in a car...

Date: Fri, 25 Jul 2014 15:12:34 -0400
From: Tom Nicholson <Gunsrus1942@Comcast.net>
Subject: Re: [R-390] Synthetic Oil

Having been raised in a family of HVAC workers, I was taught early on that when lubing a "sleeve bearing" motor to always use non-detergent, as the detergent additive would "glaze" the sleeve bearing and cause premature wear. It did seem to work for heating circulators and aqua boosters. Would this not apply to Mobil 1 , etc. Just asking
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Date: Fri, 25 Jul 2014 12:32:17 -0700
From: Bill Guyger via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] Synthetic Oil

Guys as long as we're talking synthetic oil, Royal Purple is a great lube for many things, I think the gear train would be ideal as long as you use something light like 5W-30. The armorers for the Dallas PD recommend it for gun use since it stands up to high temperatures. A quart bottle was a lot cheaper in the long run than buying some of the marvelous, magical,

miracle "snake oils" that work at the molecular level.....duh, all oil works at the molecular level. They lubricate by forming mono molecular films, but don't let the general public know that, it'd put a lot of PR guys out of work.

FWIW the last time I was over at DFW Gun range, I noticed that Royal Purple is being sold in spray cans just for gun lubricant so that might be something to think about too.

Date: Fri, 25 Jul 2014 15:51:49 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Synthetic Oil

This "may" be a mantra for HVAC, BUT, I would add a caveat. All motor oils in the '60s sold and used in automotive shops for oil changes would be completely contrary to this philosophy. The reason is simple, ALL main crankshaft and rod bearings that attach to the crankshaft ARE nothing but sleeve bearings.

The specific issue that is mentioned regarding HVAC "sleeve" bearings, is "most likely" a reference to "sintered bronze bearings". These are porous, and causing a glaze on them *would* be significant. They are "prelubricated" at time of manufacture, and oiling them during maintenance, the recommended oil IAW the manufacturer would be the best path.

Date: Fri, 25 Jul 2014 14:56:12 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] Synthetic Oil

I still use Mobil 1 synthetic cut with the magic powder. One quart will last you forever.

Some of the things I found that were interesting was the oil that is used by roller-blades by the skater crowd. It seems like more hype than anything else. It is just a teflon based lubricant.

Another I found was on an audiophile (record turntables) site where they get really obsessive about the spindle bearings and count how many revolutions the turntable takes after power is cut off (seems somewhat scientific). That oil seems a bit lightweight and appears to be better suited for the little turbine motors in air tools.

A pen oiler would be nice but a toothpick seems easier to control quantities so the radio does not get an oil bath.

Date: Fri, 25 Jul 2014 13:59:41 -0600
From: 22hornet <22hornet@gmail.com>
Subject: [R-390] Synthetic Oil

It isn't synthetic but I have used Zoom Spout, turbine, or HVAC oil for several decades it has worked very well.

Date: Fri, 25 Jul 2014 16:01:26 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Synthetic Oil

Regarding firearms lubricants and cleaners, I take what many departments and the Military use with a grain of salt! Even before I retired from Uncle Sam's Employ, the big "Mantra" was *Break Free CLP*.

If you have not had the "pleasure", DON'T! This product states very specifically that the firearm MUST be cleaned for three days in succession! Reason? It continues to leech out from the pores of the firearm for that period!

I will take good old Hoppes RBC, (Rifle Bore Cleaner), for one session, until the patch ran clean, then lubricated.

Anything that continues to leech out the remnants of burnt powder and the like for days, *IS* not anything that *I* will apply to any weapon that I personally own!

Date: Fri, 25 Jul 2014 16:12:28 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Synthetic Oil

>I was taught early on that when lubing a "sleeve bearing" motor to
>always use non-detergent, as the detergent additive would "glaze"
>the sleeve bearing and cause premature wear.

I have heard this, but I started using Mobil 1 for almost everything more than 35 years ago and have never seen this problem (or any problem, for that matter). I have a window fan that runs 24/7 from (roughly) March to November to cool the attic. Before Mobil 1, the sleeve bearings needed lubrication 3 or 4 times per season. I used M1 on it way back then, and I think I may have relubricated it 3 times since (about once per decade). Most of the sleeve bearings I have lubricated with it have *never* been lubricated again. So
whatever the theoretical problem is (or perhaps it was an empirical problem that was wrongly attributed to detergent), there does not seem to be any problem in practice with M1 motor oil (I can't speak for any other

products).

Detergent keeps tiny metal particles (worn off of beaings) suspended in the oil, while non-detergent oil lets them settle out. In a splash-lubricated gearbox or crankcase (for example), we use ND oil to let the metal dust settle to the bottom of the sump where they don't constantly circulate through the bearings. With pressure lubrication (car engine crankcases, for example) we filter the oil, which removes the suspended metal particles, so we can use detergent oil without suspended metal particles being a problem. In a typical sleeve bearing installation, there is no sump and no place for metal dust to fall out -- there is only the oil between the bearing surfaces -- so there is no disadvantage *from this source* (suspended metal particles) to using detergent oil.

Date: Fri, 25 Jul 2014 16:14:08 -0400 (EDT)
From: Ron Bussiere via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] R-390 Digest, Vol 123, Issue 11

+1 on the "snake oil" moniker. There is an excellent website called: "Bob is the Oil Guy". There are LOTS of sub-catagories for firearms, planes, trucks, motorcycles, etc. There are many contributors to the forums, that develop oil additive packages for the major oil companies. Yes, Mobil ! is excellent and has a fantastic track record. Pun intended. ha ha. Yes, Royal Purple is great stuff. I use it in one of my hot rods and I use the spray (among many others) in my firearms. I actually coat all my centerfire rifle bullets (I reload 38 different ctgs) with either HBN or WS2. Information about these chemicals can be found on the www. The WS2, has the lowest coefficient of friction known. It was developed for the space program. I use the HBN for most bullet coatings now, because it looks kinds like talcum powder. It only 'plates' the bullets one molecule thick. I also wipe the bore of a new rifle with HBN and it actually slows the bullet velocity by aprox 50 fps, due to friction reduction. Peak pressure/time thing.....Amazing stuff.

Date: Fri, 25 Jul 2014 18:05:21 -0400
From: Frank Hughes <fsh396ss@gmail.com>
Subject: [R-390] Wet vs dry lubes?

OK on all the synthetic "wet" lubes, has anyone compared experience w/ the dry lube "Tungsten Disulfide"?

Date: Fri, 25 Jul 2014 16:20:14 -0700
From: Renee K6FSB <k6fsb.1@gmail.com>
Subject: Re: [R-390] Synthetic Oil

I found that M1 (or a light syn oil if M1 too heavy) with magic powder does superb on my audiophool turntable, firearms, clocks, gee the list

goes on..... Renée, the other "crazy radio lady"

Date: Sat, 26 Jul 2014 00:25:19 -0700
From: "Drew P. via R-390" <r-390@mailman.qth.net>
Subject: Re: [R-390] Synthetic Oil

I use Mobil 1 for bicycle chains not for any superior lubricating ability, real or imagined, but because it does not gum up nearly as badly as other oils, even those marketed specifically for the application. No more chunky deposits caking up derailleur pulleys!

Date: Sat, 26 Jul 2014 08:30:45 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Wet vs dry lubes?

I'm all for the Tungsten Disulfide! The items that I've applied it to have a very noticeable improvement in loss of friction. The first place I applied it was to a Colt .45 ACP M1991A1. I've *never* experienced anything like it! It is by far the smoothest Colt .45 ACP I've now ever owned. I began carrying one at 18. I've owned and carried one ever since. TDS out performs anything I've ever used for a lubricant. I'll never go back! I'm going to reach out to Perry and see if there is more to be had. I certainly would go for several more ounces!

Date: Sat, 26 Jul 2014 08:54:09 -0400
From: Bob Young <bobyoung53@hotmail.com>
Subject: Re: [R-390] Wet vs dry lubes?

That stuff is readily available, WS2, just Google it and it is everywhere,

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Date: Sat, 26 Jul 2014 09:33:41 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Wet vs dry lubes?

Yes, It is indeed readily available. However, one has to pay careful attention to each suppliers "Minimum". Several have a minimum order amount of about $250, plus shipping. Hunting through a fair number of suppliers resulted in one that has a minimum of $54. This would be a number AND quantity that is reasonable. I can't imagine ever needing 5 lbs or larger amounts. Being a spry 64, I don't believe that I would last as long as the quantity!

Date: Sat, 26 Jul 2014 10:30:21 -0400
From: Bob Camp <kb8tq@n1k.org>
Subject: Re: [R-390] Wet vs dry lubes?

Heading back to my list .
Can you get the stuff back out (clean it up)
Does it get all over the place?

With dry lube, less is more. You very much do *not* want 5 pounds (or even 5 ounces) of the stuff in your gizmo. That's true if it's an R-390(A or not an A) or if it's an M1911(A or not an A). It might not be true if it's a city bus.

Date: Sat, 26 Jul 2014 10:46:38 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Wet vs dry lubes?

Using a Q-tip soaked in 90+% alcohol, dabbed in this Tungsten Disulfide, it gets applied in a thin coating. It does NOT get all over, it doesn't readily remove! This is a nano lubricant. It forms a molecular bond with the metal applied to. Past discussions pointed out that it *does* alter the color of a Blued firearm. I have a slight greenish hue where it has been applied. It does NOT rub off one bit *after* the alcohol "carrier" has evaporated. One should ALWAYS wear nitrile or latex gloves when applying! This stuff WILL get into the skin. I haven't suffered any ill effect from this, but it is a bear to scrub off!

Date: Sat, 26 Jul 2014 12:23:47 -0400
From: Bob Camp <kb8tq@n1k.org>
Subject: Re: [R-390] Wet vs dry lubes?

My concern is mainly that people don't go spreading the stuff on like butter on toast. A 5 lb shipment is way to much.

Date: Sat, 26 Jul 2014 11:30:02 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] Wet vs. Dry Lubes

The place where I first picked it up five years ago has a web site of:
http://lowerfriction.com/product-page.php?categoryID=1
The dry powder is $54/lb.

Date: Sat, 26 Jul 2014 12:35:16 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Wet vs dry lubes?

I agree wholeheartedly! Anyone that would slather on 5lbs of this really would be a very serious candidate for a Mental Health Center. I'm well aware about the 1911A1 version. However, every one of them I carried didn't have it stamped on the slide. This latest version, has the M-1991A1

imprinted on the slide very clearly. They also do NOT come in a blued version. They only come in a "matte" black. I'm not sure if it is Parkerized or what.

Date: Sat, 26 Jul 2014 12:38:36 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Wet vs. Dry Lubes

Tisha: that is just where I placed an order this AM. A 1 pound package will last me for the remainder of my expected lifespan! I'm certainly not going to run around lubing everything in sight or reach! I'm sure that it will be far more than adequate for my needs.

Date: Sat, 26 Jul 2014 10:00:59 -0700
From: Chris Farley via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] Wet vs. Dry Lubes

If somebody wants to split up an order, I for one would be interested in trying out say $5-10 worth of the stuff, and I'm sure there are others too.?

Date: Sat, 26 Jul 2014 13:22:11 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Wet vs. Dry Lubes

Sounds like Chris is looking to form a "group" acquisition. Several other list members may well be interested in getting together with him to do so. Just be advised that this supplier is in Canada, and the USA Ground Shipping is an additional $20. I did not find that to be out of line. My order is going to stay together for my personal needs. I have band saws, drill presses, and some odd number of power tools that will be benefiting from this order. Not to mention radio gear trains and firearms. I'm certainly going to go through my Dillon Progressive Reloader!

Date: Sat, 26 Jul 2014 11:00:26 -0700
From: "Chris Kepus" <ckepus@comcast.net>
Subject: Re: [R-390] Wet vs. Dry Lubes

Heck, I'm in for a share of purchase. At least I will be able to chime in on the next "Dry Lube" thread which will be anticipated in about 9-12 months. Last one on TD was in Sept, 2013. Great advice given re TD usage by TH. Anybody else? Another Chris, perhaps?

Date: Sat, 26 Jul 2014 13:50:35 -0500
From: "Phil Mills" <pmills7@comcast.net>
Subject: [R-390] Tungsten Disulfide by the ounce.....

I found this site offering it for $11.95 per ounce.....

http://www.microlubrol.com/krytoxgpl205lubricantgrease-2oz57gmtube-4-3-3-1-1-2-3-1-3.aspx

Priority mail shipping is $6.20 and they take PayPal if you don't want to give them cc info. I just ordered some because I have a Colt Commander that I have problems with keeping the slide lubricated enough.

Date: Sat, 26 Jul 2014 12:21:47 -0700
From: Chris Farley via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] Tungsten Disulfide by the ounce.....

I just found a few people selling it in 10gram, 1oz, and 2oz bottles on eBay, too. I would entertain the idea of ordering some and divvying it up for other group members, but for the cost and time involved to buy the WS2 in bulk, buy some small bottles or containers to put it in, then carefully fill said containers and mail them out, we might be better off just buy it from one of these places that already offer it. On ebay a 10 gram bottle is ~$9.00, 1oz varies between $13-$15, and 2oz for $24. These prices include shipping to my zip code. At 16oz per pound, the $74 1lb bag ($54 +$20 shipping) would make for a cost of $4.63 per oz before buying small containers and dividing it up. I think I'm just going to go the ePay route :) Just search for "WS2 powder", you'll get about 6 hits, including this 1oz bottle: http://www.ebay.com/itm/Tungsten-Disulfide-WS2-Powder-Pinewood-Derby-bullet-lube-1oz-28-4-Grams-/281389745215

Date: Sat, 26 Jul 2014 15:22:37 -0400
From: Bob Camp <kb8tq@n1k.org>
Subject: Re: [R-390] Tungsten Disulfide by the ounce.....

Ok, so how much is that? It’s roughly 4 cc’s of the stuff. You can coat about 8 square meters of surface one layer thick with that bottle. If you coat mating surfaces equally, it’s 4 square meters. Given the way the material works, it’s likely not a “several layers” sort of coating. Allowing for surface roughness and a bit of slop might take you down to 2 square meters. That’s a lot of playing with a pin oiler. A little bit goes a long way. Do not go crazy with this stuff.

Date: Sat, 26 Jul 2014 15:29:33 -0400
From: Bob Camp <kb8tq@n1k.org>
Subject: Re: [R-390] Tungsten Disulfide by the ounce.....

http://www.brownells.com/manufacturers/HERITAGE%20GUN%20BOOKS/index.htm

Brings up the whole set of Jerry's books. He has two on the M1911 they sort of go together.

Date: Sat, 26 Jul 2014 15:30:25 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Tungsten Disulfide by the ounce.....

I just went to the link that Phil provided. Reading the entirety of the specifications, it reveals that their particular WS2 is NOT the nano particle in its size. It is in the micrometer range. They even go so far as to essentially dissuade one from the nano particle version. It would then have a smaller spreading factor. Although I don't think that besides safety aspects in handling that it really makes a difference.

Date: Sat, 26 Jul 2014 15:52:42 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Tungsten Disulfide by the ounce.....

To be honest, I got in on the Perry buy and disbursement initially. If what I am getting is the same, and seems to be based on Tisha's post, it will be just fine! We had a phrase in the military for such things:

Bridge condition ZULU! Slicker than greased owl crap!

That was one way of passing the word regarding how the ice layer on a bridge was! Once told that, you knew without question that you were dealing with Black Ice! You'd better be ready.... Bob - NODGN

On 7/26/2014 3:42 PM, Chris Farley via R-390 wrote:
> The link provided earlier for the $54 1lb bag is for (presumably) the same stuff, they both claim .5 or .6 micron. If you wanted the nano stuff, you're going to be spending a LOT more than that:

http://lowerfriction.com/product-page.php?categoryID=19

Date: Sat, 26 Jul 2014 16:06:25 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] Fwd: re: Tungsten Disulfide by the ounce.....

From Al Tirevold to myself. Perhaps the list manager Don can get him back on the list! Bob - NODGN

-------- Forwarded Message --------
Subject: re: Tungsten Disulfide by the ounce.....
Date: Sat, 26 Jul 2014 15:54:56 -0400
From: Al Tirevold <tirevold@hushmail.com>
Reply-To: tirevold@hushmail.com
Organization: HQQ's Radio Ranch

I found: Grease - http://reelschematic.com/isc/products/Pur%252dTungsten-Grease.html

Oil - http://reelschematic.com/isc/products/Pur%252dTungsten-Lube.html

Powder - http://reelschematic.com/isc/products/Pur%252dTungsten-Powder.html

The R-390 list will not let me post - I forgot which e-mail address I used to sign up!

Date: Sat, 26 Jul 2014 16:18:21 -0400
From: Bob Camp <kb8tq@n1k.org>
Subject: Re: [R-390] Tungsten Disulfide by the ounce.....

Some numbers on the 90 nm stuff: if an ounce of 0.5 to 0.6 micron (500 to 600 nm) covers about 8 square meters, the same weight of this stuff would cover 52 square meters.

Coming up with a surface that's flat at the 90 nm level - hmmm. The R-390 is a wonderful piece of work. I really doubt though that the parts are going to look very good at magnification into the 100 nm range. Unless you want to mirror polish the parts first, I'd skip the smaller stuff.

Of course if you *do* want to do the polish job, it's actually not quite as bad a price on an area covered basis. Be careful not to sneeze when you open the container. If you just want to fool around with a true nano particle lube, the hex boron nitride is the obvious one to get. It's non-conductive and relatively safe to have around.

Date: Sun, 27 Jul 2014 15:37:15 -0700
From: Perry Sandeen via R-390 <r-390@mailman.qth.net>
Subject: [R-390] TDS Dry Lube

We are now more or less settled in SO Califorincate.

The good news is my new shop in on the second floor loft with my work bench having a 54W x 42H window overlooking a vast expanse of golf course fairway that I don't have to maintain. The bad news is I still have several thousands of pounds of radios and test equipment in the garage to unpack and install it on yet to be made shelves.

I still have several pounds of TDS powder that I will sell at the prices I listed before on the list. From 10 grams on up. It will take me a bit of time to ship as I still have to unpack it. Please contact me off list if interested.

Date: Sun, 27 Jul 2014 17:05:56 -0700
From: Perry Sandeen via R-390 <r-390@mailman.qth.net>
Subject: [R-390] Buying TDS Bulk

When I bought a bulk purchase of TDS from the manufacturer in Canada, I thought I'd be wise and buy 5 pounds for the 5+ discount rate. BUT I found out that there was a $60 something* brokerage fee* because of the 5 lbs. So if you are thinking about making a killing? Basically I broke a little better than even when I sold the TDS. (Had to buy a $35 gram scale and a 100 G cal. Weight also. I also think I got the micron (better) stuff.

Date: Tue, 29 Jul 2014 08:46:18 -0700
From: Gary Geissinger via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] Synthetic Oil

I am in the middle of restoring a Collins 18S-4A aircraft transceiver. I had to perform research in order to determine the current solvent and aircraft grease that is compatible with the original early 1950s materials. That was because the dynamotor bearings needed to be cleaned and lubricated.

I settled on Stoddard Solvent to remove the old grease. It turns out that Grainger makes a solvent that seemed similar. I spoke with a chemist with Grainger's vendor concerning the solvent. The Grainger solvent is essential the same as Stoddard Solvent. By the way, Stoddard Solvent is about 95% kerosene. No wonder many A&P mechanics simply use kerosene to clean out aircraft bearing.

After going from obsolete military specification to obsolete military specification and finally to a current military specification I found that the current synthetic grease to use is AeroShell 33 which is available in small tubes from Aircraft Spruce. This grease is just about the perfect consistency to replace the grease on shaft bearings and the like. It also has another very positive attribute. By military specification this lubricant does not have a "Rancid Odor" like most wheel bearing grease does.

Unfortunately my 30S-1 and T-368 were lubricated by the previous owners with "smelly grease"; that causes a "wife approval problem" whenever I run them for an extended period. When it is time to clean out their bearings and lubricate them I will use the AeroShell 33 there as well.

While this isn't the light synthetic machine oil needed in some applications in an R-390, it is applicable in other places.

Date: Tue, 29 Jul 2014 17:29:46 -0400

From: Bob Camp <kb8tq@n1k.org>
Subject: Re: [R-390] Synthetic Oil

I think you will find that our gear got exposed to a much wider range of solvents in the 1950's than it does today. Those were the days of the "dunk it in the tank" approach to cleaning gear. Much of what got used is now outlawed. That's not to say that it *liked* all those solvents. It probably tolerated them pretty well.

I would consider isopropanol and ethanol to be pretty good candidates for cleaning "stuff". As long as both are 99.something percent pure, there's not much to argue with. Both are flammable, so they should be used with care. Yes there are some few plastics that you can have issues with. I don't believe any of them got used in mil gear after WWII.

From: Ron Bussiere via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] R-390 Digest, Vol 123, Issue 18

Gee, no idea why my recent postings didn't make it through, concerning oil and powders.....

I have been an enthusiastic user of both WS2 and HBN for years. I have added these powders to every available oil/grease I have come across. I consider "enhanced lubrication" as a sub hobby to target shooting and gunsmithing..... A previous post mentions Stoddard Solvent (SS). As one of my 'missing' posts, I suggest going to "Bob is the Oil Guy" website, for all the lubrication facts you could ever want. The moderator is a Lubrication Engineer and develops additive packages for the major oil companies. Having said this, you will find the major ingredient is good 'ole Marvel Mystery Oil (MMO) is indeed SS. I have moved from WS2 to HBN just because of the 'mess factor'. WS2 is indeed the best possible choice. In it's preferred particle size, (which is $), it will get into the pores of your skin, which explains why it is so 'dirty'..... currently 'impact plate' all my centerfire rifle bullets with HBN as well as the bores of my precision rifles. Info on this can be found at "6mmbr".....

Date: Tue, 29 Jul 2014 19:16:31 -0400
From: Frank Hughes <fsh396ss@gmail.com>
Subject: [R-390] Cleaning R-390 gears in place before lube

Great discussion on the lubricant issue! Before I can lubricate, I have to clean the ancient crud off. I am lazy, want to try to just spray Trichloroethylene straight down the gear train and see what it removes. Possibly also use compressed air to remove the larger chunks. Is this a bad idea, as a preliminary attempt?

UGLY GEARS:
http://i180.photobucket.com/albums/x257/fish1_07/R-390/r390_gears2_zps451cb34e.jpg
http://i180.photobucket.com/albums/x257/fish1_07/R-390/R390_gears1_zpsf677a220.jpg
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Date: Tue, 29 Jul 2014 19:28:55 -0400
From: Bob Camp <kb8tq@n1k.org>
Subject: Re: [R-390] Cleaning R-390 gears in place before lube

If you just slosh cleaner around the gears the dirt just moves around in the radio. It's much better to pull the gears and clean them properly. This goes double for the split / anti-backlash gears. 99.9% of what is on there is coming off and not going back on again. Lubricating these things is very much a "less is more" sort of thing. There are very small surfaces involved and they don't move very fast / very often / very heavy loaded.

Date: Tue, 29 Jul 2014 22:22:27 -0400
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Cleaning R-390 gears in place before lube

Pull the RF deck.
Remove the springs, slug racks and RF cans.
Take the deck outside to the back yard and hang the gear train off the edge of the table.

Just pouring solvent through the gears will not remove the crud.
get your brushes and start working the solvent to scrub the metal.

Use spray bottles.
Set the nozzle to squirt.
Carefully put a screw driver into the split gears for space so you can work in more solvent and air.

Lots of compressed air to blow the solvent and crud out of the gear train.

Start with a quart of kerosene and us up the whole container.
A quart of soap and water.

A quart of rubbing alcohol, then a quart of cheep gin or vodka

You have a $1000.00 receiver so put a couple bucks into its long life.

Swab it in and blow it out.

While its clean, and still out-side, do the lube job.

Swab that on, move it in with the air, and blow all the excess out.

After this you should be able to just dust the gear train out once
a year or so with compressed air for the next twenty years.

I use a swizzle stick. A length of copper tubing soldered into an air line fitting. The end of the tubing is beat shut to just a small hole. I open the hole up enough to keep the pressure high but below the high pressure cut off point. I get max air with out the compressor motor cycling off and on.

Just take your time and you can get things clean.
Remember split gears do not run against each other.

The goal is to clean as much crud out as reasonable so it does not keep dropping out of spaces and running into the gear mesh thus causing wear.

Get the old crud, heavy lube and dust out of the gear train.
Remember to clean up the rack slide rollers.

Swab the RF can slug tubes with the good alcohol and wipe dry.
Wipe the slugs down just to take a layer of dust off them.
Slugs and tubes run dry no lube. Or you will be looking for a new RF deck.

You can remove the covers from the RF cans and disassemble the trimmer cap. But only go there if you have a real need to clean one or two that have caught some filth.

While you have the deck out check the RF band switch alignment. Ten sections and six positions in the R390. It's an eyeball to ensure you get the best average maximum switch contact on each section in each position.

Do not do this adjustment with a meter as described in the TM.

Eyeball what is going on and adjust for best setup.
Check the contacts going both up and down the megahertz range.

Date: Wed, 30 Jul 2014 13:25:59 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Cleaning R-390 gears in place before lube

Most of the accumulated dirt and grime is just sitting there harmlessly. Some of it gets between the teeth of meshing gears and slows things down, and a tiny bit gets into the bearings and between the split gears, but the rest is just ugly and does no harm. UNTIL you start cleaning or

lubricating it.

The "hose it down in situ" approach (with or without brushing) actually washes dirt INTO the bearings and between the split gears.

The only way to make sure there is no dirt in the bearings and between the split gears is to disassemble the gear train, clean everything down to bare metal, and put it together again, lubricating everything LIGHTLY as you go. This also gives you a chance to inspect the gear teeth and the faces of the split gears for burrs or other defects and to remove them (carefully, with toothpicks, needle files, Xacto blades, small, hard cutting stones, and fine grit paper). That is how one attains the ultimate smoothness of operation.

Date: Wed, 30 Jul 2014 14:07:42 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Cleaning R-390 gears in place before lube

There is ONE and only ONE solution to the cleaning. *Take it ALL apart, ensuring that you do so in a manner that you can keep very close track as to what goes back where AND in what order.*

Clean everything meticulously!

Separate the split gears, checking for burrs, and use something about as coarse as crocus cloth on a plate of glass.

Rinse everything clear with your choice of solvents. Stoddard solvent or denatured alcohol will "normally" clean things up very well. *IF* you have globs of hardened grease, you may have to obtain some carburetor/choke cleaner to get it out of there.

WARNING Do not use this OR even Stoddard solvent INDOORS! Ensure that you have more ventilation than you can possibly need! These things are EXTREMELY unhealthy to get into the skin or lungs! Their MSDS, (Material Safety Data Sheets), will get your attention if you download them and READ them!

NEVER spin a clean dry bearing! You will damage it it! I have seen entirely too many bearings that have been brought to me after this has been done. Only remedy - replace!

Ensure the split gears ARE free of any possible grit from the abrasive use!

Carefully re-install the entire gear train in the proper order, and very lightly lube with Mobile One as you go.

You won't "ever" get the lube into the bearings, over all shafts, and between split gears AFTER they are all put back together. There is NO room for it to magically get into these areas that only have a few thousands of an inch clearance!

Double check the re-assembly ensuring that all IS in the correct place, and the correct order.

Make darn sure that you lubricate the rollers on the ends of the cams, and their slots, sparingly. Some have bearings, some have simply a roller on the end of the shaft, and can be more difficult to clean and lube.

It is the ONLY way to get it properly done.

Date: Wed, 30 Jul 2014 13:57:39 -0500
From: Tom Frobase <tfrobase@gmail.com>
Subject: Re: [R-390] Cleaning R-390 gears in place before lube

My approach is as follows "from memory"; Set the radio to 7.999 MHz,

Remove the RF deck from the radio. Remove the crystal oscillator sub-chassis, remove all of the slug racks and set aside. Remove all of the RF and MF cans from the RF chassis, 4/40 screw inside the can accessed from the top. Once that is complete loosen the band switch shaft and slide back into the chassis. Remove the antenna trimmer shaft. Once the prior steps are completed the mechanical portion can be removed. The mechanical section is fastened to the chassis with (2) 6/32 machine screws in the rear and 3 1/4" hex screws in the front. I use a 1/4" craftsman box end to remove the hex screws

Separate the mechanical section from the primary chassis. This will give you an unimpeded opportunity to clean the top of the electronics chassis, I usually remove each RF and MF can cover and remove with a toothbrush any dirt that has accumulated on the trimmer, I do not use solvent other than a small amount of denatured alcohol on a rag to clean the trimmer top. I also use a Q-tip with a little alcohol inside the slug guide tube and wipe the slugs with a little alcohol. Set the cans aside for later re-assembly

Remove all slugs and keepers from the racks, don't loose the keepers, marking slugs and rack position for re-installation. I then soak and clean the racks in Sudsy ammonia in a small ultrasonic cleaner. Each of the racks contain small ball bearings, I then manually exercise each of the bearings to make sure that grease has not dried and frozen within the bearing. Once done I flush with hot water and dry.

I have the fortune to have a large ultrasonic cleaner, it will contain the entire mechanical assembly, I drop the assembly into a mild solution of water based de-greaser and run the ultrasonic cleaner until the gears are clean, I assist the cleaner with a small brush, I then flush and rinse in hot water, once this is complete I soak the mechanical assembly in kerosene overnight to make sure all of the water is displaced from the bronze bearings.

Then I drain and wipe the mechanical assembly.

I then reassemble the chassis and mechanical assembly making sure the mechanical alignment markings are correct, re-install the cans, obviously in the same place. Re-install the slugs into the rack leaving the alignment screws at about midpoint. Re-install the racks into the mechanical assembly and lubricate the cams and bearings, I usually use lightweight synthetic car oil, or whatever slick stuff you choose.

Re-attach the band switch shaft, antenna trimmer and crystal oscillator sub-assembly.

Turn on the radio crank up the RF generator set at 7.999 and hope for a tone, if it there realign the radio, if not find out what was missed.

The process is a bit of effort, but at the end of the day, I know that the radio is clean and smooth running ...

Date: Wed, 30 Jul 2014 17:46:31 -0400
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Cleaning R-390 gears in place before lube

.....clean everything down to bare metal.....

Charles, you are absolutely right. Taking a gear train all the way down and getting it clean is the way to go. Any one can learn to do it and get it right on the first pass.

But does the receiver need that level of effort?
But does the owner have the time, place and tools?

Every situation is different and having dry bathed more than one gear train. I still agree there is nothing that will match a good full disassembly and cleaning.

You point that you flush more grit into the bearing before you start getting the thing clean is a good point.

Once you start a dry bath, you have to continue until you have every thing flushed out. Any thing less than a full gallon of solvents brushed in blown around and blown out is not enough to do the process.

There was a time when these receivers received four hours of love twice a year. The idea was to get ahead of the curve and keep the receiver clean.

One pass way not be enough.

But do it once this summer.
And then do it again next summer.
And in a few years you have a clean machine.

Date: Wed, 30 Jul 2014 15:25:07 -0700
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] Cleaning R-390 gears in place before lube

OMG, Roger, you are kill'en me! Once is enough (said with a smile). 3rd revision of the Y2K has what's his names pictorial of how to do it. Well worth the effort. But then I think of the years spent with the "Too Loud Amelco". All of my 390/A's had the gear train torn apart, cleaned, etc. Not everyone has a good mechanical background; those gears, clamps, cams, clutch, planetary gear.....

Date: Wed, 30 Jul 2014 17:44:06 -0700
From: "Craig Heaton" <hamfish@efn.org>
Subject: [R-390] The Gear Train Logically

Having used Scott Seickel's gear train tutorial, it is a 10 on my scale. The first page: item #5, suggest a SUPER important item which is a large flat hard surface and a clean floor. The next on my list is a logical method of disassemble and getting the beast back together, in one working radio. The parts n' piece have to go somewhere, which makes some grown men cry.

A couple work life times ago a technique was shown to the students while attending a place of "School House Bugs". For some of us it came natural, did it all of our working lives. The light bulb lit for the rest while chasing bugs. It is all about where to place the parts n' pieces. Unless one is real good; don't dump all the parts in a brown paper bag, shake real good, invert the bag letting everything roll about the floor. At said "School House Bugs" muffin pans were suggested as a place for the parts n' pieces. The little lady of the house might not be happy using her cooking ware in that fashion. But go ahead if you dare.

The work bench must be clear of clutter. Find a new home for the junk while playing with the gear train. Clean/clear the surrounding floor. The little steel ball in the Geneva Drive is going to fall, bounce, and find the crack in the floor.

With that said, I've placed the RF deck/gear train on the right hand side of the bench (work area). The left side is clean and bare of parts, tools, etc. Follow along with Mr. Seickel's pictorial. Remove the first part, clamp, gear, etc. Now place that item to the far top left of the bench. Along with that piece, also place any clamp/fastener with said first item. Moving on to the next item, place it below the first item. When getting to the bottom edge of the bench, move over to the right and do it all over again. Repeat until all the gears, clamps, geneva drive, etc. are laid out in some logical order.

At this point go ahead and clean, deburr, lube to your heart's content with the last item placed in logical order. Put said item back onto the RF deck. In reverse order, get it back together all nice, clean, & smooth. The first time I had one of these mechanical marvels spread on the bench, it took 12 hours start to finish. Finished, done, ain't gonna do it again. It is clean, smooth, and last a long time. Next owner can sweat about cleaning it again.

Date: Wed, 30 Jul 2014 21:16:35 -0400
From: Frank Hughes <fsh396ss@gmail.com>
Subject: [R-390] R-390 Z501 success !!

<snip> While I totally agree that complete dis-assembly is best for cleaning and
subsequent lube, I just don't have the hours available, need a working R-390 for AM nets operational by Winter, a pretty R-390 is for after I retire: May-2017!

The ultrasonic cleaner idea is perfect, but mine is tiny- fits a couple of 1911's, nothing larger (sigh). Next time I purchase an ultrasonic cleaner, I will strive to obtain one so large that the R-390 RF deck and/or an M2HB fits in (sans barrel, of course)

Date: Wed, 30 Jul 2014 21:44:41 -0400
From: Bob Camp <kb8tq@n1k.org>
Subject: Re: [R-390] R-390 Z501 success !!

If you go near a radio with an ultrasonic, pull all the crystals out of it first. Ultrasonic cleaners work very powerfully over very short distances. Something like a split gear is not a good thing to attack with an ultrasonic.

Date: Wed, 30 Jul 2014 19:01:58 -0700
From: Norman Ryan via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] The Gear Train Logically

This is great advice, and I echo your sentiments about Scott Seickel's excellent piece. In addition to all that, I take copious notes including sketches while placing parts in numbered ziplock bags.? Never once do I rely on memory -- at my age mine is suspect!? I take digital pictures as well. Bottom line:? The work is exacting, but worthwhile.? If done thoroughly, I cannot see why a gear train teardown ever should need to be redone. Keep the gear train very lightly lubed with something like Mobil 1 and all should be well.

Date: Thu, 31 Jul 2014 02:39:20 +0000 (UTC)
From: bavarianradio@comcast.net
Subject: Re: [R-390] The Gear Train Logically

<a
href="http://s2.photobucket.com/user/Bavradio/media/allpix606.jpg.html"
target="_blank"><img
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target="_blank"><img src="
http://i2.photobucket.com/albums/y29/Bavradio/th_allpix558.jpg"
border="0" alt="clean gears photo allpix558.jpg" style="">
I hope this works this time...Here's a few photos of my 390 geartrain restoration... did I mention that I repair clocks for a living? Ross W1EKG

Date: Wed, 30 Jul 2014 23:26:54 -0500
From: kc9ieq via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] R-390 Z501 success !!

I had the weld(bond, whatever you want to call it) holding the SS or titanium contact on an antique spark gap key break apart by attempting to clean it in a small ultrasonic tank. Be careful. Same advice for inserting fingers into the tank while running. Enough power and bad things can happen. Google it.

Date: Thu, 31 Jul 2014 07:46:06 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] Ultrasonic cleaning

If the split gears shouldn't be cleaned by an ultrasonic cleaner, the I would have even more reservations to placing the bearings in one! In my mind, I see the bearings eating themselves! Not a good idea.

Date: Thu, 31 Jul 2014 09:53:49 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Ultrasonic cleaning

I don't have access to an ultrasonic cleaner so it's a bit of a moot point for me, but just curious what happens when cleaning things that touch in an ultrasonic bath.

I assume the advice to not clean the split gears is only when they're assembled (e.g. disassembling them and cleaning them separately is fine), but what does that do to the mating surfaces when they are cleaned when assembled? Just curious...

Date: Thu, 31 Jul 2014 11:31:53 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Ultrasonic cleaning

It is dependent upon the "strength" of the ultrasonic bath itself. The stronger the movement, the more things will essentially *beat* against each other. That is the reason I brought up the issue of bearings. During the period that they are in this cleaning solution, the lubricant WILL be removed. A bearing is either a ball, roller, or needle type of construction.

Once the lubricant is gone, then the balls, rollers, or needles will be vibrating against each other, the cage if such is used, and the inner and outer races. The result WILL be something that has an significantly increased clearance than it started with. At that point, you would be *much* better off with simply getting the sizes, dimensions, and clearances *before* they go into the ultrasonic cleaner.

The reason is simple. You *WILL* be trying to order new ones from an outfit such as Boca Bearings. If your numbers do NOT match what is off the

shelf, then they will have to make "custom" ones to fill your order. Custom anything results in the moniker - "BOHICA". Interpreted, "Bend Over Here It Comes Again".

Date: Thu, 31 Jul 2014 11:20:29 -0500
From: barry williams <ba.williams@charter.net>
Subject: Re: [R-390] Ultrasonic cleaning

I fly model airplanes and do a lot of engine work on them. My buddies would laugh at worrying over bearings in an ultrasonic cleaner. We buy them from either Boca or RC Bearings. They run at speeds up to 15,000 rpm for sport flying, and about 25,000 rpm for racing.

My cleaner uses plain old water. I do put in a little dishwashing detergent just to cut through burn on castor oil better. I don't know if that helps or not, to tell the truth.

The best method for all metals is to use an old crock pot outdoors on low heat. Put your gears in the crockpot, cover them with antifreeze and come back in about 3 hours. I don't know if that's long enough for just gear gunk but it may be. For burnt on castor and other lubricants we usually go for 8 to 12 hours on engine parts. We have to be careful because a lot of the engine is aluminum and it discolors easily.

Date: Thu, 31 Jul 2014 09:42:07 -0700
From: Chris Farley via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] Ultrasonic cleaning

I don't think any bearings used in the R-390 series receivers would be harmed much by a moderate cleaning in a light duty ultrasonic tank. True the oils leeching out of bronze parts might be something to be mindful of, but other than that.. We're not dealing with tolerances so tight that .0001" is going to make any difference. My warning was aimed more toward "assemblies" of more than one part- such as a split gear that is not intended to come apart. The cavitation bubbles can quite literally beat stuff apart, as shown on that spark gap key from my previous message. Not only that, but cavitation can easily (and surprisingly quickly) remove plating from springs, connectors, screws, etc.

A few drops of dishsoap in the tank of plain water is great- The water really needs a "wetting agent" to work well, anyway. Plain 'ol Dawn in fairly pure water works just as well as some of the commercially available "solutions". Be warned though- Do NOT use DI water directly in a stainless steel ultrasonic tank. Believe it or not, the water can actually eat through the SS because it is ion starved. This isn't speculation, it happened to a large tank at a lab near me. Use RO or distilled water in the tank, if DI

must be used fill a glass container with it (and the item to be cleaned) and partially submerge that container into the tank. Plus this method helps keep the tank water/solvent clean longer.

The antifreeze in a crock pot is a very intriguing idea!! It would both be a mild solvent, and serve to basically steam clean the parts.. I might just have to try that. Dually I wonder how well it would work as the solution in a heated ultrasonic tank... Hmmm....

Date: Thu, 31 Jul 2014 13:35:19 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Ultrasonic cleaning

I have flown R/C aircraft for a decade or two. I've rebuilt more engines than I can remember. I'll add that R/C helicopters is in this mix also! The aluminum or whatever the base metal of engines that come out of China discolors the most. Burnt on castor oil is a pain to get off!

Either Boca or RC Bearings are excellent sources! Ever single bushing on R/C cars or the Helicopters were immediately replaced with Boca Bearings!

I'd have to say that the RPM of the R/C cars exceeded that of the aircraft. When you use electric motors and get into the very fine pitch gears, and ceramic clutches, hit speeds on a junker that exceeds 60mph, (Real Speed - NOT scale speed!), then the RPMs are really up there. Racing the cars on an oval banked track and hitting 90mph real speed, you KNOW the entire gear system and motors are beyond the 25K RPM.

The most brutal are the drag racers! A 1/10th scale rail that goes through a 1/10th scale 1/4 mile speed trap that end up in the real speed arena of 132mph puts stresses on things that folks can't imagine.

This is why my experience of "observation" of others using a very strong ultrasonic cleaner on bearings has led me to my conclusion. All SS bearings are one thing. These in the R-390A gear train do not appear to me to be all SS. I see brass. That gets me concerned. Even if only the inner and outer races are brass, they will take a beating. My $0.02 worth! Never lost a Boca bearing that was properly taken care of!

Date: Thu, 31 Jul 2014 13:43:21 -0500
From: barry williams <ba.williams@charter.net>
Subject: Re: [R-390] Ultrasonic cleaning

I have always been interested in the model dragsters. If you get on RCUniverse you will see where I'm a moderator in glow engines. I don't

know about Chinese made engines discoloring worse than others, but I'll start paying attention to the discoloration stories from now on. I'm more and more into Saitos nowadays. I think the quality far surpasses other engines, including overpriced OS engines.

Another excellent cleaner is Dawn Power Dissolver. That may be enough for gears. It is excellent for castor build up but you have to leave it on for 15-45 minutes for aluminum. I suppose you could leave it longer for steel and brass. It cuts through gunk fast and is pretty safe for metals. That is a must have solvent for model airplane engines. You could spray your gears, etc and lay them aside for a while as you do other work before using a toothbrush to remove old oils. I always spray alcohol afterwards as a wash before oiling.

Date: Thu, 31 Jul 2014 13:53:10 -0500
From: barry williams <ba.williams@charter.net>
Subject: Re: [R-390] Ultrasonic cleaning

Thanks for the wetting agent tip. I should have remembered that!

Yes, do try the crockpot. It is an excellent way to clean metal parts, and you can reuse the antifreeze. Do it outside because the fumes are bad news. Cover the pot as animals love the taste and it kills them. LOW HEAT-LOW HEAT-LOW HEAT. There are a lot of reports of damage/discoloration from using anything over the lowest warm setting. I actually know a well educated person with decades of engine experience who has been using gasoline on the highest temp for years to clean his engines in his crockpot in the basement shop. True story.

Also, I just checked and I use Prestone antifreeze with ethylene glycol. I think that is the magic ingredient. There are a lot of reports of antifreeze not working at all and I'm almost sure some brands use a different active ingredient.

Date: Thu, 31 Jul 2014 15:52:12 -0500
From: Tom Frobase <tfrobase@gmail.com>
Subject: [R-390] Affordable ultrasonic cleaner

I have had this unit for about five years and it has worked flawlessly. It is still pretty compact but large enough for most jobs. I use it religiously on all sorts of things including ceramic sockets and hardware it makes old things new.

http://t.harborfreight.com/25-liter-ultrasonic-cleaner-95563.html

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Date: Thu, 31 Jul 2014 19:46:22 -0400

From: Bob Camp <kb8tq@n1k.org>
Subject: Re: [R-390] Ultrasonic cleaning

The problem with the split gears is not damage in an ultrasonic. The problem is that the dirt is way down in-between two parallel plates. There is pretty much no way to get it out of there. There's kind of a 50/50 chance you will push it deeper rather than remove it.

Date: Wed, 06 Aug 2014 15:55:38 -0500
From: Ron Kolarik <rkolarik@neb.rr.com>
Subject: [R-390] Dry lube again

Here's another source for the dry lube powders, at least the HBN https://sandblastingabrasives.com It's fairly cheap by the pound $66+$8.61 UPS to me. They do have 1/4 pound packages available for $34.99 shipping....that's still a LOT of HBN. I don't have any extra for sale, the pound I ordered is being split up for a bunch of local guys....it ain't going in a 390 :)

Date: Sun, 10 Aug 2014 20:09:56 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] Maybe OT Tungsten Disulfide issues

I'm open to any real experience and knowledge dealing with this substance. It is worse than radioactive materials! Although I can see it, I have not been able to handle it without major cleaning issues. It spreads all over the place, and this isn't even the nano version. I try to "contain" it, but it always spreads. I do not have a glove box. What has everyone been doing to avoid it going everywhere and getting tracked all over. I've been using paper towels soaked with alcohol, nitrile gloves, use Q-Tips to dip in alcohol then the powder. It is loose. Help!

Date: Sun, 10 Aug 2014 20:22:22 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] R-390A gear train

Okay, I want to mark the position of ALL the gears in the current position, prior to taking it apart for the degrease step, to be followed by ultrasonic cleaning in the small one from Harbor Freight. Yes, it will take time since it only holds a pint of fluid. It doesn't matter how many runs it takes. My concern is getting it all back together without messing up the position of the entirety. I don't want issues that I can't recover from. Is scribing the point of mesh between all or any faces a good method? Or is this mass overkill?

Date: Mon, 11 Aug 2014 09:43:39 -0400 (EDT)

From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R-390A gear train

Marking the gear-tooth positions won't help you. You will be removing them from the shafts (if I understand what you're stating you're going to do) and merely putting the same tooth aligned to the same tooth on the mating gear won't bring the system back into perfect alignment as the shafts are round and do not stay aligned to the gear when the clamps are loosened.

Date: Mon, 11 Aug 2014 10:40:54 -0400
From: "KR4HV" <kr4hv@numail.org>
Subject: Re: [R-390] Maybe OT Tungsten Disulfide issues

Here is the MSDS Data Sheet. I am no chemist or doctor but from the MSDS sheet it doesn't appear generally to be a life threatening compound from minimal casual exposure when handled with, say the same procedures as for painting. Cautions on the sheet are about the same as any other household type chemical, even less stringent.

http://www.tungsten-disulfide.com/msds.html

Date: Mon, 11 Aug 2014 10:07:57 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Maybe OT Tungsten Disulfide issues

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it does get all over everything, it is insidious. Also it does not clean off your skin very easily, in a way the fine material is almost like a tattoo and takes days to go away if you get it on your skin.

The substance is so fine that if you use it on something like the cams or those little slider bearings on the RF deck slug racks you do not need to see it for it to be having an effect. I had found that the alcohol-paste technique was just a more convenient way to get the powder where I wanted it to be. Once in place and you give it a few rubs with a cotton swab the metal takes on that iridescent sheen and you can stop right there.

For bearings or shafts I was mixing it with our favoritely quoted synthetic (Mobil 1) and putting just a drop in there. The oil was providing its own benefits and the powder was along for the ride. Definitely not a good thing if you ascribe to the "mo-is-betta" way of lubricating stuff.

Working with the stuff on radios is easy; There are so few places that need lubrication in the geartrain. When you start using that powder for other things (firearms, fishing reels, etc...) then you can get it everywhere because you have applications where there are sliders or gas blowback will

expel any excess lubricants onto your face, hands, etc... I found that out when I used a little bit of the powder/oil mix on the gas mechanism of semi-auto rifles (AR types and M-14 types). The first shot and I looked like a Three Stooges imitation with the black ring of oil on my face. The oil just seems to help that blackness from the powder get driven further into your pores. Never ever wear white (been there, done that).

Date: Mon, 11 Aug 2014 09:27:28 -0700
From: Chris Farley via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] R-390A gear train

In a word, no. Keep track of where everything came from, but position will need to be all reset regardless.? Some could be off now and not even know it, anyway.? Compile that with reassembly, even if you marked shaft positions along with where the gears mesh-? one tooth off here, one tooth off there, by the time you get to the end you could be so far off it's not even funny.? Heed the wise advise given here many times before, along with following the tuturial below (it is also basically echoed in the Y2K tutorial but the photos are higher resolution here):

http://militaryradio.com/r390a-rfdeck-geartrain.html

Date: Mon, 11 Aug 2014 12:21:20 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Maybe OT Tungsten Disulfide issues

"it is insidious" That is putting it very mildly! I tried to create one 6 oz. medicine bottle full of alcohol into one container of "paste". How much powder and patience does it take? I have gone out on the deck to do this. I spend more time "attempting" cleanup than anything else. I have no idea how much I will keep having to add to that one bottle to get a paste. It simple is still fluid with TD in it. I don't think I've even come close to paste. Going nuts with cleanup!

Date: Mon, 11 Aug 2014 11:54:41 -0500
From: Cecil <chacuff@cableone.net>
Subject: Re: [R-390] Maybe OT Tungsten Disulfide issues

You probably should be working it from the other direction....take an amount of the powder and add the alcohol to the desired consistency. Just thinking out loud...

Date: Mon, 11 Aug 2014 10:16:46 -0700
From: Norman Ryan via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] R-390A gear train

Scott Seickel's gear train tutorial is pure gold. Discount it at your peril.

End of story! R-390A RF Deck Gear Train Rebuild Scott Seickel rebuilds an R-390A RF Deck Gear Train and shares his photos and step by step instructions. Assembly 1 Assembly 2 Assembly 3 Assembly 4 A...
View on militaryradio.com Preview by Yahoo

Date: Mon, 11 Aug 2014 14:59:09 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R-390A gear train

I think you are over thinking this problem.
Pull it all apart and have some fun and get it clean.
As you put it back together do not worry about alignment.
Worry about getting split gears properly loaded.

Worry that gears run well in plane with each other and do not fall off the side of its mate.

Worry that clamps are well centered.

Then when you get it all back together and it runs end to end,
Center the zero adjust range first.
Then set the dial counter
Then do the mechanical alignment of the cams to the cam marks.
Then get the time-ing on the band switch gear set.
Then get the band switch well adjusted.
Then get the Osc deck switch well adjusted.
Then make sure you can get a spline driver into ever clamp in the gear train while it is setting at the mechanical alignment point.
Pick and choose where you put the spline bolts back in.
Put the best ones in the cam clamps.
Put the worn ones in the fixed gears.
Put the middle one sin the split gear clamps.

Now do a complete mechanical alignment of the gear train before putting the cans and slug racks back in.

There is no need to mark everything as you pull it apart.
You are going to have to adjust and readjust it all as you put it back together. It need not go back together tooth to tooth or even clamp to gear or cam. You will want to rearrange some of the small parts to help with future maintenance.

Date: Fri, 10 Oct 2014 17:42:55 -0400
From: Alan Victor <amvictor@ncsu.edu>
Subject: [R-390] RF deck removal

In the Y2K manual and the Army TM the instructions for the removal of the RF sub chassis have you remove the Oldham coupler backlash spring first. Then remove the front panel following the procedure in a previous paragraph. In that previous paragraph the KC knob is to be rotated fully CCW to -963.

QUESTION: Why not do this first and then remove the backlash spring. Does it
matter? Not knowing any better, it would seem I run some risk turning the KC knob with the backlash spring removed. Is the pressure present on the pressed couplings sufficient that this is just not an issue? Or if I rotate to -963, I cannot get to the backlash spring readily?

One last item. I notice in the TM a CAUTION that during the removal of the RF sub chassis, the Oldham coupler on the VFO shaft will come apart and the center disk will fall to the bench. I can see my luck, it will fall on the floor never to be found! This item is not in the Y2K manual, perhaps because it can be handled in a better way? Or there is typically so much grime and grease that it just does not fall off. Comments? Thanks again in advance!

Date: Fri, 10 Oct 2014 18:04:03 -0400
From: "Bill Riches" <bill.riches@verizon.net>
Subject: Re: [R-390] RF deck removal

You will find some units with the spring missing and they work ok. Take the
spring off where ever it is easiest to get to. If you lose the spring – one from a ball point pen will work! The oldham coupler is the size of a quarter and is hard to miss if it hits the floor! Good luck with your project.

Date: Fri, 10 Oct 2014 15:47:59 -0700
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] RF deck removal

Find two short blocks of wood to raise said radio a tad.
Remove top & bottom covers.
Remove Oldham spring.
Reaching in with a very long Philips screwdriver, remove green head screw
which holds clamp/wire harness just above the local gain pot. Use hole in bottom left front of RX.
Remove IF deck.
Place wood blocks/etc under said receiver; set receiver frequency to 7 +000
Drop front panel, if you got the correct clamp in above step there will be more than enough slack to drop front panel.

Next is the crystal deck; remove coax connectors from antenna relay which
are behind the crystal deck. You will have to rotate one of the gears to get to one of three green head screw on the front of the crystal deck. Loosen clamp holding said crystal deck shaft. Slide deck back towards antenna relay
and remove.

At this point, attack the RF deck with vengeance. Remove all green head screws, spacer from Oldham coupler will fall free from the PTO. It should remain on workbench.

Date: Fri, 10 Oct 2014 18:27:49 -0500
From: Phil <pmills7@comcast.net>
Subject: Re: [R-390] RF deck removal

Craig, I've done more round trips removing and reinstalling an RF deck than I care to admit to and I've never had to remove the IF deck. I do have to remove some connectors from the IF deck. Why do you list this?.... Has your memory gone the same way my 69 year old memory has gone ?

Date: Fri, 10 Oct 2014 16:59:14 -0700
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] RF deck removal

One reason, because I can! In Alan's case, he is going to take a lookie see at the entire radio. Might as well get the IF deck at eye level and search for those beautiful BBOD's. Depending on who built the modules in Alan's RX,
could be many BBOD's.

Then for reason #2, more room to play with the crystal deck. Getting that contraption back in place over all those springy
things.....joy.

Reason #3: Just another way of skinning a cat (or animal of your choice). We
all have our faults and suffer from some sort of CRS.

PS: Alan, if you are still reading these post, don't sweat that spacer on the Oldham coupler. Try putting a dab of vasoline on one side. When the beast goes back together, stick it to the PTO. It might stay in place while getting the RF deck seated. If not, loosen the PTO and don't fight city hall.

Date: Fri, 10 Oct 2014 17:15:17 -0700
From: Alan Victor <amvictor@ncsu.edu>

Subject: Re: [R-390] RF deck removal

Thanks, all good inputs. Nice to know about the backlash spring and the ball point pen substitute!

Actually, before I drop the panel and pull the RF deck out, all the other modules will be out anyway. Namely, IF deck (already out) fixed one item but may as well look for any other bugs that are obvious. The power supply and the audio deck taken out as well. Main reason... I need to move the receiver from the lab bench to the workbench. Getting down to about half its weight is better for me alone. And of course, the entire mainframe has not been cleaned at all, so that is the goal.

I guess I need to re visit Chuck's video on dropping the panel and the issue of NOT loosing synchronization. While the Y2K says full CCW on MC and KC
knob, I was under the impression, I was to set the CAM tips in line as it were at 7+000. That is, set MC and KC accordingly and pull the panel and RF
deck at that setting. Not at 00 -963. Am I missing something again? Sorry,
but I am a firm believer in Murphy's law. In any case, open to any/all comments.

One last item. *My panel hardware was redone somewhere in its life*. The Phillips screw heads on the main panel attached to the mainframe are straight head screw and use selflocking nuts. So I suspect the mainframe tap is stripped. They are stainless, but not Phillips. So I need room to get behind the panel to get them out and replace with the right hardware. Another reason to get as much electronics out of the mainframe as reasonable.

Date: Sat, 11 Oct 2014 09:05:22 -0700
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] RF deck removal

Where Oh Where to set the MC & KC knobs? I have to agree that Murphy is lurking in your lab/shack. No matter what, the front panel has to be removed in order for the RF deck to come off of the mainframe. Bottom line is; IF the mechanical alignment isn't right, ain't nothing right?. Presetting MC & KC for (Seven..Plus Zero-Zero-..Zero) at the getgo enables one to see the cams & index marks ASAP. If all is good, add that event to the day's blessings. If not, you have another challenge in life!

At that point, don't let anyone attach a drill motor to the PTO shaft and give it a spin or two. When reseating the RF deck the coupling might be a

few degrees off. Take caution not to bump the PTO shaft. If for any reason the PTO shaft is going to be turned, all is not lost. Quite simple to use a sig-gen to input a signal, turn on the BFO, loosen one of the Bristol screws on the Oldham coupler, turn the PTO shaft to zero beat. That should get you back into the ball park.

Not sure if Chucks video or the Y2K has the following: with the panel down, check/adjust the Zero ADJ device for middle range of movement. On Chuck's website, he at one time had added a last step to the IF alignment procedure. Which was how to adjust the BFO; zero beat with a 455KC signal injected into the IF.

The hardware issue: Hams use what is in the junk box!!! With luck the threads are okie-dokie and there is a store in town with the correct fasteners. Good Luck!

Date: Sat, 11 Oct 2014 14:25:56 -0400
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] RF deck removal

Looking ahead is the RF band switch.
About six wafers and six contacts on each wafer.
With the RF deck out, adjust the RF band switch by eye ball.
Tune both up and down the full range of megahertz.
As the Geneva gears rolls the switch one contact,
Look at the wafer wiper relative to the wafer contact.
Look at all the points.
Now it is a judgment call of the eyeball.
Set the switch for the best contact of all the wipers
to all the contacts on all the wafer sections.
The adjustment will be a very very small amount to be optimum.

Your worse fear is that some where in the past the switch was not well adjusted a some corner of a contact is burnt off giving you less metal than you would like. You do not want to get into tinkering with wafers and contacts. Just accept what you have and set it the best adjustment point you can. It has been good enough for the last 60 years. It is still good enough to work. Your goal is not to make the situation worse by leaving it in a less than best it can be state.

Date: Sat, 11 Oct 2014 19:04:01 -0700
From: Alan Victor <amvictor@ncsu.edu>
Subject: Re: [R-390] RF deck removal

Thanks for the input(s) and clarifications. Yes, my take away from the video seems to be 7+000 is more appropriate than 00 - 976. I managed to

get
the panel screws broken and loose so I should be able to readily drop the panel. I will have all modules out at that time except the PTO and RF/xtal sub unit. I am not sure the clutch gear PTO interface is exactly centered as in the video but I suspect that is a minor issue that can be done latter. As long as I do not do a stupid movement of the PTO shaft. Currently the CAMs that I can see are reasonably on the mark at 7+000. Of course I cannot see the rear CAMs as well as the two CAMs in the bottom front.

Date: Sun, 12 Oct 2014 20:23:48 -0400
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] RF deck removal

>Thanks Roger. On the adjustment, could you please claify, what am I >adjusting? The Geneva gear rotation? I understand the goal, just not sure of >what mechanical element must be adjusted to reach the best overall contact l>ocation for all bands.

The shaft through the band switch assembly has a clamp where the shaft and Geneva gear mate. Setting that shaft in the gear is just like setting one of the cams to its alignment mark in the mechanical alignment process. Think of the Geneva gear as being the detent in a rotary switch. In a switch you can not adjust angle between the switch detent and the wafer switch sections. The switch stops were it stops and you hope the manufacture got the wafers to assemble in a way that leaves the wafer switch wiper setting in the middle of the contact at each detent position of the switch assembly.

In the receiver the switch shaft is clamped into the Geneva gear. The Geneva gear assembly acts as the detent stops. If the clamp comes loose (they do) then you can spin the knobs all day long and the band switch does not change position. You need to get the Geneva gear into a detent and set the shaft to the correct set of switch contacts and tighten the clamp to get things back into working order.

OH IF WERE JUST SO SIMPLE.

The problem with the band switch is there is no exact alignment mark. The shaft rotates and the wafer wipers move to different contacts.

Where the shaft stop rotating with the Geneva gear is dependent on the mechanics of the gear assembly. The stop point will be different for each Geneva gear shift point. The number of degrees the shaft rotates for each detent shift may not be exactly the same. And the stop point will be different as you tune up and tune down because of small differences or lash in the drive train. The corners of the gear works are OK but not

necessarily exact to any wafer switch section.

You may have a wonderful set of wafers that line up real good, give you lots of over lap of the contact to wiper at every switch position while tuning both up and down and wonder what this subject is all about.

In reality the angle between the contacts on the wafers is not exact. Contacts will be skewed on a wafer due to the wires (do not try to rework these if you do not have to). Wafers will have a rotation skew of their own (do not work on this either).

SO:

There are 8 wafers with 6 contact, thus 48 points that must be optimized both coming and going. And just one small bolt in a clamp to control it all.

It really is an eye ball and judgment call. There is no measured maximum. At a minimum some band will not work and you can start burning contact corners off with arcing B+. With the gear lash, the switch may work going one way but not the other way. So you work on it until you get it looking good.
Very small changes.

You find as you tighten the clamp the shaft and gear changes. How much extra position change do you set in so that as you tighten the clamp you end up where you want to be. It is a touchy feely adjustment thing.

I hope this helps you can see clearly through the mud to find a solid bottom.
If not, please ask again and I will take another shot at this for you.

Date: Sun, 12 Oct 2014 19:02:51 -0700
From: Alan Victor <amvictor@ncsu.edu>
Subject: Re: [R-390] RF deck removal

Thanks Roger. I get it! Well, it will be a study in mechanics and mechanical trade offs. I certainly don't want to make it any worse than it may be now. I did some additional reading in the Y2K and the HSN letter prior addition, I believe No. 29. The mechanical alignement was detailed in this issue and to your point... Apparently the intermittent switch drive (is that the same as the Geneva?) viewed from the front in the 7+000 MC position is to have a specific alignment point. Namely 4 tooth gear vertically down in position. I should look for this as well as the six CAMs location.

So clearly, when the deck is pulled, I am going to have to pull the front

panel off the gear train. This requires removing the veeder root counter and some small gears etc... *IS THIS ALL STRAIGHT FORWARD to disassemble and reassemble? Having not done it before, are their surprises lurking?

Date: Sun, 12 Oct 2014 22:22:16 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] RF deck removal

>*IS THIS ALL STRAIGHT FORWARD to disassemble.....

A digital camera with a good macro mode, and a tripod to hold it steady, are invaluable aids when working on the 390A. Best results will usually be obtained with the camera's flash turned off to avoid specular reflections, shadows, and glare. You could easily take dozens or even hundreds of shots of things as you disassemble the radio, to make reassembly easier.

Other than that, go slowly and don't force things. The mechanism will tell you what needs to come apart to get where you need to be. If you undo something that doesn't need to be undone, redo it before proceeding.

Date: Mon, 13 Oct 2014 09:18:13 -0400
From: Bob Camp <kb8tq@n1k.org>
Subject: Re: [R-390] RF deck removal

Lurking surprises:

1) I don’t have enough light to *see* what I’m doing.
2) Which part *is* this one?
3) Does this part go on this way or that way?
4) Do I put this on first or that on first?
5) Where did that part I just dropped go?
6) That was one to many beers ?
7) I can’t do this for 19 hours straight anymore ?
8) The internet is out and I can’t find my copy of Y2K.
9) Pushing on that clip / tightening that clamp to much broke it.

Other than the last one, all are fixable with a little research or a bit more time. The worst case is you have to get on the list to beg for some odd little part that is now missing or broken. For much of what you might loose or break, McMaster Carr is your friend. For the rest of it, there are lots of people who have a parts radio. (or ummm ?. errrr ? parts radios).

Date: Mon, 13 Oct 2014 09:43:02 -0400
From: Alan Victor <amvictor@ncsu.edu>

Subject: Re: [R-390] RF deck removal

Hi Craig, Bob and all. I agree! Just in case though, Rogers inputs are valuable. My plan is to see why sensitivity drops out on the lower bands and returns after I go above 8 MHz and then return back to below 8. It does not happen all the time so it may be oxidation on the contacts of the RF deck switch
or the 2nd LO switch or as simple as sticky rack or CAM. Worse case, yes, a gear or no-mar clamp is loose and then I am forced to go to the next level.

My initial plan is to WD40 the RF gear case still assembled. Lubricate the appropriate roller bearings and clean it up as much as possible and then see what I have. So far, the rework of the radio has been positive, problems fixed and moving in the right direction. If I had a 2nd RF deck to practice on, it would be a different story. Thanks, Alan
>
> Good to see you are digging into the R-390/A. First, if it ain't broke,
> don't fix it. You should be able to put the MC knob back onto its shaft and
> rotate the RF gears thru all the bands. Take a look see at all the contacts
> on that band switch. If there is good contact, (a judgment call), some
> DeOxit might be all that is needed.
>
> PS: Roger is the man! He taught the radio school in the military.

Date: Mon, 13 Oct 2014 13:52:21 -0400
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] RF deck removal

.....requires removing the veeder root.....

Not true. The bezel (black box with micro scope glass slide as a window) comes off with the front panel. The veeder root counter and its gears are mounted to the front of the gear train. You do not have to undo any of the counter parts to remove the panel.

But some more things to look at.

You do have to loosen the dial lock and rotate it. First time around just take the knob off the dial lock and remove the bushing nut on the dial lock and let it fall loose. As you drop the front panel it will fall out. Then you get a look at what's going on so you can loosely hand the dial lock back into the front panel for reassembly. One of the Fellows pointed out that you also have to pull a wire harness clamp loose on the bottom in front of the audio deck near the local line pot from the front to back frame panel between the VFO and the audio decks. This is where you reach in with the

long #1 Philips screw driver. You will need this slack. Do this first then, If you are going to pull the RF deck also remove the spring to the VFO Oldham coupler. Use a couple blocks of 2x2 or 2x4 under the side rails to prop the front panel off the bench.

Two big knobs.
Dial lock.
Antenna trim knob.
IF band width switch extension shaft clamp.
BFO pitch extension shaft clamp.
Dial lock.
Wire harness clamp.
five 8 x32 face plate bolts three under BFO band width knobs, two more between line gain and KC knob.
Eight 10 x32 four down each front rail.
Again the slender Philips screw drive lets you reach around the guard rails (not handles, used as handles)

If you have a burr on the KHZ or MHZ shafts and the panel bushings will not slide over the burr, you can take the nuts off the bushings and leave the bushing on the shaft until you have time to hone the burr off the shaft. On reassembly you loosen the bushings and re center than as needed.

There are also three green screws along the back of the RF deck with tight clearance that must be loosened, they are captive. The long 6 - 10 inch small diameter Philips screw driver is the preferred tool for this task.

Total time to drop a front panel under fifteen minutes with beverage.

Date: Mon, 13 Oct 2014 14:55:39 -0400
From: Alan Victor <amvictor@ncsu.edu>
Subject: Re: [R-390] RF deck removal

Hi Roger, agree. However, the panel I was referencing is the gear train front panel, not the main frame front panel. All of the items you mentioned in this post are mainframe front panel items and I agree, those require attention in the process of getting to the RF deck. Now to investigate the intermittent gear and the MHz switch alignment, not sure if the gear case front panel needs removed. Is it possible to view proper MHz switch and intermittent gear alignment by looking at the BOTTOM front of the gear train? As well the 2 front lower CAMs when the KC dial is set to 7+000. If all those items seem reasonable as well as the contact points on the Mhz wafer switch, then I may initially clean the gear case intact with liberal WD40 and paint brush.

Date: Tue, 14 Oct 2014 03:19:38 +0000 (UTC)

From: Norman Ryan via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] RF deck removal

Check these websites:
militaryradio.com/r390a-rfdeck-geartrain.html
http://militaryradio.com/R390A/R390RFDeck/

Take photos of your own. Take notes and make sketches. Place gears, shim washer, etc., in zip-lock bags and number the bags with a Sharpie -- reference the numbered bags to your notes and sketches. Take your time. Geartrain is intricate, but reassembly is not impossible with constant attention along the way. If you take the split gears apart for cleaning, gently file any burrs off gear faces prior to reassembly. Do NOT dub gear teeth! Lube sparingly with synthetic oil such as Mobil-One 90W. (90W is a guess from memory.)

When engaging gears during reassembly, pre-load split gears just enough (no more!) to eliminate lash. These techniques will contribute to silky smooth single finger KC change operation.

Date: Thu, 16 Oct 2014 17:35:50 -0700
From: Alan Victor <amvictor@ncsu.edu>
Subject: [R-390] Ferrite rod-slug and rack tuning assembly

Question on the ferrite rod slug and rack:

I have seen pictures of the slug rack removed. However, I don't see in those pictures the bar that runs across the rack with roller bearings at each end. Am I missing soemething? It appears to me that when the ferrite rod and rack assembly are removed, that the bar and roller bearing assembly would all come out together. I anticipate cleaning the roller bearings after removing the rack for each band.

Date: Thu, 16 Oct 2014 19:24:22 -0700
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] Ferrite rod-slug and rack tuning assembly

The variable IF section has two (2) thingies which hold three slugs, each. The RF section has six (6) thingies which hold three slugs, each. The IF slugs are the same, but are different from the RF slugs. All RF slugs are the same.

With a dental pick, short piece of solid hook-up wire with a hook on the end; release the two springs holding the bar which holds three slugs. Remove and set off to the side. Do not move any bar to a different location! With the thingie (bar) removed it is possible to remove three IF or RF

transformers. Remove one at a time, don't find a new location for any transformer.

The IF transformers only have a wire wound core. The RF transformers have silver mica caps & a wire wound core. Each have trimmer cap(s).

If picking belly button lint is your thing: Over the years those trimmer caps have been spun in circles several hundred times. A little metal tends to rub off where it should not. Each transformer has two tabs which hold the cover in place. Those tabs can be pushed inward and cover removed. Then the end of each trimmer caps is held in place with a keeper. It, the keeper, can be slid off with a small screwdriver. The top section of the trimmer then can be removed and the offending metal can be wiped off with a q-tip and a drop of DeOxit or cleaner of your choice. Each transformer has a single Philips screw that holds it in place. After the slug(s) are out of the way, a #1 philips screw driver lowered down the center opening of the core should do the trick.

Of course, this means starting from scratch in peaking the variable IF & RF section.

The entire shooting match which hold all those bars, slugs, etc. seldom needs to be removed. Bearings are on the ends of those thingies (bars) which holds three slugs. There are several screws on each threaded slug holder. These can be loosened so the slug drops straight into the center of the wire wound core.

DO NOT USE ANY LUBRICANT ON SLUGS or INSIDE OF CORES!

On some RF sections, depending on maker, clearance is tight. Transformers on the adjacent octave might have to be loosened to obtain enough clearance to remove the wanted transformer. Hope this helps.
Craig,

From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] Ferrite rod-slug and rack tuning assembly

I have never seen any sort of binding caused by the roller bearings on the slug carrier guides. They do such a minor amount of movement up and down when tuning (less than an inch each) that unless someone has done something physically damaging to the slug carrier guides they seem to last forever.

Where I have seen damage to the slug carriers is when a radio was left sitting around without the Utah plate that covers the RF/IF decks.

Those little springy pieces of metal attached to each slug are sort of fragile. If you do pull the slug carrier guide free (and that is where you unload those springs on the end that keep the carrier pulled down tight with the brass cams) you need to be careful to not break off a slug.

If you pull a slug carrier out of the IF cans and you are missing a slug (because it has broken off) then you need to pull the IF can and dump out the slug or turn over the entire radio to get the slug to drop free. You "could" epoxy a slug back onto it's respective spring, that usually works. If not you can find a spare slug off of a surplus RF deck and replace it. Take care to note how far the slug is mounted into the rack (measure the distance) and try to replicate that insertion length. Because of the slight changes in permeability of the slug you will end up realigning the entire band. Just accept that inevitability and move on.

As has been stated, you cannot use an RF slug in an IF spot (or vis versa). Also there may be some differences between slugs in certain spots (I am not too sure about that). The slugs are pretty sensitive to lots of things, too much cleaning, the use of lubricants or solvents, moisture, etc...

The most I have ever done to them is to wipe them down with a little bit of isopropyl alcohol and to clean out the RF/IF transformer bore with a cotton swab. If I have one that scrubs against the wall I will dust it with talc (baby powder, extremely tiny amount). The other choice is to try to bend that springie thing that the slug is attached to and that is a very quick way to break it off. I found one RF deck where some individual (use unspeakable and impolite phrases here) used oil in the transformers. It made a big mess and turned things into a dirt magnet.

Date: Mon, 20 Oct 2014 12:25:36 -0400
From: Alan Victor <amvictor@ncsu.edu>
Subject: Re: [R-390] Ferrite rod-slug and rack tuning assembly

Thanks Tisha for the inputs and suggestions. I am just finishing up a homebrew Utah plate just for the reasons you mentioned. I believe all the slugs in the unit I have are fortunately in good shape and I see no binding in the slug-core interface. If there is any binding or hang up, it would be the roller-rack interface as this is where most of the grime and grease are hanging out. All of my ferrite slugs are clearly marked with color coded painted dots. The RF slugs are unique as compared to the IF. If I dare, I may take a homemade inductor, measure its L in free air and then slide the R390A slugs in and calculate the effective permeability of the core material.

I suspect my biggest fix will be the MHz gear-band switch tracking as the symptoms for occasional loss of sensitivity point to this type of problem.

Date: Mon, 20 Oct 2014 11:45:41 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] Ferrite rod-slug and rack tuning assembly

I had that exact same problem with the MHz band switch. In my case the radio was intermittent on the 2 and 3 MHz band positions. I very gently cleaned up the switch contacts under the RF deck and the problem went away. As there is some black magic (and fragile rotary switch contacts) involved I did not want to mess with it too much.

Date: Sun, 9 Nov 2014 14:52:01 +0200
From: Grayson Evans <wa4gvm@gmail.com>
Subject: [R-390] Strange slugs in my RF deck

I am disassembling/restoring a very early Collins R390A. My first restore, so going slow. I am disassembling the RF deck and notice that there are a variety of slug types in the coils. Some have a small spring attached from the slug to the adjustment screw, some have just a stiff wire between slug and screw, and some have both (a short spring with a wire attached to the slug). Someone replaced about 5 or 6 of these in the past, the screws holding the adjustment screw triangle plate look like floor sweepings, rusty flat head screws. What are the slugs supposed to look like?

The other strange thing is that a few of the replaced slugs seem odd, they are a small diameter rod of metal (half the diameter of regular slug) wrapped in cardboard. Looks like someone made them in the field. Anyone seen these?

Date: Sun, 9 Nov 2014 08:12:56 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Strange slugs in my RF deck

Sounds like someone was desperately trying to make some repair parts.

The slugs should have a small spring affixed to the slug with the other end affixed to a set screw that has a spline drive. The slugs for the RF deck are different from the ones in the IF deck - not so much size-wise as I think both are the same size, but the composition of the two slugs are different so they're not electrically interchangeable.

I'm pretty sure you can locate good slugs from either someone on this list or possibly a place like Fair Radio, etc.

BTW, these are meant to be assembled dry. Do not use any liquid lubricant

in them.

Date: Mon, 10 Nov 2014 08:15:25 +0200
From: Grayson Evans <wa4gvm@gmail.com>
Subject: Re: [R-390] Strange slugs in my RF deck

I ordered some replacement slugs from Fair. Not sure if they come with the springs, hope so. I remember something about the two (RF, IF) being different. They do look the same. So far, they all seem to slide OK.

Date: Tue, 11 Nov 2014 20:31:53 +0200
From: Grayson Evans <wa4gvm@gmail.com>
Subject: [R-390] Slug rack springs

Anyone know of a place to get replacement slug rack springs? 4 of them in my 390A look like they were made from screen door springs and one was missing. I looked around at a few “hardware” places here but nothing close. Way too big.

Date: Tue, 11 Nov 2014 15:18:14 -0600
From: wa9vrh <wa9vrh@wildblue.net>
Subject: Re: [R-390] Slug rack springs

You might try Fair Radio in Ohio https://www.*fairradio*.com
They used to have lots of parts for the 390A.

Date: Wed, 12 Nov 2014 18:42:45 -0500
From: Roy Morgan <k1lky68@gmail.com>
Subject: Re: [R-390] Slug rack springs

> Anyone know of a place to get replacement slug rack springs?

Do you mean the springs that hold the slug racks onto the cams? (not the springs that are part of the slug and hold it at the right distance from the rack)?
There used to be a company called Small Parts in Florida, but they got merged with Amazon or some such. I can?t seem to find the things they used to sell.
You may need to make springs: get some piano string wire of the smallest sort, perhaps, and wind springs yourself.

Date: Sat, 15 Nov 2014 19:15:51 -0500
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] How do you remove this gear

Grayson, travel over to this web site and look at the pictures.

http://militaryradio.com/r390a-rfdeck-geartrain.html
Scott Seickel did an awesome job capturing every thing.
You gear and how to is on the web page some where.
Just believe.

Date: Sun, 16 Nov 2014 09:57:38 +0200
From: Grayson Evans <wa4gvm@gmail.com>
Subject: Re: [R-390] How do you remove this gear

Thanks Roger, I have seen that site and the proceedure, that's what I am using. It turns out that I was not pulling hard enough. The old hardened grease really had that gear on tight! I also have the exploded diagram which shows the gear held on by a clip spring type washer but mine didn't have it.

Date: Sun, 30 Nov 2014 22:54:36 +0200
From: Grayson Evans <wa4gvm@gmail.com>
Subject: [R-390] How is this gear supposed to work?

This is a bit of an obscure question.
I am having trouble getting the "clutch" gear (21 in the exploded diagram of the gear assembly) to work properly. This is the gear on the front of the assembly where part of it engages the Kilocycle gear of the V.R. wheels. This is an odd two part gear, a movable split gear on the back with a fixed gear, attached to the shaft, in the front. There are two pins on the back gear that fit in two slots through the front gear. Three more pins are attached to a plate sandwiched between the two gears.

I took this assembly apart to clean it. It, like most of the gears, were totally gunked up. When I put it back together, it is extremely difficult move the back gear back and forth. Problem is I am not sure how this assembly is supposed to work. I am assuming that at the stop of the kilocycle range on the VR counter, the two gears slip to allow some ?overshoot? on the turning. I have no idea if this makes any sense. It looks like the clutch action adds some resistance to this movement, but I don?t know how much resistance.

Has anyone every disassembled this gear and put it back together successfully? when back together should it be easy (by hand) to move the front/back gears back and forth in the slots? or require a LOT of torque?

I haven't been able to find any kind of exploded diagram of how this thing goes together. I think I assembled it exactly like i took it apart, but maybe I did something wrong.

Date: Sun, 30 Nov 2014 18:42:28 -0500

From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] How is this gear supposed to work?

I did not look at the drawing but from your description you have the Zero adjust assembly in hand.

>When I put it back together, it is extremely difficult move the back gear back >and forth. Problem is I am not sure how this assembly is supposed to work.

The front gear location in relation to the back gear location can be varied within the range of the three pins in the slots of the front gear. But you can only change the relation of the gears when they are installed, the dial zero adjust assembly is complete and installed and the front panel is installed.

In life and real use, the dial counter is rolled over to a 100Khz point, the dial zero adjust is screwed in to push the three pins into the clutch mechanism in the gear set. You can then twist the Kio Hertz knob through the adjustment range with out moving the veeder root dial counter. The adjustment range being the range the pins can move in the slots of the gear face.

You mostly go to CAL on the function switch,
Turn the BFO On.
Set the BFO pitch to zero.
Set the veder root counter to XX X00 where you expect to find a cal tone.
Engage the zero adjust by screwing it in clock wise to free the clutch.
Rotate the Kilo Hertz knob to a zero tone of the calibration oscillator against the
zero of the BFO.
Release the zero adjust by turning it counter clock wise.

Never over crank a zero release counter clock wise. You will screw the shaft out of the bushing nut and force the zero lock disk off the end of the zero lock shaft. This state would be a broken zero adjust assembly.

You should have a nice big 1 inch or so flat washer on the end of the zero adjust shaft. If not you have a broken zero adjust assembly and you can not zero adjust your receiver. The big washer is forced against the three clutch pins by the thread movement on the zero adjust shaft. Forcing the pins in will cause the clutch to release.

With the clutch and gear assembly in hand you can not apply enough pressure to the pins to freely change the setting of the gears to each other. I think the assembly is riveted together and does not come apart. You just

have to give it a good bath to clean it up as best you can. <snip>

Date: Mon, 1 Dec 2014 00:55:41 +0000 (UTC)
From: Perry Sandeen via R-390 <r-390@mailman.qth.net>
Subject: [R-390] Gear question

Please be aware that the exploded gear drawings numbers in the manuals are different between the manuals. Also there are different disassemble and re-assemble directions. I don't know if one TM's instructions are better than another. Perhaps Roger has some advice on this.

Date: Mon, 1 Dec 2014 21:17:45 +0200
From: Grayson Evans <wa4gvm@gmail.com>
Subject: Re: [R-390] How is this gear supposed to work?

Boy, thanks for all the info. Now I have a much better idea of how this gear works and what it is supposed to do. I had it wrong. I looked at how the zero adjust screw-in plate works on another 390 I have waiting for a restore. I should have done this before but it didn't occur to me. Now I get it.

You CAN take this gear assembly apart. There is a "C" clip on the shaft that holds everything together under pressure. It is a bit complicated inside, wish I had an exploded diagram. There are a bunch of spring steel curved washers inside that provide the force pushing the pins out the front. There is also about 8 brass rings that apply friction to the disk holding the pins so it doesn't freely turn. Not sure about the purpose of these. It is hard to get back together due to the pressure the spring washers apply. Had to use a couple of C clamps.

I will keep the zero adjust procedures you also provided so I know how to do this when I get it all back together. Thanks for the "war" stories as well - great reading! Sounds like you know your way around one of these mechanical marvels!

Date: Wed, 17 Dec 2014 16:24:03 -0500
From: "billriches" <bill.riches@verizon.net>
Subject: [R-390] R390a Mhz stop

Just tore down, cleaned, and lubed gear assembly. Set Mhz stop to a smidge
past 31 Mhz. Lower stop is at 2 Mhz instead of 0 Mhz. Stop assembly only has 10 leaves in it. Normally there are 11. After rebuilding many of these cool receivers this is the first one that I have seen with this shortened tuning range. Before I took the gear assembly to pieces I did not check its normal tuning range so I don't know if it was set up to limit the top two or

bottom tuning ranges. I don't think that depot maint left a leaf out as there is no room to put another in. I do have a replacement 10 turn assembly that I can use. Just wondering why range is limited.

Date: Thu, 1 Jan 2015 11:26:41 +0100
From: djelatnik slavonija <djelatnik.slavonija@gmail.com>
Subject: [R-390] Gear reassemble problem

I need one advice regarding reassembling gear train. I reassemble entire geartrain after cleaning process but unfortunately I have one piece in leftover can. This is on picture on the following link..

http://www.myalbum.com/Photo-V8BUVAYY-D.jpg

Piece is hanging on the shaft that I think is correct one to mount like distatnt bearing, tell me is this mounting location correct?

Date: Thu, 1 Jan 2015 15:06:40 -0500
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Gear reassemble problem

Travel over to this web site and look at the pictures.
http://militaryradio.com/r390a-rfdeck-geartrain.html
Scott Seickel did an awesome job capturing every thing. Your left-over part and how to install it is on the web page somewhere. Just believe.

Date: Fri, 9 Jan 2015 14:35:51 -0500 (EST)
From: larrys@teamlarry.com (Larry Snyder)
Subject: [R-390] RF deck help

I'm chasing down what looks like a bandswitch problem (no +150 to V207 screen in any position, but present at P108). I'm in the Y2K doc, Par 6.3.3.1 step 5 and can't find those 2 screws! Could my very sloppy predecessor have left them out?

Date: Fri, 9 Jan 2015 21:54:02 -0500 (EST)
From: larrys@teamlarry.com (Larry Snyder)
Subject: Re: [R-390] RF deck help

I need to quit assuming things like green screws. Found a pic showing which ones I need to pull.

Date: Sat, 10 Jan 2015 01:54:42 -0500
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] RF deck help

When all the screws are out the deck will lift out.
If the deck is not free it is still fastened in.
Thus look for more screws.

You are looking for two screws that go through the RF deck front plate into on of the two bottom rails the divide the lower bottom half of the receiver chassis into the power supply, VFO and Audio compartments.
Anything is possible in 50 years.

Date: Mon, 19 Jan 2015 12:13:24 +0100
From: Pierfrancesco Mengacci <pf.mengacci@outlook.it>
Subject: [R-390] R390-A/URR Cam alignment. A question

I enjoyed the impressive manual "The 21st Century R390-A/URR Technical Reference" but I can't catch the authors!

My Problem: Did anyone notice that, in the section dealing with cams alignment (paragraph 6.2.5.2 point 5, revision 9 of the manual), it is not specified at which of the 32 bands the receiver must be set to check that "the cam follower on first variable IF Z213 is near the valley of the cam when Kilocycle Change indicates 500 Kcl"?

In my R390-A/URR (a Stewart-Warner make) the cam follower on rear cam of 17.5-25 Mc IF reaches the valley, for a 500 Kcl reading, only if I select the bands 11 and 22. IS IT NORMAL ???

I have not yet aligned my receiver, sensitivity is poor.

Mechanical synchronization is perfect, I think, with the only exception of the rear cam of the above IF (in all the front cams, the reference lines bisect exactly the cams ref. holes (at 07 +000) and, in addition, crystals & range coils selectors are correctly switching at required positions. PTO frequency and range are OK, also (3.455 Kcl at 000 odometer reading and 2.455 Kcl at +000).. Can you kindly help me and tell me if the above circumstance is relevant, before I proceed in electrical tuning?

Date: Mon, 19 Jan 2015 09:00:50 -0500
From: "billriches" <bill.riches@verizon.net>
Subject: Re: [R-390] R390-A/URR Cam alignment. A question

Your first if cam setting is correct - bottom only on #11 and #22 at 500khz. When you start alignment if you only get one peak on variable capacitors on variable rf and if coils the mica caps in the coils have changed value and must be replaced. It is a common problem with Stewart Warner RF decks - not much of a problem with EAC decks.

Date: Thu, 26 Feb 2015 13:56:20 -0500
From: Bill Abate <wabate@verizon.net>
Subject: [R-390] This may be of help to someone

After repairing and aligning (I dislike the word 'restoration') four other R-390A's I thought another would be no biggie. I bought my fifth a few years ago at a great price and then put it on the shelf for a future project after doing some cleaning and degreasing. Recently I ran out of 'round to's and remembered the 390A. After a power up with no smoke I put in the missing tubes and connected a speaker. Zippo! Nothing! A close inspection showed that the megacycle knob did not turn all the related gears. A gear clamp was broken. Darn! Now I had to mess with the gear train to get at that clamp. Even worse, a magnifying glass and flashlight showed six more broken clamps!

After hours of machine work I fabricated some replacement clamps. I replaced the clamps and reassembled the gear train. Darn, the gears were still slipping. Turns out the gear (#48) was slipping but the clamp was tight. Removed the gear and found the hub to gear connection was a cold solder joint. Yes, its called out in the military manual as a soldered gear (its not tin/lead solder). Did not expect that! I was worried about the heat damaging the gear if I tried to resolder it since it is tempered steel but I could not come up with a better idea. I dug out my low temperature silver solder and oxyacetylene torch. The gear repair turned out well. I did not give it a complete fillet as original since I wanted to keep the heating time to a minimum. The gear did warp slightly despite being tacked in just two places but it still was usable. Evidently the gorilla who worked on the gear train before me kept tightening the clamps until they broke when he could not stop the gears from slipping. Brawn instead of brains!

Next problem was to synchronize the gear train. When the broken clamps allowed some of the gears to slip on their shafts it became a giant Rubik's Cube. I never felt the need to disassemble a gear train before so this was all new to me. I set the cams where they belonged at 7 +000 but then found out the bandswitch was not synchronized. I found the section on synchronizing the 6 position RF bandswitch that showed you get a 56K resistance between two points (page 110 of TM 11-5820-358-35) when at 7 +000 setting. So I loosened the gear on the band switch shaft and rotated the switch shaft until I got the 56K reading and then an infinite reading when switched to 8 MHZ. You must satisfy both requirements. When that got satisfied I reassembled the rig but I still could not get the radio to align. Turns out there is more than one shaft position that satisfies the test. After studying the schematic it turns out the easiest way to synchronize the band switch is to look at the rear wafer and verify B+ to the 17 MHz oscillator when in the 00 to 07 positions. Finally got it right. After dropping the front panel and

removing the RF subchassis more times than I care to admit, I found I still could not align the radio. I neglected to align the switch gear assembly (#87). I could not find explicit alignment instructions in the manual other than to use figure 68. I carefully positioned the bottom
cogs with the vertical centerline of the gear and finally got the radio to align properly! It took me over a week to diagnose and fix these problems. Yeah, I'm slow. <snip>

Date: Thu, 26 Feb 2015 12:27:56 -0700 (MST)
From: Richard Loken <richardlo@admin.athabascau.ca>
Subject: Re: [R-390] This may be of help to someone

I am quite impressed. I fear that I would have given up long before getting to the long screw piercing the wiring harness... I would have jammed out about the time I found the soldered gear moving on its shaft.

Date: Thu, 26 Feb 2015 16:33:48 -0500
From: Bob Young <bobyoung53@hotmail.com>
Subject: Re: [R-390] This may be of help to someone

Yes, very impressive and inspiring,

Date: Thu, 26 Feb 2015 21:49:55 +0000 (UTC)
From: Norman Ryan via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] This may be of help to someone

This is an exceptionally well written and informative post. There's never a need to apologize for its length, considering the complex topic. Please feel to write again.

Date: Fri, 27 Feb 2015 11:29:35 -0500
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] This may be of help to someone

Thank you for taking the effort to repair this receiver.
Nice to hear that another receiver is operational again.

Date: Fri, 27 Feb 2015 09:46:01 -0800
From: David Wise <David_Wise@Phoenix.com>
Subject: Re: [R-390] This may be of help to someone

Yep, the man did it with style.

Date: Sun, 15 Mar 2015 17:20:09 +0200
From: Grayson Evans <wa4gvm@gmail.com>
Subject: [R-390] help needed on RF deck mechanical alignment

Finally rebuilt the RF deck on my early Collins 390A, but having some head scratching trying to get everything back aligned. I used the nice pictorials by Scott Seickel that shows closeups of how to put it back together. (by the way, there is an error in the reassembly steps) Unfortunately, his closeup photo of where the bandswitch should be does not look like my bandswitch. I assume this is because I have an older version than he did. My contacts are in a different location and the wipers are different. I have tried to use where I think the switch should be but very hard to see where the wipers are on the other switch sections. I can't find anything that says how the contacts are numbered so I could use the schematic to try to set.

Any help on setting this thing would be appreciated.

Date: Sun, 15 Mar 2015 12:09:31 -0400
From: Bill Abate <wabate@verizon.net>
Subject: Re: [R-390] help needed on RF deck mechanical alignment

I had the same problem. This worked for me.

I set the cams where they belonged at 7+000 but then found out the bandswitch was not synchronized. I found the section on synchronizing the 6 position RF bandswitch that showed you get a 56K resistance between two points (page 110 of TM 11-5820-358-35) when at 7 +000 setting. So I loosened the gear on the band switch shaft and rotated the switch shaft until I got the 56K reading and then an infinite reading when switched to 8 MHZ. You must satisfy both requirements. When that got satisfied I reassembled the rig but I still could not get the radio to align. Turns out there is more than one shaft position that satisfies the test. After studying the schematic it turns out the easiest way to synchronize the band switch is to look at the rear wafer and verify B+ to the 17 MHz oscillator when in the 00 to 07 positions.

Date: Sun, 15 Mar 2015 18:49:17 +0200
From: Grayson Evans <wa4gvm@gmail.com>
Subject: Re: [R-390] help needed on RF deck mechanical alignment

Thanks Bill, after digging around in the manual, I came across this "ohm meter" method that you mentioned. Once I figured out what the proceedure was trying to tell me, I was able to get the bandswitch aligned, I think correctly.
Also turns out I had the Geneva thing gear in the wrong position, spent awhile fiddling with that thing.

Date: Sun, 15 Mar 2015 19:04:18 +0200

From: Grayson Evans <wa4gvm@gmail.com>
Subject: [R-390] Oops, new mechanical problem

Thanks for the help on setting the bandswitch. Got that figured out.

However, I discovered that I somehow screwed up getting the cams set to the correct position. When I reassembled, I had them set for the 7MC position.
But now I see that the darn 8-16 MHz cam is not set properly, way off the mark. It only seems to move with MC knob movement. This appears to be the ONLY cam that can't be moved to realign by loosening a clamp. No clamp. Darn thing is attached by screws to the gear in front.(or is it??) Most difficult one to get to as well. Anyone have a suggestion on how to move that cam? Every other cam seems OK.

Date: Sun, 15 Mar 2015 14:53:10 -0400
From: Roy Morgan <k1lky68@gmail.com>
Subject: Re: [R-390] Oops, new mechanical problem

Sorry to tell you: you don't align that cam. You START with that cam in the right place and then adjust all the rest.

Date: Sun, 15 Mar 2015 22:03:53 +0200
From: Grayson Evans <wa4gvm@gmail.com>
Subject: Re: [R-390] Oops, new mechanical problem

Great. If it said that someplace IN BIG LETTERS, it would would have been a big help! Anyway, I THINK I see a way to take off the gear that is on top of that shaft, loosen the clamp on two others and move it. Not sure. Have to experiment next week.

Date: Sun, 15 Mar 2015 15:18:36 -0500
From: Phil <pmills7@comcast.net>
Subject: Re: [R-390] Oops, new mechanical problem

About 2 years ago I rebuilt a gear train.....about 30 times before I could get the intermittent gear aligned properly. The intermittent is the very bottom gear in the whole chain. Anyway, as it turns out, there two cams that you can not get to after the whole thing is put together. As Roy says, you align those and keep them aligned as you finish putting the gear train together. Believe it or not, with
a little practice, you can get your gear train all apart and back together again in about 15 minutes.....and I speak from experience :-)

Date: Sun, 15 Mar 2015 18:04:36 -0400
From: Roger Ruszkowski <flowertime01@wmconnect.com>

Subject: [R-390] Fwd: Oops, new mechanical problem

Be careful what you pull apart. Like Roy and Phil said there are some things that come first. You pull the wrong parts off and you will loose the alignment between the Geneva gear and the 8 - 16 Mhz cam. And as Phil says practice. practice, practice, about 30 times, and it becomes a 15 minute exercise.

Just grab the procedure from your favorite reference and take it from the top one more time. Then run through it again just to check.

On the band-width switch do the last final tweak and setup by eye ball. Look at each switch section and the wiper on each contact at each band position going both up and down the Mhz range. It's a judgment call in the end. You want the best contact wiper possible at each switch section and position.

Date: Mon, 16 Mar 2015 21:03:37 +0200
From: Grayson Evans <wa4gvm@gmail.com>
Subject: Re: [R-390] Oops, new mechanical problem (and comments on procedure)

Thanks for the suggestions Don, Phil, Roy. If I have to I?ll tear it down and start over. Once you get the hang of it, it isn?t too hard, but first I will try a few things to see if I can't get the gear attached to the shaft to turn by unscrewing the gear that it meshes with. It will take me a few days to get back to it. Will let you know.

A comment on the step-by-step photo procedure by Scott Seickel (THANK you Scott for making this!) The steps shown get less detailed at the end.

At STEP 16, you have to put the gear that turns the KC digits on the counter on BEFORE (or with) the Clutch Assembly gear. If you assemble up through STEP 18, you can't get the counter gear on as shown. The steps don't show that small gear except in the photo of STEP18

I have not been able to find any detailed explanation about the mechanical alignment in one place, When I get some time, I hope to write up my notes at least to help fill in some gaps. Gaps that obviously I encountered!

THANKS,

On Mar 15, 2015, at 11:18 PM, Don Heywood <wc4g@knology.net> wrote:

> OH, OH, now you will really get to learn about that RF deck. I usually set 16MC cam before I get going on reassembly and alignment. Just off the top

of my head I think you can loosen the clamp and slip the large MC gear (MC knob) out of engagement and then using your thumb run the RF train around until the 16MC cam comes into alignment. Now re-engage the MC shaft gear and now go thru the cam/bandswitch settings again. Don't forget to preload the split gears when engaging these gearsets. This will reduce any backlash while operating the radio. Let me know if I can provide any further assistance. You still have to set the PTO. 73 Don WC4G

Date: Sun, 22 Mar 2015 21:02:55 +0200
From: Grayson Evans <wa4gvm@gmail.com>
Subject: Re: [R-390] Oops, new mechanical problem (and comments on procedure)

Thought I would post an update on this problem. I finally had a little time to work on it again this weekend. Turns out it was not as hard as I thought to get the 8-16 MHz cam in the right place. It is possible to remove the top gear on that cam by removing the three screws that hold it on, after the gears are fully assembled; (the gear in STEP #6) Then only the 8-16 MHz cam and the 16-32 and 4-8 MHz cam move together. Once the 8-16 is in the right alignment, the other two cams can be loosend and moved back where they belong. It is a LITTLE tricky to get the gear back on, spring tensioning the split gears. Took me about an hour. Sure beats tearing the thing down again. Fortunately I had the geneva gear in the right location.

Date: Sun, 22 Mar 2015 21:07:54 +0200
From: Grayson Evans <wa4gvm@gmail.com>
Subject: [R-390] Which slugs go where?

Trying to replace some of the slugs in the RF and IF slug racks. I ordered a few from Fair Radio. Unfortunately when I got them, they were mixed together. So I am not positive which is which. I THINK the IF slugs are a little yellowish and the RF slugs are plain dark grey (normal slug color)? Is that right? I read this somewhere, but, of course, can't find where now.

Date: Sun, 22 Mar 2015 19:46:28 +0000 (UTC)
From: Larry H <dinlarh@att.net>
Subject: Re: [R-390] Which slugs go where?

Hi Grayson, Good work on the gear train. Yes, the slugs in the one of mine I can get to are as you have stated. There should also be a color dot on the top of each one. In mine the IF have green dots and the RF have red and cream dots.

Date: Sun, 22 Mar 2015 22:13:37 +0200

From: Grayson Evans <wa4gvm@gmail.com>
Subject: Re: [R-390] Which slugs go where?

Only a couple of the slugs have red dots on the top and they are in the RF section, the ones I got from Fair have no dot.

Date: Mon, 23 Mar 2015 21:11:24 -0700
From: "Dan Merz" <mdmerz@frontier.com>
Subject: [R-390] Dead except 0 to 1 Mhz R390 non-a

Hi, I haven't used my R390 for about 2 years and decided I needed to check it out compared to other lesser radios I've been using recently. It's been sitting there in the best spot in my radio area and other than hooking up the speaker it should have been ok. It was still set on 80 meters where I used it last but when I turned it on it was more or less dead except I could tell the audio was working but no indication of signals or ability to peak noise. I finally went down to the broadcast band and was able to tune in the three strongest local am stations between 600 and 1000 khz. The Megacycle change knob seemed to be the key to getting it to work and it was
very sensitive to position and would become alive by moving the Mhz change
knob slightly. And it sounded ok but I think the signal level is somewhat low on the meter compared to what I remember for the one station that I listen to the most at 960 khz. And it suddenly goes dead occasionally when I'm not touching the set but is revived by more or less moving the megacycle change knob slightly. I tried the higher bands but could get no response on any band despite a lot of motion on the Mhz change knob. Is there one particular switch that is the likely culprit? This radio has been pretty reliable in the past after I worked it over quite a bit after getting it 10 years ago but I don't recall having any problems with switches back then. I have the manuals but thought there might be something obvious that
others have encountered. Thanks, Dan

Date: Tue, 24 Mar 2015 04:29:11 +0000 (UTC)
From: Larry H <dinlarh@att.net>
Subject: Re: [R-390] Dead except 0 to 1 Mhz R390 non-a

Hi Dan, Could be the antenna connection or relay, rf amp, or if amp.
Good luck.

Date: Tue, 24 Mar 2015 02:00:08 -0400
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Dead except 0 to 1 Mhz R390 non-a

Letting these receivers just set is not a good idea. They like to get the mechanical switches moved around to help keep the switch wiper contacts clean.

Larry pointed you to the antenna relay contacts.
Try an antenna into the unbalanced input and see what you get.

Just 0.5 to 1 meg working is not a logical problem.
So antenna relay a good place to start.

Sensitivity is so low across all bands that only the three strong AM stations get through. Here you are looking for crud on a tube pin. Pull all the tubes one by one. look for an oxidized pin. reinsert each tube a time or two to cause the tube pins and socket plugs to get scraped clean. De Oxit helps a lot. Some radio Shack electronic parts cleaner is a second choice. Give the wire harness to deck connectors the same treatment.

Triage starts with 150 uv of 455 KHz into the IF deck with - 7 volts on the diode load and with 30% modulation from the signal generator almost a 1/2 watt on the local output on the back panel.

You can use the R390A trouble shooting guide found several places on the web. The test points and tube numbers will change but the procedures follow the same sequence and test values

Between CW and modulated AM you will want about 26 - 29 DB difference in level. If you can not get this out of the IF deck and Audio deck you will never get the receiver up to 10: 1 over all or close to the 20:1 it will do. Once you get the IF and Audio working you can go for MGC on the RF deck and then AGC on the receiver in general.

Do not give up there is nothing in the receiver that can not be fixed.

Some of your comments indicate the RF band switch may have some crud on it. Pulling the RF deck in your R390 is a bit more complex than doing it for an R390A but you may have to go there. Just start with the other stuff first and enough knob twisting may work the band switch contacts clean enough to be OK. Roger Ruszkowski AI4NI

Date: Tue, 24 Mar 2015 08:01:28 +0200
From: Grayson Evans <wa4gvm@gmail.com>
Subject: Re: [R-390] Dead except 0 to 1 Mhz R390 non-a

Sounds like the bandswitch is slightly off, barely making contact on one of the wipers, or one of the wipers is corroded. I had a similar problem. that is the only electrical thing that would be sensitive to slightly moving the

meg. change knob. This means pulling the RF chassis, flipping it over and checking the bandswitch position and or cleaning the contacts.

You could maybe test by measuring the B+ on the various tubes in the chassis (with the tubes pulled) while slightly moving the M.C. knob.

Date: Tue, 24 Mar 2015 09:51:17 -0400
From: djed1--- via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] Dead except 0 to 1 Mhz R390 non-a

Another thing to look at would be the cams and tuning slugs. If a clamp slipped that would also cause a lack of sensitivity.

Date: Tue, 24 Mar 2015 10:21:52 -0700
From: wli via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] Dead except 0-1 Mhz

Hmmm, same thing happened to me this year, after the unit had been sitting unused for years... it was a bad contact in the 6DC6 socket. With no RF amp stage functioning, all I got was AM radio. Needless to say, it took me a while before I found the fault.

Date: Sat, 11 Apr 2015 23:12:13 +0000 (UTC)
From: JAMES GREEN <jagreen3@sbcglobal.net>
Subject: [R-390] Ten Turn mechanism question

I am putting my R-390A RF gears back together and have had no problem until I put the front plate in place. The MC side is kind of sloppy and the gear on the MC shaft will not stay engaged. I looked closely and counted the leaves (or what ever you call them) in the ten turn mechanisms. I have 10 leaves on the MC one and 11 leaves on the KC one. Did I get them mixed up? Am I missing one? I was pretty careful about not losing any parts. If I am missing one it was gone before I started. Any advice would be welcome.

Date: Sat, 11 Apr 2015 20:45:22 -0400
From: "billriches" <bill.riches@verizon.net>
Subject: Re: [R-390] Ten Turn mechanism question

I saw one like this also and believe the unit only went to 30 mhz. Never saw anything in the manuals about it. Maybe Chuck R can enlighten us.

Date: Sun, 12 Apr 2015 19:45:08 +0000 (UTC)
From: JAMES GREEN <jagreen3@sbcglobal.net>
Subject: Re: [R-390] Ten Turn mechinism question

Good news! I must have been half asleep yesterday when I put the thing back together & counted the leaves.

I took it apart today and counted again. There are 11 leaves on each ten turn shafts. Also,the reason the gear on the MC shaft was not meshing properly is I had mashed the gear right down to the bottom and didn't realize I could adjust it up along the shaft later after I put the front plate back on.This kind of mistake is quite unusual for me. I must have been really out of it.

The RF deck is almost finished.I have all the cams aligned and the Veeder Root dial back on at 07 +000Mc.I have yet to align the rotary switch, clean and re-install al the tuning coils.Put the slug racks back in, replace a few caps and the RF deck is finished. This has been the most fun & rewarding part of the project.

Date: Sun, 26 Apr 2015 04:14:10 +0000 (UTC)
From: Larry H <dinlarh@att.net>
Subject: [R-390] R390-A Gear Lubrication Oil Smell

Before I cleaned and lubed the R390-A I'm working on, I read through the Pearls and forum for advice. The overwhelming consensus was to use Mobil 1 75W-90 (or similar non-sulphur) oil for the gears. That I did and it certainly works great!

However, after a day back in the house, I noticed a smell like a machine shop (mostly in my work room). I thought since I put it on very sparingly, I would not experience that. I guess I should have expected it, but maybe it's due to our air and heat not running this week. So now it's back in the garage sitting.
Any how, is there a good oil to use that has a lot less aroma? I was looking online, and saw an oil for compound hunting bows that looks good and is synthetic and odorless - 'Spot On Lubricant - VersaOil'. It's viscosity is 50 at 40*C, which might be a little low. The viscosity of Mobil 1 75W-90 is 103 at 40*C. The viscosity of Mobil 1 10W-30 is 63 at 40*C. The viscosity of Mobil 1 75W-140 is 170 at 40*C. So, is 50 to low of a viscosity to use? Any suggestions that will let me bring it back in the house where I need it would be most appreciated.

Date: Sun, 26 Apr 2015 04:59:46 +0000 (UTC)
From: Norman Ryan via R-390 <r-390@mailman.qth.net>
Subject: Re: [R-390] R390-A Gear Lubrication Oil Smell

I use Mobil 1 90W. It probably is similar in odor to yours. To me the smell is similar to natural gas. The odor does not persist, but goes away over time. So, not to worry, in time your rig can be brought back in from the

garage.
When used sparingly, Mobil 1 works really well and tends to stay where you want it.

A teeny, teeny dab on gear clamp screw shoulders and threads allows the clamps to be tightened more with less risk of breaking. Just be sure the clamp inner surfaces and shafts are completely dry.

Date: Wed, 24 Jun 2015 11:07:56 -0700
From: Rick Popovich <RickP@uei.csus.edu>
Subject: [R-390] R-390A RF Deck Synchronization - HELP !

I'm a regular reader but not always a regular contributor to this group, however, I know that the groups collective knowledge will be able to assist me or at least point me in the right direction to find the information I need.

I am in the process of reviving a Amelco R-390A. I am now working on synchronizing the RF Deck. I've done a number of R-390 decks with great success, however this one is giving me fits. The previous owner appears to have tried to make adjustments to the gears and as a result a number of them were moved in or out on their shafts; placed in sync with gears that they are not supposed to contact or moved out of alignment with the gears that they are supposed to mesh with.

I have removed the deck from the receiver and have aligned all the cams as outlined in an article on one of the well know R-390A sites but I have noticed there are other connections to the gear train that operate a shaft or shafts on the underside of the RF Deck. I have not yet been able to find out how to sync or set the positions of these gears as I am almost certain they are also out of sync as a result of all conditions I described above. Hopefully someone has dealt with this problem before and can enlighten me before I get on the crazy train !

Date: Wed, 24 Jun 2015 14:49:09 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] R-390A RF Deck Synchronization - HELP !

http://www.r-390a.net/R-390A-Gear-Rebuild.pdf

Date: Wed, 24 Jun 2015 12:08:20 -0700
From: Rick Popovich <RickP@uei.csus.edu>
Subject: Re: [R-390] R-390A RF Deck Synchronization - HELP !

Thanks to you and Craig for the information - I will check this link shortly. Another member has pointed out the pages in the R-390A

maintenance manual that show the positioning of the gear(s) on the intermittent switch drive which is the shaft on the underside of the RF deck. It's looking like I may be able to get it all set real soon. I will let the group know how it goes.

Date: Mon, 23 Nov 2015 12:47:24 -0600
From: Reuben Popp <reuben.popp@gmail.com>
Subject: [R-390] Fwd: R-390A dial/gear clamps

Other than Fair Radio, does anyone have a source (or perhaps has themselves) for dial/gear clamps? I explicitly need one for the veeder-root counter, but a full set (or two) would be most helpful.

Thanks in advance (as always), happy early T-Day to all and 73 Reuben

PS I'm not opposed to Fair Radio by any means, I'm just not sure if they'll have a full set.

Date: Mon, 23 Nov 2015 11:01:39 -0800
From: Pete Lancashire <pete@petelancashire.com>
Subject: Re: [R-390] Fwd: R-390A dial/gear clamps

My one and only R-390A is still sealed in plastic, it came from a VERY heavy smokers environment. Someday I'll restore it. Would this be the type of part one could get from PIC or Berg ? Love to see one, might have some ideas

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Date: Mon, 23 Nov 2015 11:40:36 -0800
From: Pete Lancashire <pete@petelancashire.com>
Subject: Re: [R-390] Fwd: R-390A dial/gear clamps

Pic and Berg are two of the big makes and sellers of all things to do with small gears, drives, shafts etc. http://www.wmberg.com/
http://www.pic-design.com/index.html

There are others but these two have been around for ages. Just don't faint when you see the prices :-)

Date: Mon, 23 Nov 2015 13:43:45 -0600
From: Reuben Popp <reuben.popp@gmail.com>
Subject: Re: [R-390] Fwd: R-390A dial/gear clamps

Oh... in that case for the rest, has anyone used something from these two? If so, does anyone have a specific part number?

Date: Thu, 14 Jul 2016 12:15:00 +1000

From: Pete Williams <jupete@internode.on.net>
Subject: [R-390] Gear train rebuild..

A couple of tips from experience..... not extensive but having relied on the Y2K-3 reference, thought this might be a useful addendum. Also saves a great volume of cussing.

1. Before reassembly set the Geneva drive to the 07 +007 position per drawing in manual. Check the wafer contacts on the band switch to agree
with the pics for the 7 Mhz position.

2. Keeping the 8-16Mhz shaft in position when fitting the other gears is a pain. I've used a small bolt ,washer and nut thru the cam hole at the rear of the RF module holds it in place for the duration and on its mark. ---Check tho'

3. Fitting the other gears while maintaining the 2 tooth stretch of the split gear also a pain. I do the 2 tooth stretch and use a short piece of fine wire thru' and around the teeth and twist to hold the alinement. Keep the clamps positioned for ease in tightening when doing the final check/cam setting. The wire can be cut off at this time too.

4.Fitting and mating the gears while tied now is much easier. Don't tighten the clamps on the shafts but just enough to stop gears moving from their adjacent alinement setting. Don't try to hold the shafts to their marks--- sort this at the end.

RF MODULE ... T 204 4 - 8Mhz antenna xfmer/assy
With a seeming increase in these radios and assemblies coming on the scene, it would be wise to check that front end coil.... For whatever reason, previous users either private , mil/navy managed to get large amounts of RF into the front end.

The most recent one I did had the primary fibre former and wire completely carbonised. This would make it the 4'th I've encountered over the years so apparently that frequency range the most popular in high power circles.
Thanks to those who have gone this route before and authored such a fund of knowledge.

Date: Wed, 13 Jul 2016 19:42:07 -0700
From: "Craig" <hamfish@comcast.net>
Subject: Re: [R-390] Gear train rebuild..

No doubt, a gear train rebuild of a R-390/A is a test of one's mechanical aptitude. The current version of the Y2K R3 is a great document. Scott Seickel's "Gear Train Rebuld" in that version made the task easier for me.

Placing the parts in a logical order on a clean work bench while disassembling helps. An uninterrupted 12 hour work period for the rebuild should be set aside.....plus several 6 packs of adult beverage.

Date: Sun, 9 Oct 2016 6:41:20 -0400
From: <wb3fau55@neo.rr.com>
Subject: Re: [R-390] Band Switch Rocking (a new activity)

Hi Don, how right you are about the switch rocking. I am now working on the original Motorola RF deck from the project 390A. The unit we last fixed is a Stewart-Warner RF deck. So I had the intermittent gearset out of this deck and put it in another deck, something else wrong with this one, so I put it back in the Motorola. So using the method of measuring resistance reading on bands 0 thru 7 it works fine, running the switch clockwise. Running it back counterclock wise, it misses the reading in the 2 to 4 range unless I rock it back and forth. So I do see some backlash in the gears, as likely the problem. But this is an old 58 contact item. The gears are gummy with dried up grease.
So I am cleaning up all this. Lot of fun, but it will look nice and work good when done-hi.

---- Don Heywood <wc4g@knology.net> wrote:
> Russ, more on the bandswitch... I have found that when I don't use one of my
> 390's in a while I need to rock the bandswitch to get good signals. I think
> you know that the bandswitch only moves between 'octaves', not with each >MC change. So what I do is rock the MC knob several times at the point where >I know the bandswitch will move. It moves between .5 and 1MC, then from 1 to
> 2MC and then 2 to 4MC, etc. I will rock the MC knob between 1 and 2, 3 and
> 4, 7 and 8 and 15 and 16. This is where the switch moves. This sometimes
> cleans up the switch. Hope I did not confuse you. Don

Date: Sat, 10 Dec 2016 15:41:30 -0500
From: Glenn Scott <wa4aos@aol.com>
Subject: [R-390] R390(A) Gear Chemistry Questions

There are a number of gears in the mechassembly of the R390 series receivers that are brass colored. I'veheard these called bronze and/or brass for decades. Does anyonereally know the actual chemistry involved

in the manufacturing of thealloys used in those gears. Passing a strong Neodymium magnetacross the surface, you can feel a slight attraction as you'd expectfrom a high grade of near pure silver, however, the attraction doesnot pull the magnet to the gear. Is this due to a small iron content inthe alloy or does brass and bronze exhibit the same characteristicsas near pure Ag? In my experience brass would be too soft for use in those gears without there being other metals in the alloy; I am NOT sure about the characteristics of Bronze. These are very hard gears and have heldup very well in most of the R390 series receives I have restoredduring the last 20 years. I'm just curious if anyone can confirm the provenance of these gears?

Date: Sat, 10 Dec 2016 16:25:58 -0500
From: Bob Camp <kb8tq@n1k.org>
Subject: Re: [R-390] Legible Question R390(A) Gear Chemistry

Brass = copper (50 to 70% + zinc
Bronze = copper (88%) + tin
Nickel Silver = copper (60%) + zinc + nickel
Gunmetal = copper (~85%) + zinc + tin

Both brass and bronze *may* have other stuff in them. Bronze is often a mix of several materials in addition to the basic copper and tin. The above is hardly an exhaustive list of all copper alloys. Since alloys that have both zinc and tin in them are possible, you can have stuff that could be either a brass or a bronze depending on your point of view.

Best bet - they are some sort of brass. Bronze is a mess to machine and brass is very easy to work with. Gears are made on gear cutting machines. It is a process not unlike other metal machining. Gear cutting machines are much happier working with brass.

Date: Sat, 10 Dec 2016 19:29:37 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] R390(A) Gear Chemistry Questions

> Does anyonereally know the actual chemistry involved in the manufacturing of thealloys used in those gears

360 Brass is used almost exclusively for gears like those. It is very strong and wears well (due in part to a small percentage of Iron), corrosion-resistant (due to the high Zinc content), and is easily machined (due in part to a few percent Lead). I cannot say with certainty that's what they used, but the physical
characteristics of the gears (and the bushings) are certainly consistent with 360, and it would have been an almost automatic choice for a

mechanical designer.

Date: Sat, 10 Dec 2016 20:26:15 -0500
From: Glenn Scott <wa4aos@aol.com>
Subject: [R-390] R390 Gear Chemistry

Thanks Bob and Charles.. Not being a chemist, I didn't know what the composition was but I have heard those gears called brass and bronze interchangeably for decades; I was just curious based on my experiences with brass. The info Charles gave regarding the material may be 360-Brass seems to be a good choice/answer. I did some reading from a google search and found the following link and this seems like the best description of what those gear actually be made of.

https://www.speedymetals.com/information/material13.html

My experience over the years with brass has been, it's somewhat soft and I questioned its use as a gear, especially, in receivers that have survived well after 5 decades. My brass experience was obviously using a different alloy of Cu and Zn. And perhaps the slight attraction to a Neodymium magnet was possibly due to the fraction of 1% of Fe. Since brass can be alloyed numerous ways, Bob's comments were also VERY helpful.. Not that anyone probably cares too much, but perhaps someone should make a note in the Pearls Of Wisdom Files regarding 360-Brass. Perhaps some other future R390A and/or (Non A) enthusiast may be curious. Maybe that same alloy was used in the 75A, 51J and R388 series receivers as well.

One thing that's great about this list is, generally, any reasonable question sent up the proverbial Flagpole is usually met with kind, competent, knowledge and or experiences from many of the exceptionally bright people who frequent here.

Date: Fri, 16 Dec 2016 00:05:18 -0500
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Gear Chemistry

Will some one smack a cam in a hardness tester and give us a number. This will give us a range of likely alloys. Maybe not, heat treating could be in the works. I always though that looking in many receivers since the late 60's that the metal was just a stock known machine alloy. It stamps into parts well and wears well for a 100 years of use. Obviously the gear trains are not made of a pure soft brass.

Over in manufacturing, these gear trains are just more big clock parts. By 1955 it was just the last end runs on some well used war materiel production machinery. Nobody was building big clocks and analog bomber

range finders and equipment of such ilk. The gear trains of these receivers were the state of manufacturing art. The need for cash registers, typewriters, bomb-sights, artillery gun sights, and other special machinery had brought the underlying
industrial capability to a level where small production runs (500 units in the total order) were produced order after order and parts are truly replaceable and interchangeable.

In 1966 I did not see 2016 on the horizon. Vacuum tubes are the steam engines of electronic communication as we know it on the Internet. The US military transmitters and receivers were the Union Pacific Big Boys of their era. Dinosaurs, all come and gone and now mythology.

Why not just good old cartridge brass not exactly deemed good enough for casing brass but good enough to role in to sheets and stamp parts from. Recycle, recycle, recycle, This activity is not a new idea.

Date: Fri, 16 Dec 2016 08:58:56 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Gear chemistry, magnetic effects on non-ferrous metals

The dragging effect that you felt when moving a strong magnet over the gear
is generated by eddy currents being induced in the metal. It is described with Lenz's law and works just as well with aluminum that has no ferrous content.

It has a few really neat (and common) applications, the magnetic drag is also used in vending machines to detect fake coins as a good coin has a very specific amount of drag that is the result of the eddy currents as it moves past a magnet. Too fast or too slow and the coin is rejected.

I used a plastic pipe with a magnet dropped through the center as a great teaching tool of the effect. The magnet takes so many milliseconds to go from end to end and I set up a set of photodetectors at each end with a signal generator and pulse counter to show the time for the magnet to pass
through the pipe Then I slipped an aluminum doughnut outside of the plastic
tube and dropped the magnet through the center. It was very apparent in how
much the eddy currents slowed down the magnet on its fall through the pipe.

Date: Tue, 21 Mar 2017 12:39:09 -0400

From: hackmohr@myfairpoint.net
Subject: [R-390] R-390\URR Geartrain Problem

It's been a year and a half since I last posted here. It took that long but I finally found the spare parts I need to continue a R390\URR rebuild. I've got the RF Deck out again and a mostly complete spare deck for parts. I have some questions about the mechanical side of things. I'm not a gearhead so I'll try and keep my nomenclature as accurate as I can.

There are 2 inner cams on the 2nd variable IF camshaft which control the motion of the 1st IF can rack. These cams have a rounded convex side, a sharply pointed peak, and a rounded concave side. The IF can rack rollers on both of my decks have no problem traveling up the convex side to the peak and down the other side. But reversing the geartrain movement, the rollers get stuck on the concave side of the cams and are unable to travel over the peak. The cam edge is almost vertical and presses against the rollers rather than allowing them to travel up and over. The geartrain drags down as the camshaft spins inside the gear. On both decks the gear clamp screw is stripped and unable to tighten around the camshaft. (As if countless techs have tried to fix the problem by just tightening the gear clamp enough to force the rollers over the cams)

I haven't yet pullled the IF can rack apart but I'm assuming that the rollers stuck against the cams is something that can be adjusted out? Any help will be appreciated. Thanks.

Date: Tue, 21 Mar 2017 14:01:01 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R-390\URR Geartrain Problem

I suspect that the rack slides are dirty and that the rack rollers are stuck (thus not "rolling" anymore). My advice is that you have to remove all the racks (number those before.. more easy when you re-assemble). Clean everything ! Clean also the gear train the best you can. BTW, you really have to replace the stripped gear clamps screws ! Re-align the cam positions at 07+000 very carefully. Lubricate all the gears with synthetic oil (some uses Mobil synthetic oil, but I used Finish Line "Cross Country" Synthetic Bicycle Lubricant). Lubricate the rack rollers with the same (free them if they are stuck). Re-install the racks one by one and check their operation thru a complete travel (from both MC and KC tuning knobs). Lubricate the slides lightly with synthetic oil too.. At the end, everything should operate easily and smoothly.

Date: Wed, 22 Mar 2017 11:42:38 -0400
From: hackmohr@myfairpoint.net
Subject: [R-390] R-390\URR Geartrain Problem -- RESOLVED

Thanks to Jacques VE2JFE, and Don WC4G for pointing me in the right direction. It never occured to me that the inner cams on the 2nd IF camshaft were also a part of the overall cam alignment. I thought I had a separate problem to fix first. I tossed the bad gear clamp screw, aligned the cam, pulled a good screw from the spare, and tightened it down. The rest of the cams fell into place without adjustment. ?So the RF Deck is cleaned, oiled and aligned. Ready for the coil cans and slug racks to go back in.

Date: Mon, 3 Apr 2017 11:58:41 -0700
From: Dan Merz <mdmerz@frontier.com>
Subject: [R-390] Kilocycle knob moves megacycle change knob

Hi, my 390a has symptom that moving the kilocycle knob also moves the megacycle change knob. I haven't explored yet but it seems megacycle knob itself is "gummy" and not working right so I haven't forced it much. This receiver hasn't been used much in last 10 years but was working smoothly probably a year ago. And had been cleaned and lubed with synthetic oil, maybe 15 years ago. I suspect some shaft is sticking to cause this odd symptom. Where to look first?

Date: Mon, 3 Apr 2017 15:17:29 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Kilocycle knob moves megacycle change knob

It's been a while since I had one open, but I'm pretty sure there's a spring-loaded detent that's supposed to lock the MGC shaft/knob at each position. Perhaps that's not working correctly?

Date: Mon, 3 Apr 2017 15:20:37 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] Kilocycle knob moves megacycle change knob

The differential drive is frozen ?

Date: Tue, 4 Apr 2017 14:34:17 -0700
From: Dan Merz <mdmerz@frontier.com>
Subject: Re: [R-390] Kilocycle knob moves megacycle change knob

Jacques, thanks for suggestion. The problem was solved by lubrication of the sliding racks and some exercising of the mechanism. I got some off-post suggestions from Roger R. and I'm copying you on details of my use of his suggestions. I'll lightly re-lube the gears but that's beyond what was needed. Reducing friction there can't hurt though the KC knob turns pretty easily and the MC knob is holding ok at the detent position after I

lubed the racks.

Comments to Roger
I needed a little perspective before going off the deep end. I see the detent mechanism and realize with your comments and after looking at the set on the bench what is going on. I'm pursuing that some re-lubrication will solve the problem. The differential gear can throw KC motion back on the MC knob if the detent isn't holding strong enough relative to friction of gears on the other path for motion. I'm thinking lubrication of the path of gearing and the sliding racks beyond the differential will take care of it. The detent almost reliably holds now after I played with the motion a bit so I think lubrication will do it without messing with the detent mechanism. It took me a while to see where the detent is but finally was sure when I i.d'd it in chapters 6 and 10 of the 21st century manual.

Date: Fri, 07 Apr 2017 10:24:48 -0400
From: hackmohr@myfairpoint.net
Subject: [R-390] R-390 RF Deck Reinstall - Loading Two Teeth?

Can anyone explain what is meant by "loading gear by two teeth" in the TM-35 manual procedure for replacement of the RF Deck? There are 3 mentions of this in the procedure: (6) "Load the large brass split gear two teeth", (9)"Load the Megacycle Change control drive gear by two teeth" and (12) load the gears two teeth". I'm assuming it's a procedure to keep the RF Deck gears from clashing with the chassis gears when you reinstall the deck? But I'm mystified as to what and how you "load two teeth". BTW I've started a webpage for a blow-by-blow account of my rebuild if anyone is interested at http://home.myfairpoint.net/~hackmohr/r390/

Date: Fri, 7 Apr 2017 09:38:04 -0500
From: Cecil Acuff <chacuff@cableone.net>
Subject: Re: [R-390] R-390 RF Deck Reinstall - Loading Two Teeth?

The split gears are spring loaded...meaning the two halves have a spring that can tension the difference in the two halves rotational position relative to each other. When relaxed there is zero difference between their relative rotational positions. To induce loading, while unmeshed with its mating gear, you rotate the two gears in the split pair a number of teeth relative to each other against the spring tension...you hold that relationship while you mesh that split gear with its mating partner in the gear train. This tension reduces backlash in the gear train. I mentioned a "number" of teeth because some like a two teeth preload...some one...some maybe three. It's a trade off...more preload results in a harder to turn geartrain but little backlash...less preload an easier to turn gear train with a bit more backlash.

Hope I didn't confuse the issue. It's actually more difficult to explain than to do. Cecil K5DL

Date: Fri, 7 Apr 2017 11:22:51 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R-390 RF Deck Reinstall - Loading Two Teeth?

With the gear teeth disengaged from its mating gear(s), allow both gear halves to self rotate to the position where the spring has no tension.

If the gear teeth are not completely aligned, then in the direction of increasing spring tension, rotate one gear half against the other gear half to align the teeth to the first position where the teeth align. That should not be more than 1/2 tooth difference and that's essentially "zero spring loading".

Continue rotating the gear half in the same direction to where the teeth align again. That's "one gear-tooth spring loading".

Continue rotating the gear half in the same direction to where the teeth align again. That's "two gear-teeth spring loading".

Like Cecil said, it's more difficult to describe than to do. :)

Date: Fri, 7 Apr 2017 11:26:26 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R-390 RF Deck Reinstall - Loading Two Teeth?

I should add that once in the spring-loaded position (two-teeth, three-teeth, whatever), then reengage the split gear to its mating gear(s). I suppose that's obvious but...

Date: Sun, 22 Oct 2017 18:14:01 -0500
From: Stan Gammons <s_gammons@charter.net>
Subject: [R-390] R-390A gear train rebuild

I ended up replacing the gear clamps with some from a parts RF deck I got from a list member. Thanks Russ! Now I'm reassembling the gear train following the gear rebuild document on the R-390A.net website. The steps for re-installing the final differential gear don't seem right though. I don't see an easy way to load the split gears on the 2-4 Mhz slug rack which mates with the rear gear on the final differential gear if one has the 1-2 Mhz gear installed. It looks like it's going to be hard enough to load them even without the 1-2 Mhz gear installed. But, the gear rebuild instructions do not mention loading the 2-4 Mhz split gear though. Any tips on re-installing the final differential gear?

Date: Sun, 22 Oct 2017 20:25:56 -0500
From: Stan Gammons <s_gammons@charter.net>
Subject: Re: [R-390] R-390A gear train rebuild

Never mind, I figured it out after looking at the TM. Appears as though I have a problem with the final differential gear though. The brass gear on the front doesn't turn. Does that gear solder to the bronze center bushing?

Date: Wed, 10 Oct 2018 09:37:32 -0400
From: dog <agfa@hughes.net>
Subject: [R-390] Cleaning the Megacycle bandswitch

It appears that the gain in my 390A will change over time. I've tried changing tubes to no avail. Then I noticed that if I rocked the Megacycle Change the gain goes back to 'normal' and stays there for a while. It's also noisy changing bands. What is the recommended procedure to clean that switch?

Date: Wed, 10 Oct 2018 10:31:42 -0400
From: Guido Santacana <gsantacanav@gmail.com>
Subject: Re: [R-390] Cleaning the Megacycle bandswitch

What I have done to clean the switch in the rf/crystal deck is to go over it carefully with a camel hair brush dipped in Deoxit. This is done just before returning the RF deck to the main chassis. When everything is back in its place I move the switch through all bands. It has worked for me.

Date: Wed, 10 Oct 2018 17:02:12 -0700
From: Larry H <larry41gm@gmail.com>
Subject: Re: [R-390] Cleaning the Megacycle bandswitch

I believe that most of the RF deck switches are ceramic, so a little cleaner or solvent on them is not a problem. But, the 2nd xtal osc switch is phenolic and it can absorb chemicals and damage it by reducing it's insulating characteristic. Care to not get any cleaners or solvents on them is important. Deoxit is good to use on them, but not on the phenolic part.

Date: Wed, 10 Oct 2018 20:22:02 -0400
From: Guido Santacana <gsantacanav@gmail.com>
Subject: Re: [R-390] Cleaning the Megacycle bandswitch

You are correct Larry I had a bad experience using Deoxit on a Phenolic wafer switch in a multiband radio.Since then I never sprayed Deoxit on

Phenolic wafer switches. What I did with the R390A was to apply it with a fine brush only on the contacts being extra careful to avoid letting much Deoxit on the wafer. It worked but your mileage may vary. I am sorry about not mentioning that detail before but thanks for bringing it up.

Date: Wed, 10 Oct 2018 20:43:02 -0400
From: dog <agfa@hughes.net>
Subject: Re: [R-390] Cleaning the Megacycle bandswitch

The early 2nd Xtal oscillator switch (148) is indeed phenolic, I still have it out. I'm sure the older one is too, but I'll have to remove it to check. It needs cleaning anyhow. I have some De-Ox I can be sparse with. Good thing I didn't spray that old can of 'Crown 8070 Electrical 88' cleaner on it. That stuff was great though, but you can't get it anymore. It was great on pots.

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From: dog <agfa@hughes.net>
Subject: Re: [R-390] Cleaning the Megacycle bandswitch

The early 2nd Xtal oscillator switch (148) is indeed phenolic, I still have it out. I'm sure the older one is too, but I'll have to remove it to check. It needs cleaning anyhow. I have some De-Ox I can be sparse with. Good thing I didn't spray that old can of 'Crown 8070 Electrical 88' cleaner on it. That stuff was great though, but you can't get it anymore. It was great on pots.

Date: Mon, 25 Feb 2019 18:34:13 -0500
From: Ed G <ed.n3cw@gmail.com>
Subject: [R-390] Main Dial Tuning Friction

Been following this list for many years, and appreciate the wisdom here. I have a Capehart R-390A in great shape. It works well and has no problems except that the main tuning dial (the ?Kilocycle Change? dial) is somewhat tight not excessively so, but a bit hard to turn. I have cleaned the tuning mechanisms, and used Teflon grease in a few spots and synthetic oil sparingly on the gears. Because the receiver is working so well I am hesitant to disassemble anything too far.

I've read lots of R-390 material over the years, but don't recall seeing much about a recommended way to approach gear train friction so that one ends up with the smooth, almost effortless tuning 'feel' I have experienced on other R-390As (other than a total disassembly/rebuild).

Perhaps there are certain problem areas in the mechanism that tend increase tuning resistance over time? Something I could address without a complete tuning module disassembly? Any recommendations would be appreciated.

Date: Mon, 25 Feb 2019 16:08:38 -0800
From: <hamfish@comcast.net>
Subject: Re: [R-390] Main Dial Tuning Friction

Two things come to mind. The KC shaft passes through a bushing and the hole in the panel has a larger diameter than the bushing. Could be misalignment between the two. Have you checked how freely the PTO shaft turns? The descant bag in my Motorola PTO had broken, can't tell you how that added grit to the works.

There is lots of free play of the PTO bracket and the already mentioned bushing, getting everything into proper alignment takes just a few minutes.

Date: Mon, 25 Feb 2019 18:29:07 -0600
From: "Francesco Ledda" <frledda@att.net>
Subject: Re: [R-390] Main Dial Tuning Friction

It may be a misalignment of be the brass guide on the front panel behind the main tuning knob. This is somewhat movable and needs to be properly aligned. Its purpose is to avoid bending the tuning shafts.

Date: Mon, 25 Feb 2019 18:16:32 -0800
From: Larry H <larry41gm@gmail.com>
Subject: Re: [R-390] Main Dial Tuning Friction

Ed, You can try doing the recommended PM from the tm-11-856a on p. 150, but after all that time, it probably won't help that much. The 3 areas that put load on the kc tuning knob are the vfo, gear train, and the slug racks. You can try to identify which is doing it by the process of elimination. Try to disconnect the vfo at the oldham coupler, Try manually raising up the slug racks one at a time when one is at the bottom of travel and see if it's sticking (be careful to not go too high). I usually find them to be a problem. If you determine that the gear rack is part of the problem, cleaning and lubing without taking it apart rarely does much good, and some times makes it worse.

A synthetic heavy weight oil should be used on the gears. Most automotive oils will have that familiar aroma, if you like that. There has been lots written on this subject and is in the pearls in 'rf deck, mechanical'.
Link to pearls: http://www.r-390a.net/Pearls/

Date: Tue, 26 Feb 2019 03:27:15 +0000 (UTC)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Main Dial Tuning Friction

Francesco Ledda, The R390 and its variant's are open case gear boxes. We just can not do an oil change with additives and spin the gear train clean smooth and deburred. Stop and look at the mechanical leverage being applied in the cam racks. Nice clean slides and rollers. Free hanging cores.

Minimum rack spring tension all come back to your wrist. Clean machines are friendlier pets. Compressed air. Vacuum shop vac with a short small diameter snout. A process called dry cleaning is where the front panel gears are hung off the edge of a table. spray in solvents and air blow dry. Hair dryer on Hi Fan No heat works well. By all means check all your front panel bushings. Five each. Drop the VFO back and slide the washer out of the coupler. A lot less friction could be a VFO shaft lube problem. Same stiff operation and you can start looking for the friction points. Octave to Octave in the cam racks will each feel different.
Roger Ruszkowski

Date: Fri, 1 Mar 2019 13:11:36 -0600 (CST)
From: K PERALES <kenperales@comcast.net>
Subject: [R-390] Fix for ZERO ADJ.

Has there been anything written about repair of the ZERO ADJ., when it does not seem to release the clutch to zero the kHZ dial setting. I am off from 1 to 3 kHZ over the full range of 0 to 32 MHz which is probably more than just the zero adjust but I cannot do even the basic adjustment on any calibration point from top to bottom. Looking down inside the front panel, I can see shaft turning and as it gets close to the stop point turning clockwise, I can see what I assume is the clutch plate just barely moving. I have looked through many of the instruction manuals I have but seen nothing about repairing the ZERO ADJ. I am guessing that someone out there has repaired this at some point.

Date: Fri, 1 Mar 2019 20:03:52 +0000 (UTC)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] Fix for ZERO ADJ.

Are all the panel screws present and tight? They have to be to press in the clutch. Also, is the zero adjust actually pressing in the clutch If it is and the clutch plates are not slipping you might get them to release and slip by dropping a little oil on the clutch plates. If the clutch plates are dry then they won't slip at all and the mechanism won't work as designed.

One more thing Ken. The zero adjust knob has a little tab on the backside of it that works as a stop against a like tab on the shaft. If your knob is seated down too far on the shaft or was not tightened on the shaft at the right starting point, then the stop on the knob/shaft will prevent the clutch from being pressed in sufficiently to cause the plates to separate. Take the knob off and examine if it is hitting the knob stop prematurely.? If it hits the stop prematurely, back it off counterclockwise a bit and reset the set screw and try again.

Date: Fri, 1 Mar 2019 20:50:00 -0000

From: "Andy G8JAC" <g8jac@btinternet.com>
Subject: Re: [R-390] Fix for ZERO ADJ.

I just had to do mine. The "stop" you feel is a flange on the inside of the knob contacting a lug held by the nut that holds the assembly to the front panel. The plate that you see is a pusher plate that operates the clutch which is behind the large gear.

The adjustment is detailed in the TM but I don't think that it was reproduced in the Y2K manual. Remove the knob from the Zero control. Wind in the shaft until you feel the plate on the end contact the clutch pins, then back off to give about 1/8 inch free play. Re-attach the knob in a position so that turning it anti-clockwise nearly hits the stop. Turning Clockwise should now release the clutch (so that you can move the VFO without moving the Veeder-Root counter). You may have to juggle the position of the knob on the shaft to obtain a good positive clutch release as the knob hits the stop lug.

Actually, I found that doing all this still didn't give me a good clutch release so the only solution was to drop the front panel down so as to see what was happening. The culprit was the disk on the end of the Zero adjust shaft was so loose that it was tipping over so that it failed to give even pressure on all three clutch pins so the clutch didn't disengage cleanly. The solution was to remove the shaft and disk and peen the end over so as to stop the disk wobbling. Re-assemble, adjust as above, problem fixed. If yours is too far gone or broken, Fair Radio have them at $20.

Date: Fri, 1 Mar 2019 16:41:04 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Fix for ZERO ADJ.

I had the same/similar problem on one of my R390As. I think someone had replaced the original plate/disk with a piece of sheet metal that didn't contact the clutch pins very well. A replacement shaft fixed the problem.

Date: Sun, 10 Mar 2019 13:35:31 -0400
From: dog <agfa@hughes.net>
Subject: Re: [R-390] J208/P108

Now it's working. I'm not sure what I did. Maybe the whole thing is just 'static between the earphones'. I get pretty confused easily these days.

Can someone tell me how to tighten the nuts in the front panel for the tuning dials so that they don't bind when tightened. I have the mechanism working real smooth, but when I tighten the panel nuts, they bind. Same with the ANT control.

Date: Sun, 10 Mar 2019 17:22:57 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] J208/P108

The tuning controls bushings and the ANT one have to be tightened AFTER all the panel nuts are seated properly. The is a certain amount of "play" when the bushing are not tightened in their respective panel holes. This was done on purpose. Unscrew the bushing nuts, tighten all the panel screws, then tighten the bushing nuts: all should then be OK, without binding.

Date: Sun, 10 Mar 2019 21:34:32 +0000 (UTC)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Binding in the bushings

Dave, (agfa@hughes.net) you ask Can someone tell me how to tighten the nuts in the front panel for the tuning dials so that they don't bind when tightened. I have the mechanism working real smooth, but when I tighten the panel nuts, they bind. Same with the ANT control.

Dave, the 1968 school house text book answer to your question is "very carefully" Pull the knobs and bushing one more time. The shaft hole through the bushing and the shaft must align. The shafts by design are square to the face plate and I still have some nice bridge stock shares for sale. Look for a burr around the hole in the panel on both sides of the panel. In some previous wrench some metal was jammed up and now it sticks up in the way of least friction.With the last wrench tighten the bushing is pulled to the face plate and cocks when it can not set square to the panel.The bushing can be honed, drilled machined for a better operation.Rotate the bushing 1/8 turn and tighten. Repeat rotation and tighten until you find the spot of best alignment where the error of bushing hole to bushing face has the minimum difference to the error of the shaft being perpendicular to the face plate. Hang the front panel off the edge of the bench and with the receiver resting flat on the surface of the bench loosen all the front panel screws and let the alignment relax. Start with the 10 32 side bolts and do the small sub chassis hardware last. Loosen the RF deck green screws and giggle the deck a bit for a better alignment.The order in which the RF deck green screws are tightened will torque the RF deck and thus the shaft alignment to the front panel. All these difference values are measured in RCH.It is not a lot but it is the difference between ok and best of class.Use a fiber washer behind the bushing nut to compensate for the not squarely aligned parts. It wrenches up tight enough to hold the shaft center against strong arms but is still at a lower friction level on the shaft rotation.Set the bushing up finger tight where you want them and put a drop of lock tight in between the bushing

and the panel to glue the bushing into a low friction position. The glue will set and form the shim needed between the bushing face and the front panel. Elmer's white glue may be a better choice. Once you clean the burrs out and find you still do not have a low friction operation due un straight and miss aligned things, you may want to hone the bushing hole. A bobby pin, length of emery sand paper and electric drill motor will put a polish in the bushing hole quite easily. The idea of sliding a cutting tool onto the shaft and cutting the paint and facing a seat around the shaft hole in the face plate presumes the bushing hole and its seating face are the same true as the cutting tool. Not going to happen. Some face plate holes are still abysmal and have been since their creation. It gauged to specification so keep that wheel a turning and give a little more each day. Over size but not to big not to small not near imaginary center. Some of the bushing faces are minimum size. A pair of thin flat washers used with these bushings offered a solution to keeping the bushing in proper alignment and offering low friction operation. This is a feel skill part of being a hands in Amateur with a R390 receiver. Dave some where you just get a sense of where it needs to be and how to make it happen. Yes the parts are interchangeable but not yet by mindless robots.The difference between it works and it works well is a human touch.You tighten up snug and feel for the coming friction.You find you can bump the shaft, skewing the bushing a RCH and relieve the friction. Know you know which way you need to travel when bringing the bushing from snug to tight.You now bump the snug bushing back from best alignment to some imaginary point.You then wrench the nut tight on the bushing while the pair skew the needed RCH back to a point of perfect alignment. Once a month a maintenance man grabbed all the knobs on a receiver and felt their operation. We expected a proper feel. On the spot repairs and adjustments were completed as needed. Do 10 in one work shift no over time. Six days on and two days off in an eight day week rotate through a day, swing, mid shift schedule. These bushings were always good well aligned and trouble free. As strange as it may sound, I suggest the whole RF deck needs the green screws set loose, the bushing aligned, the bushing tightened, and the deck giggled to free behavior. Tighten the internal RF deck screws before you tighten the external RF deck screws along the left side panel. Then redo the bushings again. Seriously the order in which the receiver and decks are wrenched together makes real differences in a receivers friction performance. This is where you start maintaining a receiver Jay Leno Garage style as opposed to Guy getting an edge on a kitchen knife. I am sorry Dave, but the answer is practice, practice, practice.A mantra is that yesterday this receiver was working. Today it is not so well. Expectation is that only one thing is now wrong with the receiver. Bushing bind.They did not use to bind and have worked well for over 50 years.

All three shafts and bushing bind at once. From day one all the R390

receivers have had a chassis setup and alignment. The units are bolted together panels of metal punched within tolerances. We keep it together from maintenance activity to activity. But move a receiver thump and thump and things skew. Do not lift your receiver by the front crash bars. Do what you need to do to get what you have smooth. Some fender washers may be needed. And they may not be uniform in thickness when fit to finish. Respectfully, Roger Ruszkowski
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Date: Sun, 10 Mar 2019 18:22:04 -0400
From: dog <agfa@hughes.net>
Subject: Re: [R-390] Binding in the bushings

Thanks for the hints. I figured it was not going to be simple. As of yet, I'm not quite ready to install all the front panel screws until I get everything to my liking. But I'll take these ideas when I get there, hopefully soon. I'd really like to button up one of these units as a good working and tested unit. The other one will come along.

I'm thinking my issue with the CAL was that I just was not turning on the BFO so I could hear it. I know, stupid, but I do stupid things, kind of like why I can't remember why I just went into that last room.

Date: Wed, 7 Aug 2019 18:00:27 -0700
From: Larry H <larry41gm@gmail.com>
Subject: [R-390] R-390A KC knob bind

I mentioned in my last post that the KC knob in the 390A I'm working on had a bind in it. I thought I checked the VFO when I first got it, but I guess not close enough - that's where the bind was at. And it was not on the inside, it was the Oldham coupler clamp (which was not tight). Somehow the coupling had gotten pushed onto the shaft too far and it was rubbing on the mounting frame every rotation. While I had it out, I checked the tube, components and lubed the inside points. It works like new, now. The nut on the end of the core is just right tight on the shaft, so there is no end play there or on the shaft bearing. I have not done measurements on it, but should be a very good unit. Now the KC knob turns smoothly and is even a little easier to turn after the maintenance.

Back to the knobs. Got to get some more paint - Lowe's was out today.

Date: Tue, 18 Feb 2020 18:17:56 +1300
From: Ken <kenharpur@startmail.com>
Subject: [R-390] R-390 Veeder Root counter

My R-390 is in need of a new Veeder Root counter...there are quite a number of them available on our favourite auction site. My question is, are

the Veeder Root counters interchangeable between the R-390 and R-390A? It looks to me like they are identical but I just want to be sure before I go ahead and buy.

Date: Tue, 18 Feb 2020 23:11:36 +0000 (UTC)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R-390 Veeder Root counter

Good news the answer is on line.Out on the R390.net site are two different parts manuals. You guessed it one for the R390 and one for the R390/A TM 11-5820-357-35PTM 11-5820-358-25P Cruse the noun nomenclature until you find the description and part number. Look the number up in the other parts manual. If the two counters are not the same at least you will know which part you do need. Sent from my childhood bedroom while my library of visual reference is in storage. Input at an ergonomic work station for “south paws” even. Ken, all the documents are on-line. Download yourself some PDF copies. Read the AGC thread. Some of the best exchanges in years on the topic. The manual is good for part numbers and cross use. The manual also has an AGC schematic that follows actual construction. “Actual circuit” operation is not explained in the TM. The glass box view is very opaque, 60 years after production some new problems are coming up as parts do get old and give it up.
Respectfully Roger AI4NI

Date: Wed, 21 Apr 2021 08:56:55 -0700
From: Foster <fosterp@pahrump.com>
Subject: [R-390] R-390A ZERO ADJUST CLUTCH

I am having problems with a Zero Adjust Clutch. The pins are being pushed in OK but the clutch is not releasing. Anyone have any hints/recommendations on how to clear this problem certainly would be appreciated.

Date: Wed, 21 Apr 2021 14:20:08 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R-390A ZERO ADJUST CLUTCH

The problem came suddenly or it is a R-390A that you had not used for a long time ? Have you tried to check the end-play of the zero adjust button, does there is a very small clearance between the disk and the pins when the control is turned fully counter-clockwise, or there is a big one ? I had the same kind of problem with an EAC...

Date: Wed, 21 Apr 2021 19:38:11 +0000 (UTC)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] R-390A ZERO ADJUST CLUTCH

Sounds like the knob is hitting the stop prematurely. Turn it to the right until it hits the stop, then loosen the set screw and turn the knob to the left about 1/4 turn, and reset the set screw. That may give you a it more authority on pushing in the clutch.

Date: Wed, 21 Apr 2021 15:37:36 -0700
From: Larry H <larry41gm@gmail.com>
Subject: Re: [R-390] R-390A ZERO ADJUST CLUTCH

Hi Foster, If you look down at the gears where the clutch is at, you should be able to see the plates move apart when you turn the knob clockwise. If the clutch plates do not move apart, then the disc that pushes on the 3 clutch pins is not pushing them in far enough. If you can see the clutch plates move apart, then they probably need to be cleaned.

Date: Wed, 21 Apr 2021 17:42:41 -0500
From: Cecil <chacuff@cableone.net>
Subject: Re: [R-390] R-390A ZERO ADJUST CLUTCH

And the zero adjust has a limited range.
Beyond that it's an alignment problem!

Date: Wed, 21 Apr 2021 17:39:35 -0700
From: Foster <fosterp@pahrump.com>
Subject: [R-390] R-390A ZERO ADJUST CLUTCH

Thank to all those that have provided an input to solve the problem. I Certainly appreciate your efforts. I have dis-assembled the mechanism and cleaned the 4 spring washers, 6 copper discs and pressure plate (with the 3 visable fingers) and the split gear assembly.. Now the challange is to put it back together. Thanks again !

Date: Wed, 1 Dec 2021 08:20:19 -0700
From: <gary.biasini@shaw.ca>
Subject: [R-390] R-390a Refurbishing questions

I composed this email yesterday and sent it but Outlook shows no evidence of that unfortunately. I am hoping for some help from the group. In cleaning up 2 R-390a receivers:

1. I lost one spring from the RF rack - can anyone point me to where to buy replacements?
2. I dropped one RF rack and a ferrite rod broke in 3 pieces - can I just glue them back together and will they work as expected? If so, what glue is recommended? If not, can anyone point me to where to

buy replacements?

3. When looking at the bare chassis after removing the RF and IF modules, on one radio, the grounding comb is installed with the teeth pointing to the right, away from the IF chassis and in the other, it is pointed to the left, towards the IF chassis. Which is correct or does matter?

Date: Wed, 1 Dec 2021 12:30:32 -0500
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R-390a Refurbishing questions

1_ RF rack springs: I still have some spares that I can send to you if you are willing to pay for the postage.
2_ Argh: shit happens, isn't it ? Is it a RF or an IF slug ? As you can remember, they are not interchangeable. The RF ones (red and white dotted) have a relative permeability of 10, the IF ones (more greenish or having green dots) have a relative permeability of 4. Yours was used in which rack ??
3_ The "comb" should be below the junction of the RF and the 2nd crystal oscillator chassis.

I never take picture of the "naked" chassis when I restored my three sets (I should have), but it makes no sense if the combs are not contacting the RF chassis edge. For the slug + spring, let me know.

Date: Wed, 1 Dec 2021 10:43:46 -0700
From: "Jordan Arndt" <Outposter30@shaw.ca>
Subject: Re: [R-390] R-390a Refurbishing questions

The raised rounded contact "teeth" should point towards the IF deck. In the pre-Internet era, I very cautiously used crazy glue to repair a couple of broken slugs in a R-390 RF deck. Just make sure that the glue drys thoroughly before re-installation and also make sure that it doesn't extrude beyond the surface of the slug or it may bind up in its travel through the core... These days, I'm pretty sure someone has some cores and/or springs available...!

Date: Wed, 1 Dec 2021 21:15:30 -0700
From: <gary.biasini@shaw.ca>
Subject: Re: [R-390] R-390a Refurbishing questions

Thanks. I will try the crazy glue and advise if it works.

Date: Thu, 2 Dec 2021 14:55:16 -0500
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: [R-390] R-390A RF slugs "spring" replacement

Just a question: does anybody ever tried to replace some RF slugs broken "springs", except Jordan Arndt that used pieces of guitar strings ??
I just tried something with three units I have which do not use any magnetic material. If anyone interested, I can write down the procedure. Let me know.

Date: Thu, 2 Dec 2021 13:22:03 -0700
From: "Jordan Arndt" <Outposter30@shaw.ca>
Subject: Re: [R-390] R-390A RF slugs "spring" replacement

I haven't actually tried to repair those 2 slugs with brass guitar string yet because I had enough "spares" thanks to you and another fellow who's name I don't recall offhand. I've been looking at using phosphor bronze acoustic instrument string, but haven't gone too deep into looking for the right type... What did you come up with...??? I could give it a shot...!

Date: Thu, 2 Dec 2021 16:24:02 -0500
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: [R-390] TR: R-390A RF slugs "spring" replacement

It was just a trial, but I used something we already discussed about: a small length of RG-178 Teflon coax with the outer insulation stripped, leaving only the braid and the internal wire. Just a bit smaller in diameter than the original bronze spring. I glued that piece to both the brass screw and the iron dust slug using only a drop of cyanoacrylate glue. The result can bend slightly, like the original spring, but is invariable in length. And not magnetic.... Tested it using a wire coil on a HP 4192A at 10MHz: within 2 % compared to the original (with the bronze spring) part. No significant differences in the ESR, indicating no added losses from the "repaired" slug. I will write something about, with pictures...

Date: Thu, 27 Jan 2022 19:21:14 -0500
From: "thoyer" <thoyer1@verizon.net>
Subject: Re: [R-390] 390 RF Deck Replacing After Removal

Is the "green gear" still in place? Mine didn't have one at all and it took a couple tries to get everything in place and working properly. You'll read a lot of posts on the web that if that green gear is not there that the radio is no good anymore. The way I look at it, the factory had to put it together first without the green gear so it is possible.....

Date: Thu, 27 Jan 2022 21:12:25 -0500
From: Glenn Little WB4UIV <glennmaillist@bellsouth.net>
Subject: Re: [R-390] 390 RF Deck Replacing After Removal

If the switch is brown, you may create more problems by squirting contact cleaner on the switch. The phenolic in the switch will absorb the contact cleaner and swell. The swelling will jam the switch If the swelling occurs, you will have two choices, flush the switch with alcohol to remove the cleaner, or replace the switch.

To properly clean a phenolic switch you place a minute amount of cleaner on the contacts and rotate the switch to clean the contacts.
Avoid getting the cleaner on the phenolic.

Date: Thu, 27 Jan 2022 22:56:24 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] 390 RF Deck Replacing After Removal

> If the switch is brown,..... Correct.

> If swelling occurs, ... Your results with switch cleaning have apparently been much better than mine. The switches I've tried to recover were all sprayed by other people, and in some cases quite some time ago, so I don't know the full details of their trauma (other than by their odors, which have all been familiar -- i.e., common switch cleaning products). But I have almost never managed to save switches that had swelled.

> To properly clean a phenolic switch..... Yes, that is the right way to do it. And not just for phenolic switches, for ALL switches. Hosing it down is not the proper way to clean ANY switch.

Date: Fri, 28 Jan 2022 11:42:19 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] 390 RF Deck Replacing After Removal

Fiddling with that switch on the bottom of the RF deck is the biggest PITA! I had problems with one of my receivers where I had intermittent performance on only some of the bands; The radio would go mostly deaf in 1 MHz positions and it was intermittently happening. The problem boiled down to imperfect connections on that switch.

It was frustrating because you need to do a major disassembly to get to it each time you make an adjustment and whatever adjustment you made was not always certain to fix the issue. You could get it to disappear on one band; only to have it now crop up in a different band.

It took a couple of days to resolve and I had to just step away from the radio a half-dozen times out of frustration; I wanted to toss the entire receiver out of the second story window and down in to the yard, where I could dig a deep hole and bury the radio.

I guess that the next level of frustration I could ever possibly get would be in trying to adjust the compensator disk on the PTO. Thank goodness I had good PTO's with linearity!

Tuning racks, stagger tuning the IF, finding the right tube for each socket... child's play when compared to that switch. Years of therapy have gotten me over the trauma, but I will not even lift up one of the spare RF decks and look at the underside... That would give me flashbacks.

Date: Fri, 28 Jan 2022 14:39:41 -0500
From: Bob kb8tq <kb8tq@n1k.org>
Subject: Re: [R-390] 390 RF Deck Replacing After Removal

You do *not* want to know what the line workers at Motorola thought about adjusting the PTO linearity. Twenty years later, if you brought up the R390, you got an earful (and then some) from those gals about just what a horrible job it was ?.

Date: Fri, 05 Jul 2024 00:03:21 -0700
From: fwbray@mminternet.com
Subject: [R-390] R-390a Tuning Problem

I purchased an R-390a a couple decades ago and replaced the suspect capacitors, etc. I haven't used it a lot in the interim due to high urban noise but it has a tuning issue that I never resolved.

Specifically, there appears to be mechanical slippage somewhere in the Kilocycle tuning mechanism. I have made sure that all the cams are in the correct position at 7+000 and that the PTO is also correctly positioned. I have also checked to see that there is no excessive play in the Oldham coupler. Everything appears to be tight.

If I turn the Kilocycle knob rapidly, it appears that the PTO gets out of synchronization. I haven't been able to identify any broken or loose clamps in the gear train. I can readjust things so that are again aligned but the problem repeats itself. The gear train is clean and lightly lubricated. Has anyone encountered and resolved this issue.

Date: Fri, 5 Jul 2024 02:23:32 -0700
From: Larry Haney <larry41gm2@gmail.com>
Subject: Re: [R-390] R-390a Tuning Problem

Hi, Yes, sometimes oil will find its way onto a shaft where it's clamped, but the clamps can't grip the shaft tight enough to stop slippage with oil on it. And if you overtighten the clamp, it may crack. The only solution

is to clean the shaft and clamp spline. The problem point is probably where you correct the alignment problem. If you correct it at the Oldham coupler, that's probably where it's slipping. To test it, you can grab onto the vfo shaft and turn the KC knob a little to see if you can see some slippage there.
