

## ANTENNAS FOR THE R-390A

### Feeding the Antenna Input

by Chuck Rippel June 1999

Connecting an Antenna to the Input of the R390A is a subject that comes up often. The R390A has two, rear mounted antenna inputs. One is marked ``BALANCED" and the other, labeled ``UNBALANCED." Most new R390A users will choose to feed the antenna through the ``UNBALANCED" input. Unfortunately, the receiver suffers some loss of sensitivity. The correct choice is to feed the receiver using the ``BALANCED" input. Unfortunately, the connectors to properly accomodate this a rare and when they are found, expensive. However, there is an easy around this dilemma.

The antenna is fed into the right side of the ``BALANCED" input with with center conductor of RG8X or RG-58/U. As shown in the picture to the right, the left side of the antenna input is grounded VIA the red wire which is inserted into the left hand pin jack and the opposite end grounded VIA the one of the 4 antenna relay assy mounting screws, located just below and to the left of the connector. In the case of RG8X, some of the center conductor strands, usually about 3, must be removed in order for the center conductor to fit into the small antenna input pin-jack. The co-ax is then made up in an appropriate length and terminated in a PL-259 connector for easy connection to your antenna system. After installation, best performance is obtained when the receiver is also aligned using this input.

The enterprising R390A owner who is also handy with sheet metal fabrication can add an SO-239 connector to the antenna input of their receiver. The picture at the left is simply an appropriately drilled piece of sheet metal bent at a 90 degree angle then fitted with an SO-239 connector. A 0.01UV ceramic disc capacitor has also been added to provide some measure of input DC isolation. Electrically, this input functions identical to the one described above.

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Date: Sat, 12 Dec 1998 15:31:15 -0600

From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>

Subject: Re: [R-390] Re: R390A antenna

The best antenna depends on the application. If you have a particular station that transmits horizontal polarization you will make good use of a rhombic oriented in that station's direction. You can do quite well with a single long wire (several wavelengths) oriented about 30 degrees from the great circle path to that station. For more general use either a shorter long wire, say 30 meters in length raised 20 meters high, each dimension

+/- 15 meters. A single long wire has many lobes. The trouble with a single wire antenna is that the lead in wire is as much antenna as the main antenna wire itself so that the lead in wire picks up a lot of hash from TV, computer and other household appliances.

It doesn't work well to shield lead in wire as a coax run because at most frequencies the impedance of the long wire antenna is high and the mismatch to the coax extreme.

For lower noise a center fed dipole is better with the dipole half wave long at the most desired frequency and oriented perpendicular to the preferred reception direction. Its very practical to connect dipoles of different lengths in parallel to the same piece of coax for better results at many frequencies. Its also practical to have several dipoles at different orientations on the same coax. If some have the same lengths its probably better to make a turnstile (which should be discussed in the ARRL handbook, maybe in the VHF antenna chapter).

73, Jerry, KOCQ

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From: "Thomas A. Adams" <103360.2133@...>

Date: Fri Jan 9, 1998 1:49 am

Subject: [R-390] Re. Receiver Multicouplers

I've been using a couple of surplus multicouplers here for a couple of years now. One of the boys on BOATANCHORS came into several depot overhauled jobs, and I bought a couple of them. The critteres are ANTENNA COUPLER CU-168 / FR.R. They take up 8.75" of rack space each, and can drive 5 receivers each. According to the manual, they're intended for Navy shore installations. The input / output connectors are type N. They seem to be pretty simple. They take a 70 ohm unbalanced input impedance, and transform it to a 1000 ohm balanced transmission line. I modified this slightly; it now transforms 50 ohms to 800 ohms (a pair of 4:1 baluns stacked). Five identical RF amp stages are tapped across the hi Z line.

Each RF amp consists of a balanced (push-pull), neutralized cathode follower; a pair of 12AU7s, with the dual triodes wired in parallel. This is followed by a push-pull grounded grid stage (two more parallel wired 12AU7s) whose plates are feeding a broadband output transformer for impedance matching. The thing looks like a push-pull version of the so-called "cascode" RF amp design that was popular for VHF converters in the 1950s. The original designed frequency range of this thing is 2 - 32 MHz. I haven't swept the modified units, but they seem to work well from the upper AM broadcast band to 30 MHz or better.

These units are neat in that the whole thing is modular. The rack panel

contains the power supply / AC line filtering, the hi - Z "artificial transmission line" (actually, a lumped constant line made up of coils and capacitors), and sockets for plugging in the individual RF amplifier modules.

Overall, there isn't any signal gain that I can tell; call it unity. The 12AU7 isn't exactly what I'd consider as my first choice for a 1st RF amp tube, but it doesn't seem to degrade R-390A noise figure to any noticeable extent.

The manual (TM 11-5985-212-15) is January, 1961 issue, reprinted for Army use, but the printing history says it's a reprint of NAVSHIPS 91697A, dated 10 Sept. 1952, so we've got a pretty good idea of the vintage of the design. No dates on the nomenclature plates of my units, but they have Navy markings, and are made by Hugh H. Eby Company (whoever the hell THEY are!). I'd strongly recommend them to anybody who encounters these beasts at a hamfest or whatever; mine run 24 hours a day, 365 days a year, and there's been nary a problem.

BTW... I know that 5 receiver outputs isn't really enough for a lot of us. There are provisions for hooking several of these things in series, but I've put in a much more satisfactory solution to the lack of output holes. Everyone who has ever been in broadcasting knows about the audio jackfields in every station; small rack panels with .25" ring / tip / sleeve jacks used for patching audio components together. Well, at TV stations, there is a video version of the jackfield.

These things use patch cables made of 75 ohm coax, and the rear of the jackfield section is usually covered with BNC connectors to the individual jacks. These are PERFECT for patching receivers to antennas, or to multicouplers! They are good for MORE than enough bandwidth coverage to hit at least the low VHF range. True, they're built for 75 ohms, but the patch cables are so short in terms of a wavelength at HF that the mismatch introduced is negligible. I have my receiver antenna inputs routed to the jackfield panel (lower row), and the multicoupler outputs routed to it also (upper row). Two seconds with a patch cord puts any receiver in the shack on any antenna available, or routes any antenna into one of the multicouplers. A very convenient arrangement.

Be warned tho; if bought new, video jackfield is VERY, VERY expensive!!! However, it occasionally turns up at hamfests. If you're lucky enough to spot a few sections in good shape, GRAB 'EM!!! Also, grab every patch cable you can lay your hands on at the same time; not all brands of video jackfield use the same plugs, and they aren't always interchangeable between brands. Also, tho you probably won't see any, there ARE video jackfield sections that have INTERNAL TERMINATIONS! These are NOT what you want; check with a

VOM or DMM for an open circuit before you buy, if possible! BTW... I wouldn't trust these things for transmitting, at least for powers above a few watts. I don't know what a video jack will take, but I don't wanna risk frying a jack.

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From: Ed Tanton <n4xy@...>  
Date: Fri Jan 9, 1998 4:04 am  
Subject: [R-390] Available RCVR Multi-Couplers

Hi Bob... et al... I have been in touch with Toronto Surplus, and they have 2 multicouplers for sale, one for HF and one for VHF/UHF. I don't think they would mind my reprinting the pricing email, so it is listed below. That said, I am considering-and have most of a paper design completed-to build my own with either 5 or 10 outputs-as I recall. The reason for the-preferably 5-outputs involved the best power splitters/combiner available from Mini-Circuits, specifically if you want the unit to extend down to WWVB, but still function to 30MHz. Isolation was pretty good, and gain and low noise not that much of a problem.

I am even thinking about selling these on a cost-plus basis if there is enough interest. One feature mine will have, that adds considerably to the cost-but is essential as far as I am concerned-is automatic bypassing and grounding using vacuum relays. I would probably want to do that with surplus, tested, RJ-1As. It would take two for KW-level full-breakin DPST-bypass capability. Best surplus price around-when you can even get them is ~\$35.00 each... and the new prices get nasty... several years ago-perhaps 10 now that I think about it-they were almost \$100 each in small quantities... I imagine they are a LOT more than that now.

Anyway, if you-or anybody else expresses an interest, I'll be happy to provide more details. Right now, I would expect a gain of a little less than 10 db, fully automatic RF-switching AND key switching AND amp switching. Full protection of both the unit and any rcvrs connected to it, and fail-safe switching under any and all potential conditions. I may even use a front-end fuse... or just the simple series 100 ohm 1/8th or 1/10th watt resistor AMECO, MFJ, or Palomar use in their RF-Switched Pre-Amps. Switching times of around 8-10mS. Etc. etc.

But there is always the ones Toronto Surplus has... they sound pretty good... they have Type N's, they say the units are in good > excellent-but used-condition, and do not have a manual. Connectors are either Type N or BNC depending on the connection and the unit. I have no relationship with them, and do NOT yet own either unit-although SOMETIME after I recover from Christmas I'd like to get one of each type-or at least the VHF/UHF unit.

As an aside, I have been looking into broadbanded high-signal level-capable amplifiers with this in mind, and one potential choice may very well be 4 VN-10s in Push-Pull-Parallel. I have to actually do some breadboarding and see what kind of noise level is going to result, as well as how well certain other units might do the same job... one of them a single IC w/4 FETs in it with something like an SN-7000 designation... fairly common... I just don't remember the exact #... I do have some of them, as well as a bunch of 2N5109s and MRF-901s... and want to see how each stacks up against 'just' a MIMIC! Like I said, anybody interested can drop me a line/email.

Here's the email I got from Toronto Surplus several weeks ago:

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Dear Sir,

Thank-you for your enquiry regarding items you are interested in. The following are the prices:

Olektron MC 1003 Antenna Multicoupler: this unit is in like new excellent condition with a frequency range from 50-450 mHz and is priced @285.00U.S.

RE GRIMM RG-8103 Multicoupler, HF this unit is tested, in good condition and priced at \$145.00U.S.

These prices do not include shipping. If you are interested in ordering either or both of these items we would be happy to provide a quote for shipping.

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From: Cyo7700 <Cyo7700@...>  
Date: Fri Jan 9, 1998 6:06 am  
Subject: [R-390] r-390/multicouplers

There are some CU-1280's out there in surplus land somewhere. These must be the Granddaddies of them all: you can hook up to 32 rx's to 1 antenna with this unit. Made by Sylvania for the Navy, an excellent piece. I got mine for about \$100.00 plus shipping about 5/6 years ago after reading an article or ad in an SWL mag, I believe MT. I can't find any manuals or schematics anywhere (even NTIS or Navy), and there is nothing on the various MILISTS about it. I had heard of these types of devices from some hams and military types, so as soon as I got the chance to get one, I carped the diem. Besides my R-390A, I've only had 7 other radios hooked up to it at one time, and it can make for some interesting cacaphonic effects. NB connubial bliss may suffer, but these things are a necessity if you can't string up all sorts of antennae, and you like to moniter a variety of stuff like I do. RF Sytems has a passive splitter for 1

antenna/2 rx that is also excellent, and I understand that they also make a splitter for 1/4, active-12V, probably also just as fine a piece of equipment as they always seem to make. Somewhat pricey. Scour the planet for that '1280. You'll be happy. And no, I don't have any stock in RF Systems, Sylvania, the Navy, or MT. But isn't this a great list?

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From: "Joseph W. Pinner" <kc5ijd@...>  
Date: Wed Dec 31, 1969 8:59 pm  
Subject: Re: [R-390] multicouplers

>BTW in addition to their distribution and set-to-set isolation functions,  
>these multicouplers serve an even more important function, I believe,  
which is  
>that they might protect your R-390s or whatever from all but direct  
lightning  
>strikes. I don't think a passive system would do this.

I can testify to this. Forgot to disconnect the antenna one day. That afternoon we had a severe thunderstorm. Lightning struck near by - not at the antenna. My multicoupler front end was burned out - but no receivers were damaged. Still looking for replacement transistors (2N2876) or a replacement multicoupler.

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Date: Fri Jan 9, 1998 11:29 pm  
Subject: Re: [R-390] CU-1280 Multicouplers

>I don't think that those couplers are very good. Today RF amps can provide  
>much better noise figure than anything build 20 years ago. Regards,  
Francesco

True. The ECG-128 transistors I have used as replacements in the CU-1280 are rated at 6 dB noise figure. The Watkins-Johnson HF-1000 is rated at 9dB with the preamp on. The R-390A is rated at 10dB noise figure. Given a few dB of loss in the input circuitry, and possible non-optimal operation of the CU-1280 transistors, the noise figure of the CU-1280 should be approximately the same as the R-390A. Noise figure and intermod susceptibility are often a trade-off. At the lower HF frequencies, the antenna noise is much greater than the noise generated by my CU-1280 at my relatively quiet location. If you can hear the noise level rise when you connect the antenna to the input of the coupler, there will be little to gain from a better noise figure in the receive system. If the noise does not increase, I would suggest looking for a high loss in the feedline or a very inefficient antenna.

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From: "Thomas A. Adams" <103360.2133@...>

Date: Sat Jan 10, 1998 1:47 am  
Subject: [R-390] Multicoupler noise figures

True, the older multicouplers have noise figures that look sorta sad by today's GaFET standards, but consider this; While it may be a make or break factor in VHF and UHF systems, on HF receiver front end noise figure isn't all that important.

On VHF and UHF, the only significant noise floor the cosmic background noise; as Penzias and Wilson theorized (and got a Nobel prize for it too!), about all the background noise you're dealing with is Doppler shifted energy from the original "Big Bang" that created the universe, and not a whole lot else. The closer the receiver's first RF amplifier noise figure can come to that level, the greater the receiver's apparent sensitivity. Once you get down to HF however, you can't even HEAR the cosmic noise; there are too many other things, like the earth's atmosphere, and the synchrotron radiation of not only the earth's, but of OTHER planet's magnetic fields (you can listen to Jupiter on about 18 MHz! Karl Jansky did it in the 1930s, and thus invented radioastronomy) generating a much higher noise floor.

Unlike VHF and UHF, at HF even a POOR vacuum tube front end will provide a noise figure that is well below the "natural" noise level.

At HF, far more important is the ability to handle intermod situations. This is where a lot of modern receivers fall flat on their solid state faces; my little Sangean portable is a total disaster on the 31 metre band in the early evening, because the designer went for TOO MUCH front end sensitivity (ie, smallest noise figure, as expressed in maximum stage gain in the first RF amp for the device's inherent noise figure). All those quarter and half megawatt rigs, tied to 15 or 20 DB gain antennas, are just too much for the poor box to handle. The 20+ year old multicouplers have an edge here; toob circuits aren't nearly as prone to overload and intermod as the new solid state stuff; that's one reason the R-390 series is so great! A good HF toob receiver can stand the very slight degradation in noise figure that a multicoupler will introduce.

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Date: Sat, 12 Dec 1998 17:15:03 EST  
From: JCStott@aol.com  
Subject: Re: [R-390] Re: R390A antenna

> What is the group's opinion about proper configuration for an antenna  
> system that is dedicated for the R390A?

I have found and presently use a Horizontal Loop as an antenna of preference. I believe that the ARRL Handbook (1992) list it as "The Loop

Skywire.' Mention is made of it in Electric Radio # 16 page 6. I choose to feed the loop with 300 ohm twin lead, ARRL handbook referenced RG-58 as a feed line.

I have a switch box that lets me select the Horizontal Loop, Long Wire, 28 MHz vertical and Meter J-Pole then a patch panel to direct the connection to the desired Receiver.

My Horizontal Loop is about 25 feet high and a 272 feet loop (about 68 feet per side) which is for 80 meters. However the loop competes well on all but the higher frequencies and it is non directional. I have thought of putting up a Horizontal Loop optimized for the 20 Meter Band. The ARRL Handbook (1992) quotes "The Skywire has been called 'the best easy-to-build, multiband antenna around.....the best kept secret in the amateur circle." I have to say

that it is very good, is easy, and not very visible to those that object to antennas in the neighborhood. 73, John Stott KB5TKH

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Date: Tue, 22 Sep 1998 13:41:25 +0530  
From: "Percy Mistry" <Percy\_Mistry@ril.com>  
Subject: [R-390] Better Antenna Strength

Let me quote one more hint I came across. I tried it and it did give some effect on the weaker community of radio signals.... "Better antenna strength can be achieved by reversing the cables tagged P205 and P206. Next, stick a jumper wire into the two holes of the balanced antenna input (short 'em). Use the center contact only of the UNbalanced ant.input from a longwire. You are getting the full strength of your antenna now."

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Date: Tue, 22 Sep 1998 13:43:02 +0200  
From: Thomas Roth <th.roth@apc.de>  
Subject: [R-390] Re: Better Antenna Strength

Where did this bit of info come from ??? I don't know wether or not I'm imagining things, but I can hear CLA41, Habana Radio on 17165.6 where I heard nothing before. I'm quite a non-technical guy, so I wonder what reversing P205 and P206 and then shortening the balanced ant input is supposed to do.....?!?

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Date: 22 Sep 1998 06:55:38 U  
From: "Richard McClung" <richard\_mcclung@tcibr.com>  
Subject: Re: [R-390] Re- Better Anten

If you look at the schematic you will see that as originally wired the Whip Ant input at J105 by-passes the first tuned circuits and is coupled to the RF Amp at V201.



Short the 125 Ohm Balanced pins at J104 at reverse P206 and P205 you are now allowing the Whip Ant at J105 to pass the signal through the tuned circuits previously by-passed. It certainly makes signals better.

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Date: Tue, 22 Sep 1998 20:03:17 -0400  
From: "Chuck Rippel" <crippel@exis.net>  
Subject: [R-390] Re: Better Antenna Strength

That is a standard military mod, good information and glad to see it posted here. The Military even went so far as to have a special shorting connector made up for the "Balanced" antenna input to accomplish just that. Although a step in the right direction, based on some earlier performance trials I did a few years ago, I usually end up "undoing" that mod during a restoration in favor of the following configuration: Face the rear of the receiver. The "Balanced" input has 2 connections. Ground the left one to with a piece of buswire by simply inserting the uninsulated wire in the left pin hole and then attaching the other end to a nearby screw. Make up a length of RG-58U with a connector on one end only. Make up the other such that the center conductor can be inserted into the Right side pin of the "Balanced" antenna input then ground the shield to another nearby screw. Dress the co-ax such that it passed through one of the brackets used to wrap and store the the A/C cord and tie-wrap the coax securely to that bracket so that no stress is placed on the "Balanced" antenna input connector. After this is done, go ahead and mechanically align the Antenna Trimmer gear using the Red Dot on it per the manual. When that is done, install the necessary adaptor on the co-ax and perform the RF alignments using a generator with a 50ohm output. You will find that the performance is wonderful and the trimmer will center up nicely on a true 50 ohm antenna.

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Date: Wed, 23 Sep 1998 17:48:34 -0500  
From: Phil Mills <pmills@a.crl.com>  
Subject: [R-390] balanced antenna input adapter

Chuck's description of grounding the left pin of the balanced antenna input and connecting the unbalanced antenna wire to the other pin got me to checking on something. It seems that the R390 that I acquired a while back had an adapter on the balanced input so I took a closer look at it. It is a twin-ax to C adapter that grounds the leftmost pin. In case anyone is interested, the adapter is a right-angle job and carries the number UG-971/U.

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Date: Wed, 23 Sep 1998 16:27:24 -1000  
From: petesr@juno.com (peter, sr. a. wokoun)  
Subject: [R-390] Re: Better Antenna Strength

If I'm not mistaken, this mod is an official military field change for shipboard installed R-390As. I don't know which field change number from memory but if you really want to know, let me know & I'll check my info at work tomorrow.

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Date: Wed, 23 Sep 1998 22:41:49 EDT  
From: JCStott@aol.com  
Subject: Re: [R-390] Re: Better Antenna Strength

Navy technical manual NAVYSHIPS 0967-063-2010 Figure 5-13.  
Schematic Diagram

(Sheet 1 of 4) Zone D 15 shows the alternate antenna configuration.

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From williams@auburn.campus.mci.net Sat Dec 12 15:34:37 1998  
Date: Sat, 12 Dec 1998 17:34:36 -0600  
Subject: Re: [R-390] Re: R390A antenna

Nice rig. Same as my own. Serial number 266. I've had up rhombics and was very disappointed in the low gain. After dozens of wire antennas I suggest running up as much as you can over a tall tree limb. The best I've found slopes up to the limb and then straight down to head height for a vertical portion. I then run the remainder horizontally. 100-200 feet will produce an excellent DX antenna. Barry

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Date: Sat, 12 Dec 1998 19:05:06 -0500  
From: "Charles A. Taylor" <CALLTaylor@cwix.com>  
Subject: Re: R390A antenna

If you can erect rhombic(s), by all means do so, especially if you are a dedicated HFBC DXer. However, a rhombic, properly constructed, is unidirectional; therefore, it is less suitable for casual listening.

A dipole, cut for one or two bands, is an excellent alternative for one who cannot erect rhombics. It is perhaps the second choice for a dedicated HFBC DXer, and an excellent choice for the casual SWL. It is, however, bidirectional.

A short longwire (a long shortwire?) tends to be even less directive than a dipole; therefore, it is probably a better choice for the casual SWL.

A vertical antenna is the least demanding for space, and it is non-directive. It is, however, the most sensitive to RFI fields, which tend to be vertically polarized.

It is a matter of end use. For casual bandscanning, the longwire and the vertical are probably better, in that order. If, for example, I want to listen to RadIo Pilipinas (Philippines), for my wife's and my keeping up-to-date on events there, my first choice, real estate permitting, is a rhombic directed at about 285 degrees. My second choice would be a dipole similarly directed.

A reasonable alternative to a rhombic for us who are without sufficient real estate, is a dipole with reflectors and directors erected aft and fore.

So, generally, from least desirable to most desirable, the order would be vertical, longwire, dipole(s). The rhombic requires much land and is useful only for one direction (two, if you know how to reverse its aperture).

Charles A. Taylor    WD9INP/4    Grifton, NC

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Date: Sat, 12 Dec 1998 18:29:13 -0500  
From: "Bruce J. Howes KG2IC" <bhowes@buffnet.net>  
Subject: [R-390] (R390) Multiple 390s on the same antenna?

I have a question that I am sure has been asked before in the group, but what is the proper method to connect more than one receiver to the same antenna? I currently have 2 R390As running off the same antenna, and the apparent signal strength (via the carrier level meter) does not seem to be affected.

Any thoughts, suggestions?

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Date: Sat, 12 Dec 1998 20:11:22 -0500  
From: Steve Murphy <k8vo@flyingbeers.org>  
Subject: Re: [R-390] Re: R390A antenna

I guess it would depend upon what your listening habits are. My 390A is used primarily on the amateur bands, and it uses the same antennas as my transmitting equipment. The antennas are all resonant in the amateur bands, so I use the unbalanced input without a tuner. This works well for SWLing also, but certainly not as well as would a resonant antenna or a random wire/tuner combination. If I were to use the radio to primarily listen on the SWBC bands, I'd give a serious look at one of the commercially made SWL trapped dipoles, like the Alpha Delta. Others may disagree, but I believe that there is no substitute for a resonant antenna when it comes to pulling in weak signals. 73, Steve K8VO

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Date: Sat, 12 Dec 1998 19:39:28 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Re: R390A antenna

My most recent HF antenna is an inverted V fed at the center and top with coax. Been copying hams all over the world on 75 meters and 30 meters with it. I think it works.

You might want to put some priority on the coupling capacitors to the audio grids too.

There's been so much happening that it takes about 80 hours a week to keep up. I've not seen the Navy manual, nor attacked a 390(a).

With their invar tuning capacitors the Command set receivers will just about keep up with a 390 for stability. And with their multiply tuned IF's they might out hear a 390A in noise and static. I built up a BC-453 with crystal converter back about 1956, and it still out hears the 75S3B during staticy conditions because the undercoupled IF transformers don't ring like the mechanical filters. I've just bought a Tentec Corsair II and its filters seem to be designed for better transient response too. I'm seeing those command sets we bought for a buck or two are now commanding \$100 if original. But then there are few that haven't been modified because they were so cheap and so common. 73, Jerry, KOCQ

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Date: Sat, 12 Dec 1998 22:21:01 -0600  
From: williams@auburn.campus.mci.net  
Subject: Re: [R-390] Re: R390A antenna

Mine came in a big, heavy cabinet. no covers. my second one is a Stewart-Warner which had the top and bottom covers and the Utah cover. Both have meters. The Motorola was bought at Fair Radio by a friend. He kept one and sold me the Motorola. It has been the most sensitive radio ever made.

As for the antenna book, do like I did and put it on the shelf and forget it. I am continually disappointed that it only covers Ham transmit and receive bands. DXers outside of the Ham bands are ignored. You won't find my slope-vertical-horizontal antenna in any book, but it works better than any other kind. My most disappointing antenna was a 1000' beverage last year. I now use 1000' vertical loops hung between two trees. I have two of these type antennas. Let me know if you need to know more. Joe Foley's response to you is quite good. I've done the same thing with astounding results. Good luck

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Date: Sat, 12 Dec 1998 20:56:01 -0600  
From: Orrin Bentz <orrihb@paulbunyan.net>  
Subject: R-390 Antenna

What you want to do is put up the highest, longest wire antenna possible at right angles to the direction of reception you are most interested in. Use Copperweld #14 antenna wire with insulators at the ends. Connect the end of the wire directly to the unbalanced input connector. Then optimize reception with the ant. trim control whenever you change frequency. This is on the theory that the more wire you have up in the air the more voltage will be induced into the antenna from the electromagnetic wave front. In the ARRL Handbook there are also several designs for multiband wire antennas. You might try them out against the longwire. Hope this helps.

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Date: Sun, 13 Dec 1998 08:56:44 -0600  
From: Orrin Bentz <orrinhbe@paulbunyan.net>  
Subject: Antennas

The selectivity features of the R390 should take care of most man made generated noise and QRM . Vertical antennas are much more prone to picking up noise. It seems that most man made noise is vertically polarized. A 100' wire on your roof should do fine, of course higher is always better but you have to be practical also.

A receiving antenna does not need to be at least 1/2 wavelength above ground at the operating frequency like a transmitting antenna to achieve the lowest angle of radiation for DX work.

Atmospheric static (QRN) is going to be a problem on AM receivers no matter what you do. There are sophisticated Digital Signal Processors available these days that you can install outboard of the radio and do a pretty good job of cancelling noise. But first do a lot a patient experimenting with the selectivity controls on the receiver. This is kind of an art and you will be surprised how sharply you can tune in a signal with a little practice. A little help from a Ham friend or receiver expert will go along way towards achieving this.

Good luck, Orrin NOHYF

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Date: Sun, 13 Dec 1998 13:39:49 EST  
From: JCStott@aol.com  
Subject: Re: [R-390] Re: R390A antenna

> Now that makes great sense. I am glad to have a testimonial from one who  
> actually built one....

Keep in mind that anything from a clip lead to whatever you can dream up will work on the R-390A or other receivers. However there is a need to switch from one to another instantly when making a comparison otherwise there is no point of reference, performance needs to be

measured. My Horizontal Loop is not always the best but it is consistently better than my other available choices. Space and polarization certainly enter into the equation as well as the requirement for direction. Another is the noise factor, man made noise seems to be predominately vertically polarized and the Horizontal Loop is not immune, but is less sensitive to the vertical polarization. Of course that is a disadvantage if the signal you are trying to receive is vertically polarized. 73,  
John Stott KB5THK

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Date: Sat, 12 Dec 1998 16:10:17 -0800 (PST)  
From: Joe Foley <redmenaced@yahoo.com>  
Subject: Re: [R-390] Re: R390A antenna

I have a long wire hanging in a 40 foot Hickory tree and I've been able to hear everything that has been posted here as a challenge to hear, including Radio St. Helena. So considering practicality and expense I'd say that was the one to use. Joe

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Date: Sat, 12 Dec 1998 22:24:22 -0600  
From: williams@auburn.campus.mci.net  
Subject: Re: [R-390] Re: R390A antenna

I agree with you Joe. Did the same thing with 100' of Radio Shack speaker wire. Caught a 45' high tree limb. Left 10' to run inside. The oddest thing was that if I took the end of the wire as it was hanging down and put it in a 10-15 degree slope reception jumped like crazy. This 100' antenna could compete against any other antenna. Forget the books and just throw up wire and experiment. Besides, the ARRL Antenna book really sucks. In my humble opinion. Barry

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Date: Sun, 13 Dec 1998 15:04:55 +0000  
From: "Michael P. Olbrisch" <kd9kc@whc.net>  
Subject: Re: [R-390] Re: R390A antenna

williams@auburn.campus.mci.net wrote:

> My current favorite antenna is a 1000' vertical loop that is about 26' per side.

How is this done, is it 10 loops at 26 foot per side, or is it one loop with the sides 26 foot high and the top and bottem 449 feet each for the 1000 foot total. The first could almost be made rotatable, while the second would surely not be.

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Date: Sun, 13 Dec 1998 16:08:51 -0600  
From: williams@auburn.campus.mci.net

Subject: Re: [R-390] Re: R390A antenna

The antenna is a delta shape, with the top 2 corners tied off between 2 trees, about 40' off the ground. The bottom, the point, is tethered to a stake. Very stable and sturdy in high winds. The antenna is built on the ground with one continuous run of 1000' wire. I used cable ties to connect the corners and with several wooden dowel spreaders on each side. This allows it to keep it's shape, spread each run of wire working from the outside to the middle. Takes about 3 hours to make your first run. Once you figure out how to do it, the second run of wire goes fast.

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Date: Mon, 14 Dec 1998 16:38:19 -0400  
From: Chuck Rippel <crippel@erols.com>  
To: wli@u.washington.edu  
Subject: Re: [R-390] Re: R390A antenna

I use a 120M, 90M, 60M sloper which just works famously. Do you know how to feed the balanced connector? I ought to take some hi-res pictures of the lashup and post them?

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Date: Tue, 15 Dec 1998 23:12:03 -0600  
From: williams@auburn.campus.mci.net  
Subject: Re: [R-390] Re: R390A antenna

> I THINK This means that he has a multi-turn delta loop with the top two corners at 40 feet and one corner at the bottom, each side 26 feet long.

Yes, that is what I meant. Very compact antenna actually. Very directional. Easy to check the lobes since I have two of these. Barry

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Date: Sat, 19 Dec 1998 19:12:45 -0000  
From: David Barnby <dave.barnby@btinternet.com>  
To: wli@u.washington.edu

I just re-read your question about antennas for your receiver and realized that you were not asking about medium frequency but the HF band. I have gotten down from the attic a catalogue of antennas from MF to UHF by a company called CSA.

They list a number of antennas including conical, sloping VEE, log periodic, dipole, "T", rhombic, wide fan, all of which are quite directional. Also, as you know the larger they are (proportion of wave length) the greater the gain and the greater the directivity. Your problem I would imagine is that you would want all round (omni) coverage and the full 24 MHz bandwidth, so obviously the gain is going to vary greatly across the band if you are using only one antenna. I doubt that you are going to get

much gain (perhaps 5dB at most) with a wide band omni type antenna.

Your rhombic might be a good idea. I remember an amateur made one on a wooden frame which he could rotate to maximize a signal. The ones (nested rhombic) in the catalogue show gains from 6 to 12 MHz (night rhombic) 11 to 19dB and 13 - 24.5 MHz (day rhombic) 17 to 20dB. You wouldn't get that sort of gain from something the size that you could mount on your roof without upsetting Margaret though. The book says the rhombic is a most effective HF antenna for long distance point to point communications services as it combines good directivity with high gain and reasonable bandwidth. The only other possibility which is easy to make is the VEE antenna which only needs one mast and could be quite large without being obtrusive - but it is a directional antenna.

They do show in the catalogue a transportable "active loop" (type TLM) antenna system which you can lay out on the ground (consists of 4 separate loops some 3 ft in dia) to provide the directionality (or all round coverage) you require at any one time (they say it takes 15 minutes to set up). The words say the system can be set up for endfire operation (use for >1000km) or broadside operation (for short to medium distances). "Interference from nearby transmitters or ECM (electronic countermeasures) by the use of low noise (<5dB), high linearity amplifiers built into the base of each of the 4 loops. The system is designed for the military of course. Your receiver spec is no doubt so good that the antenna is not going to buy you that much improvement I suspect. One important thing is to listen at the appropriate frequency for the time of day/season etc - there used to be prediction charts produced for best transmission and don't forget we are coming up to a period of high sunspot activity which will wreck havoc. If you are interested I can send you the appropriate pages of the catalogue from which you might be able to choose a design to make or purchase. A length of wire might be your best answer after all!

DAVID

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Date: Sun, 10 Jan 1999 23:54:09 -0600  
From: GeorgeHumphrey <gah@koyote.com>  
Subject: [R-390] Best Low-Cost Antenna for 390A

I'm pretty new at this ham stuff and have tried a few wire antennas. If you were to suggest the single best antenna for all bands for use with a 390A, what would it be? Not interested in transmitting at this time, working on code for upgrade. Just want to listen. If this has been covered before I got my 390A late last year, just point me in the right direction.

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Date: Sun, 10 Jan 1999 10:14:43 -0800  
From: Colin Thompson <burkec@goldstate.net>



Subject: Re: [R-390] Best Low-Cost Antenna for 390A

For the most part, my best results in a rural, low background RF area are with a simple wire to the Balanced connector. The left side of the Balanced connector being connected to ground per Chuck Rippel's instructions. FWIW, the seven foot lead to connect to my antenna distribution center often works just fine!

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Date: Mon, 11 Jan 1999 12:15:33 -0400  
From: "Chuck Rippel" <crippel@erols.com>  
Subject: Re: [R-390] Best Low-Cost Antenna for 390A

Colin makes a good point. I use a 120M, 90M, 60M and 49M sloper I built and mounted about 60' up on my tower. It slopes to the NE, about 20 degrees and the end is about 10' off the ground to clear to ROPS of my tractor. Easy, to build. One feed point with 1/4 wave of wire for each of the bands you want to cover tied to it. Hold the wires apart with 1/2" PVC pipe with holes drilled in it. Feed point is approximately 50 ohms and it is somewhat directional where it is "pointed." Very impressive performer.  
Chuck Rippel, WA4HHG

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Date: Sun, 10 Jan 1999 22:55:40 -0800  
From: "Walter (Volodya) Salmaniw, MD" <salmaniw@home.com>  
Subject: Re: [R-390] Best Low-Cost Antenna for 390A

George, the hands down winner, in my opinion, would be a T2FD, ie tilted, terminated, folded dipole...an excellent performer for the average backyard!

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Date: Mon, 11 Jan 1999 10:00:50 -0500  
From: "Charles A. Taylor" <CALLTaylor@cwix.com>  
Subject: Re: [R-390] Best Low-Cost Antenna for 390A

I lived in my wife's hometown in the Philippines for a spell. I set up a 30-foot terminated sloping antenna with the top end at the window of our second-floor bedroom, and I remember it working very well on all low bands. The termination tends to reduce frequency sensitivity, although it also changes the directivity (probably toward the terminated end). Something simple often serves very well.

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Date: Wed, 17 Feb 1999 10:39:59 -0500  
From: "Charles A. Taylor" <CALLTaylor@cwix.com>  
Subject: [R-390] Re: Whip antennas

It seems to me that the whips aboard the USS Hancock (CVA-19: my old ship, had something like 20+ R-390As aboard) were 35 feet high. I had to,

on occasion, fix these things. They were mounted just about anywhere a whip could be mounted. The outboard whips were mounted on "catwalks" just below the carrier's flightdeck. For obvious reasons, they had to be lowered to a horizontal position while the ship was launching/retrieving aircraft.

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Date: Thu, 18 Feb 1999 07:59:51 -0800  
From: Edward Zeranski <ejz@nosc.mil>  
Subject: Re: [R-390] Re: Whip antennas

That was/is the standard Navy whip used with different tuners depending on the TX etc. TX ants. had the insulator painted red with the RX being blue. On a destroyer we used wire fans, horiz wires, and wire cone ants also. The R390As were paired with WRT-2 txs (early-mid '60s) and we still had the old standby TCS-12 loaded to a wire. URC-32 was the new kid on the block and usually used as just another RX, it wasn't built for all day key down RTTY traffic. I missed getting an SRT and its tuner a few years ago because of the hauling distance, Georgia-California @ 1000 lbs, but luckily was able to pass the info to a friend in NC who bagged the TXs. One of these days I'll find some BIG Navy iron to pair with the R390As that live here. Right now there are 4 TCS-12s and 2 sets of RAK/RAL, a couple RBS but a large chunk of Haze Grey or Blk Crackle would hold down the shop in strong winds and the 3ph power is already here. Those whips did load pretty well over the 10,000 mile gnd plane!

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Date: Tue, 30 Mar 1999 14:12:52 -0800  
From: "Robert Thompson" <arq3@imagineii.net>  
Subject: Re: [R-390] AC line filter problem, and a big thanks

Yes a "Beverage" should work very well in the early AM hours I have heard them often on a mini beverage 250 ft long at this time of year, also a beverage works very well on the lower bands. BTW I almost always use a beverage on the lower bands. This antenna is quiet and suited very well for DX-ing.

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Date: Mon, 14 Sep 1998 15:11:17 -0400  
From: "Chuck Rippel" <crippel@exis.net>  
Subject: Re: [R-390] Active Antennas

2nd Generation actives like the Dressler work wonderfully and can easily compete with wire antennas. There is a very extensive review on active antennas in the 1996 World Radio TV Handbook.

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### **Notes from the US Army Fort Deven's Training Manual 1964**

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#### **Fixed Antenna**

- (a) Vertical tower is used for vertically polarized signals with high gain due to its height. Difficult to erect, non-directional, hard to camouflage
- (b) Beverage antenna is unidirectional. used to receive VLF ground waves. Extreme length (miles), vertically polarized, and not ususally terminated.
- (c) Sloping V is a full-wave, directional, terminated, horizontally polarized unit used in mobile, semi-fixed, and some field stations.
- (d) Rhombic antenna is ideal for permanent installations. It is efficient, highly directional over a broad frequency range. End-terminated and unidirectional, each rhombic must be placed at least 600' apart (unless using space diversity system).

### **Portable Antenna**

- (a) The whip vertical antenna varies from a few feet to 100' high. Easily erected, acceptable sensitivity over a wide spectrum. Used in mobile and semi-fixed locations. Vertically polarized.
- (b) Doublet and double-doublet are horizontally polarized. These are dipole antennas.
- (c) Long-wire antenna is erected in emergencies when no other antenna is available. The longer (in wavelengths) it is, the more bi-directional it is.  $468/\text{Freq} = \text{wave-length in feet}$

### **Diversity fundamentals**

Diversity overcomes signal "fading", which is generally a local condition. Space diversity reception is a configuration where multiple widely spaced antennas feed mutiple receivers, such that at least one of them will produce useable output. For maximal usefulness, the outputs should be interconnected so that automatic selection of the strongest received signal is made, and the other weaker signals are suppressed.

### **Multicouplers**

CU-168/FRR allows five receivers to operate off a single antenna. 2-32 MC

CU-52/URR allows up to 10 receivers (unbalanced ant input) or 5 receivers (balanced ant input) with minimum of interaction

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Date: Mon, 5 Apr 1999 21:49:12 EDT  
From: SBJohnston@aol.com

Subject: Re: [R-390] Antennas

Since you expressed interest in a broadcast band filter, I guess you're thinking the radio is being overloaded by the new broadcast station. Could be, but other possibilities exist... first, the signals might really be there - - their new transmitter may have a problem. Do you hear them on other receivers? If so, you could take a portable shortwave receiver to another location more distant from and see if you hear the spurious signals. If you still hear them, it might be worthwhile to contact the Chief Engineer of the station.

Another definite possibility (since the problem showed up after antenna work) is that it is not overload to the front end of the radio, but rather spurious signals created in a bad connection (acting like a diode) somewhere on the antenna, feedline, or a nearby metallic object (such as gutters/downspout joints, tower section joints, and the like).

I once had a complaint from a ham saying my 5 kW broadcast station was putting spurs all thru the 3 MHz range. He lived a number of miles from the transmitter site, so although the signal would be pretty strong at his place, he wasn't too likely to be getting overloaded, either.

After demonstrating to myself that all signals from our transmitter were greater than 80 dB down from the main carrier (it was nearly the time for the annual check anyway), I took a portable shortwave receiver (Sony 2010) and our tunable field strength meter over to his house and showed him they did not hear the spurious signals in his front yard, but as we walked into his backyard we started to hear them. As we approached the "ladder-line" hanging down from his dipole antenna it got very strong. Shaking the line made the spurious signals come and go. Close inspection of the antenna system revealed that the solid-conductor wire inside the ladder-line jacket had broken off and was barely touching at times. Combine this with a little corrosion and it was probably forming a point-contact diode, generating harmonics and mixing strong signals to produce new signals.

I've heard of similar problems in antenna traps, antenna tuners, tower joints, etc. The first time I experienced it myself it was quite hard to troubleshoot because I heard it on all my antennas. The antenna with the bad connection was radiating the spurious signals into the other nearby antennas, so they all heard it. I finally found which one was the culprit by lowering each one to the ground while listening to the others. When I lowered the one with the bad connection, all the spurious signals disappeared on the other antennas.

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Date: Sun, 9 May 1999 17:02:59 EDT

From: SBJohnston@aol.com  
Subject: Re: [R-390] Indoor antenna advice.

>it is find the best possible indoor receiving antenna...

I'd say you should wrap a few turns of wire around the owner's waist and dangle him out the window - his body will provide great end-loading. Seriously... I've found indoor antennas are always work better if you can get even just a few feet of wire outside... In other words, run the wire around the ceiling molding or something, then send it out the window as far as you can.

Magnet wire is very hard to see, so you could dangle as much as practical (not down beyond the window of the floor below, etc) with a small, gentle weight to hold it straight. Don't use a big weight like a coffee cup (like we did at Dayton two years ago - the magnet wire broke and the cup fell six stories to the alley below, smashing to a million bits on a dumpster below).

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Date: Sun, 9 May 1999 17:07:18 -0400 (EDT)  
From: Norman Ryan <nryan@duke.edu>  
Subject: Re: [R-390] Indoor antenna advice.

Funny you mention this. Been thinking we should start an antenna thread. Have wanted to erect something outside, but all that is up right now is a wire strung around the inside of the house. Live alone, so don't have to answer to anyone about it. It's about forty or more feet of wire roaming aimlessly about indoors, fed from one end. Works OK, perhaps, but lack a point of reference.

While we're at it, anyone have preferences for outside antennas? Have a dipole "Eavesdropper" in the package that would be nice to erect, but power line is too close to where it wants to be. (Have to hassle with local power company to see if they will bury some of it near where electric power enters house.) Qth is a northward facing hillside. How high up Nob Hill are you?

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Date: Sun, 9 May 1999 17:34:43 -0400  
From: "Howard Rawls" <howard@cconnect.net>  
Subject: Re: [R-390] Indoor antenna advice.

Hi Jim, I live on the other coast in eastern NC and I'm thinking about building an indoor loop antenna. I put up a long wire last week but have not had the nerve to use it because of the frequent electrical storms. One of the other list members is building a loop also, maybe he will report on it soon. I seem to remember several small loop antenna designs in QST and 73 over the last few years. I saved them (out in the barn) because I knew that someday I would HAVE to build one! Good luck with whatever you

build, and please let us know how it works out.

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Date: Sun, 9 May 1999 21:39:15 +0100  
From: "Phil Atchley" <ko6bb@elite.net>  
Subject: Re: [R-390] Indoor antenna advice.

You didn't give many details of what facilities are available. First step is to do a survey of the receiving situation as to things like, is the building "steel-reinforced concrete :>( wood :) and things like large picture windows or access to the attic). I had a wire under the eaves of this apartment (single story, mostly wood products & tile roof which they made me take down.e attic for 40-10 meters fet with mini-8 coax. use the 40 meter feeding coax an all on 80M & 160M with this setup I've worked about 125 countries and verified 67 to date. On SWL I have 155 NASWA countries verified. A "invisable" loop of wire strung around the ceiling in the corner between ceiling/wall often works well for receiving and is often quieter than a dipole. Just feed it with coax or twinlead or whatever. May not be tuned but will work. I once ran one with no tuner on 40meters, transmitting I had a SWR of 2/1 worst case. It was about 1 "S" unit down from my 40 meter dipole up in the attic. If you have a large picture window a loop of wire (stick-on alarm tape works well) can often provide a usable signal. Your "LAST choice should be one of those cheap "amplified" antennas with a 2-3 foot whip. They will increase the signal strength, along with any noise generated in your building. I use a 3 foot on a side rotatable loop (with low noise mosfet amplifier) for the AM BC band. This is tunable/rotatable, built from PVC and mounted on the end of my radio operating table for BC DX. Works very well and allows me to null QRN/QRN from my computer and the wifes TV. I hope that this gives you some ideas. I'm not allowed any outdoor antennas and I've gotten compliments for my operation. (wish I had a 100' tower hi ;-)

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Date: Sun, 18 Jul 1999 23:31:13 -0700  
From: "Gene G. Beckwith" <jtone@sssnet.com>  
Subject: Re: [R-390] GFI/grounds

Driven ground rod good idea for safety...I have found that more than one is better... seems they vary in conductivity depending on soil, aging, moisture content, and so on...I am planning on at least three...but that's just my approach. Re performance...suspect your whole station will be quieter and safer with excelent ground system...

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Date: Mon, 19 Jul 1999 10:31:21 -0500  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re:coax cables

I think your RS coax may prove to be practically unshielded unless they

have changed their designs recently. Copper costs money, and it takes good machinery to braid it tight. RS doesn't want to spend money so likely the braid was made by hand by Chinese kids and it didn't use much copper. You might want to look at the braid and compare coupling through the coax. Hook up one of your jumpers (old then new) with a termination on the other end and see how much computer and monitor noise you hear in the receiver. I think you'll detect a significant difference, not in favor of the RS coax.

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Date: Sun, 18 Jul 1999 23:31:13 -0700  
From: "Gene G. Beckwith" <jtone@sssnet.com>  
Subject: Re: [R-390] GFI/grounds

Driven ground rod good idea for safety...I have found that more than one is better... seems they vary in conductivity depending on soil, aging, moisture content, and so on...I am planning on at least three...but that's just my approach. Re performance...suspect your whole station will be quieter and safer with excellent ground system...

Date: Mon, 22 Mar 1999 13:26:58 -0500  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] RF deck - balanced antenna

BRIEFLY: Adjusting the antenna balance is NOT needed for normal operation...it is needed for use with direction finding antennas (which NONE of us have). You do not need to do that adjustment. If you do it, it will probably not affect your radios operation for normal hookup.. that is with one side of the twinax grounded and the signal fed to the other side.

It sets the condition that a single signal fed to BOTH sides of the balanced antenna input transformer creates the MINIMUM received signal strength

I can clarify what the poorly written procedure in the MIL-SPEC for the R-390A means, and the even more poorly written procedure in the maintenance manual means.

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Date: Mon, 22 Mar 1999 21:38:44 EST  
From: DJED1@aol.com  
Subject: Re: [R-390] RF deck - balanced antenna

The balanced setup with the 68 ohm resistors is only used to adjust the first transformer for balance; the rest of the transformers are adjusted using the signal generator connected to one side of the balanced input, and the other grounded (there may need to be a terminating resistor in parallel with the input, depending on your generator). The balance setup with two 68-ohm resistors feeds both sides of the balanced feed in-phase, which should

result in zero receiver output if it is properly balanced. I gave it a try with a simple Heath generator and was able to adjust the receiver to null down 40 to 50 dB. Now if I could find an antenna that's balanced...

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Date: Fri, 30 Jul 1999 19:53:10 -0700  
From: Leigh Sedgwick <bipi@worldnet.att.net>  
Subject: Re: [R-390] Re: grounds

> (a) aluminum vs copper to run from the rcvr to the outside to the  
> grounding rods? Gauge? My stuff is on the 2nd story, so the run is 25'  
> outside to the rods..... (no cold water pipes accessible)

I run heavy grounding strap to dedicated grounding rods about 4 feet out the wall from the radios. Long ground runs are probably not too critical if one is not transmitting where they can cause high RF levels locally in the room caused by resonance, etc. I've not heard any comments about receive problems but if you hear of any comments in that regard, I would be interested in hearing about them too. Sold my restored R390A to a friend in SLC. So, now I've got my other (non-working) unit on the desk in pieces. Still have to remove the RF deck which will be a new challenge for me. This should be fun. Give me a call sometime and stop in for a cup of java.

> (b) Notice that near all the Navy units have a NE-2 bulb across the  
> antenna input... should we keep them? Any value in a civilian  
> installation?

Can't help ya on this one.

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Date: Fri, 30 Jul 1999 21:18:58 -0500  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Re: grounds

NE-2 on the antenna input will divert some static charge energy from the input circuits. Won't hurt anything in receiving, may cause static clicks when they work. My HF antenna spark gap does that too. They won't protect from a direct lighting hit. Only a significant series air gap with the antenna grounded on the side of the gap away from the receiver will protect the receiver from a direct hit. Something like a few feet of air gap...  
73, Jerry, KOCQ

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Date: Fri, 30 Jul 1999 19:59:20 -0700 (PDT)  
From: Joe Foley <redmenaced@yahoo.com>  
Subject: Re: [R-390] Re: grounds

The National Electrical Code sayeth thus:



NO ALUMINUM WIRE WITHIN 18" OF THE GROUND UNLESS IT'S RATED FOR DIRECT BURIAL (That would be insulated)

So, because of the corrosion problems with aluminum spend the money and use good ole copper. What gauge? BIG! Especially for Rf. Braid would be best there. I'm going to use #4 just cause I have it. Put your ground rod(s) under the downspout so it/they stay wet.

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Date: Sat, 31 Jul 1999 04:06:56 -0000  
From: "Michael P. Olbrisch" <kd9kc@elp.rr.com>  
Subject: RE: [R-390] Re: grounds

My ground rod is a 20 ft length of hard drawn copper pipe, 3/4" in diameter. I torch-soldered a garden hose coupling to it, then put the hose to it, got up on the roof, and had the kids turn on the water. I left 4 inches above ground. Using a vise, I squeezed it flat for 3", bent that horizontal, and drilled a 3/8" hole in that end. My ground wire is a 6' length of O/O insulated. I crimped/soldered a lug on the outside end. I then cleaned both connections, bolted it together for strength, and then soldered it for WX protection. Inside it split into 2 lengths of 4ga to the table tops, and 8ga from there to each piece of equipment. I believe you need the solder for protecting the joint against the rain etc... but you need the bolt for strength, just in case that you do take a hit, and the solder melts. BTW, typical water table here is 6 ft.

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Date: Sat, 31 Jul 1999 07:52:53 -0000  
From: "Rick Blank" <rblank@texas.net>  
Subject: Re: [R-390] power supply noise

Recently at the new home of the fellow I work part time for, he had expressed dissatisfaction with the sound quality he had been getting in his two new dedicated listening rooms. These rooms are specially engineered as to size, double thicknesses of 1" drywall with an elastomeric bonding layer between them, special studs, all kinds of the exotic, esoteric, thinking that are being incorporated into new high-end listening rooms dedicated to stereo music reproduction.... speaker placement, cables, powerline filters, etc., all had an effect, but, not to the extent that he had observed at his old house....

Late one night while listening to the Art Bell show on one of my '390's, it struck me, his house was stucco, the special wall isolation studs were metal, the roof decking was covered with an aluminum foil IR barrier...heck, he was darn near living in a 2 story, 4000 square foot Faraday cage! Every bit of noise from his computers, computerized HVAC control system, digital intrusion alarm system, digital phone system, halogen lights, and all the rest of the garbage generated in any normal

household, was being kept inside the dwelling!

One of the audio line conditioner manufacturers has recently brought out a line noise analyzer (which in talks to the designer, is a receiver that is coupled to the AC line and "hears" noise in the 200 to 300kHz range) and we broke open one when we first got one and started listening. It was unbelievable the amount of noise that even wall warts pump back into the AC lines!

This company, Audio Prism, was founded by one of the former engineers from RF Engineering, I believe but don't quote me, and they specialize in taming noise problems on AC lines for audio systems. They also sell a set of devices which are parallel line shunt filters, basically a cap across the hot and neutral lines, that you plug into as many unused outlets in your house as you can afford. These things really did clean up a lot of the noise in most all of the outlets just by plugging one in on a branch, but, there were certain circuits, yes, isolated back to the panel, that still picked up noise if an adjacent line wasn't quietened...very interesting!

So, being the avid experimenter that I am, I took an Icom R-70 receiver over to see what kind of stuff was just in the "air" (nope, not gonna pull an R-390 or even a 51J-4 out of the rack for anyone!)....I also took along a bunch of Corcom and Raytheon EMI filters (the kind that are usually built into equipment with 1/4" quick disconnect terminals), some cheap extension cords cut into two so I had a section to plug these filters into the wall and an outlet to plug stuff into the filter with.

What really amazed me, though, was not what was being received by a small antenna, but, what came thru the AC line that the receiver was plugged into! I really did not expect to see powerline noise come thru the receiver's power supply and screw up reception as badly as it did! It was an eye opening experience for me.

I found S-9+ noise levels at 120kHz, and from 220 to 280kHz...with the receiver plugged straight into the wall....some of the Corcom filters did nothing for the noise levels, others brought it down to S-5...an MIT isolation transformer and a Versalabs "Wood Block" line conditioner dropped noise about an S-unit...an Audio Prism Foundation series powerline filter killed the noise when the receiver was plugged into it and the S-meter sat at about S-1.....the little parallel line filters helped a little, but, much more so when every outlet in the room had one in them and the receiver was plugged into the AP Foundation filter.

Now, before we get into flooby dust and other recipes for disaster, I don't really want to entertain discussions on what brand or type of powerline filter works or doesn't and why the specialty audio filter manufacturers

charge so much for their products, these are just my observations, OK?

I tried a TrippLite Isobar Ultra...not much noise reduction at all, basically useless in this instance.

I also tried a Tice Solo A/V and it reduced noise down to about S-1

As a testament to what this noise was doing for reception on much higher bands (this radio just had about a 24" folding whip w/an SO-239 plug attached to it) I tried the experiments again and tuned the receiver to WWV at 15mHz..... with the radio plugged in without filtering, WWV could occasionally be heard beneath the noise, but not enough to tell what the time

announcement was...with one of the good powerline filters, WWV was not strong, about an S-3 or 4, but was perfectly readable....

I then tried the best of the Corcom filters, I don't remember what series it was, I may look it up later, with a 5mfd @ 370VAC, metal can, motor starting capacitor across the output of the filter....this also worked quite well, not quite equivalent to the Audio Prism Powerline Foundation power conditioner, but very close.

There is a website by one of the audio "gurus" that has good information on building parallel line filters: <http://www.magnan.com/column.shtml>  
Go down to the do it yourself section on this page. Magnan also talks about line conditioners on this page.

These are just some observations that I have made and it really opened my eyes as to what kind of garbage is really on our AC lines....makes me think about redoing the shack with some decent filtering....probably help improve faint signals a bit if what I found with the little Icom receiver is any indication.... This is just food for thought....

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Date: Sat, 31 Jul 1999 04:49:21 -0500

From: Nolan Lee <nlee@gs.verio.net>

Subject: Re: [R-390] Re: grounds

Copper or copper weld. 8 gauge or 6 gauge with good quality clamps. I've been told that the copper weld will actually remain intact longer than the pure copper will if it's "hit" but I haven't researched this.

>My stuff is on the 2nd story, so the run is 25' outside to the rods.....(no cold water pipes accessible)

Call around on the price of the wire, it varies a bunch from place to place as do the ground rods. Personally, I won't use the galvanized ground rods,

only copper weld ones. A pair of 8 foot copper weld ground rods spaced 8 to 10 feet apart with one continuous length of the ground wire from the farthest rod to your ground buss in your shack is the way to go. I'm guessing that in Washington State, you get your share of rain like we do. If not, placing a ground rod where the soil stays damp in the summer, like near a septic tank or treatment plant, grey water discharge from the laundry room, or the AC evaporator coil drainage pipe, etc can't hurt.

Some of the rods have threaded ends and can be joined with a coupler (and brazed or silver soldered if you're a fanatic) if you have to get down 16 feet or more to damp soil. An old method of improving the ground was to pour salt into the soil around the ground. This will improve the conductivity of the soil but I read somewhere that it's not a recommended procedure any more because that over the long haul, it will hurt the conductivity of the ground rod because of the additional corrosion build up. I'm sure that one of the guys that works with this kind of thing on a daily basis would know for sure.

You can't have enough grounding. I can walk around the shop naked while covered in sweat with bare feet on bare concrete floors with 90%+ humidity and don't even get so much as a tingle off of anything.

>(b) Notice that near all the Navy units have a NE-2 bulb across the antenna input... should >we keep them? Any value in a civilian installation?

The old ones used 991 lamps and called them a "tube". :-) Leave them. They're cheap insurance against either a lightning strike down the road a piece, or static build up from the antenna in high winds. I don't remember the exact numbers but I read a interesting piece when I was a teenager about the static buildup in longwire antennas from wind. The numbers were very surprising. One of the first things I did to the Icom R-71A's when I bought them was to add NE2 lamps across each of the antenna inputs and shunted each with a 10K 1 watt resistor to catch the static electricity buildups that aren't high enough to trigger the neon lamp. Real cheap insurance for the front end of SS radios and not a bad idea for the BA stuff either. I didn't bother with the 10K bleed resistors with the BA stuff, only the SS radios. I could have probably gotten by with higher value bleed resistors but...

I took a lightning hit thru one of the longwire antennas a few years back. It fried every component, including all 21 of the tubes and the power transformer in one of the antenna couplers. I suffered no damage to any of the receivers, not even the SS ones. I attribute this, first to luck, and to good grounding and neon lamps, bleed resistors, etc.

For the SS stuff, I also add three 150 volt MOV's to the AC power input inside the receiver. One between the hot and the neutral, one between the hot and the ground, and one between the neutral and the ground.

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Date: Sat, 31 Jul 1999 08:20:05 -0400 (EDT)  
From: Rick Giguere <rick@rifan.com>  
Subject: RE: [R-390] Re: grounds

The weak point here would be what you used for a bolt. Was it brass??? If it was steel, then the combination of galvanic action and good old rust has probably made it useless by now.

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Date: Sat, 31 Jul 1999 09:59:09 EDT  
From: DJED1@aol.com  
Subject: Re: [R-390] power supply noise

Very interesting post. I didn't think the line noise would have been all that significant- you've opened our eyes to another area of investigation. An important question though: what is the effect on a grounded R-390 with and without the powerline filter. I expect the R-390 has better filtering the most sand-state receivers.

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Date: Sat, 31 Jul 1999 14:08:01 -0000  
From: "Michael P. Olbrisch" <kd9kc@elp.rr.com>  
Subject: RE: [R-390] Re: grounds

Yes it was brass, and once covered in solder it is sealed against air and rain. It should keep for years, and experience has shown that my last one was still primo at 7 years, when I cut it off to move here. It works.

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Date: Sat, 31 Jul 1999 10:23:50 -0500  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Re: grounds

I've seen static build up on unconnected dipoles with enough voltage to snap over an SO-239. With a couple hundred feet of RG-8 for capacitance, the first snap lifted me out of my chair... A bleeder resistor might have calmed the situation. A ground wire plugged into the coax connector on the patch panel did calm the situation. It probably would be handiest to use a wire wound bleeder resistor, to achieve a higher RF impedance because of the coiling with a lower value resistor... I've not tried it, but probably 1K wire wound, say 5 watts, maybe 10 watts power rating should be appropriate.

I used to have a lightning protector on a center fed long wire antenna. Lightning hit the ridge cap of the corn crib that held up the south end of

the wire, jumped 8 feet to the antenna, burned holes in the direct burial telephone drop wire I was using for feed line, and blew up the lighting protector that included NE-62 sized neon bulbs. Then there's ham gear that hasn't worked since and light switches at the opposite end of the house that I had to replace. The protection of a neon bulb is proportional to its electrode area, but probably not enough to ever handle more than static charge, for sure not a direct hit.

Now in my HF antenna feed I have a high voltage series fuse made of a single strand of #36 copper wire in each side of the feeder and the outside radio ground. I have the VHF coaxes brought to a patch panel and when there's a thunderstorm about, I disconnect everything. The patch panel and HF antenna connectors are up high so that there's always a significant (several feet) air gap between them and the radio cables. For convenience I use type C connectors on the coax patch panel.

MOVs on the LINE side of line filters are effective at protecting SS and hollow state equipment. They are far less effective on the radio side of the filter because the low pass filter broadens impulses, lowering their peak voltage, but not changing their energy while the MOV is strictly a voltage device and often doesn't trip on the lowered voltage produced by passing that impulse through the line filter.

Our local 2m repeater uses gas discharge type protectors on the exposed antenna and on the AC line to the cabinet, and so far for the past decade or two has been working without any damage from lightning. Its antenna is on top a water tower with nothing to protect it from hits. I forget the maker of the gas discharge protector, but they weren't cheap. So far they seem to be doing very well.

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Date: Sat, 31 Jul 1999 18:27:50 -0700 (PDT)  
From: Joe Foley <redmenaced@yahoo.com>  
Subject: Re: [R-390] Grounds

Consider the voltage of the "signal" you're trying to eliminate, it is a "noise" signal, maybe a very low voltage, with very low current. It needs a very low resistance/impedance ground path. It also needs a very short path as we don't want the new ground path to pick up any other noise, that is, induced by passing it by other sources of noise. Although the water pipe is a grounding means acceptable (barely) for power it isn't good for what we're trying to do, its a higher resistance grounding path. There are rusty couplings, rubber washers, different composition components (causing galvanic corrosion), and then to top it all off there is the meter to get around. That's if there isn't a pressure tank/switch and pump to generate more noise on the ground wire. Then there's that PVC pipe! Is your water system really grounded? Sure its full of water but how thick are the hard

water deposits lining the pipe?

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Date: Sat, 31 Jul 1999 21:35:19 -0500  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Air Cond QRM, Part Trois

<snip>

A ground wire that's effectively 1/4 or 3/4 wave (or any odd number of quarter waves long) is no ground for RF. Doesn't matter much what the width or diameter of the ground conductor is when its that length.

The NEC and NESC writers want to depend on grounds for protection ignoring the fact that most driven rods aren't much of a ground except in swamps and that water pipes are more and more often made of plastic, including the mains and often meters have intentional dielectric unions to prevent electrolysis of the meters. While the NEC still recommends grounding to the water pipe the latest codes recognize that water pipes can't be depended on for grounds. I know in this old house that the plumbing inside is copper, but there's a transition to PVC somewhere between the house and the well. Found that out one January day when the water pressure started falling and the propane tank started to sink into all that soggy ground where the PVC pipe had split. Water in the pipes has no significant benefit for grounding.

I'm somewhat of a reactionary concerning power line grounding. I don't believe that grounds are good enough to depend only grounds in places like dairy barns, but I believe there has to be series gaps AND grounds to isolate long range currents from those dairy barn local grounds. With milk being a bit better conductor than plain water it doesn't take much voltage difference between the milking piping and the barn floor to irritate the cow. Then she stops being friendly to the milker and gets sick from not being properly milked. One report I read said the subject that was tested with 2.5 volts RMS became uncooperative and was dropped from the experiment. I expect she kicked a hole in the side of the barn and kicked the experimenters through it.

According to research on grounds published by the NBS about 1916, hydraulically driven grounds are far poorer than driven grounds. Sure its easy to get a hole hydraulically but you don't get intimate contact between rod and dirt and you don't have dirt that's been compacted and smeared by the rod to push against the rod. Maybe in a few years it will get better, but not initially.

A noise signal may be volts or many volts. We want to enclose that noise and not conduct it to ground or to the power line. To keep it in the enclosure we need power line filters on the power feeding that enclosure,

and we need that enclosure to not be floating at the RF frequencies we want to listen to.

**A long ground wire can act as an antenna** to radiate noise to the official radio receiving antenna.

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Date: Sun, 01 Aug 1999 08:30:50 -0600  
From: Thomas Marcotte <marcotte@iamerica.net>  
Subject: [R-390] Controller QRM

<snip> Found that the wires coming out of the Honeywell controller were radiating the noise.

I placed a Rat Shack separable choke coil on the thermostat wire, several turns, another choke coil on the burner control wires, and then could manage only one pass of a large cluster of wires coming out of the controller through the choke. The noise went from 2 S units to 1 S unit.

Looks like these wires are acting as the ant for noise from the controller.

So, we're getting closer, but would like some recommendations on what to do next. Getting only one pass of a cluster of wires through a choke coil seems like a tough nut to crack as the cluster of wires is thick and the wires are too short to really coil up multiple turns. Can one pass help? Perhaps more clamp ons of one pass are in order? Any ideas on fabricating a foil shield for the wire cluster? Al or Cu? Getting close.

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Date: Sun, 01 Aug 1999 10:49:37 -0500  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Controller QRM

Its hard to get and maintain connections to aluminum foil without welding, so copper foil will do more for shielding.

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Date: Mon, 02 Aug 1999 12:07:22 MDT  
From: Kenneth Crips <w7itc@hotmail.com>  
Subject: Re: [R-390] Re: grounds

Because you are not transmitting the 25 ft should be ok, however I would not use aluminum, copper is much better, it's not that copper conducts better it is the fact aluminum corrodes badly when in contact with other metals, setting up little diodes that can cause noise. If you already have the aluminum go down to any hardware store or electrical supply and ask for the anti-ox stuff for aluminum wire and follow the instructions and you'll be just fine, just make sure you seal up the connection points and every couple of year renew the anti-ox compound. By the way one of the



best compounds out there is called Butternut Butter, it comes from Butternut Antennas and is used in the joints of their excellent antenna lines, it is like a grease and doesn't wash out of the joints of an antenna.

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Date: Mon, 02 Aug 1999 12:14:15 MDT  
From: "Kenneth Crips" <w7itc@hotmail.com>  
Subject: [R-390] the neon bulb

By all means keep the neon light I live in heavy duty thunderstorm country and it is interesting to watch the bulb flicker and it bleeds static charges off the antenna to ground, that is, just before I disconnect the antenna.

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Date: Mon, 25 Oct 1999 08:18:16 +0200  
From: Thomas Roth <th.roth@knuut.de>  
Subject: [R-390] Magnetic Loop

Somewhat off-topic but interesting nevertheless. The ALA 1530 untuned active loop antenna. If all I heard about it is true, it would be an ideal antenna for folks without space. I'll borrow one soon for tests. Some folks on the German language A-DX list said they heard St. Helena better on this antenna (while having it indoors !!!) than on their wires outside.

Check out <http://www.wellbrook.uk.com/> and make sure you read the 'Reviews' section.

The 'K9AY DIRECTIONAL TERMINATED LOOP ANTENNA' also sounds very interesting.

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Date: Fri, 31 Dec 1999 16:05:28 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] Nuvistaplug help

I'm not familiar with the SB-110 conversion scheme but agree that a well designed LC VFO is the way to go for minimum phase noise. For VHF and above I have settled on the Kenwood TS-830 as my IF platform of choice; low phase noise being the primary consideration. Several mods have corrected other deficiencies. On HF I have decided ( thru years of testing) that a SYSTEM NF of around 5dB is required for maximum performance above roughly 20 MHz. I will say that for the average listener that is severe overkill but my antenna system and location is not the average. On the 15 and 10M ham bands I utilized a 4 high stack of 4el yagis that are switchable phased in several elevation angle configurations. At times a homebrew preamp with a 1dB NF in front of a TS-940, R4C, 75A4 with the typical 12+ dB NF made the difference between solid copy and pure noise.

The R-390 and 390A series, with all the iterations, can only benefit when pushed to the max. With a 100' long wire for the antenna there is no reason to optimize.

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Date: Wed, 5 Jan 2000 16:07:37 -0000  
From: "Phil Atchley" <ko6bb@elite.net>  
Subject: [R-390] MFJ 1024 Outdoor active antenna with BA's....

Has anybody used the MFJ 1024 active outdoor antenna? If so any remarks pro - con would be appreciated. I forwarded this from the SWL list after receiving no answers. I usually prefer passive antennas (quieter) and have a Alpha Delta DX-B sloper mounted over the metal roof of the mobile home. Also have a hustler 6BTV 6 band (amateur) vertical mounted over the same metal roof. The Sloper works especially well on the lower bands as well as Broadcast AM.

I thought I'd like to try a fairly short (4 foot or so) active antenna mounted on top of the 30 foot mast that supports the sloper, getting it up as high and clear of surroundings as is possible in this mobile home park. This to AUGMENT the existing antennas only, not to be used as the main antenna. It would be used with a Hammarlund SP-600, (future) R-390A and other quality table top receivers, no portables which might be subject to overload. Any thoughts on the subject?

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Date: Wed, 12 Jan 2000 10:59:52 -0500  
From: "Warren, W. Thomas" <wtw@rti.org>  
Subject: RE: Re[2]: [R-390] Signal generator connection questions

>Original question: why 125 ohms for the balanced input to the 390a?

I'm getting more of a suspicion that you're absolutely correct. A buddy of mine here who worked on 390A's while in the Navy thinks that in the 1940's, there was a standard of 125 ohms for balanced feeders aboard ships.

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Date: Wed, 12 Jan 2000 11:46:14 -0500  
From: kmlh@juno.com  
Subject: Re: Re[2]: [R-390] Signal generator connection questions

I dont remember balanced feeders on any Navy ship I was on. While the newer gear was/is coax fed, the earlier RAK-RAL, RBA/B/C, TBK, etc used single wire fed long wires. They came down to the bulkhead and then thru an air insulated large diameter coaxial tube to the various radio rooms. Ships without a superstructure that did not allow long wires, carriers, etc relied primarily on 35' or shorter whips. '73 Carl KM1H

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Date: Mon, 17 Jan 2000 10:10 -0800 (PST)

From: rlruszkowski@west.raytheon.com  
Subject: [R-390] antenna match

I used a no brand antenna match between my long wire and my R390/A. I put a triax connector on the antenna match box and wired the split caps to it. between the antenna match and the receiver I have a 10ft length of tri ax (I do not remember the cable number type). I have a long wire to the unbalanced side of the antenna match. Inside the antenna match is a single cap, a split cap and a roller inductor. With the switches I can seem to match almost any frequency to the receiver. I am not happy with my receivers sensitivity right now and have no good measurements. If I can hear a signal, the match gets me a stronger (louder) signal. The part I like is the match acts more as a narrow band filter and trims a lot of the off frequency noise, with out a loss of signal. The bad part is forever re setting the match. I use the straight-through switch most of the time to tune. this feeds the wire to one side of the tri ax and grounds the other pin. I am starting to believe most of my sensitive problem is my ground path. Are you using a wide band toroid match that we do not have to tune?

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Date: Mon, 31 Jan 2000 21:01:19 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] Beverage antenna

A Beverage made up of Slinky toys....metal ones of course, except for 11M..They are cadmium plated spring steel and survive outdoors quite well for several years....I had one up here in NH for 10 yrs before it rusted away.... I use 5 of them soldered end to end and stretched out about 175'. Feed with a 9:1 balun which is not ideal but works fine....actual measured impedance is around 1K. Quite broadband, at least 1.8-14MHz and good directivity. For a bit more F/B add a few radials out front in line with the antenna, fan over a total of 20 degrees. Spray over the solder joints with your favorite rust preventer. I have compared against conventional 500-600' Beverages and the Slinky hears everything its big brother does and appears to have even lower noise pick up. I wrote up a rather extensive post on Topband a few years ago and many have also reported excellent results, even as short as 100' so they are nice for small lot sizes.

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Date: Tue, 01 Feb 2000 21:33:47 +0100  
From: Johan.Andersson@draminst.se (Johan Andersson)  
Subject: [R-390] Wire antennas,

Dunno if this will be called hype from the group, but at least some seems to be into this lo-noise antenna thing. An 150 kW AM station can lie just 1 dB above the noise floor (and hence become a "DX") - given a lousy antenna setup. Now - we can twiddle and tweak the RF decks, optimize IF Gain and purchase low-noise 1st RF tubes 'til kingdom come - it won't help us a bit if

we don't hook the piece up to an antenna with at least equal (or rather: better) signal to noise-ratio.

Guess a stock R-390 will have a better S-N than the average antenna, especially when the coax's braid is connected to the RX chassis, so why bother optimizing the RX? I'm not saying everyone should do it - but at least check that your signal chain has no weak links or that you're overdoing this "R-390 maxing out"-thing... Or if you do - that's OK too - as long as you're at least knowing you're doing just that... I mean- we usually don't use microscopes for hammerin' nails - do we? So why use an less-than-optimal antenna (and lead-in) to our beloved and optimized BAs?

`Nuff o'preachin' for now- this is the latest finding on RX antenna matching; W4RNL has done some really interesting NEC modeling on the T2FD at, <http://www.cebik.com/t2fd.html> and found the following:

1: Typical nominal impedance is rather some 900 ohms (Yup!) w a 800 ohm

terminator @ 2:1 SWR

2: The elevation pattern "breaks down" to a Zepp-like one, when the antenna length is longer than 1.25 wl.

This means a <40 ft antenna for the entire HF range...

And this is just for starters - he won't comment on the S/N tho - bummer! Check it out for yourselves!

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Date: Tue, 01 Feb 2000 14:28 -0800 (PST)  
From: rlruskowski@west.raytheon.com  
Subject: [R-390] Re(n+1) Wire antennas, cont"d

Yes, I have to accept what you say here. Time to get out doors and work on the antenna for a while. Enough of this tube testings and coil peaking. It's time to now work on the new weakest link in the system.

Date: Tue, 01 Feb 2000 18:28:21 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Re(n+1) Wire antennas, cont"d

The T2FD is a dummy load with wires. Uniformly bad radiator throughout its frequency range many dB down from a resonant dipole. On receive the dummy load contributes a lot of noise.

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Date: Wed, 2 Feb 2000 01:26:24 -0000  
From: "Michael P. Olbrisch" <kd9kc@elp.rr.com>  
Subject: RE: [R-390] Re(n+1) Wire antennas, cont"d

> The T2FD is a dummy load with wires.

I disagree. I use a T2FD for HF operation, and I find it to be quite acceptable. It is not as good as a single band dipole on any one frequency, but it does allow me to work all the MARS and ham bands on a single coax.

> Uniformly bad radiator throughout its frequency range many  
> dB down from a resonant dipole. On receive the dummy load  
> contributes a lot of noise.

Interesting comments. But again, I work MARS stations from Indiana to Washington state on 3.2 MHz regularly, without difficulty. Does this sound like a uniformly bad radiator? OK, so I am only 5 dB over 9 instead of 10 dB over 9. I am not a DXer, and the small loss is acceptable to me. Also, you would have them believe that a T2FD is a noisy antenna. If anything, it is exactly the opposite. I find it to be a very quiet antenna. Now I do not mean to make your title look bad, so perhaps you can explain how I get quite acceptable results out of what you call a "dummy load with wires" or a "Uniformly bad radiator"

But whatever you do, do not tell my antenna that it isn't supposed to work... maybe it just doesn't know it!?!? <GRIN>

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Date: Tue, 01 Feb 2000 21:20:40 -0500  
From: "Randall C. Stout" <rcls1@sprintmail.com>  
Subject: [R-390] T2FD -pros and cons?

I was just getting ready to put up a T2FD. The antenna section of Radio Netherlands thought they were great, Universal Radio thinks they are great (even allowing for a bit of retail puffery). Proported to have very very low noise, much better than dipoles, long wires, etc., and have a very broad coverage. However, if Jerry says no, I am really in a quandry. The one Universal touts has a length of 45ft, uses a 'special balun to match the impedance so that its a good match for 50 ohm coax. I would really appreciate some extra input! I listen from broadcast up to 16 meters, so need broad coverage. Ok, guys, lets hear some opinions!

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Date: Tue, 1 Feb 2000 20:45:31 -0800  
From: bloper@ix.netcom.com  
Subject: Re: [R-390] T2FD -pros and cons?

I've used one with great success, both as a ham and in military HF work. I guess a dipole cut exactly to freq. would be best, but if you can't have that use the next best thing...Good luck

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Date: Tue, 1 Feb 2000 22:01:53 -0500

From: "Joe Schreiber" <jschreiber@adelphia.net>  
Subject: Re: [R-390] Re(n+1) Wire antennas, cont"d

Hi... This assertion is inconsistant with my observations. The T2FD is the quietest (S/N) receiving antenna I have used. The resonant dipole may have more gain at it's resonant frequency, but I find S/N more important, and at frequencies other than it's resonant frequency the dipole has underperformed the T2FD in my comparisons. Your results may vary depending on how much noise is present at your receiving location. I have no opinion about the T2FD as a transmitting antenna... Joe Schreiber.

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Date: Tue, 01 Feb 2000 21:32:34 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] T2FD -pros and cons?

Of course it's quiet, it has a 20 db attenuator built in.

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Date: Tue, 01 Feb 2000 22:06:06 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Re(n+1) Wire antennas, cont"d

Just shows that you have been using excess power for the paths you have been working. I still think the T2FD is a leaky dummy load.

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Date: Tue, 1 Feb 2000 22:18:11 -0800  
From: bloper@ix.netcom.com  
Subject: Re: [R-390] Re(n+1) Wire antennas, cont"d

I know we used it with fairly low power and kept RTTY shots up. I guess bottom line is if you can throw up multiple yagis on a 150 foot tower, do it, if not try the T2FD

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Date: Tue, 01 Feb 2000 22:16:05 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] T2FD -pros and cons?

I much prefer an arbitrary length dipole with high impedance feeders and a good tuner, it will also work everywhere without the effect of a 15 or 20 dB attenuator in the line.

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Date: Tue, 01 Feb 2000 22:58:09 -0600  
From: "Joe L. Reda" <joer@reda.com>  
Subject: Re: [R-390] T2FD -pros and cons?

Odd, though, the literature I have on the TTFD purports that it's one of the greatest antennas ever (and this isn't antenna company stuff). If the snow

ever melts here, I'm getting ready to put one up and hook my National NCX-5 to it. I hadn't thought of it for receiving (shows you how much I know about antennas!), but mebbe I'll also hook the ol' R390A up to it. One never knows . .

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Date: Wed, 2 Feb 2000 05:09:14 -0000  
From: "Michael P. Olbrisch" <kd9kc@elp.rr.com>  
Subject: RE: [R-390] T2FD -pros and cons?

And I much prefer a separate dipole for 2.2, 3.2, 4.0, 4.5, 5.1, 6.8, 7.2, 8.1, and 10.1 MHz. But since I do not want to run 9 coax lines into my house, and I do not want to hassle with a manual tuner and ladder line, the T2FD does it for me.

> it will also work everywhere without the effect of a 15 or 20 dB attenuator in the line.

But now you need special considerations like ladder line and a tuner. I use coax and no tuner. Guess it boils down to if I miss that miniscule amount of power that you would gain with all that extra work. As several on the list have pointed out, it get the job done for them. But we are neither PHD RF designers nor DXers, so good enough is good enough for us. 15 or 20 dB may apply to your test, but in real life use it doesn't seem to be that much here. A very large number of Army MARS stations use these "dummy load" T2FDs successfully on a daily basis. Bottom line, I work what I want to work, and well enough.

Hey out there, if you are thinking of the T2FD design, it isn't magic. It isn't a 6 element yagi at 250 feet. It isn't a full sized dipole at resonance. But it is a useable antenna. Give me a freq and a time, I will show you. I can't make it any plainer than that.

Date: Wed, 2 Feb 2000 05:26:44 -0000  
From: "Michael P. Olbrisch" <kd9kc@elp.rr.com>  
Subject: RE: [R-390] T2FD -pros and cons?

Give it a try. Especially for RX, the design is very simple. And the termination doesn't need to be high-power either.

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Date: Tue, 01 Feb 2000 23:46:59 -0800  
From: Dick Carroll <dixie@townsq.com>  
Subject: Re: [R-390] T2FD -pros and cons?

A T2FD is an antenna that only a non-engineer could love. At first exposure, I doubted seriously it that the thing would actually work an HF SSB net, and would have bet it wouldn't have done a good enough job at it

that an experienced HF operator wouldn't notice the difference between it and a discrete on-frequency dipole. But that's what happened. The state's National Guard used them at each Armory in the state, and held a HF SSB net above 8 mhz daily at 9am. Of the couple dozen stations checking in, all running 100 watts to Collins KWM2A transcievers, at no time did I ever hear one that I considered "weak" , and certainly none was too weak to have handled any needed traffic.

No doubt signals would have been at a higher level with discrete dipole antennas, but that fact didn't affect us in any way. No one noticed what had to be a rather serious reduction in signal strengths. The one I used hung about 70feet up on a 350 ft freestanding tower, and sloped down on each side, Inverted V style. Most others I saw at other installations were not nearly so high, some 20-30 feet up, yet all were used successfully. I understand that many US Government agencies used them for years, and I'd guess some still do.

The antenna's instructions note that they work better when used with an antenna tuner. I found that the tuner did help in transmit loading.

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Date: Wed, 2 Feb 2000 00:46:02 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] R390/A Antenna and Ground Problems.

> You don't mean PVC pipe do you?

Sure, why not? At HF the loss is minimal and the stuff lasts a long time outdoors. Many antenna manufacturers use it. Nylon is the lossy stuff.

Date: Wed, 2 Feb 2000 01:03:48 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] Re(n+1) Wire antennas, cont"d

Hey, I have 4 towers 70 to 180' and still think the T2FD is fine for those that can't live and sleep antennas.

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Date: Wed, 2 Feb 2000 00:58:05 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] T2FD -pros and cons?

You know what they say about opinions Randy??

The T2FD is a decent compromise antenna that has been around longer than the naysayer. Just dont expect equal performance to a full size resonant dipole on all frequencies. It will be down typically 5-10dB over most of its range. Just remember that the antenna loss will add to the



existing receiver Noise Figure so it will pay to have it well aligned to minimize the effects. I have yet to try one but I hear that those small magnetic antennas work quite well, I believe they are called Isotron.

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Date: Wed, 2 Feb 2000 00:36:18 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] Wire antennas,

Actually, a poor antenna may have a better S/N ratio than a more optimum version. A case in point is a 80M dipole at say 25' high will at times hear better on 160M than a high resonant dipole or a vertical.

Although broadband by fact of the resistive termination.... it has no natural noise reduction. Barker and Williamson sold versions from 3-30 and 1.5-30 MHz for years. Altho inefficient they were very popular where a quick install was required such as during the Gulf War. A low horizontal loop, at least 0.5 wave at the lowest desired frequency and fed with balanced line into a tuner will offer better S/N. It will perform from 3 -30 MHz if cut for 3 MHz. A vertical quad or delta element can be made to offer excellent performance and can be switched from horizontal to vertical polarization with a small relay. By their very nature a closed loop, type of design is lower noise than a straight wire or vertical. I get the feeling that several of the more vocal members on this list have nice radios but poor antennas and/or locations so tend to ignore those of us who take their antenna installation even more seriously than some old radio.

Wed Feb 2000 06:54:44 -0000  
From: "Phil Atchley" <ko6bb@elite.net>  
Subject: [R-390] Wire\_antennas

After following this thread (and keeping my silence for awhile) I thought I'd inject my .02 worth. I have right now only a couple antennas right now, a 60 foot sloper mounted less than optimum height and a Hustler 6BTV 6 band vertical (80, 40, 30, 20, 15 & 10). But I have found an antenna used on a band for which it is NOT resonate will often give a better receive S/N ratio, the sigs may be lower but the noise may be even lower yet. EXAMPLE: When I was in the apartment I had 5 dipoles up in the attic for 40, 20, 15 & 10 meters (2 at 90 degrees for 20M), I used the 40 meter dipole as a "top loaded tee" against ground for 160/80. (worked/verified 26 states 2 way on 160 with this "indoor" setup) But sometimes listening on say 40 meters Broadcast the 20 or 15 meter dipoles often gave better Signal/Noise ratio. And lower noise is what it is all about. And I would have to say that all 5 of those antennas were within similar distance of the apartment wiring as far as adjacent "noisemakers" go. AND I had some local "DXer" friends who were amazed at what all I worked with my "Attic dipoles up 12 feet above ground". What

it boils down to is that antennas are an "in-exact" science and what works for you at your location is "the best antenna for you"..... nuff said.

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Date: Wed, 02 Feb 2000 07:57:55 +0100  
From: Thomas Roth <th.roth@knuut.de>  
Subject: Re: [R-390] T2FD -pros and cons?

I've been using a T2FD for two years now and presently have it hooked up to my non-A 390. It works very well indeed. While of course signal strength is less than on the dipoles, it's also a lot quieter. I like tropical band dx-ing a lot and the noise there often is quiet bothersome. On the T2FD things are often a lot easier on my ears. Mine is cut for 3-30 MHz, one end about 30 meters high, the other about 25 meters. And I use a tuner of course. My advice, just try it out - it won't make you bankrupt to get the components - and see for yourself... IMHO it's a great alternative for us cliff-dwellers.

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Date: Tue, 01 Feb 2000 23:02:01 -0800  
From: "Walter (Volodya) Salmaniw, MD" <salmaniw@home.com>  
Subject: Re: [R-390] T2FD -pros and cons?

My two cents re the T2FD...As far as I'm concerned it is a superb compromise antenna. I use 6 antenna choices at my location, fed into a 6 way coax switch, then out to a 32 to 1 multicoupler and out to my various receivers. The choices I have are the T2FD (cut for 4.9 MHz), Eavesdropper commercial trap dipole, 60 meter diamond loop, 25 meter dipole, random wire, and a vertical. Of all of these, I use the T2FD about 80% of the time, as it provides the best S/N ratio, followed by the Eavesdropper, then the 25 meter dipole, and then the rest. I can attest to it's usefulness, especially it's broadbanded nature. Until now I didn't expect that it would be supplanted, but I now have on order from Wellbrook Communications in the UK, their K9AY, which recently has had rave reviews from DXperts in the field.

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Date: Wed, 2 Feb 2000 15:25:53 +0100  
From: "Federico" <federico@novara.alpcom.it>  
Subject: R: [R-390] Re(n+1) Wire antennas, cont"d

Dear friends, do you employ a T2FD made from yourself or a commercial T2FD (B&W?)?. Please let me know because I'm interested to bought an antenna of this type (a good one) or construct one by myself in this case I need to know the lenght of the antenna , how many inches are betwenn the two wires, the value of the terminating resistor and the type of balun employed to feed with 50 ohms coaxial. If each of you shall be so kind to answer to these questions I think that we can have more practical information about this

interesting type of antenna. Many thanks. Federico

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Author: Johan.Andersson@draminst.se

Date: 02/01/2000 12:33 PM

Dunno if this will be called hype from the group, but at least some seems to be into this lo-noise antenna thing. An 150 kW AM station can lie just 1 dB above the noise floor (and hence become a "DX") - given a lousy antenna setup. Now - we can twiddle and tweak the RF decks, optimize IF Gain and purchase low-noise 1st RF tubes "til kingdom come - it won't help us a bit if we don't hook the piece up to an antenna with at least equal (or rather: better) signal to noise-ratio. Guess a stock R-390 will have a better S-N than the average antenna, especially when the coax's braid is connected to the RX chassis, so why bother optimizing the RX? I'm not saying everyone should do it - but at least check that your signal chain has no weak links or that you're overdoing this "R-390 maxing out"-thing... Or if you do - that's OK too - as long as you're at least knowing you're doing just that... I mean- we usually don't use microscopes for hammerin' nails - do we? So why use an less-than-optimal antenna (and lead-in) to our beloved and optimized BAs? `Nuff o'preachin' for now- this is the latest finding on RX antenna matching; W4RNL has done some really interesting NEC modeling on the T2FD at, [tp://www.cebik.com/t2fd.html](http://www.cebik.com/t2fd.html) and found the following:

1: Typical nominal impedance is rather some 900 ohms (Yup!) w a 800 ohm

terminator @ 2:1 SWR

2: The elevation pattern "breaks down" to a Zepp-like one, when the antenna length is longer than 1.25 wl.

This means a <40 ft antenna for the entire HF range... And this is just for starters - he won't comment on the S/N tho - bummer! Check it out for yourselves! Hope someone will find this info useful, and for the others perhaps as a source of amusement?

Date: Wed, 02 Feb 2000 10:41:23 -0500

From: Bill Cotter <[bcotter@pop.uky.edu](mailto:bcotter@pop.uky.edu)>

Subject: [R-390] horizontal loop receive antenna

Brian Beezley, K6STI, did a very nice article a couple of years ago on a horizontal receive antenna designed for high noise rejection. I believe I saw it in QST (I'll try to locate tonight). He went to great lengths to work through the theory needed to arrive at a model. Then tested it with some of his well known antenna design tools. As I recall, it was a loop about ten ft above the ground, fit in a small yard, had a balanced feeder between diagonal corners. I think it would be worth investigating if a low noise, broadband receiving antenna is what you're seeking.

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Date: Wed, 02 Feb 2000 11:56:21 -0500  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: R: [R-390] Re(n+1) Wire antennas, cont'd

Details on how to build the antenna are at:  
**<http://www.radiohc.org/Distributions/Dxers/ttfd2.html>**

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Date: Wed, 2 Feb 2000 12:01:47 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] T2FD -pros and cons?

And I thought you were still young Jerry! The first I remember reading about the T2FD was in a late 40's era CQ Magazine or maybe a pre-War QST. Maybe some "real" old timer can comment about their use in WW2 or Korea!

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Date: Wed, 2 Feb 2000 13:40:12 EST  
From: DAVEINBHAM@aol.com  
Subject: Re: [R-390] T2FD -pros and cons?

Randy & everyone else, I use a T2FD and am very pleased with it. I live in beautiful downtown Birmingham, Alabama in a rather shortwave unfriendly area. I can see the towers of the local TV stations out my window to the west, there is a group of industrial plants about a mile to the north. I have lived here over 30 years and used many different antennas and the T2FD is far and away the best. It is remarkably quiet and works well over the spectrum it was built for. The plans I used to construct it can be found on the webpage of Radio Havana.

**<http://www.radiohc.org> Click on Arnie Coro's Dixer's unlimited.**

From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] RX dummy loads

I don't think S/N is improved by a lossy antenna unless the receiver was deficient in dynamic range and the noise peaks were overdriving the receiver. Under local storm conditions, many receivers are overloaded by thunderstorm static and S/N at the detector can be drastically improved by antenna attenuators and front end detuning.

The resistor contributes noise, called Johnson noise, strictly a function of resistance and temperature. In a relatively efficient antenna like a resistance terminated rhombic, atmospheric noise at HF should nearly always override the resistor noise. When the antenna receives signals quite a few dB down from a dipole that may not be true.

Reducing the signal from the antenna by either antenna losses, mismatches, or feed line attenuators should not change the S/N at the receiver, though when taken to an extreme the weak signal may lose S/N due to receiver noise. This happens sooner at 30 than at 2 MHz because the receiver noise tends to be greater (more than a little in the tube receiver) and the atmospheric noise component is smaller and doesn't propagate from everywhere at the same time nearly as much as at the lower HF frequencies. The CFA, another "antenna" that won't work without a feed line to do the radiation work. Doesn't hurt to have a resonant antenna near by to be shock excited by the feed line radiation... E.g. the comparison antenna can take over from a truly rotten antenna. Did that for CFA comparisons and also classically for the DDRR of old which was demonstrated on the ground plane of a full quarter wave vertical. When tested in isolation the performance is far poorer than the original Electronics article claimed.

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Date: Wed, 02 Feb 2000 17:26:54 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Re: [R-390] Re(n+1) Wire antennas, cont'd

Phil, do you have that sloper connected to a 60 foot tower topped with a tribander? If not, it's a poor antenna because the sloper really is a type of DELTA match for the tower. Most of the radiation pattern from a sloper is due to the tower current, not the sloper current. A ham locally tried that years ago and gave up.

The low antenna like your misapplied sloper is better for short distances (a few hundred miles on 75 and 40), while the vertical is mostly good for DX of a few thousand miles or more. On 75 and 40 it won't quite give a decent ground wave range and the low angle of radiation inherent in the vertical won't bounce back down for several thousand miles. But the vertical will accept all the local noise sources within a few miles so tends to be a noisy antenna.

Antenna height and type control the vertical radiation angle and on any given path at any given time some condition is optimum, not necessarily the highest antenna. Judging antennas by propagation gets overly confusing unless the same antennas are compared with the same propagation conditions over a period of years. We hams tend to not do that, but rather work what we hear and whoever hears us with whatever antenna we have. Just that using the T2FD adds excessive losses to that equation and a center fed wire with tuned feeders and a tuner to handle it (which leaves out most of the commercial T network plus balun tuners) generally works significantly better for both transmission and reception. The same antenna is not necessarily better for reception and

transmission, especially at 7 MHz and below. The 3.5 and 7 MHz dx chasers around me are heard best on their verticals but hear better on most anything else, because anything that's directive in the right direction can improve the signal to noise ratio over the vertical, but only the vertical with a lot of ground radials will transmit the best low elevation signal to be heard at the DX station. Things like the Beverage have are poor for signal strength, but good for directivity and since low noise is not hard to achieve at a few MHz in the receiver that weak signal can be of benefit. 73, Jerry, KOCQ

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Date: Wed, 02 Feb 2000 17:26:47 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] T2FD -pros and cons?

The earliest reference I know of is late 50s.

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Date: Wed, 02 Feb 2000 18:34:08 -0600  
From: "Joe L. Reda" <joer@reda.com>  
Subject: Re: [R-390] T2FD -pros and cons?

Well . . this is the page I'm using to design my antenna:  
<http://www.gb.nrao.edu/~dgordon/ham/t2fd.html>.  
They seem to have a bit to say about its efficiency. I'll be happy if it works better than my current antenna, which is nothing at the moment. The TTFD represents, at least to me, a way to have a somewhat multiband antenna for receiving and transmitting without climbing up a tower . . and, as my first antenna project, it seems to be doable.

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Date: Wed, 02 Feb 2000 17:18:10 -0800  
From: "Walter (Volodya) Salmaniw, MD" <salmaniw@home.com>  
Subject: Re: [R-390] T2FD -pros and cons?

Jim, it's a "tilted terminated folded dipole"...exactly describes what it is. There are a number of great web sites describing these antennas, as well as a Pop Comm article a few winters ago, and a Proceedings article by Guy Atkins, in WA. A very easy site is Arnie Coro's at Radio Havana Cuba ([www.radiohc.org](http://www.radiohc.org)).

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Date: Wed, 02 Feb 2000 20:23:24 -0500  
From: antipode <antipode@ne.mediaone.net>  
Subject: Re: [R-390] T2FD -pros and cons?

Is this T2FD antenna the same one which used to be sold by a guy in Florida (I think his name was Sonny) and advertised in CQ Magazine? As I recall it was merely a 51-Ohm resistor inside a weatherproof housing with connections to attach the "dipole" wires to. I believe the ARRL

wouldn't even allow it to be advertised in QST. Too many wild claims.

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Date: Wed, 02 Feb 2000 17:25:25 -0800  
From: "Walter (Volodya) Salmaniw, MD" <salmaniw@home.com>  
Subject: Re: [R-390] T2FD -pros and cons?

Jerry, there is reference to the T2FD in the June, 1949 issue of QST magazine (refer to the nordic dx site: [www.nordicdx.com/antenna/wire/t2fd.html](http://www.nordicdx.com/antenna/wire/t2fd.html) . Note both the US Navy and the Japanese experimented with these antennas in the 40s, with very positive results.

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Date: Wed, 02 Feb 2000 20:41:09 EST  
From: Kenneth A Crips <w7itc@juno.com>  
Subject: [R-390] Isotron antennas

I know several people who run the Isotron and they work fairly well. They won't out class a good dipole up a 1/4 wave length. But if you don't have the room they aren't a bad choice, One ham I know runs a 20 meter Isotron in an housing development with restrictive covenants. He has the people living on either side of him convinced it is a rain sensor for his sprinkler system.

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Date: Wed, 2 Feb 2000 20:54:35 -0500  
From: "Ronald Reams" <wa4mjf@worldnet.att.net>  
Subject: [R-390] T2FD ANTenna

Looked up the URLs. This looks a lot like my B&W antenna. It goes from 1.6 to 30 supposedly with no more than 2-1 SWR. Use it on MARS and hambands and never had more that 1.6 - 1. Slopes from tower 60 feet to 25 feet. Nice antenna, stainless steel wire and feed with RG-213.

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Date: Wed, 2 Feb 2000 21:18:48 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] T2FD -pros and cons?

I believe the original name was Terminated 2 Wire Folded Dipole. The configuration differs from a conventional folded dipole in that the non fed element is center terminated with a resistor. This makes it rather broadbanded while sacrificing a bit of efficiency.....typically 5-10dB or so in a properly sized antenna.

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Date: Wed, 02 Feb 2000 20:22:54 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] T2FD -pros and cons?

No the T2FD is sneakier. Its a folded dipole with the side opposite the feed cut and terminated in a resistor. B&W used to sell one, and threw in a peck of junk in the tar they hid the resistor in to make it harder to X-ray.

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Date: Wed, 2 Feb 2000 21:26:00 -0500  
From: "Joseph W. Pinner" <kc5ijd@sprintmail.com>  
Subject: Re: [R-390] T2FD Antenna

I use a B & W one for NAVMARCORPMARS work as well. It provides great coverage and is easy to feed.

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Date: Wed, 02 Feb 2000 22:17:02 -0800  
From: "Gene G. Beckwith" <jtone@sssnet.com>  
Subject: Re: [R-390] horizontal loop receive antenna

Bill Cotter wrote:

> Brian Beezley, K6STI, did a very nice article a couple of years ago  
> on a horizontal receive antenna designed for high noise rejection.  
> I believe I saw it in QST (I'll try to locate tonight). He went to  
> great lengths to work through the theory needed to arrive at a  
> model. Then tested it with some of his well known antenna design  
> tools. As I recall, it was a loop about ten ft above the ground,  
> fit in a small yard, had a balanced feeder between diagonal  
> corners. I think it would be worth investigating if a low noise,  
> broadband receiving antenna is what you're seeking.  
>> A low horizontal loop, at least .5 wave at the lowest desired  
> frequency and fed with balanced line into a tuner will offer better S/N. It  
> will perform from 3 -30 MHz if cut for 3 MHz. A vertical quad or delta  
element can be made to >offer excellent performance and can be switched  
from horizontal to vertical polarization with >a small relay.  
>>By their very nature a closed loop,type of design is lower noise  
> than a straight wire or vertical.            73 Carl KM1H

Was that antenna strictly for receiving or could it be used for xmit too?  
Have heard of guys using big horizontal loops (160 and 80 meters) with  
excellent results and reported low noise for both xmit and rcve...often fed  
with open wire ... these said to be broad banded and quiet..

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Date: Wed, 02 Feb 2000 22:21:59 -0800  
From: Dick Carroll <dixie@townsqr.com>  
Subject: Re: [R-390] T2FD -pros and cons?

Joe, I'd be the last person to discourage you from using a T2FD, as I noted  
earlier I was quite surprised at the performance we got from the units I  
used. But don't take too much of the hype on that website to heart. I'm no  
antenna engineer, but one doesn't need to be to question their claim of 4 to



8 db improvement over a dipole. That is way out of range, by any accurate measure. But for certain, they do work and are the antenna of choice in many circumstances. Go for it.

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Date: Wed, 02 Feb 2000 22:45:42 -0800  
From: Dick Carroll <dixie@townsqr.com>  
Subject: Re: [R-390] T2FD -pros and cons?

> Is this T2FD antenna the same one which used to be sold by a guy in Florida (I think his name >was Sonny) and advertised in CQ Magazine? As I recall it was merely a 51-Ohm resistor >inside a weatherproof housing with connections to attach the "dipole" wires to.

Naw, that was Sonny Irons' "Maxcom Matcher". Had a coax connector and a terminal for each side of whatever wire you wanted to hang on it to "match". Had some integrated circuits embedded inside the epoxy block that encased the whole thing, to throw off inquisitive Xray-ers (one of the hammags had a photo of an xray - you could see IC's inside it). Eventually someone hammered one open and the expose was complete. The T2FD is a different beast. It's terminator is at the other end of the radiating elements. But comparing it with a rhombic is nonsense. At Fort Monmouth NJ in the early 60's the MARS and ham club station had quite an array of impressive aeriels hanging, including a classic Signal Corps terminated rhombic, which stood on four 70ft spruce utility poles and was something like 475 feet long (from memory). It was pointed just south of west, across the USA. When you put ANY signal on that thing, you \*drew\* attention on the band. One afternoon I put the HT37 into the Thunderbolt amp on AM, and called CQ on 40 meters. The response was amazing, something extraordinary to hear. Bedlam. But I was able to pick out KOLTJ, Theda in Springfield, MO whom I knew personally, running her DX100. The rhombic was pointed right at her. And, of course, I was using an R390A for the receiver.

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Date: Wed, 2 Feb 2000 22:05:25 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] Isotron antennas

So I take it then that they are a single ham band ( or less) antenna? What about the AEA IsoLoop? That one claims 10-30 MHz in a 35" loop with efficiencies in the 72-96% range as compared to a full size dipole. Any truth to those claims?

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Date: Wed, 2 Feb 2000 21:56:15 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] T2FD -pros and cons?

No, that was the Maxcom. It was the real dummy load that Jerry

mistakenly attributes to the T2FD. Another beaut from Florida was the Match All. Must be either something in the water down there or the shysters from NYC moved south!

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Date: Thu, 3 Feb 2000 00:19:09 -0500  
From: kmlh@juno.com  
Subject: [R-390] T2FD -pros and cons?

It is also just about impossible to eliminate feedline radiation from such a poor antenna. If it is to work "everywhere" it will be impossible to tell without a PHD what the VSWR is on the feedline at every frequency which makes the tuner design far from simple and user friendly. Without extreme care the tuner loss can also be substantial. A radiating feedline is more apt to pick up unwanted noise and even a perfectly balanced feedline is highly susceptible to unbalance from surrounding objects, and the weather. No thanks, been there done that ages ago. Since 1984 ( when cable came to this area) I use CATV hardline and quad shielded CATV Rg-11 or Rg-6 for all my TX and RX feedlines up thru 70cm. No more noise, RFI and best of all, no more TVI complaints....not even in my own house. Best of all its free.

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Date: Wed, 2 Feb 2000 22:32:03 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] T2FD -pros and cons?

Ah So, Tnx for the correct name Walter...its been awhile since I read about it and tnx also for posting the web info. I met Arnie a few years ago when he was a special guest at the New England VHF/UHF Conference in Vernon, CT ; a real interesting talker. The T2FD may be installed in just about any configuration while remembering that any deviation from strictly horizontal will affect directivity and elevation angles. Installed as an inverted V will give horizontal radiation broadside and a substantial vertical component off the ends.

One thing that I have noticed in the posts here is the dimension of 40' or so. I dont know what the published frequency range of that version is but it certainly is not 3-30MHz and may contribute to some misunderstanding of its efficiency.

From the B&W catalog, who incidentally claim to have patented the antenna, the dimensions are:

3.5-30 MHz	90' long, with 19" element spacing
4-30 MHz	65', etc
2-20MHz	185', etc

Perhaps someone with a B&W version can let us all know what the resistor value measures. That is the antenna that was used in the Gulf War and I ran almost 2000 phone patches from NH to our troops using 100W xcvrs in the middle of the desert. No mean feat since propagation to that part of the world is often shaky at best.

I suspect it has pretty well been established that the T2FD is a pretty decent compromise antenna that deserves consideration by anyone in need of something simple, broadband and cheap.

Maybe some kind soul would include the various construction details and installation methods on his R-390 web site for others to see.

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Date: Thu, 03 Feb 2000 01:46:35 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] RX dummy loads

There is a lot of directivity in the Beverage that helps in ignoring noise in directions away from the desired direction.

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Date: Thu, 03 Feb 2000 09:26:25 +0100  
From: Johan.Andersson@draminst.se (Johan Andersson)  
Subject: [R-390] The Four Letter Word antenna

Thanks for your elaborate reply - actually never realized that the Johnson noise could have a consequence on this "four-letter-word" antenna. Now I have to find a way of keeping the resistor cool - perhaps putting it in a styrofoam container w LOX :-). Seriously- Guess I have to delve into the theory on this, and find its bearings on performance. Thanks again- Jerry!

And as I've read a few notes on its origins, I might add a few pennies worth: W3HH is claimed to be the originator of this device. And if anyone else want to know more on construction of it: Check this out:

<http://www.nordicdx.com/antenna/wire/t2fd.html>  
<http://www.nordicdx.com/antenna/wire/t2design.html>  
<http://www.nordicdx.com/antenna/wire/t2fdcomp.html>

W4RNL has also done some really interesting NEC modeling on the T2FD at, <http://www.cebik.com/t2fd.html>

And finally I've found another guy into this lo-noise RX antenna racket:

<http://www.anarc.org/naswa/badx/antennas/grounding.html>  
[http://www.anarc.org/naswa/badx/antennas/low-noise\\_antenna.html](http://www.anarc.org/naswa/badx/antennas/low-noise_antenna.html)  
[http://www.anarc.org/naswa/badx/antennas/SWL\\_longwire.html](http://www.anarc.org/naswa/badx/antennas/SWL_longwire.html)

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Date: Thu, 03 Feb 2000 08:27:19 EST

From: Kenneth A Crips <w7itc@juno.com>  
Subject: Re: [R-390] Isotron antennas

Yes the Isotron is a single band antenna, the interesting thing about them is you can stack them and they work kind of like a Hustler mobile hf setup where you mount up to three coils to one mast. The 40, 80, and 160 meter Isotrons have a real tight "Q". The things do work but they will not replace a good dipole up x feet in the air.

I don't know much about the so called magnetic dipoles of MFJ and AEA. as I recall K. M. Sturba (a pen name) in the Aerials column in World Radio savaged the design. I am here to tell World Radio is one of my favorite ham magazines (Electric Radio is the best). It's worth it's cheap subscription rate just to read Sturba's and I'll Paddles column on antennas. The couple are apparently electronic engineers of some sort but no one, at least no one I have heard of, know who they are.

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Date: Thu, 3 Feb 2000 12:45:38 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] RX dummy loads

In its original tilted config the T2FD also shows directivity even on the fundamental frequency. As you increase frequency the main lobe shows even more directivity. That was demonstrated many times during the Gulf War when the radio ops had to reorient the lower end of their T2FD's towards the USA. Very rarely did any of them have trouble hearing the stateside stations. The biggest complaint was the wind and sand making headphones necessary at times.

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Date: Thu, 03 Feb 2000 12:18:10 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Isotron antennas

Antenna radiation comes from current through a conductor. The longer the conductor and the greater the current, the stronger the radiated signal. The small loops require large conductors and low loss capacitors to get the resonant current high to get small efficiency. The trade off is very narrow bandwidth when the loop size is small. A resonant antenna can build up greater currents for the drive power than a none resonant antenna and so produce a stronger radiation field.

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Date: Thu, 03 Feb 2000 17:11:02 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Deaf R390/A

If you can SEE arcs the power company has lots of problems that may

including hot wires falling off the poles. When you can see the arcs call the power company. If they won't fix it keep calling them. PGE was just cited by the FCC for not fixing bad power lines. It may take repeated complaints.

>After I get past a good Rf ground, what should I try? I know how about a T2FD. What will >help me balance the local hash against the real signals?

All it will do is reduce all signals which may keep noise peaks from overloading the receiver. Check for modulation using your widest filter, Collins mechanical filters are notorious for ringing on power line noise. If your TV isn't on cable you should also be seeing slowly rolling bars of sparklies from the power line hash.

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Date: Thu, 3 Feb 2000 18:53:22 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] Deaf R390/A

Congrats on getting Phase 1 squared away Roger. Now on to the next step. From your description I get the feeling that the location is poor as are many readers antenna options. Have you tried any noise cancelling circuits? MFJ (horrors) has an excellent unit ( MFJ-1026) that is very well designed and maintains phase balance over a wide frequency range. [www.mfjenterprises.com](http://www.mfjenterprises.com)

With a simple noise antenna it is possible to cancel local noise sources by well over 30db. The caveat is that only one noise source can be fully cancelled at a time and the unit has no effect on atmospheric noise. It works only with local generated man made noise but it has been demonstrated by many to be a real nice accessory. Multiple sources can be suppressed if you are willing to compromise between them For some it may be the answer between tuning the bands or watching TV. Im real suprised that the resident experts have not mentioned this product..... perhaps they do not sell it or have not been the designers..... BTW, anyone who knows me or has followed other lists will realize that I am NOT a certified degreed expert on any subject...just a practioner in reality.

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Date: Thu, 03 Feb 2000 19:44:09 -0800  
From: "B.L.Williams" <B.L.WILLIAMS@prodigy.net>  
Subject: Re: [R-390] Deaf R390/A

I would like to add that the JPS ANC-4 is probably a much higher level noise cancelling box in terms of quality. From what I've read and seen hands on they both work identical principles and approaches. I have a JPS NIR-12 and it is a boatanchor of a dual DSP unit if there ever was one. Quality is top notch in everything. Design, workmanship, guts, manual, and performance. The metal housing is R-390A chassis grade steel. I've not seen anything this thick in sandbox stuff. They take shielding

seriously and I am therefore impressed. JPS has a very good reputation and the tech support is excellent. I have a friend who bought the NIR-10 and the upgrades keep coming or the notices are sent on time. I have found the JPS tech support very good at responding to email with my questions on theory and operation.

I'm not trying to knock Carl's suggestion on the 1026 but I know you can't go wrong with the JPS ANC-4. I think they are priced only \$20 over the MFJ and it is worth more for what you get in comparison.....IMHO. The MFJ 1026 is pretty scary to look at when you open it up.

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Date: Fri, 04 Feb 2000 00:58:14 EST  
From: Kenneth A Crips <w7itc@juno.com>  
Subject: Re: [R-390] The antenna at your/my house

So true that is where antennas like the Isotron come in they are small and do work and they can be easily hidden. One of the better compromise small antennas that is so much cheaper then anything else is form Lakeview antennas, they make the HamStick series. They have a device the joins up two hamsticks to make a small rotatable dipole, this is a great little antenna. I have used this antenna in portable QRP setup it worked great.

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Date: Thu, 03 Feb 2000 23:02:31 -0800  
From: Dick Carroll <dixie@townsq.com>  
Subject: Re: [R-390] T2FD -pros and cons?

Hold on, guys. You need to realize something here. If you're an engineer, the T2FD simply stinks in the efficiency department, and you can easily prove it. For the rest of us, a bunch of hams looking for something wideband and practical, that we can use with good results (lots of government and other entities, too) then it works pretty well indeed. I'm sure all it would take to convert most of us to their point of view would be a side-by-side comparison with antennas of provable high efficiency. And we'd probably still use our T2FD's. They're acceptably efficient for most uses and they are practical.

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Date: Fri, 4 Feb 2000 12:01:42 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] The antenna at your/my house

Here is something very simple for apartment dwellers and others with restricted space.

Take a replacement telescoping auto antenna and mount it on a bracket that is attached to a piece of plywood or any insulating material. Wind a

loading coil on a 2" diameter by 12" to 18" long piece of PVC pipe. #14 copper house wire with the insulation removed works good. A simple way to space the turns is to wind another wire in parallel and then remove after the desired one is secure. Solder on a solder lug or wire pigtail every turn. If you can find a length of 2 or 2.5" B&W coil stock by all means use that. Splice what you can find to make a full length. Mount the coil to the plywood. Attach one end of the coil to the antenna and the other to the center conductor of a length of RG-58 or any other coax. Impedence is not critical. Attach one or more counterpoise wires of any length over about 15' to the coax shield and run anywhere you can, vertical or horizontal, any size wire, even #30 is fine here.

Attach to a balcony railing or window frame with whatever works for you, either quick removal or more semi permanent.

You can tune the antenna with a wire and alligator clip attached to the coax center conductor ( or the other end). Or use one or more RatShack rotary switches.

Certainly not fancy and a real compromise but better than nothing. The resonant frequency range will be determined by the overall inductance of the coil whip combination but it should be at least 5-30MHz.. A tuneable preamp may help.

Please, no analysis on how poor this is compared to a T2FD at 100' !!

73 Carl KM1H

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Date: Fri, 4 Feb 2000 12:27:40 -0600  
From: "Jon & Valerie Oldenburg"  
<jonandvalerieoldenburg@worldnet.att.net>  
Subject: Re: [R-390] Deaf R390/A

> Drive more than one ground rod and use 8 foot rods. Space them about  
> 8 feet apart and use one continuous piece of wire for the ground lead.

A couple of hints on driving the rods. Try to find a rotary hammer drill. Frost up here right now is 2 1/2 feet deep ( it has been a really warm winter, only below zero at sunrise as of late- normal frost is 3 feet plus) and using the drill on "hammar" you can wirl them right through the frost in a matter of minutes for a 8 foot rod. Second choice is a post pounder as used for steel fence posts available at any good builder supply. Try to get a 12+ pound one. @ rods minimum, three in a triangle with 6 foot sides is better. Use a continous wire, pay extra for the 5/8 copper clad rod. 73's  
Jon KB9VFD

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Date: Fri, 4 Feb 2000 16:28:48 -0800 (PST)  
From: Joe Foley <redmenaced@yahoo.com>  
Subject: Re: [R-390] Deaf R390/A

One alternative you might consider is this: National Electrical Code  
Section 250-52 Made and Other Electrodes.

(d) Plate Electrodes. Each plate electrode shall expose not less than 2 sq. ft. of surface to exterior soil. Electrodes of iron or steel plates shall be at least 1/4 in. in thickness. Electrodes of nonferrous metal shall be at least 0.06 in. in thickness. Plate electrodes shall be installed not less than 2 1/2 ft. below the surface of the earth.                   --end of code section--

Of course that's minimum standards. I've seen ground rods laid in ditches, too, but I don't care for that one. I'd like to see any connection to a ground rod or plate that deep done by cad-welding so there's no chance of it loosening. In your case I'd like to see a bigger wire back to the panel, too. You're trying to drain off any noise, in this case, which will have a low potential and needs a big, low impedance wire. The wire going to the panel should be in one loop starting at the panel, connecting all of the rods or plates, then going back to the same lug that it started from where it also connects to the power neutral and does so at ONLY this one point. To drive ground rods, rent a hammer drill, biggest you can find, with a pointed chisel bit, it fits right in that dimple on the top of the rod. Oh yeah,... keep that dimple, the inspector will look for it, it shows that you didn't cut off the rod and put in a short one.

There were 1200 changes in the Code for this year, the entire section on grounding has been denoted as having changes in it. They wanted \$30 for the book!

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Date: Sat, 05 Feb 2000 11:01:55 EST  
From: Kenneth A Crips <w7itc@juno.com>  
Subject: [R-390] A good book

One last post from me about antennas. My favorite book about wire antennas is *Practical Wire Antennas, Effective HF Designs for the Radio Amateur*, by John D. Heys G3BDQ (ISBN 0 900612 87 8) published by the Radio Society of Great Britain. This book covers all kinds of wire antennas their good and bad points. It has a section on receiving loop antennas that is very interesting. It is Technical enough to make the engineers among us happy, but it isn't like Dr. Hawken's books about black holes, the Big Bang, etc, which I am lucky to able understand the first paragraph in each chapter.

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Date: Sat, 5 Feb 2000 17:24:08 -0500



From: kmlh@juno.com  
Subject: [R-390] Tower Grounding

Johan's post got me thinking again ( a dangerous thing) but it was way too long to try and reply to and follow my usually warped train of thought in reply.

The question is: Is a tower ground really necessary?

At my prior home 1972-89 I had 100' and 140' towers. The location was on fairly wet soil and the water table was as high as only 3' below ground level. The top 6-10" was thick black topsoil and the rest was pure sand. Into that I ran three 8' ground rods, one from each tower leg...it was like pushing thru butter. Both towers regularly took lightning hits but I never lost anything. I was also at the lowest part of town....right next to a huge wetland area. Shunt fed the towers on 160M and absolutely kicked ass with well under legal power. Since 1989 I am now at the highest part in town and for at least 12 miles around....a 500' difference in ASL.

I have 4 towers up here, 70 thru 180'.

One is a simple "temporary " 70' of Rohn 25G that I ran up just to get on the air and not miss Bouvet Island in 1989-90 winter. Operated in an unheated building with arctic clothes and a 240V line ending in alligator clips. Worked on 10-160M ! It sits on a Rohn concrete base plate which just sits on the ground....been there 11 years now and has moved down maybe one whole inch. No grounding whatsoever and guys still go to 3 pine trees. Almost as bad as my 1967-70 QTH where I had 90' of 25G up and guyed to old engines lying on the surface...too rocky to dig and the local junkyard was a 1/4 mile away. Sixpack delivery! OK...now I supposedly got a few more smarts, made more money and moved to Valhalla.

Here it goes. My 180' Rohn 45G has a concrete base which runs between 8 to 14 inches before I hit solid rock. I dug all the way down....and even cleaned and polished the rock. Poured some "Pour Rock" down as a bonding agent and then some bags of store concrete mix to wind up with a 3'x3' platform about 4" above grade. This all took more beer than hours. There is absolutely no grounding or any attempt. The guys are all insulated every 28' with #502 Johnny Balls. The tower sits on a pier pin in the base with a standard Rohn concrete base plate. With a 4el 40M yagi at the top everything moves around a bit during hurricanes and Noreasters. Just like it is supposed to...I also use all 1/4"EHS guys...more CATV freebies.

The same pattern is in use with my last 2 towers, both 100' of 25G.

Thinking about # 5 for this spring....maybe to support a T2FD array of slopers (: Somewhere back many years ago I read A US Army study about lightning and tower grounding. It claimed that a tower that was well insulated from the surrounding ground could act as a "Cone of Protection" Damned if I can find that info today. Anyway to cut this short, I have never had a lightning hit on any of my ungrounded towers in the 11 years I've been here. I have had 2 hits which both came in on the utility line, one on the AC and one on the telephone line. Ive never lost even a transistor on any of my ham equipment. A neighbor who at first hated my big tower is now a big fan, he has never been hit either whereas others over about 600' and more away get nailed regularly.

I tried to bring this subject up on a rather censored antenna reflector a year or so ago and got kicked off by the ListNazi owner.

I know Joe is gonna kick my butt around on this one but lets discuss it please. Im well past the point of "pure luck" here!

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Date: Sun, 6 Feb 2000 01:47:52 -0000  
From: "Michael P. Olbrisch" <kd9kc@elp.rr.com>  
Subject: RE: [R-390] Tower Grounding

We have a remote site, a large jet engine mounted on the ground, about 250K-SHP (estimated) spinning a 100M-watt generator. The site is about 200 yards away from an AM broadcast transmitter. The noise from the AM station is very strong. The entire site is grounded, and the rebar grid under the site and foundation is a part of that ground. I do not know if it helps, because I have no way of disconnecting anything there. I do know that our pollution monitoring system was plagued with noise on all the sensors until we grounded it to the grid.

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Date: Sat, 05 Feb 2000 20:14:38 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Tower Grounding

There used to be a company in Florida who made a business supplying barbed wire top hats for towers. They were about 12 feet on a side, triangular and had special barbed wire with twice the density of points as ordinary fence wire so they ended up with lots of sharp points up there in that crow's nest. Their claim was that the sharp points caused corona and discharged the atmosphere around those towers so that lightning wouldn't be initiated there... They did a large business with NASA.

I've not heard of them in a few years. Could be a few of their crow's nests were fried by massive direct hits and that ruined their claim.

My tower, a mile from anything taller on flat ground in the middle of Iowa, has two ground rods at its base, 8' rods driven ten feet deep and spaced 8' apart, plus 6 or 7' long 8" diameter screw anchors on the guy wires and the guy wires are not insulated. I'd rather distribute lightning currents than be concerned about the effect of guy wires on HF antennas. The VHF antennas don't care too much about the guy wires. When I take it down I expect to see that the top of the mast has been melted a bit from hits. Though the power line has suffered more lightning damage than I have since the tower was up, though there has been some to equipment. I failed to isolate everything that night. Normally I isolate the equipment and electric ground from the tower ground when there's lightning about. That saves the equipment.

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Date: Sat, 05 Feb 2000 21:49:16 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Tower Grounding

Well, I just did a search on "Lightning Elimination Associates" and found their home page. They are STILL in business.  
<http://www.lightningeliminators.com/History/>

The other result of the search was an abstract of an article about protecting explosives bunkers...  
<http://www.jhu.edu/~cpia/ddesbdat/8810120.html>

So I searched on their modern name, Lightning Eliminators & Consultants and found: An interesting press release about MOVs they now push as well. [http://www.oilonline.com/news\\_techfront\\_other\\_tflec2.html](http://www.oilonline.com/news_techfront_other_tflec2.html)

Several articles on commercial tower grounding and protection, not only LEC: <http://www.fedele.com/website/tech/towers.htm>

Lightning Eliminators & Consultants turned up 87 hits, probably a few more of real interest. I used Alta Vista to do the search. Interesting guarantee they have now. If lightning strikes the protected object in the first year after installation or recertification they will add to it or replace it. Apparently no guarantee after that or more than that.

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Date: Sun, 06 Feb 2000 17:06:32 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Re: Tower grounding

I think we figure an average flash for only 5 to 7 Kilo amps in the USA. Though 40 KA can't be ruled out. A good ground according to the National Electrical Code is 10 ohms R. So 7 KA makes 70 KV to the earth at that point, or to the average earth potential at some distance, more than a few

feet.

The conventional wisdom as reflected in the code is to try to bring everything to the same potential as if it was DC, not a fast rise pulse that's a traveling wave. The effective sites that I've heard about use wide copper strap to surround the transmitter shack at the base of a tower, perhaps 18" or 2' wide, this is a smaller space than a house. Then they run sturdy conductors or strap to the tower legs and to numerous ground rods. The only time when there are too many ground rods is when there's no room left for foundations, water lines, and power feed cables.

This, in my opinion, is like trying to protect from the impact of a freight train by adding only mass to the buffer in front of you without allowing room for that buffer to move when impacted without hitting you. You need a massive buffer, some space filled with gentle springs and some more buffer to move you gently out of the way of the train.

I feel its more effective, to have both shunts (all those grounds) and series isolation. That first ground will limit the voltage rise to something far less than the voltage it took to jump the first gap from cloud to ground. Maybe 400 KV for Johan's 40 KA stroke. That may not jump more than a couple feet, so if the coax cables are disconnected and isolated that far from the radio equipment which is grounded tens of meters away, there's a good chance that there won't be that second arc to the equipment. When I've had damage its been because I breached that gap or didn't make it a couple feet, just left it at a few inches.

The surge protector that offers DC continuity can protect the radio because the gas tube is really fast at firing and can fire before the pulse travels to the radio. There may benefit to adding quarter wave long shorted stubs across the inputs of the radios of sturdy coax to narrow the bandwidth of the energy applied to the radio.

The repeater that I helped build here at least a decade ago uses polyphaser gas tubes on the coax and power lines and though the antenna is exposed, so far there's been no damage detected. Of course, it is grounded a bit better than average, since the antenna is on top a water tower, and the repeater cabinet is bolted to a leg of that water tower and that particular water system has been installed long enough that all the pipes are cast iron and steel spread over a half square mile of USDA laboratory complex. Its been at least a couple years since anyone has seen the repeater cabinet open. The Cablewave antenna and the gas discharge tube protectors did add significantly to the cost but so far seem to have been worth their cost. Maybe we should think about new ones just for good measure though.

I have other as yet unproven ideas for VHF lightning protection, such as

inserting lengths of dielectric waveguide in the transmission line. Coupling to those dielectric waveguides might also be tuned to add rejection of unwanted signals such as TV and pagers. I've not yet achieved making the first one for VHF or UHF yet.

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Date: Sun, 6 Feb 2000 18:11:56 -0600  
From: "Bill Hawkins" <bill@iaxs.net>  
Subject: RE: [R-390] Re: Tower grounding

Worked at a blasting cap manufacturing plant in 1960. They used lightning rods on buildings and got the ground resistance down to one tenth of an ohm, measured with a crank device like a Biddle megger. But when lightning was in the area, they blew a siren and evacuated the explosives buildings. The 'cone of protection' came later, after I'd moved on, but I remember it protected a circle on the ground whose diameter was the height of the tower. The tower was grounded well enough that the lightning strike would not be tempted to stray from the tower. Dunno if they could stop evacuating buildings if they had a tower. Never lost a building in the 5 years I was there.

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Date: Mon, 07 Feb 2000 20:27:20 EST  
From: Kenneth A Crips <w7itc@juno.com>  
Subject: [R-390] another good book

I finally found the other antenna book I wanted to mention.

**HF Antennas For All Locations. by Les Moxon, G6XN**  
(ISBN 1 872309 15 1) published by the Radio Society of Great Britain,

This book is much like the other one I mentioned, **Practical Wire Antennas**. The book not only covers wire antennas but quads, delta loops, beams, vertical, mobile antennas, invisible antennas, arrays, and on and on. Again it is technical enough to interest an engineer without blowing others away. In it's chapter entitled Antenna Construction and Erection it shows how to build a simple lightning arrester for open-wire feeders. Good book!

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Date: Mon, 07 Feb 2000 23:54:29 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] Re: Storms

Compared to the voltage between cloud and earth, any ungrounded antenna is going to be held close to earth voltage and so supply that initiating stream of electrons, but unless the antenna is grounded substantially enough to carry 20 or 40 Kilo amps, its going to fry everything that's connected to it when the cloud discharges to the

antenna following that initial trigger.

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Date: Mon, 07 Feb 2000 23:54:51 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] another good book

Trouble is that G6XN doesn't understand the 8JK so he despises it. Constantly grumbling about the "8JK modes" of some wire antennas. He thought (according to a QST article eons ago) that it was sufficient to make an 8JK work with its out of phase dipoles by using separate feeders of arbitrary length with one twisted. I thought that too, but never put the array up... Would have been rotten, since the 8JK gets its gain from the excess circulating current between the two dipoles being closely coupled and fed out of phase with a short feeder between them that is crossed. Its essential that that feeder be air insulated, sturdy (for low loss) and no longer than the spacing of the dipoles to get 8JK gain. 8JK makes that point clear in his book though I missed it for a long time.

I've had a copy of G6XN's HF Antennas for all Locations for quite a while, years if not decades.

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Date: Tue, 8 Feb 2000 17:45:02 -0500 (EST)  
From: JOHN\_SEHRING.parti@ecunet.org (JOHN SEHRING)  
Subject: [R-390] GAIN & EFFICIENCY OF ANTENNAS

Efficiency and gain are two completely separate issues. Efficiency describes how much input RF power is lost to non-RF things like heat.

Gain describes to what extent an antenna does \*not\* radiate in an omnidirectional manner. I.e. it reduces radiation in some directions to accentuate them in others--this describes the pattern of the antenna. Gain is usually referenced to something, typically an isotropic antenna (fictitious but useful) or a dipole, in free space. It is possible to have an antenna that has low efficiency and a sharp pattern (e.g. Beverage), or high efficiency and low gain (e.g. a simple dipole), or any other combination, depending on actual requirements. The TTFD is an example of trading some efficiency away for more broadbandness.

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Date: Tue, 8 Feb 2000 17:45:03 -0500 (EST)  
From: JOHN\_SEHRING.parti@ecunet.org (JOHN SEHRING)  
Subject: [R-390] SMALL ANTENNA EFFICIENCY

Not so. (small loops)

They need large (low-loss) conductors and low loss caps to increase their

efficiency. This is because the radiation resistance of small antennas is extremely low. As a result, for a given power, antenna currents are very high. Because all system loss resistances are in series with the radiation resistance of antenna, these losses can dominate when the radiation resistance is low. (Impedance matching to the antenna is a separate issue.)

> The trade off is very narrow bandwidth when the loop size is small.

The small impedance-bandwidth (i.e. SWR rise away from resonance) is a necessary consequence of the low loss (high Q) of a properly designed small antenna. Ironically, wider bandwidth for a given size of antenna is a tip-off that efficiency is not as high as it should be.

> A resonant antenna can build up greater currents for the drive power  
> than a non-resonant antenna and so produce a stronger radiation field.

Not true! If that was so, then all the non-resonant antennas (typically fed using antenna tuning units for impedance matching), such as long wires or extended Zepps, would be significantly poorer in performance than resonant antennas such as a dipole. And that is clearly not so. They have gains that can equal or exceed that of dipoles. The input impedance of an antenna depends on its configuration and the frequency of applied power. It's a matter of impedance matching to get equal currents in different antennas driven by the same amount of power. Yes, the current \*distribution\* across the element(s) will be different for resonant and non-resonant antennas. But that says nothing directly about efficiency and gain.

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Date: Wed, 16 Feb 2000 11:14:24 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: [R-390] T2FD Swamping Resistor Source?

The truly non-inductive resistors come from Global. The company still exists, though the company name has changed. Do an internet search on Global. There probably are some Collins PN Globals at that place in Nebraska who thinks all Collins parts are made of solid gold, even when what they have are incoming inspection rejects. A workable alternative is a gaggle of 10 watt tin oxide film resistors in parallel. They aren't very inductive and they withstand abuse better than globals. The Dale NH series are almost none inductive at audio. They ARE inductive at RF. They are wire wound.

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Date: Wed, 16 Feb 2000 19:51:26 -0500  
From: Al Tirevold <tirevold@mindspring.com>  
Subject: Re: [R-390] T2FD Swamping Resistor Source?

Fetch a ME-165 power meter that was designed for the T-368 - especially one with broken meter, smashed connectors, etc. - cheaper that way. Inside are 12 (yes, twelve!) 600 ohm 50 watt non-inductive resistors used to make up a 600 watt 50 ohm dummy load. Liberate those suckers with a small torch and you're in business - mine cost me a buck and a quarter each! Fair has them for \$25 or so

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Date: Sat, 19 Feb 2000 16:46:19 -0800  
From: Craig McCartney <craigmc@pacbell.net>  
Subject: RE: [R-390] Homebrew Multi-couplers???

When I first went to work at KFS (Maritime station in Half Moon Bay, CA) much of the antenna distribution was done with just one buffer-type amp at the building entrance and then 50 ohm coax and BNC Tees at each (of 20 or 30) receivers. Not elegant, but it seemed to work!  
In some cases, like the rhombics and Vees, the buffer amp was actually at the bottom of the pole nearest the antenna feed point where the 600 ohm line was converted to coax for the long run to the building. 117VAC was fed down the coax for the tube in the amp! This was 1994, BTW!

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Date: Fri, 03 Mar 2000 08:55:49 EST  
From: Kenneth A Crips <w7itc@juno.com>  
Subject: Re: Re (N+x) :[R-390] Balanced vs. Unbalanced

You can have your cake and eat it too. Go the <http://www.radioworks.com> Not only do they have what I consider the best wire antennas going they have other goodies that are a great help to the Ham, and SWL. on the question of balanced vs unbalanced; I agree it is a pain bring a balanced feed into the house for any distance. Radio Works has a balun which is designed to mount on a gable, out side a window, whatever. the balanced line goes on one side and your coax screws on the other letting you bring the coax into the radio room. Their paper catalog is almost a reference work in it's self and their website is even better.

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Date: Tue, 29 Feb 2000 18:14 -0800 (PST)  
From: rlruszkowski@west.raytheon.com  
Subject: Re[2]: [R-390] Balanced Input

Jerry wrote me the following, I would like to share it. I do not think its off the R390 topic. It does give us some real numbers to consider while engaged in your hobbies.

.....  
Practically no receiver matches the source. Measuring the input impedance of the radio to see what the antenna impedance should be is not the right technique for optimizing the radio's performance. Yes it will



maximize the signal to the RF stage control element (whether grid, gate, base, cathode, emitter, or source), but that's not necessarily the impedance for optimum performance. The rubs are that the impedance seen by that active device input terminal usually have to be different than the maximum gain impedance to achieve minimum noise and maximum signal handling capability. In some devices, GaAsFETs come to mind, the SWR may be 10:1 if measured at the receiver input terminals, yet the Signal to Noise ratio is better with that mismatch than with the impedance matched. And over the 60:1 frequency range of the R-390(A) the amount of mismatch for best NF will be quite varied. When measuring the NF of the best available devices today, the NF source has to keep the exact same impedance between on and off or the uncertainty in the NF is greater than the NF. Its common to require more than 40 dB return loss on the noise head (e.g. have a 20 dB attenuator between the noise source and the receiver) and not find that is adequate for repeatable measurements. SWR better than 1.0002:1... Fortunately for this discussion tubes aren't quite so low a NF, nor quite as picky. In my opinion, if the specs say the receiver balanced Z is 100 ohms (or whatever it is specified at) converting the antenna to that balanced impedance will result in better performance than strictly matching the measured input impedance because that's what the engineers developed it to work best at. There's an article in the latest Microwaves and RF magazine that I was looking through this morning that claimed a circuit was possible with care that would optimize both noise figure of the stage AND impedance match. In my first quick scan of the article I didn't detect the magic technique. I'll have to study it some more. This is the holy grail of receiver design because when the RF stage SWR is very high, the input filters don't perform as predicted. Matching the input filters wrecks the noise figure most of the time... Makes it very hard to achieve required specifications. 73, Jerry, KOCQ

.....  
Jerry, Please keep writing. I do learn a lot from you. Thank you. I have no idea in hell what my receivers input impedance is. I do see your point "converting the antenna to that balanced impedance will result in better performance". Yes, day in day out ASA copies all kinds of stuff all over the place. Those R390's needed to produce the best signal at any time. And doing whole field stations by the rules is the only way to make sure the best performance is going to be achieved. I have this wire out side and this receiver on the table. between them on the table beside the receiver I have a box with 4 knobs. I just spin those knobs around and stop where I have the best sound I can get on the selected frequency at the moment. I am starting to get happier with what I hear because I do not hear the computer or the florescent lights any more. I am staring to get happier because I here more ditties than before. I have no clue what the hell the numbers are. I will continue to screw with it to determine if I can eke any more low level signals out of the configuration. I have all the wire I can get in the air. I am working off the end of the wire

because I can get that in the air and stay on my own lot.

I wish I had a ground.

The theory is all good. But I am working a multiple choice test. I have no essay choices. In the best of worlds I could write Santa a nice essay letter and get my wish list filled tonight, because I would ask for that also. However, with the stuff in the house what is the best MC Giver you can work up on your knowledge. Some knowledge may be to have sense enough to open some books.

I can change the circuit. I can adjust the values of parts in the circuit. My measurement is can I hear it and can I hear it well enough to copy it.  
Roger KC6TRU

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Date: Fri, 03 Mar 2000 10:45:39 -0600  
From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: Re (N+x) :[R-390] Balanced vs. Unbalanced

A fixed impedance ratio transformer will only work at one frequency on an antenna, maybe two frequencies. In between the antenna is reactive and can turn the transformer into a trap to minimize signal transfer.

Winding a torroid transformer for 600:50 is very difficult. And the result doesn't have a broad bandwidth. The rub is that the inductance of the winding needs to have a reactance several times 600 ohms, but the winding can't approach a quarter wave of wire. This favors the highest permeability core material, but that material has greater losses. And has a greater dielectric constant that makes the quarter wave shorter also. This is a case when every try I've made doesn't win for losing. The best I accomplished had about the same bandwidth as a fix tuned antenna tuner.

A **shielded feed line**, balanced or unbalanced is better for avoiding noise pickup on the feed line. Optimally the unbalanced feed line and balanced feed line should be connected to the center of a wire, not an end, and the unbalanced (e.g. coax) line should be connected through a balun or at least a decoupling choke of a ferrite sleeve around the outside of the coax to minimize the antenna currents on the outside of the coax being coupled to the inside of the coax. A reasonably close spaced open wire balanced feedline is better than a single wire feeder for noise rejection, not as good as a coax line. Belden used to make a line called 8290 a shielded balanced 300 ohm line. I've found its good for at least 200 watts of transmitter power and gave shielding needed for being underground without excessive losses.

Because of the reactance of an antenna not at its natural 1/2 wave

resonance and the range of feed impedances, that peak when its a full wave length long, a 300 or 450 ohm line is better when using a tuner than coax line. Look at the extreme cases... At 1/2 wave resonance the Z is around 50-70 ohms depending on height above ground. At full resonance the Z is more like 1000 ohms. If the feed line happens to be a quarter wave long at either of these, the impedance will transform to a resistive impedance at the radio end. 50 ohms through a quarter wave of 300 ohm line makes a feed Z of 1800 ohms, (through 450 ohm line its 4050 ohms), and 1000 ohms through a quarter wave of 300 ohm line is 90 ohms, through 450 ohm line is 202.5 ohms. 50 ohms through any length of 50 ohm coax is still 50 ohms, but 1000 ohms through a quarter wave of 50 ohm line is 2.5 ohms. Tuned circuits match impedances of 25 to several thousand ohms nicely, take unreasonably sized Capacitors and tiny inductors for matching 2.5 ohms.

Then when at a frequency away from resonance there's a lot of reactance from the antenna that the fixed tuned transformer can cope, and the tuner needs a wide range of capacitor to accommodate. With an antenna that doesn't match the impedance of the transmission line and the transmission line is not a multiple of a quarter wave long, the input Z can be very reactive. But with a reasonable impedance transmission line it is practical. I've used the same center fed wire with tuners from AM broadcast to 144 MHz.

At low frequencies (up to where the antenna is 2 wavelengths or so long) I use a series tuner, link coupled. Above that I use parallel tuned tuners and tap the feed line on the tuned secondary. Such tuners have been used in ham radio for 60 or 70 years and are shown in considerable detail in ARRL handbooks of most any vintage.

A tuner gives two benefits: efficient signal transfer to the receiver and an additional tuned circuit for better rejection of unwanted signals (though the unwanted has to be in other bands than the band where its tuned).

I've not had good results with an unbalanced tuner and a balun on the antenna side. Its too easy to tune up the balun and not get power to the antenna. The range of impedances is too great for the balun and core to handle. I know there are commercial tuners using the principal, sometimes they work sometimes they work poorly.

73, Jerry, KOCQ

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Date: Fri, 03 Mar 2000 11:33:51 -0700  
From: "jordana@nucleus.com" <jordana@nucleus.com>  
Subject: Re: Re (N+x) :[R-390] Balanced vs. Unbalanced

Just a note ... I have used Hy-Gain BN-86 baluns for many years on the balanced inouts of 390 and 390A rcvrs... the results are excellent, and the balancing adjustment,( forward-most trimmer in the RF Coil assembly), taken from the 390 not"A" manual works very well on the "A" version.. they can be mounted on the rear panel using a longer screw than the one just above the AC Line filter cover and a twin-ax connector using 12-16 gauge stranded insulated wire... On another note the Front panel mounted circuit board mod,( two jumper wires) on most Navy units was used to convert the 600 ohm line ckt to 450 ohms... if you use a 590 or 620 Ohm resistor on the rear panel for proper (nearly correct) Line Level meter reading, remove the jumper, or use a 470 or 430 ohm resistor or a parallel pair of 910 ohm jobs , and leave the jumpers in place... 73 de Jordan...

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Date: Sun, 5 Mar 2000 17:01:33 +0100  
From: " Dr. Clemens Paul" <cpaul@nikocity.de>  
Subject: [R-390] FW: Balanced input - some measurements

Sorry for the inconvenience with the table.  
Now (3rd try) id should be o.k.

Johan's (the Swedish cheapskate) nice words ("well done,Clemens") encouraged me to do some measurements on the balanced input now instead of going through my still deaf IF-section.<g>

Before going into measuring impedances (will follow some day) I thoutht it might be interesting to measure SWR because it tells the losses due to mismatch. First I measured directly (one pin of the antenna input jack grounded) and then with a homebrew 1:2.5 balun to see if it's worth to use such a device.

I used a HP 141 spectrum analyzer / 8443A tracking generator system and a HP 8721A directional bridge. The measured return loss was converted into SWR (at 50 Ohm) and then the loss due to mismatch was calculated. The balun itself showed a SWR of 1.25 from 1.8 MHz to 25 MHz and 1.3 from 25 to 32 MHz when terminated with a pure resistive load of 125 Ohm. Only for direct comparison the balun was assumed to be lossless which is of cause not true. So about 0.1 to 0.3 dB loss in real world would have to be added (or even more).

Abbreviations used in the following table:

RL1	return loss without balun	[dB]
SWR1	SWR	" "
Loss1	Loss	" " [dB]
RL2	return loss with balun	[dB]

SWR2    SWR    "    "  
 Loss2    Loss    "    "        [dB]

DIFF    theoretical benefit of a lossless 1:2.5 balun [dB]

Frequ.[MHz]	RL1	RL2	SWR1	SWR2	Loss1	Loss2	DIFF
0.5	8	26	2.32	1.11	0.75	0.01	0.74
1.8	10	28	1.92	1.08	0.46	0.01	0.74
2.5	5	11	3.57	1.78	1.65	0.36	1.29
3.5	8	19	2.32	1.25	0.75	0.06	0.69
4.5	6	13	3.01	1.58	1.26	0.22	1.04
5.5	7	18	2.61	1.29	0.97	0.07	0.90
6.5	8	24	2.32	1.13	0.75	0.02	0.73
7.5	10	28	1.92	1.08	0.46	0.01	0.45
8.5	6	16	3.01	1.38	1.26	0.11	1.15
9.5	6	14	3.01	1.50	1.26	0.18	1.08
10.5	6	14	3.01	1.50	1.26	0.18	1.08
11.5	6	15	3.01	1.43	1.26	0.14	1.12
12.5	7	16	2.61	1.38	0.97	0.11	0.86
13.5	8	20	2.32	1.22	0.75	0.04	0.71
14.5	12	34	1.67	1.04	0.28	~0.00	0.28
15.5	30	14	1.07	1.50	~0.00	0.18	-0.18
16.5	12	36	1.67	1.03	0.28	~0.00	0.28
17.5	14	30	1.50	1.07	0.18	~0.00	0.18
18.5	14	24	1.50	1.13	0.18	0.02	0.16
19.5	18	18	1.29	1.29	0.07	0.07	0.00
20.5	26	16	1.11	1.38	0.01	0.11	-0.10
21.5	40	16	1.02	1.38	~0.00	0.11	-0.11
22.5	28	16	1.08	1.38	0.01	0.11	-0.10
23.5	22	17	1.17	1.33	0.03	0.09	-0.06
24.5	18	16	1.29	1.38	0.07	0.11	-0.04
25.5	15	15	1.43	1.43	0.14	0.14	0.00
26.5	12	13	1.67	1.58	0.28	0.22	0.06
27.5	10	11	1.92	1.78	0.46	0.36	0.10
28.5	9	10	2.10	1.92	0.58	0.46	0.12
29.5	7	7	2.61	2.61	0.97	0.97	0.00
30.5	6	6	3.01	3.01	1.26	1.26	0.00
31.5	5	5	3.57	3.57	1.65	1.65	0.00

I think the figures clearly show that the \*maximum\* possible signal gain by the use of a balun is roughly 1dB on \*some\* of the lower frequencies (where it is of no importance). So this device can contribute nothing to improve the signal to noise ratio by its impedance transforming action.  
 Clemens DL4RAJ

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 Date: Sun, 05 Mar 2000 23:11:50 -0600

From: "Dr. Gerald N. Johnson, P.E." <geraldj@ames.net>  
Subject: Re: Re (N+y)[R-390] Balanced vs. Unbalanced

The receiver NF is going to probably be higher at 30 MHz than at 1 MHz while the atmospheric noise may be smaller. Man made noise may be either. There's often benefit from directional antennas to reject point noise sources.

Voltage at current minima and current at voltage minima can be a problem. But using a tuner, I've abused a length of the Belden 8290 with 200 watts as much as possible. I tuned a shorted length with a series tuner and dissipated 200 watts in the tuner and line. The coil in the tuner was a 5 KW BC matching coil made of 1/4" wide edge wound copper strap. It didn't heat and the current didn't damage the 8290. Then I removed the short and connected the tuner for parallel tuning and had great corona off the cut end of the cable, but no arcing with as much voltage as I could generate with that tuner and 200 watts of RF.

At 2.5 ohms reflected impedance, I would be 20 amps per KW. At 1000 ohms, E would be 1000 volts. Probably lower than the plate voltage in the PA and current lower than the circulating current in the PA plate tank.

I prefer the old link coupled tuner, I get better balance and far better versatility for tuning odd reactive impedances. It helps reject both BC and harmonic interference.

Many commercial tuners are T with two series capacitors and a shunt inductor. Sometimes there is a tuning capacitor in parallel with the shunt inductor. They can sometimes fail to reduce harmonics, though generally the modern solid state radio has enough harmonic filter internally to meet FCC rules without the need for an external filter.

A very high input Z amplifier has potential for a lot of internal noise just from the electron noise in that high impedance, but is the formula for an active antenna.

What I think you need is antenna directivity, a fairly low noise MATCHED preamp with good dynamic range, an adjustable attenuator between the preamp and the receiver to allow minimizing preamp gain to protect the limited dynamic range of the receiver from strong signals. You probably need a noise blanker in the receiver to shut it down on noise peaks if the noise is from ignition or power lines. No matter the noise source you need an IF response curve that resists ringing. That leaves out Collins mechanical filters. The rub with a noise blanker is that it works in a wider bandwidth than the AM or SSB signals you want to detect and can cause severe intermod when the noise chops holes in a strong signal within that

blanker bandwidth.

Under certain conditions you may only need an attenuator between the antenna and the receiver to keep the peaks of the noise from driving the receiver into clipping. For antenna directivity you may need a LP or for narrower bands, a multi element yagi or an array of loops, shielded or unshielded. A shielded loop will be more predictably bidirectional while an unshielded loop can be anything from bidirectional to having a cardioid pattern with a single notch, due to the combination of antenna effects. I did mention an article about a low noise amplifier that claimed a good input impedance match. I've not gotten back to read and understand it. Normally the amplifying device needs some other impedance than the conjugate match to achieve the best noise figure.

73, Jerry, KOCQ

Date: Mon, 06 Mar 2000 13:38:53 -0500  
From: asmodeus@mediaone.net  
Subject: Re: [R-390] Homebrew Multi-couplers???

For the folks looking for the multi-coupler article, it is titled "Up to Four Receivers on a Single Antenna", by Michael Lass, DJ3VY and appeared in the April 1995 issue of QEX, pages 13-17. Due to this title, searching the QEX index for multicoupler did not yield anything!

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Date: Tue, 07 Mar 2000 20:43:35 +0100  
From: Johan.Andersson@draminst.se (Johan Andersson)  
Subject: Re(n+1):[R-390] Atmospheric noise level

>You can find data on noise field strength levels, that are based on ITU-R  
>Rec P.372, for frequencies 10 kHz to 30 MHz, on the CEPT/ERC Report  
069  
>(Published 1999). The report is available at ERO (European Radio Office)  
>server <http://www.ero.dk/doc98/Official/Word/REP069.DOC>  
>Noise data is at Annex B of the Report.

- -Ok and thanks again, Yrj^! Perhaps someone else is interested in what our \*true\* bottom line is? Some conclusions from reading the above might be a little disappointing, tho...

- 1: Except for in rural areas, man made noise is dominant from 500kHz thru 30 MHz.
- 2: Galactic noise could only be heard in \*quiet\* rural areas.
- 3: Atmospheric noise is below man made noise only 30% of the time in quiet rural areas, except for between 7 and 14 MHz.

So now over to the figures of the man made and galactic noise (for the European continent - but I doubt CONUS varies much from these), assuming perfect dipoles and feedlines with optimal match (-Anyone who hasn't?) to the receiver which has a 2.7 kHz bandwidth, in dB relative to 1 microVolt at 300 kHz:

Business areas: 63.6 dBmyV, -27.7 dB/decade (up to 250 MHz)

Residential areas: 59.3 dBmyV, -27.7 dB/decade ditto

Rural areas: 54.0 dBmyV, -27.7 dB/decade ditto

Quiet rural areas: 40.9dBmyV, -28.6 dB/decade (up to 30 MHz)

Galactic @ 10MHz: 1.39dBmyV, -23.0 dB/decade (up to 200 MHz)

Hope I haven't made any mistakes, and that some of you might find it useful!

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Date: Fri, 17 Mar 2000 05:55:46 -500  
From: Brent Reynolds <jbr@randomc.com>  
Subject: Re: [R-390] "Mini-BNC Connectors"

Thanks for all the replies regarding my question about the connections on the back of the R-390A. What kind of whip antenna would one connect via that C connector, and what would or would it not buy you when compared to using some kind of small-scale antenna setup using the twin-ax connection? Is it still possible to get a whip antenna that can be used indoors, connect to the receiver directly with that C connector, and cover the entire frequency spectrum that an R-390A knows about? If so, what would it cost and where might it be obtained? For my current situation, a good full-coverage whip that could be connected directly to the radio would be the most ideal setup.

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Date: Fri, 17 Mar 2000 06:48:38 -0500  
From: "Ronald Reams" <wa4mjf@worldnet.att.net>  
Subject: Re: [R-390] "Mini-BNC Connectors"

I just have a 15 foot whip, ..trying to remmeber... I think 2 MS-116 2 MS-117 and 1 MS-118. I use the older M-38A1 type mount, but the newer HUMVEE mouunt would work just as well and it is a lot lighter.

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Date: Fri, 17 Mar 2000 19:22:31 EST  
From: Kenneth A Crips <w7itc@juno.com>  
Subject: Re: [R-390] "Mini-BNC Connectors"



I use a Butternut HF6V vertical, it works very well. I suppose you could buy one new, but I have seen Butternuts at just about every hamfeast I have been to for sale cheap. 50 bucks or less.

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Date: Fri, 17 Mar 2000 20:57:47 -0800 (PST)  
From: John Kolb <jlkolb@cts.com>  
Subject: Re: [R-390] "Mini-BNC Connectors"

> ...What kind of whip antenna would one connect via that C connector, and what would or would it not buy you when compared to using some kind of small-scale antenna setup  
> using the twin-ax connection? Is it still possible to get a whip antenna that can be used indoors, connect to the receiver directly ?

The whips I've plugged into a R-390 were generally the 35 foot long whips located at different points in the superstructure of Navy ships - though I believe 28 and 42 feet were also standard sizes. This is NOT referring to the "whip antennas" as found on portable radios :)

Date: Fri, 17 Mar 2000 22:25:47 -0800  
From: Ed Zeranski <ezeran@concentric.net>  
Subject: Re: [R-390] "Mini-BNC Connectors"

The 35 ft whips are/were common Navy TX-RX antennas. As said these are not anything like the 116-118 whips on say...a GRC-9 or GRR-5. These are about 5" dia at the base and heavy. The big grey nasties can be on fixed or tilting bases with the TX ones painted red at the base and RX ones blue. Generally the shipboard '390s ( back in my misspent youth) were connected to an antenna patch panel rather than hard wired to a specific antenna. The 35ft whip was very common but fans and horizontal wires were there too depending on ship type. I can't remember the nomenclature of the active HF ant/whip/amp used back in the '60s but I know such were used on destroyers etc.

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Date: Sat, 18 Mar 2000 03:40:13 EST  
From: Kenneth A Crips <w7itc@juno.com>  
Subject: Re: [R-390] "antennas"

An antenna that I have used in the past, I would use it now except I don't have the room, is an inverted "L". This antenna is really a vertical with a substantial part of it laid over, you feed it at ground level with the shielded part of the coax to ground or better yet a ground radial system. I have always liked wire antennas because I live in high wind country, sustained winds of 60 plus mph are common in this area. If a wire is blown down generally all you have to do is to rehang it. Commercial vertical that

stand up well in this area are the BTV series from Hustler, the 4, 5, or 6 BTV, Butternuts Hy-Gain Hi-Towers, and I understand the Force 12 vertical are fantastic. The Turkeys are; all the Cushcraft vertical, R5, R7, R7000, etc, The GAP vertical. Now this isn't about how well the antenna works as an transmitting or receiving antenna this is just mechanical. The Hy-Gain Hi-Tower is an antenna that has more love-hate relationships than any other I know of in this area. If you have the room to put down the ground radials it might be the greatest amateur radio vertical antenna ever made, if you don't it could break your heart. I have fantasized about erecting one of these antennas in the middle of a swamp. Talk about "getting out" feed this with 1000 or so watts and I would come crashing out of the High plains. Feed it with one watt and I could weedle my way into just about everywhere. But then I live 30 miles north of My real fantasy antenna system the towers of WWV wire antennas all>

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Date: Sun, 19 Mar 2000 22:39:25 -0500  
From: dave or debbie metz <metzd@cfw.com>  
Subject: [R-390] FLR/9 web pictures

Given the recent thread on the FLR9's and the mods to the R390's, I thought folks might enjoy taking a look at this picture:  
<http://www.almgraph.com/fsa/PhotoGab.htm>  
Now that's an antenna array!

Date: Tue, 21 Mar 2000 11:36:16 +0100  
From: Johan.Andersson@draminst.se (Johan Andersson)  
Subject: [R-390] T2FD info

As usual, things are never as easy as they seem - there are a few approaches to this. As high impedance broadband xfmrs are "hard" to make, I think a fairly low impedance will do. Why not go for 75 ohm line to the RX? It'll be closer to the R390's "nominal" 125 ohms ! And that way a simple 4:1 balun would feed the T2FD directly, with a resistor value of 390 ohms. Just remember to use a non-inductive type.

>Now that the 390A is playing I need something better than a 30' hunk of  
>wire in the basement and dont want to disturb all the ham antenna  
>switching matrices on the other side of the basement.  
>Figure a T2FD at around 60' will do what I need for now.

Seems like a 60' antenna would have a 5-25 MHz design frequency range, with a 2 ft spacing between the upper and lower parts of the dipole. Guess it'll be decent from 3 thru 30 MHz tho. Feedline also have to leave the 20-40 deg sloping dipole at a right angle. If you want to complicate matters here's some further reading:

<http://www.cebik.com/t2fd.html> (on modeling this dummy load)  
<http://www.nordicdx.com/antenna/wire/t2fd> (design and performance)

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Date: Tue, 21 Mar 2000 11:07:50 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] T2FD info

Ive had good results with 9:1 but if I need more a 2 stage version is simple as detailed in Sevicks book. I'm not particularly concerned about a 3:1 or less VSWR. If need be I can use a preamp.

>Why not go for 75 ohm line to the RX? It'll be closer to the R390's  
>"nomina"l 125 ohms! And that way a simple 4:1 balun would feed the  
T2FD directly, with a >resistor value of 390 ohms. Just remember to use a  
non-inductive type.

There was something mentioned a month or so ago that indicated the actual terminator resistance should be around 1K. Guess I'll experiment with different values.

>>Figure a T2FD at around 60' will do what I need for now.  
> Seems like a 60' antenna would have a 5-25 MHz design frequency range,  
> with a 2 ft spacing between the upper and lower parts of the dipole.  
Guess  
> it'll be decent from 3 thru 30 MHz tho. Feedline also have to leave the 20-  
40 deg sloping dipole at a right angle.

I meant 60' high but I think instead it will go up to 90' . That way I can get a decent slope from a 90' length or even longer. B&W claims 1.8-30MHz with 90' and 2-22 MHz with 185'. Think I'll try around 120'.

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Date: Thu, 23 Mar 2000 07:35:53 -500  
From: Brent Reynolds <jbr@randomc.com>  
Subject: Re: [R-390] "MC connector and whip antennas, (was mini BNC ...)

When I was asking about connecting whip antennas to the R-390A via the C connector jack, I had in mind such whips as one might use in a mobile application, as on an SUV, a van, a pickup truck, or even on a car, maybe something in the length range of, say, four to six feet, or 130-170 centimeters, and maybe with some kind of active antenna or other signal boosting circuitry added. What would be a good antenna of this type to try, or even, would it be worth it. What I mean is, would it be worth it, as opposed to just running about 10-20 feet, 3-6 meters, of wire? I know the wire route is considerably cheaper, but I was wondering if there is any difference in the path between that C connector and the -390's front end

as opposed to the path between that front end and the twin-ax balanced connector. As you all know, and as I knew it would be before I ever saw one of these puppies, the sensitivity to radio signals of any communications receiver with no antenna of any kind is barely above that of a stone. I could just see my landlord's reaction if I got hold of one of those 35-foot whips off of some cruiser and stood that sucker up outside my window. That would be actually interesting to find out, but I think I'll pass on the experience just the same.

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Date: Thu, 23 Mar 2000 13:32:24 -0000  
From: "Michael P. Olbrisch" <kd9kc@elp.rr.com>  
Subject: RE: [R-390] "MC connector and whip antennas, (was mini BNC ...)

It would work. I have successfully heard ham SSB sigs using a 6 ft piece of wire indoors. It was not great, but it did work. If you are serious, why not get a set of ham radio mobile antennae, and tune them to the areas you are interested in. I have used a set of hustler mobile coils for years to SWL while on the road. Since it is a receiver, tuning isn't critical. A complete set in good shape cost me \$50 at a local hamfest. Using capacity hats and longer or shorter whips, I have tuned the Hustlers anywhere from 3.0-30 MHz no problem.

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Date: Thu, 23 Mar 2000 08:07:22 -0600  
From: "Jerry G. Kincade" <w5kp@swbell.net>  
Subject: Re: [R-390] "MC connector and whip antennas, (was mini BNC ...)

I think if I lived in an apartment or such I'd try a loop, larger the better, made from #30 or smaller magnet wire, put up with thumbtacks at ceiling level around the perimeter of the room, or maybe even the entire apartment, coupled to one of the small MFJ tuners. Last resort might be one of the "active" antennas. Expensive, though, so never tried one.

Date: Thu, 23 Mar 2000 10:02:27 +0000  
From: "B.L. Williams" <B.L.WILLIAMS@prodigy.net>  
Subject: Re: [R-390] "MC connector and whip antennas, (was mini BNC ...)

Sounds like you live in one of those antenna-unfriendly zones. I've known people who just tossed wire out of the window if they lived up on higher levels. If you live on the top floor you could toss some thin wire out of your window to the ground and then attach a weight on the end of the wire and shoot it back over your apartment roof with a wrist slingshot. Or, shoot the wire down the length of the roof and let it lie there. You can also shoot it from your window up to something tall like a tree or another building. If you use your imagination you run thin wire like Jerry said all over the place and get decent reception. If you have access to the attic then you have it made. There are endless possibilities for running wire up a

receptical cover into the attic for some neat antennas.

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Date: Thu, 23 Mar 2000 10:44:48 -0500  
From: kmlh@juno.com  
Subject: Re: [R-390] "MC connector and whip antennas, (was mini BNC ...)

A homebrew version of the B&W "Apartment Dweller" can be built for under \$10. Attaches to a window sill or railing and can be installed/removed in minutes. It might make a good primary or backup antenna.

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Date: Fri, 07 Apr 2000 09:56:36 -0500  
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>  
Subject: Re: [R-390] Hold on to your tube radios, boys!

Given a coax run and an antenna the static charge can store considerable energy. I've seen midwest USA charged thunderheads without lighting charge up dipoles and coax enough to flash over the front of SO-239 connectors. The first snap made me rise a foot or so out of my chair while studying in the hamshack. 100 feet of 50 ohm coax has 3000 pf capacitance. Charge that to 5 KV. There's considerable energy. Turn on a silicon diode to couple that to ground (if the voltage didn't do it first) and the current surge can be significant.

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Date: Fri, 07 Apr 2000 12:29:53 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Hold on to your tube radios, boys!

The Navy RAL and RAK receivers, dating from about 1938, had a resistor from antenna to ground to bleed off antenna static electricity.

Date: Sat, 8 Apr 2000 07:26:43 EDT  
From: Radiomatt@aol.com  
Subject: Re: [R-390] Hold on to your tube radios, boys!

In the days I used a longwire (I've gone to active antenna(s)), i had a 20k resistor to ground at the far end ; I'm under the impression there was less noise, but as with all antennas, the conditions can hardly ever be duplicated for real testing.

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Date: Thu, 27 Apr 2000 18:23:02 -0500  
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>  
Subject: Re: [R-390] Re: [Antennas] Ground Question

Nay, you can never have an excess number of grounds and those grounds should be specialized for the ham shack. NEC requires more than just a

simple ground rod because one ground rod is not a very good ground. More are better. RF grounding that tries to depend on house wiring ground leads to extended lightning damage as well as RF burns to the radio operator and excessive TVI.

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Date: Thu, 27 Apr 2000 22:03:49 -0700  
From: Dick Carroll <dixie@townsqr.com>  
Subject: Re: [R-390] Re: [Antennas] Ground Question

> Nay, you can never have an excess number of grounds and those grounds  
> should be specialized for the ham shack.

No argument. But if I only have one it dang sure ain't gonna be in my basement floor! NEC requires more than just a simple ground rod because one ground rod is not a very good ground.

>More rods are better.....

Yeah. But one poorly placed rod that tries to do the work of many is better left uninstalled. I'm convinced that \*none\* IS better, and then unhook all AC and antenna lines when the station is not in use. And I mean, unhook the antenna lines \*outside\* the house. Lightning has one, and only one mission: "Find Ground, via the path of least resistance/impedance." My mission is to see to it that my body and my station are NOT in that path. The objective is to give the lightning a low impedance path to ground early in the game, so that it has greatly lessened inclination to come into the house for a 'visit' via your feedlines. Safety grounding for AC is another matter entirely and the household AC wiring ground system will take care of that well, if the housewiring was properly installed. Everyone should get a small plug-in outlet tester and check each outlet. Too many of them have faults to trust them without checking.

I have three driven ground rods at my 60ft tower, hooked to each leg with #6 solid copper wire. The tower is 100 feet from the house. My rotor and coax feedlines run underground to about 15 feet outside the house, where they emerge and terminate. I use a length of RG8 running from the house wall to the termination point. Normally I leave it all unhooked. I use quick-disconnect PL259's and hook up to operate. When I leave home, I unhook the piece of RG8 and isolate the feedlines out in the yard. The rotor and remote antenna switch cables are fitted with MOLEX plugs so they can also be disconnected and pulled back to the house. When I'm off the air, all my gear is unplugged from AC and all antennas are completely disconnected.

> RF grounding that tries to depend on house wiring ground leads to  
> extended lightning damage as well as RF burns to the radio operator and

excessive TVI.

Any ham that needs RF grounding in his shack had best be finding out why, or as a minimum install a few common mode RF chokes on his incoming lines. Use of 1:1 choke baluns at the feedpoints on coax fed antennas will generally eliminate it. If it is being induced onto the feedlines from a radiating antenna I'd use some chokes before the lines enter the house. My lines are lashed to the steel tower leg, then run underground for most of 100 feet, and I have no RF coming into the shack whatever, without needing choke baluns. And all antennas are unbalanced.

If you live in lightning country and can't do a proper job of lightning mitigation, and few hams can, I think you're much better off to do what you can to cause the lightning to go to ground right away at the antenna, keep everything floating in isolation when not in use, and never hook up to operate in weather conditions where lightning threatens at all.

After some of the things I've seen lightning do, I wince when I hear someone on the air say they just turn off the rig when they finish operating. Any radio installation that depends on a ground rod or two to protect it is just raising the expectations of the owner, not providing real protection. Often it's worse than no ground at all, since the owner expects it to protect his station. Anything other than a complete common-point system designed to ground EVERYTHING on the premises to a single heavy, VERY well grounded terminal point is just asking for it. That's a tough project for most hams. And few hams have UFER grounds.

Once after a storm I happened onto a large oak tree that had just been lightning struck. It stood in the corner of a field and served as the corner post for a metal barbed wire fence where the rest of the fenceposts were steel. It was in the Springtime when the sap was rising, and the tree was stripped absolutely naked, without a shred of bark remaining, down to the top barbed wire, and from there on down to the ground the bark was still in place. The lightning had literally exploded the sap underneath the bark, turning it into steam, and none of the bark remained on the tree, it all laid on the ground. The tree was gleaming white. When the lightning had travelled down to the top wire of the fence, it then went along the wire into the ground through the steel posts, and didn't vaporize the sap in the lower part of the tree into steam, thus the bark remained on the portion of the trunk below. The tree showed no other damage, so it had to have been a smaller lightning strike, at that.                      Dick WOEX

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Date: Fri, 28 Apr 2000 07:43:31 -0500  
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>  
Subject: Re: [R-390] Re: [Antennas] Ground Question

You have to go through basement wall or floor to get to the outside from the basement panel. I have added a ground rod here since finding the water pipe from the well is plastic. I drilled a hole diagonally through the bottom of the basement blocks (found a drain tile outside) so the top of the rod is 6' below ground and the rod goes out at an angle. Whether its a help from lightning or not, I don't know, though the last time the antennas took a hit, I didn't detect any wiring damage, just a KU band satellite data receiver.

I disconnect all antenna and Rf ground connections when not operating in the summer time but leave the tower and the external lightning arrestor grounded separately from the house grounds. I don't believe in connecting the Rf grounds to the house grounds all the time. Grounds just aren't that effective. I don't insulate the guy wires so the guy wire anchors (8" plates 8' deep) act as distributed ground. Unfortunately I've added a packet node to the operations here and that means it needs to be on more than off. I want to construct some isolation between the antenna coax and the radio but haven't done it yet, so when storms roll in, I get up and unhook that antenna too.

A small plug in outlet tester is not much of a test of ground quality. Its satisfied if the ground can handle a few milliamps, so indicates OK if the ground wire accidentally touches the metal box, it doesn't test for true integrity of the ground. When I want to make that test, I use a modified outlet strip where I have an isolated outlet wired with ground and neutral swapped so a 1500 watt heater load can be applied with return through the safety ground. A voltmeter between ground and neutral shows the quality of each of those circuits. I can check for wire size and for bad connections by comparing the drop in the neutral to the drop on the ground with the same load.

An outlet tester can sometimes show stupidities of permuted wire connections or the lack of any grounding.

I use type C connectors on my antenna patch panel for quick disconnects.

I use a ten pin Jones plug for the rotor.

I don't disconnect my equipment from the AC line when off, but do disconnect the compute modem phone line when there's lightning about. I do have MOVs on the computer lines in the UPS and a surge protected switch and the main hamshack 12 volt power supply has MOVs on the line side of the noise filter. Eventually the MOVs will cause trouble due to dissipating charges, but so far none have shown any visible problems.



Users of gear with mechanical and most crystal filters quit operating when the storms are at a safe distance because those filters ring so much they can't hear any radio signals anyway.

The most effective commercial repeater site grounds are ring grounds with multiple rods, where the repeater building is ringed with a wide copper strap, maybe 18" wide. That conductor is approaching the size necessary to keep voltage drops low for kiloamp lightning currents.

I believe that protection from lightning hitting antennas needs multiple elements. First the antenna support and lightning arrestor needs to be grounded outside, then there needs to be series impedance in the transmission line to the equipment to cause the lightning to stay outside. That series impedance might be a choke coil, from winding the coax into a coil, or I'd prefer some sort of DC break. For VHF and UHF, I'm considering a dielectric waveguide that could also act as a single resonator bandpass filter. All conductors of my HF antenna feedline and my RF ground pass through high voltage fuses made of 9" lengths of #36 wire mounted on an insulator. Feed lines need shorted quarter wave shunt stubs to be sure all conductors have the same LF potential. Polyphasor line and antenna protective gaps seem to be effective, the local ham repeater antenna is on top a water tower and has survived being the highest spot for miles for more than a decade using them. Its sure that the iron and steel water lines from that water tower make a far better ground than one can achieve with mere ground rods.

Even with good grounds on the tower and lightning arrestor, there can easily be a few KV potential difference between the tower and remote earth during a lightning stroke. The series isolation needs to be only good for those few KV, not the entire lightning potential from cloud to ground.

The NEC only accepts grounding in profusion, it does not accept my idea of grounding plus series isolation. I don't believe the NEC techniques are adequate because ground rods are so relatively poor which comes from the relatively poor conductivity of soil.

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Date: Fri, 28 Apr 2000 13:36:04 -0500  
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>  
Subject: Re: [R-390] Re: [Antennas] Ground Question

>I don't know where this thread went astray but I apologize for the  
>confusion. My original question was :Is a ground rod through a basement  
floor >legal by NEC? I'm talking about AC line ground, NOT RF. I owned a  
house >that was built that way in 1963, wired by a licensed electrician  
and inspected. >I asked the question first over on antennas@qth.net but  
got nowhere.

> 73 Carl KM1H

1999 NEC 250-50(c) accepts an electrode encased in at least 2" of concrete located near the bottom of a concrete foundation or footing that is in direct contact with the earth, essentially 20' of rerod or #4 copper in the concrete. 1999 NEC 250-52(c) on Rod and Pipe Electrodes requires that 8' of the rod shall be in contact with soil and should be driven straight down unless rock prevents that. The paragraphs here neither accept nor reject rods driven through a basement floor. On these grounds, I'd say that a ground rod driven through a concrete floor with the connection properly protected from damage per NEC 250-10, acceptable practice. Likely inspectors will vary.

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Date: Fri, 28 Apr 2000 22:21:06 -0700 (PDT)  
From: John Kolb <jlkolb@cts.com>  
Subject: Re: [R-390] Re: [Antennas] Ground Question

> I use type C connectors on my antenna patch panel for quick disconnects.  
> I use a ten pin Jones plug for the rotor.

Speaking of lightning protection, most patch panels have incoming antennas and the output leads to the receivers/transmitters on the same aluminum plate. A lightning hit to the antenna will send some of the current through the shield of the lead from the patch panel to the radios, and then out their ground path. A better arrangement is to have the antennas come in to one panel, well grounded. A distance away is a second panel with all the radios. Removing all the patch cords between the two panels opens both the center conductors and the ground path. The lightning still might jump the 2-3 feet between the panels, but less current would make the jump and more would take the direct path to the ground rod. Disclaimer: obey all provisions of the NEC, of course.

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Date: Sat, 29 Apr 2000 05:39:48 -0500  
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>  
Subject: Re: [R-390] Re: [Antennas] Ground Question

MY patch panel has only antennas. And its mounted high so that cables are not near it when disconnected. I INSIST on ground isolation of several feet, else its not worth the bother.

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Date: Sat, 29 Apr 2000 22:44:50 -0700  
From: Dick Carroll <dixie@townsqsr.com>  
Subject: Re: [R-390] Re: [Antennas] Ground Question

> A small plug in outlet tester is not much of a test of ground quality.  
> Its satisfied if the ground can handle a few milliamps, so indicates OK

- > if the ground wire accidentally touches the metal box, it doesn't test
- > for true integrity of the ground.

Yes, but it does show pretty clearly when a wiring mistake has been made. And there are more mistakes made in residential AC outlets than you'd think. I've found several with the plugin tester, and they are the faults I worry most about. But other mistakes occur that you won't find with an outlet tester. A friend's wife was almost electrocuted by her electric range when, after using it for several years, she happened to touch a metal pan on the range and the water faucet at the sink simultaneously...she got a terrible shock. Investigation revealed that the 220 AC was miswired, the neutral and one side of the 220 were reversed. It had been that way for over ten years, just lying in wait. If our house had an electric range, I'd be checking for voltage between a burner and the kitchen sink faucet.

- > I use a ten pin Jones plug for the rotor.

I plan to change to something like that, the Molex's just don't hold up to the weather that well.

- > The most effective commercial repeater site grounds are ring grounds
- > with multiple rods, where the repeater building is ringed with a wide
- > copper strap, maybe 18" wide. That conductor is approaching the size
- > necessary to keep voltage drops low for kiloamp lightning currents.

I drove a 8 foot ground rod at each tower leg (large freestanding tower), bonding each leg to its ground rod. Then I ran a #6 solid copper wire around to each one and then bonding that ring to the equipment building AC neutral. I installed Andrews cable grounding kits just above the start of each cable's drip loop, taking that ground wire in a straight line to another ground rod directly below, which was also bonded to the ring. All this helped greatly in reducing, and almost totally eliminating, further damage from lightning. For the first time, lightning would strike that tower without damaging anything, or even blowing any line fuses.

- > Even with good grounds on the tower and lightning arrestor, there can
- > easily be a few KV potential difference between the tower and remote
- > earth during a lightning stroke. The series isolation needs to be only
- > good for those few KV, not the entire lightning potential from cloud to
- > ground.

In an 1982 issue of Ham Radio mag Bill Orr noted in his column that a method of lightning avoidance known as "Waveguide beyond Cutoff", where all feed and rotor lines run through a metal tube that is grounded on one end. I don't have the magazine at hand and don't remember the

exact details but it looked simple enough to set up. Evidently the grounded tube presents a high impedance to the lightning. Of course the coax prevents the signal from being affected by the impedance. Some authorities say that it won't prevent lightning, but it should help to do so, and along with other measures should be effective.

> The NEC only accepts grounding in profusion, it does not accept my idea  
> of grounding plus series isolation. I don't believe the NEC techniques  
> are adequate because ground rods are so relatively poor which comes  
from  
> the relatively poor conductivity of soil.

I often doubt the NEC codes are written by RF-literate people.

Date: Tue, 2 May 2000 18:13:13 -0700 (PDT)  
From: John Kolb <jlkolb@cts.com>  
Subject: Re: [R-390] Waveguide beyond Cutoff

Think of it this way, If you place a 12 ohm resistor in parallel with a 12 Kohm resistor, and place the pair across a 12V battery, you will have 1 ampere of current through the 12 ohm R, and 1 mA through the 12 K R.

The lightning is going to take multiple paths - through the ground rod you provide, but also through the coax to the radio, then through the power line ground to other grounds, etc - any which way it can.

The trick then is to make the ground as attractive as possible, and make any other path look as poor as possible while still functional for the intended purpose. Unplugging antennas is great, but those of us in So. CAL see lightning once every three years, and seldom bother. Arranging the extra coax between the lightning arrestor and the rx into a large coil to add series inductance for common mode voltages which the lightning most likely will be, after arcing through the coax insulation, is said to help. Putting in a sprinkler system? Use copper pipe and tie into the ground rod.

Had an effect similiar to lightning when a TV antenna fell on 14 KV power lines near the apartment - voltage surge blew a light bulb out of the socket, embedding shards of glass and solder blobs into the ceiling, and bouncing the light bulb base off a door into the bedroom - nice bank shot. Arced across an open power switch to vaporize 3" of PCB etch in a recorder in my unit - got into the phone and cable wires and destroyed appliances thoroughout the block.

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Date: Wed, 03 May 2000 06:50:15 -0500  
From: Randy & Sherry Guttery <comcents@mississippi.net>

Subject: Re: [R-390] Waveguide beyond Cutoff

Preface: we're in Thunderstorm Alley - just east of Tornado Alley - LOTS of thunderstorms. Hmmm. I don't see what a single loop would do... Many do have a loop at the entrance to the building to act as a drip-loop to keep rain from running in along the hard line... What would be MUCH more effective is a "spark gap" in the feed plumbing just inside the dog house where the feedline terminates and the "antenna match" caps / coils reside (dog house wiring is often called plumbing because a lot of it is 1/4 or 1/2 copper tubing - with the ends flattened and drilled for mounting hardware). I just make a tight radius bend in the feed piece that goes to the antenna feed-thru -- and position the "bottom" of the bend about 5-10 times the gap distance for the peak voltage at full power --- I.E. take a 5KW AM station: You have 500V RMS on the feed which just happens to be 707V Peak. So you leave about a 1/4 inch or so between the bottom of the "loop" and ground - usually the dog house box itself - since they are bonded to the Antenna ground system. This won't stop a direct hit - but it will slow it down. The AM transmitter I keep up as a favor to a friend (WMER 1390 AM Meridian) has a 97 foot tri-wire vertical that gets hit during an average year 3 - 4 times - and near strike induced transients about twice that. The loop stops all of the near strike stuff. The last three direct hits did no damage beyond the doghouse (the bypass switch on the antenna current meter gets blasted apart fairly regularly - the meter itself about half the time- and it's "out of the circuit" until the switch arcs... When I first took the transmitter maintenance over several years ago - the transmitter itself suffered three really serious hits in one summer. I completely re-did the doghouse - including doing the drip-loop correctly (there was a "sag" in the 1/4 copper tubing - now it's a very sharp radius bend). Since then I've had to repair stuff in the dog house a dozen times - but nothing has gotten past the dog house since (i.e. no damage in the transmitter). Now you can clearly see where it's arced to the case - nasty damage. I have no illusions - a hard direct hit will do serious damage to the transmitter's variable inductors - and probably crack a couple big caps (transmitter caps seem to fail with a hairline crack where they have suffered a flash-over) - but it is going to take "a big one" to get by the "loop". "Knock on wood" - the only thing I've had to do to the transmitter in the past year - is install a timer that tracks sunset / sunrise - so it automatically reduces his nighttime power - then brings it back up at sunrise.

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Date: Thu, 04 May 2000 20:45:02 -0700  
From: Robert Tetrault <tetrault@teleport.com>  
Subject: [R-390] Re: Lightning Protection

Sorry, I should have spelled it out: Common Mode Choke. There is a thread about waveguides beyond cutoff (also lightning protection) that has had some discussion of the use of them. Essentially, a **common mode choke** is

a pair or more of conductors having (ideally) perfect mutual inductance (coupling) and equal inductance presented to a wave traveling in-phase along each conductor. The equal inductance and perfect coupling present a simple impedance to the common mode voltage while the normal signals, being differential are passed straight through unattenuated. The perfect coupling means that little of the common mode voltage is converted to differential mode. This is the definition of Common Mode Rejection Ratio. A common mode choke can be built using simple turns of the coax or the twin lead. You will also see them looking like a ferrite block clamped around the monitor cable or the power cable (or even knots in the power cable). The ferrite is acting like a very lossy resistor at the EMI frequencies. A wave traveling in-phase on two or more conductors is pretty much the definition of common mode voltage. It is the typical mode of propagation for lightning, while coax and twin lead propagate through differentially induced voltages. Another difference between coax and twin lead is the IN-difference that coax has to the bends, materials, occasional metal pieces between the source and the load, as a result of the grounded shield around the center conductor. On the other hand, with twin lead, each lead is carrying a voltage which is 180 out of phase with the voltage on the opposite lead. The voltages are equal and balanced with respect to each other, with little consequent radiation (they cancel each other out). Most importantly, they are balanced with each other and with respect to ground. Being balanced with respect to ground implies that each line should see the same impedance to other objects as its opposite line. Therefore, whatever is physically done to one line should be done to the other, as exactly as possible. Physically and electrically symmetrical. That is why twinlead shouldn't be allowed to come close to other objects as much as possible. It should be possible to connect each line of the pair to a series string of gas discharge tubes whose total voltage exceeds the line voltage at a given power level. After that point, as the line moves towards the shack, you could form the twin lead into a large solenoid, where the turns (3 or 4) are spaced about 4X or greater than the diameter of the twin lead. With the solenoid diameter approximately 1 to 2 feet. If the start and finish are kept coaxial, the opposite diameter could be brought within 6 inches of a large metallic sheet, say 1 foot by 2 feet, connected by a similarly sized metal strip directly to ground (several ground rods) or simply bury a goodly length of the metal strip (20Feet?). The result would be a large common mode choke (not saturable), bifilar, whose inductance is transparent to differential mode voltages (the impedance that might be seen by one line is canceled by the magnetic field caused by the other line) but offers some impedance to the lightning surge that is traveling common mode (in-phase on each line). You would also have the bleedoff made possible by the capacitive metallic plate as well as the series string of gas tubes. Some effort should be made to locate this gas discharge tube string at a voltage minimum point along the feedline, which will change as frequency changes, say from band to band. The old trick of moving a small

light bulb connected to a loop along the feedline to map out the mins and maxs would be useful here. Finally, if your patience has not been exhausted, return loss is another method of describing SWR, based upon the reflection coefficient (RC) measured in a return loss bridge. An RC equal to .01 of the reflected open or short circuited excitation voltage equals a return loss of 40dB and an SWR of 1.02. It is calculated by:

$$RL(dB) = -20 * \log_{base10}(RC)$$

The attenuation (dB) caused by a given RC is  $attenuation = -4.34295 * \text{natural log}(RC)$

I mention a RC of .01 because it is equal to 1 volt reflected from 100 volts excitation into an open circuited port which is then connected to the line in question. You get the drift. Current Handbooks have it described somewhere. The value of RL is that it is more precise as the SWR gets down towards 1 to 1. In commercial broadcast, where the power gets into the megawatts, they can't afford ANY losses in the feedline, and hence typically get RL's equal to as much as 55 dB. The equivalent SWR would be 1.002. Distinguish the difference between 1.02 and 1.002 on an analog scale!! That difference is a thousand watts of loss(heat) in a coax. Something's gonna give! RL is more usually used in engineering than SWR for that reason. Having a termination capable of 60dB or better RL is VERY handy. Fair was recently selling a Narda N coaxial termination 5 watts, 40dbRL at 18GHz. I guarantee the RL at HF or even UHF will be better than 60dB. 24 bucks! surplus. 450 new. Sorry to be so at-length.

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Date: Fri, 5 May 2000 00:57:05 -0400  
From: kmlh@juno.com  
Subject: Re: [R-390] Waveguide beyond Cutoff

> > In an 1982 issue of Ham Radio mag Bill Orr noted in his  
> >column that a method of lightning avoidance known as  
> >"Waveguide beyond Cutoff", where all feed and rotor lines  
> >run through a metal tube that is grounded on one end.I don't  
> >have the magazine at hand and don't remember the exact  
> >details but it looked simple enough to set up. Evidently the  
> >grounded tube presents a high impedance to the lightning. Of  
> >course the coax prevents the signal from being affected by  
> >the impedance. Some authorities say that it won't prevent  
> >lightning, but it should help to do so, and along with other  
> >measures should be effective.

> While Orr was a prolific writer in amateur journals and an  
> excellent designer of high-power amplifiers, he often stumbled when  
> it came to theory in electromagnetics and antennas.

Amen to that, some of his "theories" reminded me of Lew Mc Coy <sp> and a few other gasbags of that era. When you run a conductor through a tube, the tube can no longer be viewed as a waveguide with a low frequency cutoff. It is now a TEM mode transmission line and its low frequency response extends to DC. "Waveguide Beyond Cutoff" openings make excellent ventilation holes in equipment and they leak minimal RF when designed properly. But put a conductor inside the waveguide and they behave completely differently.

>A number of people wrote to Ham Radio magazine at the time, but to >the best of my knowledge, Orr never issued a retraction. The method described will NOT >prevent lightning transients from entering an enclosure (hamshack).

I live an hours drive from the old HRM office. Several of us drove there one day and got a complete run around from Skip Tenney and his staff when we presented multiple documents on Orr's column repeated errors. It was really a shame since HRM had been the mainstay for quality articles since QST was pretty much into nothing interesting in those years and CQ was strictly in la-la land. I had a personal reason for being there since Skip and Jim Fisk I had considered friends ever since they came to National Radio looking for advertising support for issue #1.

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Date: Mon, 8 May 2000 14:00:45 -0500  
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
Subject: [R-390] Unbalanced Whip Antenna Connector

I know the TwinAx connectors are still available (disguised as IBM networking connectors), but are connectors for the unbalanced input still available? The center hole in mine is rather bugged(sp?) up to the point it won't hold a pin tightly enough to stay put. I figure this is a dead-end, but I thought I'd ask. Along these lines, are there any sources for mini-BNC adapters (not the connectors, but adapters)? Perhaps if I had a double-male, I could then use my mini-BNC to BNC adapter I have. It would bypass the antenna relay, but at least it would hold. Again, I figure this is a no-go, but you never know. Perhaps there are antenna relays in better shape than mine available? From Fair?

Date: Mon, 8 May 2000 15:45:27 -0400 (EDT)  
From: Norman Ryan <nryan@duke.edu>  
Subject: Re: [R-390] Unbalanced Whip Antenna Connector

Fair Radio is a good source for R-390A parts like the antenna relay. Someone on the list might have one as well also. <http://www.fairradio.com>



or RF Connection in Gaithersburg, MD, is a good source of odd RF connectors.

<http://www.rfconnection.com> (I think!) What you're seeking in the way of adapters might be a bit too @@rare@@ as we see on eBay. It's easier to get the regular connectors and make up your own adapters with a short piece of coax between them. You can usually find what you need at hamfests. The balanced connector, as you note, is a twin-ax, the unbalanced is a "C." The jacks on the antenna relay are integral and thus can't be replaced easily. This is a shame as so many antenna relays have been ruined by not being careful with the jacks.

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Date: Mon, 08 May 2000 16:33:22 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Unbalanced Whip Antenna Connector

Nope, it is: <http://www.therfc.com/>  
The R.F. Connection  
213 N. Frederick Ave. Suite 11-W  
Gaithersburg, MD 20877 USA

Tech Support (301) 840-5477 Orders (800) 783-2666  
24 hour Fax (301) 869-3680 email address: [rfc@therfc.com](mailto:rfc@therfc.com)

A few weeks ago there was a report that he had the rare twinax to UHF connector mentioned in the R-39x manuals. I have neither confirmed that nor checked his web site to look for them.

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Date: Mon, 8 May 2000 15:48:18 -0500  
From: "Larry WA9VRH" <wa9vrh@ocslink.com>  
Subject: Re: [R-390] Unbalanced Whip Antenna Connector

HI Scott give Mike Currie a call 972-612-8123 or e-mail [frconnect@aol.com](mailto:frconnect@aol.com) He is from Texas Connectors. I bought some of these from him at a hamfest in Chicago early this year. He was getting \$5.00 - \$6.00 ea. new old stock. said he had lots of them. 73's Larry WA9VRH

Date: Mon, 8 May 2000 17:06:30 -0400 (EDT)  
From: "Paul H. Anderson" <pha@pdq.com>  
Subject: Re: [R-390] Unbalanced Whip Antenna Connector

I bought a pair of UG-970 twin-ax to PL-259 adapters from him and received them. Seems he can get them fairly easily, if you're willing to pay (out the nose). He also has made up adapters (i.e. a twin-ax connector, some cable, and a PL-259 connector) for less. I'm not sure the UG-970 that I received is silver plated, but I don't have it in hand to inspect, either.

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Date: Mon, 08 May 2000 21:54:15 EDT  
From: Kenneth A Crips <w7itc@juno.com>  
Subject: Re: [R-390] Unbalanced Whip Antenna Connector

First the good news: You are not out of luck. Pasternack Enterprises as two kinds of bulkhead mount female C connectors. It looks like their model No. PE4240 C Female, Bulkhead, rear mount, solder cup, mounting hole BO7 is the one you want. Now the bad news: it costs \$27.95 (My catalog is almost a year old) go to <http://www.pasternack.com>

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Date: Tue, 9 May 2000 08:27:59 -0500  
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
Subject: RE: [R-390] Unbalanced Whip Antenna Connector

Actually, the part I need is the male fitting and it looks like they have several styles. In particular is model PE4242 for RG58 (and others) coax - \$11.95 each. I'm waiting to hear from another source (much cheaper), but if not, at least I have a line on these. I wish I could replace the integral female connector as well. That's the one you list which, by the way, is now only \$21.95.

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Date: Tue, 09 May 2000 07:36 -0700 (PDT)  
From: rlruszkowski@west.raytheon.com  
Subject: Re:[R-390] Unbalanced Whip Antenna Connector

Yes C connectors for the unbalanced input are available.

One by pass option is to use the BNC to Mini BNC adapter from the IF output. This would get you from the RF deck connector cable to a BNC Female that would accept a cable. Sorry I do not know the part number or a source for those adapters.

The center pin in the C connector can be changed out. The antenna relay will disassemble and can be worked on. The center pin from a female C connector can be soldered in as a replacement. Some craftsmanship may be required.

If you are working with an R390 or A you really want to use the balanced input. The unbalanced input by passes the first can and antenna trim. That by pass gives up a lot of selectivity and rejection of out of band pass signals (noise) Use Chucks feed method over the unbalanced input.

I use a short (3 foot) length of twin Ax into a small box. In the box is a HF materiel torid 1" OD 3/4" id and two 10 turn windings of enameled copper single strand wire (#18). I have a 360 pf variable cap in series with the torid on the twin Ax side. Under 8 Mhz it helps. Over 8 Mhz I leave it fully

meshed.

On the other side is my unbalanced feed. I have a whole antenna match between the antenna wire (end feed 60 foot) and the torid coil. One end is grounded Mostly some cap in series with the antenna gives a good match.

This feed really helped get the common mode noise out of the receiver. A lot of the local noise no longer gets into the receiver. I bring the coax into the box through a clamp type feed through. The coax sheild is not grounded. About 1/2" inside the box it is just trimed neatly to the out side jacket and left open.

The two twin lead conductors are linked to the torid and cap in a series circuit. The Box is grounded to the station RF ground. The receiver has a 3 wire cord that goes to the standard power receptical. Grounding the box to the receiver offers no change in noise or signal at my shack. Things may vary. Mine did vary until I got all the grounds cleaned up and re worked. (30 year old copper wire in the house)

Order a 3 meter chunk of twin Ax with two male connectors from a computer supply house. Chop that in two and have two connectors and short cable lengths to feed your receiver with. 29.95 should be about right for the cable and two connectors assembled.

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Date: Wed, 10 May 2000 08:32:03 -0500  
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
Subject: [R-390] Update

I took Roger's advice and used the mini-BNC to BNC adapter with a BNC to SO-239 adapter to hook up the unbalanced input to my antenna. As I was tuning around the connector moved and suddenly the signal dropped to nearly nothing. I moved it and the signal jumped up and down. A stinking intermittent in the PL-259! I was blaming the receiver. I guess in all my moving the connector from rig to rig, I've pulled something loose in it.

I now have the first two bands working pretty good with local BC stations strong enough to where the front end is getting overloaded and have to turn the RF gain back (a good thing, right?). I brought my wife out to see my progress. We have a local talk station and I had it playing. Instead of marveling at the radio, she commented on what the guy was talking about - "He's making a good point..." or something like that. It's just lost on her, I'm afraid.

I simply love to watch the line level meter as it moves so responsively to the audio. This is the only R390A I've ever seen in action and I'm having way too much fun.

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Date: Sun, 21 May 2000 22:17:41 +0500  
From: <harrisw@airmail.net>  
Subject: [R-390] r-390 antenna relay

I have a problem with the antenna relay in a r-390. It is slow or may not even pull in on standby or calibrate. What should the voltage be to it.

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Date: Mon, 22 May 2000 06:16:49 -0400  
From: "P. Rovero & Family" <provero@connix.com>  
Subject: Re: [R-390] r-390 antenna relay

This is symptomatic of a bad copper-oxide rectifier stack in the power supply. It produces the DC to operate the relay. Same cause for relay "chatter" or "buzz". Just replace it with a generic silicon bridge rectifier block.

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Date: Sun, 18 Jun 2000 14:24:00 EDT  
From: Kenneth A Crips <w7itc@juno.com>  
Subject: Re: quick ant question

Wow what a ground plane for a vertical antenna, I would run a ground to several points around the edge of the roof and put up a vertical, you will have a more QRN/M but it should perform well. Just for grins before you do anything try using the roof as an antenna you might be pleasantly surprised.

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Date: Sun, 18 Jun 2000 20:49:23 -0000  
From: Phil Atchley <ko6bb@elite.net>  
Subject: Re: [R-390] Re: quick ant question

> better off with a vertical whip as they used aboard ship?  
> The roof as well as the second story radio room is grounded with  
a.....

The metal roof should make a nice ground plane for a vertical. I live in a 14x65 foot mobile home which has a metal roof and a large metal awning on either side, probably 1500 to 1600 Sq/ft of sheet metal groundplane. On one side, roughly in the middle of the length and mounted at the junction of the home and carport I have a 24 ft Hustler 6BTV vertical mounted. This is a 6 band model that covers 80, 40, 30, 20, 15 & 10 meters and requires either radials or groundplane under it. It performs very well. ONE CAVEAT. Some of the verticals that don't require radials do NOT like metal groundplane under them as it detunes them. Some GAP models, R5 etc among others fall in this category,

Cannot answer about the T2FD as I don't have one. I do have a Alpha Delta DX-B Sloper mounted in a far from optimum manner, being somewhat low over the metal roof it resonates low on all bands but makes a very good antenna for the low bands 160M thru 30M.

Best I can do with the real estate at hand.

73 de Phil KO6BB

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Date: Sun, 18 Jun 2000 14:50:12 -0500  
From: Dr. Gerald N. Johnson <geraldj@ames.net>  
Subject: Re: [R-390] Re: quick ant question

A vertical above the roof with the coax braid connected to the roof should work very well. I did that once with a trap vertical on top a corn bin. For more local (500 miles or less) below about 10 MHz, tilt the vertical 45 degrees for some NVIS effects.

73, Jerry, KOCQ

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Date: Sun, 20 Aug 2000 15:46:38 -0500  
From: "Jim Reynolds" <ki6up@earthlink.net>  
Subject: [R-390] R-390A worse nightmare

A storm blew up and I disconnected the antenna from the Tuner and shut everything down as normal here in north Florida. Lightening began to hit very near as the storm came full speed to my house. Inside the rack was my R-390A left on due to my not seeing the dim panel dial light.

Lightening hit the ground very close to the house and I smelled the familure smell of wires burning. I panicked as I raced around the shack only to see my front switch in the "AGC" position and the new power strip on. I looked as hard as I could - no lights. After the storm passed, I got behind the radio and removed the AC fuse, it was toasted. I put another in and turned it on - immediately it blew. Please - I need suggestions - where do I start. The other two fuses are ok. Where do I start???

Did the EMF come through earth and travel up the ground? Was it traveling in the AC line to the house? Has anyone had this happen before?

Heart broken is a understatement.

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Date: Sun, 20 Aug 2000 19:13:46 -0400  
From: "Barry Hauser" <barry@hausernet.com>  
Subject: Re: [R-390] R-390A worse nightmare

Sorry to hear of your woes. I have had some experience with lightning damage. Here's a few simple tips based on my observations -- although your mileage will vary.

The key thing is to give the rig a very close eyeball inspection. Don't clean anything! Lighting can do some very wierd things -- like vaporize a piece of wire or a component and leave other components just millimeters away, completely undamaged. It "tried" to find the shortest, lowest resistance to ground, and there are plenty of small wire/component routes along the way. Since your antenna was disconnected, it probably came by way of the PS. First dumb thing to check is the fuseholder of the fuse that got trashed. It could have melted and shorted.

Before removing any modules, look over everything you can see with a bright light. Pay particular attention to any black smudges on the chassis, working from the point of entry, but not limited to that. I short piece of wire or resistor may only be a ghost -- not a lot of unkumpucky (sp?), but just a tiny shadow of remains.

As you remove the modules, check under each one, again looking very closely. If you're experience is similar to mine, the extent of the physical damage may be small and nearly invisible -- so difficult to find but easy to fix, hopefully.

If something looks peculiar, but you're not sure, use the new Y2K manual with the color photos to help identify things. Might help. While we have the presumption that tube equipment is more lightning proof than solid state, if the lightning could jump a mile or so through the sky, and a couple hundred volts can flow through the vacuum of a tube, then ... it's possible for lightning damage to generate an internal short in a tube, no? Check 'em. Unfortunately, given the enclosed modular construction of the R-390A, you probably should pull all the modules to check for damage. Or, you can check tube socket resistance measurements against the chart in the manual, although some of the specs there are misleading due to mods and production line changes that weren't reflected in them. However, you'd be looking for a dead short where some resistance is called for. Key contribution from me though -- look carefully -- especially for smudges of what looks like lamp black. Also, there may be a loose part rolling around -- like a resistor fragment. But very often, the sacrificial component is completely vaporized. Good luck. Hopefully your broken R-390A and heart will soon be mended.

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Date: Sun, 20 Aug 2000 23:37:22 -0000  
From: "Michael P. Olbrisch" <kd9kc@elp.rr.com>  
Subject: RE: [R-390] R-390A worse nightmare

Wish I had some data near to hand, I would give some input. This is going to be an interesting thread. Please keep us up to date on what you find.  
Good luck sir.

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Date: Sun, 20 Aug 2000 19:37:03 -0600  
From: "B.L.Williams" <B.L.WILLIAMS@prodigy.net>  
Subject: Re: [R-390] R-390A worse nightmare

Barry (the other Barry) had some good advice. Also, before you touch anything at all, put your nose down in the radio and sniff. You may smell the burned modules before opening them up and actually seeing the damage. If it has been a couple of days and something really fried good you should have an easier time locating the burned area(s) by smell.

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Date: Sun, 20 Aug 2000 21:56:41 -0400  
From: "Charles A. Taylor" <calltaylor@yahoo.com>  
Subject: Re: [R-390] R-390A worse nightmare

Fortunately, this ought to be easy to find.

Since the antenna was disconnected, the damage was probably done to the power supply... especially since the fuse blows immediately upon energization. If the machine has OEM rectifiers, i.e. 26Z5s (or is it 25Z4s, or 25Z6s? Aw, rats!), unless there was a direct/near direct hit, they probably aren't at fault. I'd guess that the input filter (capacitors) shorted to chassis.

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Date: Mon, 21 Aug 2000 00:27:21 -0400  
From: "Barry Hauser" <barry@hausernet.com>  
Subject: Re: [R-390] R-390A worse nightmare - followup

Jim just found that his R-390A has the 26Z5W's subbed out with silicon rectifiers and it sounds like they used 10 ohm dropping resistors. One rectifier is definitely bad and both resistors are fried. He has some parts on hand, but I forgot the specs -- What's good for the rectifiers, with some margin -- 400v PIV? Is 1 amp sufficient? Does 10 ohms sound reasonable? What wattage for the resistors?

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Date: Thu, 24 Aug 2000 16:59:11 -0400  
From: "Jeff Adams" <jadams@mcqassociates.com>  
Subject: Re: [R-390] which antenna jack

The R390A is normally aligned and optimized for the Balanced connector.

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Date: Thu, 24 Aug 2000 15:55:23 -0700  
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>

Subject: Re: [R-390] which antenna jack (Is there more than one?)

Download the very fine R390 manuals on the net. Look at the schematics. You will quickly observe the ballanced antenna goes through a set of tuned circuits. That very first slug in the front of each Rf rack. Whereas the unballanced input goes around that circuit. Do you have any need for selectivity and out of band signal rejection at your receive site?. You can feed the ballanced input with an unbalanced line. That line may have any thing on the other end which may or may not function as an antenna. On any day at any location and any set up one or the other may provide more of what you think you want in the headset. If we knew what the results were going to be for you we would not be playing with only a few R390's . We could be collecting many and haveing a real radio room.

Your Army Security Agency with many thousands of receivers in use around the world and with all kinds of antennas (big & small) over the last 50 years has always considered the balanced input the way to go.

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Date: Thu, 24 Aug 2000 16:21:59 -0700  
From: "Kurt" <radiouser@uswest.net>  
Subject: Re: [R-390] which antenna jack

I too have been told both opinions by 390 people who should know. What I have found for myself and verified with the schematic and years of experience from people much wiser than I, is to use the balanced input for coax, shorting one side to ground. This technique is explained very well on Chuck Ripple's R-390 web page. Using the balanced input provides greater selectivity and a little more gain in the Rf stage. I know one major restorer of 390's insists that the single input is the correct one for coaxial input. But if you look at the circuit this is nothing more than a high Z input with very little added selectivity. When any length of coax longer than a very few feet is connected, the capacitance of the coax eats the signal. If you want the feed a long wire directly into the 390, then use the single ended input.

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Date: Fri, 25 Aug 2000 01:51:27 -0400  
From: twleiper@juno.com  
Subject: Re: [R-390] which antenna jack

The Navy MOD (I forget the number) uses a shorting plug on the balanced input and switches P5 and P6 (I think...check the schem) to put one side of the balanced input on the "C" connector and ground the other. This way you can get the advantage of the balanced input (supposed to match something like 20 to 250 ohms) without the hassle of the twinax connector. I noticed slightly higher signal and sharper antenna tuning



with this arrangement and use it on all of mine.

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Date: Fri, 25 Aug 2000 08:39:21 -0700  
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>  
Subject: Re: [R-390] which antenna jack

If the solution to which jack to use on the R390 was easy, then the R390/A would of only had the most useful one and the other would have been removed to save cost. That relay ain't cheep. Day in day out, location, antenna and materiel on hand coupled to what you want to hear will direct which way to go. This debate should rage on until at least Christmas. As soon as we solve it we can get back to the gear lube. Please keep commenting. Learning that the coax is sucking my signal could help me get more signals.

Date: Thu, 14 Dec 2000 12:35:38 -0500  
From: "EXT-Corbeille, Richard E" <Richard.Corbeille@PHL.Boeing.com>  
Subject: [R-390] antenna

I was transferred to Alabama this summer and have finally settled in and had time to think about an antenna for my R-390a. I had previously used a long wire strung in the attic but this time I purchased a used Butternut 26 foot vertical (looking for better performance). This past weekend I mounted it on the deck, about three feet off the ground, and installed the four ground radials. When I did an "A-B" comparison between the new installation fed into the balanced input and a test lead in the unbalanced input, I was very surprised to find almost no difference. On BC, the test lead actually produced a higher signal strength. I expected the "new" antenna to pull in signals that the test lead couldn't, but that was not the case. I have the feeling that I am missing something very basic. Am I?

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Date: Thu, 14 Dec 2000 10:40:21 -0800  
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>  
Subject: Re: [R-390] antenna

I share Richards problem. What are we doing wrong? Roger KC6TRU

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Date: Thu, 14 Dec 2000 13:19:24 -0600  
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>  
Subject: Re: [R-390] antenna

Feeding the butternut through coax, it's mismatched except where it's resonant and the radials are only effective where they are a quarter wave long. Its way too small for resonance (even loaded for ham bands) at BC frequencies so is a relatively high impedance connected to low impedance coax. Then there's signal polarization and antenna directivity patterns.

The vertical's pattern is modified by the house its next to. And there's elevation angle of arrival of signals that favor different antennas at different times and frequencies and distances. **The vertical should be great for shortwave signals at long distances**, though if the broadcaster is using a horizontally polarized antenna the vertical might not always be best. Angle of arrival for the same station can vary widely according to ionospheric layer positions and density.

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Date: Thu, 14 Dec 2000 14:18:47 -0600  
From: perique@fastband.com  
Subject: Re: [R-390] antenna

My understanding is that the R-390A is designed to be run with a SHORT coax. A LONG coax will not work as well. The radio is designed to be pushed out of a plane and set up in the field. A long wire tossed up into a tree will work just fine. Try a plain long wire, as long, high, and straight as possible. When I lived in western Mass. I had mine set up with a 250 foot #14 solid copper wire, strung between 2 big pine trees. We were up on the side of a mountain, facing east. Radio Baghdad came in like it was next door!

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Date: Thu, 14 Dec 2000 15:30:52 EST  
From: Llgpt@aol.com  
Subject: Re: [R-390] antenna

<< My understanding is that the R-390A is designed to be run with a SHORT coax. A LONG coax will not work as well.

Only if you are using the unbalanced " C " connector. I use 60 ft. of RG-213 to feed the balanced antenna input, works fine. One can use the unbalanced by switching J-105 and J-106 and short The left side ( looking at the twin-ax connector from the rear ) of J-107. This is an old Navy mod. The radio is designed to be pushed out of a plane and set up in the field. Pardner, I think you have gotten your wires crossed between the R-392 and R-390A. A long wire tossed up into a tree will work just fine. Try a plain long wire, as long, high, and straight as possible.

<< When I lived in western Mass. I had mine set up with a 250 foot .....

Of course it will, as long as you use the unbalanced connector.

---

Date: Thu, 14 Dec 2000 13:39:49 -0800  
From: jan@skirrow.org  
Subject: Re: [R-390] antenna

>the deck, about three feet off the ground, and installed the four ground

>radials. When I did an "A-B" comparison between the new installation fed  
>into the balanced input and a test lead in the unbalanced input, I was  
very

How did you feed the (presumably) unbalanced antenna lead into the  
alanced antenna input??? You will kill a bunch of signal if you do it  
wrong!

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Date: Thu, 14 Dec 2000 16:38:04 -0500  
From: "Jim Brannigan" <jbrannig@optonline.net>  
Subject: Re: [R-390] antenna

The old adage is that verticals radiate poorly in all directions. But this is  
not helpful.....

A few items are needed to be helpful...  
Which Butternut?           What frequencies?  
Time of day?                How long are the radials?  
Did you tune it?            Feedline?

Date: Thu, 14 Dec 2000 17:02:27 -0500  
From: "Jim Brannigan" <jbrannig@optonline.net>  
Subject: Re: [R-390] antenna

The antennas here are used for transmitting.... I've had very good luck  
with the G5RV on 80-40M and with the ends shorted 160M.... While  
fooling around with the G5RV I discovered that it is a very good  
broadband SWL antenna (with or without the antenna tuner) at 102 feet  
in length it will fit into most suburban lots and can be installed as an  
inverted VEE. As might be expected, performance falls off on the higher  
frequencies, but it is still very usable.....

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Date: Thu, 14 Dec 2000 21:24:37 -0600  
From: "Jon & Valerie Oldenburg"  
<jonandvalerieoldenburg@worldnet.att.net>  
Subject: Re: [R-390] antenna

The two primary antennas in use at the home QTH for receiving are a 95  
foot long wire feed with RG-8 and a loop stick home brew ( 628 feet #18  
wire wound on a 4 foot piece of PVC with a 5" aluminum capacity hat.)  
Both are at about 18 feet elevation and work well, the long wire seems  
more sensitive and is a bit more noisy. Will have to try the GR-5V, I have  
one up as a transmitting antenna here. On the vertical performing poorly  
I'd first check connections, improve grounding and maybe look into a  
antenna tuner.....

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Date: Thu, 14 Dec 2000 20:21:25 -0800  
From: "Walter (Volodya) Salmaniw, MD" <salmaniw@home.com>  
Subject: Re: [R-390] antenna

>My understanding is that the R-390A is designed to be run with a  
>SHORT coax. A LONG coax will not work .....

Chris, your advice needs to be taken with a grain of salt. What you describe might suggest a random wire. I don't agree that as straight as possible is necessary for a random wire. Wires too long will degrade higher frequency performance. Possibly you are inferring a Beverage (or mini-Beverage). Length is important, with lengths in the multiple wavelengths. 250', I'd describe as a mini-Beverage. You DON'T want it as high as possible, but rather just a few feet off the ground, or in some circumstances on the ground works fine. Extremely directional, and very quiet. What we're getting at is virtually ANYTHING will work to pull in a signal on our R390\*s, but a BETTER antenna will really make the set shine. My favourite (and a US Navy favourite) is the T2FD, or Tilted Terminated Folded Dipole. Extremely easy to construct, and excellent broad spectrum coverage across all HF bands. Don't need much room either. For the MW enthusiast, many are excited by the K9AY setup. Otherwise various loop antennae can be bought or constructed.

Date: Thu, 14 Dec 2000 10:17:59 -0800  
From: "Roger L Ruzzkowski" <rlruszkowski@west.raytheon.com>  
Subject: Re: [R-390] EAC Problems (antenna relay)

You are about to do some surgery. The whole relay will disassemble. You may not even need to unsolder any of the coil leads to get the job done. You will want a very good Philips Screw drive to remove some of the little screws that are covered with green lock stuff. (If yours is virgin and never been opened before.) The nylon pin between the armature and the contact reeds may be binding and need a bit of burnishing. A contact may need a bit of bending to give it a bit more tension to keep it closed. The old take it all apart, clean it, and reassemble it and report no trouble found on the 2404. Is likely in order here. About 1 hour from power off to power back on.

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Date: Fri, 15 Dec 2000 10:12:35 -0500  
From: swlchris@juno.com  
Subject: Re: [R-390] antenna

I myself have the R390 non A version, and I haven't had any problems using long lengths of coax. As a matter of fact, I have no choice really, considering that living in an apartment has it's disadvantages when it comes to antenna placement outside. I haven't tried using the balanced

connector that much. .Right now one of my antennas, the 21 ft vertical, is over 170 feet away from the building while the other two antennas are about 40 to 60 feet away from the building. So with that long of coax and hearing what I do, I wouldn't think that length of coax is that important. But the kind of coax for that long of run sure is. Don't use el-cheapo RG58, use the real good stuff like RG-8 or better. I know it's thick but it helps a lot. For the shorter run from the 100 ft longwire I can get away with using mini RG8x. However, since the antennas are not multiband antennas, I do use a antenna tuner to get maximum signal out of the suckers :) The little MFJ901B does a great job matching a 21 ft vertical to 60 meters. Hope this helps

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Date: Fri, 15 Dec 2000 14:40:11 -0500  
From: twleiper@juno.com  
Subject: Re: [R-390] antenna

The balanced input works very well with a doublet fed by twisted pair or ordinary zip cord. Just pick up a couple hundred foot roll of 18GA zip (lamp) cord and (if you don't have the twinax connector) just strip and tin one end and shove the conductors into the balanced input. Then tie-wrap it to something nearby so the conductors won't fall out. Hurl the spool out the window and down the street. Go to the other end and "unzip" the cord back to the point where you estimate the feed-point for the doublet would be, and put a tie-wrap around it. Then grab your rod (fishing, that is) and cast a sinker the first of two "opposed" trees that will support your doublet, and help it work its way back down to earth. Cut your line (make sure it is at least 10#) and tie it to one of the "unzipped" conductors. Do the same with the other tree and line. Hoist both ends up and leave plenty of "sag" so things can blow around a bit. You will be amazed.

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Date: Fri, 15 Dec 2000 15:33:09 -0500  
From: "EXT-Corbeille, Richard E" <Richard.Corbeille@PHL.Boeing.com>  
Subject: RE: [R-390] antenna

A sincere "thank you" to everyone that responded to my question. This list is great! My antenna installation can probably be termed a kluge and I will get more data on it this weekend, but I didn't want any more time to elapse without expressing my thanks.

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Date: Fri, 15 Dec 2000 15:41:27 -0500  
From: "AI2Q Alex" <ai2q@ispchannel.com>  
Subject: RE: [R-390] antenna

A few minutes spent calculating Ohm's Law using some hypothetical resistor values will mathematically prove that maximum power is transferred to a load when the impedance of a load is the same as the

impedance of a source that's feeding it. Having said that, the theory is proven in practice here. I use physically large so-called antenna tuners in my radio shack. They're easily capable of handling the reactive voltages and huge circulating currents of kW-size Amateur transmitters. I say "so-called" because they don't "tune" my antennas. Instead they transform the impedance of the antennas into a value that matches my receivers and transmitters--for maximum transfer of signal.

What I enjoy here is the ability to adjust my tuners, and peak signals up \*tremendously\* on the R-390A's signal strength meter. So, your MFJ901B is a step in the right direction. I urge anyone on this list to think about adding some impedance-transforming network/s ahead of your R-390 if you haven't already considered that. Also, a "tuner" will offer additional selectivity. I'm always amazed at how I can actually "tune" my antennas--sometimes without putting RF power into the tuning indicators at all--just by peaking the noise level.

Also, the fact that anyone is able to hear a given station is no foolproof indicator of an antenna's effectiveness or efficiency (which is why it's nice to have a reference antenna when comparing new antennas). I've heard stations, and have had successful contacts with many stations, using very short (physically) electrically-lengthened antennas at my end. That doesn't mean that those antennas were as effective as full-sized antennas installed at greater heights, etc.

In fact, to my way of thinking, the most telling mark of a successful Amateur Radio station is an effective antenna that will help guarantee reliable communications--even under poor conditions. Last, I tend to use antennas fed with open-wire transmission lines, not coax. That permits me to operate easily them on any frequency in the 0.5 Mc. to 32 Mc. HF spectrum that the ol' 390 will cover. You can get a conjugate match with coax, but for transmitting you might exceed a coax cable's voltage breakdown specs (I also have a pair of 1/4-wave coax-fed switched phased verticals with over 3,000 feet of radials under them, but they're for 80-meters, and work okay with the R-390A, but not for frequencies too far away from that part of the spectrum). Hope these comments serve as food for thought. -- Alex in Kennebunk, Maine

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Date: Fri, 15 Dec 2000 19:58:19 +0000  
From: blw <ba.williams@home.com>  
Subject: Re: [R-390] antenna

> Then grab your rod (fishing, that is) and cast a sinker the first of two  
> "opposed" trees that will support your doublet, and help it work its  
> way back down to earth. Cut your line (make sure it is at least 10#)  
> and tie it to one of the "unzipped" conductors. Do the same with the

> other tree and line. Hoist both ends up and leave plenty of "sag" so  
> things can blow around a bit. You will be amazed.

I prefer a wrist slingshot and some tire weights with Shakespear 20lb test line from Walmart at under \$3 for 750'. A friend of mine used his bow and arrow to shoot over several trees for a draping longwire.

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Date: Wed, 20 Dec 2000 23:54:57 -0600  
From: Nolan Lee <nlee@gs.verio.net>  
Subject: [R-390] antenna input wanted...

I lost my primary long wire SWL antenna last night to a suicidal tree branch. Right now, I'm using my backup "hurricane" antenna that I have running along the inside of the roof ridge of the attic of the shop. I'm thinking of going ahead and revamping my antenna layout for the R-390A's and R-1051B's. What I'm looking for is coverage of 2 to 30 MHz.

Any input would be appreciated. I'd love to just order a pair of a certain brand of slope type antenna but would gouge my right eye out with a rusty tire iron before I'd spend that much for a pair of antennas that will end up getting toasted somewhere down the line from a falling tree or worse. Surely, there must be plans for an equal "clone" somewhere. I've been toying with the idea of a loop for MW and SW use.

Possibly with turns taps controlled remotely via sealed military 24 volt relays. Have any of you guys tried one? Anyone have any formulas or plans?

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Date: Thu, 21 Dec 2000 02:06:25 -0500 (EST)  
From: Norman Ryan <nryan@duke.edu>  
Subject: Re: [R-390] antenna input wanted...

Lots of websites out there with many ideas-- so much so, it's hard to decide on one. I still have a random length wire wandering aimlessly around inside the house while I try to make up my mind on an outdoor antenna.

Check out <http://www.hard-core-dx.com/nordicdx/antenna/index.html>

or <http://www.radiohc.org/Distributions/Dxers/ttfd2.html>

The K9AY loop looks intriguing and the TTFD doesn't look difficult to build. What sayeth the group?

IMO, bottom line to the antenna question basically is to experiment. Let us know what you find and good luck.

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Date: Thu, 21 Dec 2000 10:48:46 -0600  
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>  
Subject: Re: [R-390] antenna input wanted...

A couple groups of paralleled dipoles with fat tips on the longest one. The two groups at right angles.

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Date: Thu, 21 Dec 2000 09:48:58 -0800  
From: Walt Salmaniw <salmaniw@home.com>  
Subject: Re: [R-390] antenna input wanted...

Nolan, no doubt in my mind. A simple project, with little cost. Can be built and erected in a half day. The T2FD. Tilted terminated folded dipole. Very broad spectrum. I have 6 antennae to choose from at my QTH and use this one 90% of the time. It's that good! Arnie Coro's site at Radio Havana Cuba has a good set of plans, as does a site with one of the Euro SWL clubs (can't remember which). If you have any of the old Proceedings pubs, Guy Atkins wrote an excellent review. Hope this helps!.....Walt.

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Date: Thu, 21 Dec 2000 10:24:23 -0800 (PST)  
From: Fernando Quinones <nf6q@yahoo.com>  
Subject: Re: [R-390] antenna input wanted...

Hello.. I've found interesting reading at <http://www.antennex.com>

Particularly the small mag loop antenna for 80 and 40. Got all the 1" copper plumbing for a 13ft diameter loop. That set be back a bit.. jeesh copper is a bit pricey.. While I'm at it, anyone willing to give up a high voltage capacitor in the 10pf-200pf. E-pay prices are not in the forecast.

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Date: Thu, 21 Dec 2000 21:52:34 -0800  
From: Robert Tetrault <tetrault@teleport.com>  
Subject: Re: [R-390] antenna input wanted...

I'd like to know the URL for Radio Havana just to see the plans. Another thought for antennas is an active antenna, Nolan. They are just as effective as a long wire and take nothing in the way of erection time. Dressler is good, though the freight, at about \$300, is heavy, it is very worthwhile when weighed against the time, toil, tears and sweat of putting up any kind of wire outdoors.,

IMHO. I think there is a short expo on the T2FD at R-390a.net. Basically, you'll need a folded half-wave dipole for the lowest frequency (about 170 feet), but at the point right above the feedline is a 300 Ohm resistor (that's the terminated part). The feedline is a matched 600 to 450 Ohm



transformer to the ladder line. Broadband. Non-harmonic. Flat.

Anyway, the Dressler is for me, though you could build one out of tubes should you choose. Since most of these active antennas use a high current FET at the input as a source follower to a 50 Ohm output amp/buffer for driving the cable, why not use a FET that is thermionically activated? I think Dressler can go below 550 on your AM dial...

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Date: Fri, 22 Dec 2000 13:15:12 -0600  
From: Nolan Lee <nlee@gs.verio.net>  
Subject: Re: [R-390] antenna input wanted...

That sounds like the ticket. I'm trying to find more information on that particular type of antenna but pictures are lacking. Ditto for a search of the patent office files. Does this beast use any type of terminating resistors or loading coils etc.? 14 gauge stranded wire is cheap as hell by the 500 or 1000 foot spool. There must be a season that it costs what it does.

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Date: Fri, 22 Dec 2000 13:21:30 -0600  
From: Nolan Lee <nlee@gs.verio.net>  
Subject: Re: [R-390] antenna input wanted...

Thanks, Walt. I looked at the plans for it and it looks like it wouldn't be a bad choice except that I'm looking for something that's more directional that I can use in pairs. Coverage of lower frequencies might come in a little handy too.

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Date: Fri, 22 Dec 2000 13:22:55 -0600  
From: Nolan Lee <nlee@gs.verio.net>  
Subject: Re: [R-390] antenna input wanted...

<http://www.antennex.com> Interesting site, thanks.

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Date: Fri, 22 Dec 2000 14:09:02 -0600  
From: Nolan Lee <nlee@gs.verio.net>  
Subject: Re: [R-390] antenna input wanted...

>Another thought for antennas is an active antenna, Nolan. They are just as  
>effective as a long wire and take nothing in the way of erection time.  
>Dressler is good, though the freight, at about \$300, is heavy,

Way way than I'd spend on an antenna. I've had running automobiles that cost less than that! <grin>

>it is very worthwhile when weighed against the time, toil, tears and

sweat of putting up any kind of wire outdoors., IMHO.

I've never really had any problems with the installation.

>I think there is a short expo on the T2FD at R-390a.net. Basically, you'll  
>need a folded half-wave dipole for the lowest frequency (about 170 feet),  
>but at the point right above the feedline is a 300 Ohm resistor (that's the  
>terminated part). The feedline is a matched 600 to 450 Ohm transformer  
to  
>the ladder line. Broadband. Non-harmonic. Flat.

I looked at the T2FD design but it's not very directional. One of my problems is that I have a high tension line right of way along the Western edge of my property. It's somewhere around 240 or 250K volts. Normally it's quiet. If it's foggy or raining, I get "static from hell" from it on any N/S long wire and my "hurricane" antenna that's also orientated in that direction. The power line is about 700 feet from the shop/shack. An E/W oriented long wire is quiet as a tomb. What I want to try is a couple of directional antennas oriented NE/SW and NW/SE. I'm hoping that the extra distance where their pattern "crosses" the high voltage line is enough to eliminate the static. I may have to modify the orientation a bit but I should be able to increase the effective distance from the high tension lines to maybe a quarter of a mile or more. I ain't no engineer but it seems to me that the theory is sound. Hmmmm, I thought the same about 8 track tapes too, though. <grin>

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Date: Fri, 22 Dec 2000 15:50:01 -0700  
From: "Kurt" <radiouser@uswest.net>  
Subject: Re: [R-390] antenna input wanted...

I use a simple antenna system consisting of two parallel ( in the vertical plane) long wires about 100 feet long, each feeding an I.C.E. beverage matching assembly. The coax from the matching units feed an MFJ 1025 noise canceling/ phasing unit. I probably don't get much directivity from the antennas but with the phasing unit I can definitely reject signals from most directions. I can't remember if terminating a beverage makes it directional or not and certainly a 100 feet is not much of a beverage. Comparing this system to other ham type beams and quads in more rural settings close by, there is VERY few signals I can't hear. The beams and quads always have more gain but really can't out hear me. Let us know what you decide on. We all use great receivers but very few of us have the perfect antenna to feed them.

Date: Sun, 24 Dec 2000 15:36:11 -0500 (EST)  
From: Norman Ryan <nryan@duke.edu>  
Subject: Re: [R-390] antenna input wanted...

Thanks for the antennex website. Some articles by L. B. Cebik are there. He has a website you might want to check out-- lots and lots of antenna articles heavy on theory. The guy is brilliant, but frequently way over my head. <http://www.cebik.com>

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Date: Mon, 25 Dec 2000 20:56:17 -0600  
From: Nolan Lee <nlee@gs.verio.net>  
Subject: Re: [R-390] antenna input wanted...

The actual building of one of these should be a snap. Calculating the lengths will be tricky for best coverage of 2 to 30 MHz though without having to use ten pairs of wires or something. I'm more concerned with broadcast and utility parts of the HF spectrum than the ham frequencies. I noticed that the popular commercial antenna of this type is a lot shorter than it should be for the lower frequencies that it covers. None of the photos are very clear but it looks like it has a coil on each end of the longest section. It doesn't look like there's enough wire there to equal the length that the antenna should be. Any ideas?

Jerry, is there any formula for spacing the various pairs of wires of the dipole below the ones above it? Come to think of it, is there really a need for spacing them at all. Would simply using insulated wire and bundling all of the wires together work? This would result in a "tapered" cable on each end. Is there anything that would keep me from using say 8 pairs of wires cut for different frequencies? Ten? Twenty?

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Date: Mon, 25 Dec 2000 22:53:19 -0600  
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>  
Subject: Re: [R-390] antenna input wanted...

Somewhere I've seen a set of lengths for SW BC coverage. Basically it would be about 95% of half a wavelength at each band of interest. The resonances aren't as picky for receiving as for transmitting.

> .....It doesn't look like there's enough wire there to .....

The low band can be loaded out at the ends or near the ends. That's another chapter in the ARRL antenna manual.

> Jerry, is there any formula for spacing the various pairs .....

There have been lots of discussion of spacings. Most have found that a couple to a few inches of spacings cuts the interactions between the antennas and their precise lengths. There is more interaction when closely spaced.

> Come to think of it, is there really a need for spacing them at all.....

Such antennas have been made with flat antenna rotor cable. If you plan the cuts carefully, you only need enough cable to be the total of the longest and shortest elements on one side. You don't have to buy flat cable the length of the longest dipole... Like I said it takes some planning.

Structurally, I don't think all rotor cable is a great idea, because 22 or 24 gauge wire inside an insulator doesn't handle wind and ice well. I'd suggest for reliability that the longest element be made of #12 stranded building wire (or copperweld) and then the shorter elements be made of rotor cable... Fundamentally the thinner the wire, the longer the resonant length and the narrower the bandwidth. So fatter wires or parallel wires of nearly the same length or my forked end all increase the bandwidth and shorten the antenna.

> Is there anything that would keep me from using say 8 pairs of  
> wires cut for different frequencies? Ten? Twenty?

For receiving if you never checked SWR, I'd suspect 8 dipoles in parallel are plenty for .5 Mhz through 30... Remember that the 1/2 wave dipole works just fine as a 1.5 or 2.5 or 3.5 wavelength dipole (at 3, 5, or 7 times the fundamental resonant frequency), just the radiation pattern changes, but the feed impedance at those lengths is still quite reasonable.

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Date: Thu, 28 Dec 2000 15:20:49 EST  
From: GBabin73@aol.com  
Subject: Re: [R-390] antenna input wanted...

.....there really a need for spacing them at all.....

I have successfully constructed parallel dipoles using flat multiconductor rotator and ribbon cable. For receive only antennas, it's not too critical. Use the old  $468$  divided by the frequency of interest formula for total length, split it in the middle and feed one end with the center and the other end with the braid. Start with the highest frequency on the bottom wire, trim it to length and work up to the lowest freq (longest wire) on the top conductor. There will be some interaction with the wires in such close proximity, but it is minimal and not very critical, unless you plan to transmit.

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Date: Thu, 28 Dec 2000 21:01:25 -0600  
From: "Jon & Valerie Oldenburg"  
<jonandvalerieoldenburg@worldnet.att.net>  
Subject: Re: [R-390] antenna input wanted...

Radio Shack used to sell an antenna constructed exactly this way. The local store got two for me when they closed them out in Dec 1998. I've read reports it is as effective as some of the big name 'DX' multi band listening dipoles costing well over \$100. I haven't put one up yet as I have been pleased with the 96 foot long wire and the Army Colo stick loop antenna (info@Radio Havana web site) in use here.

Jon AB9AH

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Date: Fri, 29 Dec 2000 12:34:26 -0600  
From: "J. Christopher Brown" <perique@fastband.com>  
Subject: [R-390] Sloping antenna for R-390A?

Hi, and Happy New Year to all! As we head into the 21st century, does anyone have any tips about putting up a sloping antenna? I too was very pleased with a longwire with my R-390A. However, where I live now, I have only one big tree at the back of the lot (large pecan). I would rather have two trees that size, but given that I have only one, would a longwire running from about 50-60 feet elevation, then coming into the shack at about 5 feet elevation (about the same as sea level here in New Orleans), be better than the same longwire at a uniform 10 or 15 feet above the ground? Your thoughts and comments greatly appreciated.

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Date: Fri, 29 Dec 2000 17:01:06 EST  
From: DJED1@aol.com  
Subject: Re: [R-390] Sloping antenna for R-390A?

Higher is always better!

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Date: Fri, 29 Dec 2000 20:58:15 -0500  
From: The Maryland Crofts <croft@patriot.net>  
Subject: Re: [R-390] Sloping antenna for R-390A?

How about a "sloping folded unipole" or 300 Ohm twin lead (twisted together at the far end) and then fed with coax near the end closest to the receiver? Not for transmitting but should get most of low and mid band frequencies (and not too bad for near ten meters).

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Date: Tue, 2 Jan 2001 01:07:02 -0500  
From: swlchris@juno.com  
Subject: Re: [R-390] Antenna Questions (ducking&running)

I have a R390 (non A version) made by Motorola, and from what I can tell, there has been an interesting difference on the antenna inputs for me here. I have three antennas here out of this apt, a 21 foot vertical, 140 foot longwire, and a 60 foot dipole. What made the difference for me is the

MFJ 901b antenna tuner. All my antennas are coax fed because of the long runs out to the antenna..I tried using the funky twin ax antenna jack for balanced antennas using a paper clip and another wire to ground ,the results were kinda pitiful. I think that jack really needs to be fed with that 300ohm or more balanced line to really work well. Coax lines just don't match to it too well for me anyways. The unbalanced jack is the one I use, gets the most signal into the radio and works well enough for me. Using the antenna trimmer in tandem with the MFJ antenna tuner gets me some decent results here as evidenced by my loggings. The vertical is fed direct,as it was an amateur band antenna made in England a long time ago by Ham International. The dipole is homemade and I use a HyGain balun for it to feed the coax. The longwire isn't fed by a balun yet,I have to make one for it. All three antennas come into a switchbox I got for dirt cheap awhile back , into the tuner,then from the tuner into a MFJ antenna switch I use to switch between radios. \*wondering how much insertion loss I have with all that crap now that I think about it\* Anyways just experiment and find what works best for you :) Chris

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Date: Tue, 02 Jan 2001 04:36:28 -0500  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Antenna Questions (ducking&running)

HAH! Your radio may have had Field Change 4 (or whatever number it was) done to it. The coax wires at the antenna relay are re-arranged to route the UNbalanced coax connector to oneside of the RF antenna coils and ground the other side.

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Date: Sun, 25 Oct 1998 08:19:10 -0600  
From: "Jon Oldenburg" <jonandvalerieoldenburg@worldnet.att.net>  
Subject: Fw: [R-390] St. Helena-Loop antenna used.

The plan for it was on receiving antennas page on the Nordic DX home page. It consists of a 5 foot length of 1 1/2" PVC capped on both ends.

A 5" disc of 1/16" aluminum is fixed to one end as a counter-poise and the 20 ga magnet wire is attached to it. the wire is then feed back thru a hole in the top cap and the back out the pipe about 2" down. There is 620 feet of wire wrapped around the pipe, you cover the wire with electrical tape as you go to help hold it in place.

When there is about 3' left of the wire you drill a 1/16" hole and feed the wire back into the pipe. A coax panel mount socket is affixed to the bottom cap, and a ground lug affixed to one of its mounting screws.

The whole unit has been spray painted to weather proof it and it is mounted to my deck railing with a radio shack mast mounting kit. You are

supposed to use a long wire tuner with it, but I haven't got around to ordering one, the R-392 seems to like it as is. Jon Oldenburg

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Date: Fri, 19 Jan 2001 17:03:40 -0500  
From: tbigelow@pop.state.vt.us (Todd Bigelow - PS)  
Subject: Re: [R-390] The wonder of it all..

Cathy, think of the antenna as one of the most important parts of your system. A marginal receiver will work amazingly well with a great antenna system it seems, while a great receiver will only give marginal results on a bad antenna, far less than it is capable of.

Active antennae perform well for what they were intended to be used as - a compromise for either space, time, or budget (or any combination thereof). They're actually pretty amazing when you think of what they can accomplish with such limitations.

If you get a chance, do some reading on the Beverage antenna. No, it isn't made of beer cans, rather named after its founder. It's installed low to the ground, maybe 6+ feet high, over a long distance. This seems to go against the 'higher is better' rule, but the results from everyone I've spoken with are phenomenal. Apparently, being located closer to the ground weeds out a lot of the excess noise, while still allowing the desired signals to reach the receiver. Just remember, they're quite loooooong. But, if you have the space, it's tough to beat. Do some reading on antennae, you'll be amazed. To think of the difference a simple wire can make...

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Date: Fri, 19 Jan 2001 21:19:27 -0500  
From: Al Solway <beral@videotron.ca>  
Subject: Re: [R-390] directions, please

I just finished the final sensitivity tests after restoration and alignment which included the balance adjustment. The 10db Signal + noise to noise ratio sensitivity is less than 0.35uV on all bands. Above band 08 they are less than 0.2uV. This is not my point but just a little bit of sharing my personal satisfaction with my first R-390A.

I have a center fed 186 ft antenna up about 40 ft. This antenna is fed with two lengths of RG62, 93 Ohm coax. The shields of the coax are connected together at the antenna feed point but not to the antenna. Each center conductor is connected to each side of the antenna. In the shack the coax shields are connected together and then to station ground. The center conductors are connected to the balanced I/P of the radio. This configuration now becomes a balanced shielded transmission line. The impedance is 2 times the individual coax impedance. In this case 186 Ohms. The feed line run is about 140 ft.

Now for performance. At my QTH here in Montreal the noise is very high especially power line buzz. With my 100 ft long wire antenna hearing anything but the strongest local medium wave stations is impossible. It is possible to null out some of the noise with a small 1 ft loop but not great for DXing. This evening I am able to hear on 160M at 1848 Khz two Hams KR2F and somebody else. This is with the balanced antenna. With the 100 ft long wire it is impossible hear anything except power line noise. Last week on 1375 Khz I was able to hear for the first time the French station from St. Pierre et Miquelon. On the R5000 and the long wire only noise. Feeding the R-390A with one side of the balanced antenna only yields as much noise as the long wire. So in my opinion adjusting the balancing capacitors has been worth the effort. This confirms Roy Morgan's opinion of balanced fed antennas.

By the way Walter I would not have done this adjustment if it been for the suggestion in your alignment procedure. Thanks. Good receivers are only as good as the antenna they are connected to.

Date: Sat, 20 Jan 2001 09:18:55 +0000  
From: blw <ba.williams@home.com>  
Subject: Re: [R-390] The wonder of it all..

We do discuss antennas at times here. It is a welcomed topic. Sometimes, you would be surprised at the stations that a little bit of wire tossed out of a window brings in.

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Date: Mon, 22 Jan 2001 16:10:40 -0800 (PST)  
From: Dick Davis <enigma\_y\_2000@yahoo.com>  
Subject: Re: [R-390] Re: Beverage space requirements

I use a Slinky Beverage, which in my case consists of 5 or 6 Slinkys soldered together and then matched to my 50 Ohm feed line with a small toroid transformer. It is about 6' above ground. As a receiving antenna, it compares quite well to my DX-A Sloper which has the apex at about 45 feet.

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Date: Mon, 22 Jan 2001 19:43:57 EST  
From: Llgpt@aol.com  
Subject: Re: [R-390] Re: Beverage space requirements

You may want to lower the apex of the alpha delta sloper to around 30 ft., and the low end tp 10-10-1/2 ft. They work better, and long range dx reception is much improved. However, if working short stuff, leave it there.

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Date: Mon, 29 Jan 2001 15:24:15 -0500



From: Thomas W Leiper <twleiper@juno.com>  
Subject: Re: [R-390] Diversity

Space diversity utilizes two antennas that are a wavelength or more apart feeding two receivers. The placement of the antennas causes one antenna to receive better than the other during a fade. The AGC and diode output are cleverly tied together so that the AGC of the receiver pulling the stronger signal reduces the gain on the weaker receiver (thus it's diode output) and causes the diode output of the stronger receiver to be dominant.

Polarity and directional diversity is sometimes useful for hams and swls who do not have the real estate for effective space diversity. I use two doublets oriented NS and EW for my diversity reception of aviation communications, which emanate from all quadrants. I have also used vertical and horizontal (polarity diversity) antennas with some success in the higher bands.

Frequency diversity utilizes the same two-receiver concept to receive intelligence transmitted on two different frequencies at once, and can be had with only one antenna. A good example is to receive the Coast Guard CAMSLANT out of Chesapeake which often transmits simultaneously on 5696 and 8983.

Date: Mon, 29 Jan 2001 16:45:34 -0500  
From: chantz@well.com  
Subject: [R-390] Diversity

A few minor thoughts about diversity to add to these great explanations. There can presumably also be "phase diversity" where, for a limited frequency band, (e.g. 20 meters) two parallel dipoles feeding different receivers are separated by a small amount (say  $1/3$  wavelength) to get signals after highly localized nulls pass through, due to skip. Regarding general space diversity use, it's clearly easier for diversity reception to have one "master" VFO and BFO controlling two (or more) diverse receivers. Thus, if one bridges the AVC and Diode out outputs of say a stock SP-600, one still has to change the frequency as one hops around the band. For those higher end receivers which have VFO as well as BFO "out" and "in" jacks on the back, (e.g. SP-600 JX-17 / 31 and others), one can use one VFO and BFO setting on the "master" receiver and tune around pretty easily.

As mentioned previously regarding the CV sideband adapter, a cool thing would be to have a diversity receiver with one VFO but two slightly off-set BFOs, if this fed two separate earphones you could really listen to the band and "be there". For those unfortunates who are (gasp!) not into boatanchors or mods, it would seem that one could make a modern-day diversity receiver relatively easily by having the same computer control

two similar rigs/antennas (e.g. two old ICOMs. with same control address on the same buss). It's also possible to have two or many diversity antennas with one specialized active antenna switch and one receiver - the switch quickly "polls" the antennas periodically and "settles" on the antenna with the highest signal strength at the moment as expressed by the receiver's AVC/S-meter. I think the Heil Ham Handbook has a circuit for an op-amp comparator which is also useful for diversity experimentation. Diversity reception was really prominent for RTTY and commercial point-to-point voice where signal strength considerations were important. For CW, the ear/mind combination seems to have as much db gain improvement as many diversity rigs. Like most things, diversity seems to be making a comeback now for spacecraft use, concert microphones and cellular/wireless reception of "confused and reflected" urban signals. I think one of the ops on the list has written a fine article on this subject; not sure of publication status.

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Date: Mon, 29 Jan 2001 18:27:20 -0500  
From: Thomas W Leiper <twleiper@juno.com>  
Subject: Re: [R-390] Diversity

It's called replacing the mono headphone jack with a stereo one and bypassing the monitor switch on your CV-157. And you are right, you definitely feel like you are "out there" as you tune. Real, motor controlled boat anchor synchronous dual-sideband reception.

Date: Tue, 30 Jan 2001 07:50:20 -0800  
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>  
Subject: Re: [R-390] Accessing Antenna Trimmer Cap.

Use a small 3" C clamp for force. Cut a small pin for the punch. Use a nut or bushing on the anvil side so the pin can slide into it as it comes out of the shaft and gear. We had a small clamp that had the anvil ground down and a hole drilled through it in line with the clamp screw. The clamp screw had been turned down to a smaller dia. than the pin. I think the clamp screw was a replacement section of thread stock and it had a nice knob on it. I think, I took one apart once. The problem was not in the can. Now after 50 years, there could be things in there that need service.

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Date: Tue, 30 Jan 2001 11:14:53 -0500  
From: jmille77@bellsouth.net  
Subject: Re: Re: [R-390] Accessing Antenna Trimmer Cap.

Yes a previous owner has already punched a hole. I have sprayed it, it is not noisy but I suspect some leakage to ground due to residue buildup from a lifetime of spraying. Being obsessed with cleaning this radio, I wanted to get access directly to the variable capacitors for inspection. I have a

feeling the designers did not want to make that easy, looking at the thing. Was hoping someone had opened the can before without destroying everything in the process.

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Date: Wed, 31 Jan 2001 13:17:24 EST  
From: G4GJL@aol.com  
Subject: [R-390] Diversity idea

I knew of space and frequency diversity. But it strikes me that in a fading signal, RF phase change is also a parameter. It gives rise to phase distortion, and multiple paths have different phase lengths. Could phase diversity, by the use of two identical receivers, sharing the SAME antenna, but with a fixed (or adjustable) phi, between them, produce similar results to SD and FD?

I will try out an experiment on two 390As, or two B40s, with a +90 deg splitter in the ant circuits and independant phones. Anyone got any ideas on how to make a quadrature audio signal adder? ....Now I have a perfect excuse to get another 390A as a third control signal source to prove the diversity experiment.

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Date: Wed, 31 Jan 2001 13:45:01 -0600  
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>  
Subject: Re: [R-390] Diversity idea

Propagation phase is critical to the antenna, where one antenna sees signals from two paths and they can cancel. No number of receiver phases down the feed line will see any difference in phase once the cancellation has occurred at the antenna.

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Date: Wed, 31 Jan 2001 22:16:23 EST  
From: DJED1@aol.com  
Subject: Re: [R-390] Diversity idea

I doubt it will work, except for the part about buying another R390A. Diversity relies on one signal being strong while another is faded. One antenna, one output and you don't have diversity unless you do time diversity. That's practical with digital signals but not with R-390s. Enjoy the new radio, however. Ed

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Date: Thu, 29 Mar 2001 15:11:03 -0800  
From: Leo Jormanainen <lexa@mail.island.net>  
Subject: [R-390] T2FD

I'd like to build a T2FD for 9mhz to use with my R-390A. All of the web sites state that I have to use a Balun. All I have is 75ohm twinlead and a 1-

1 coax connector from a old antenna supermarket dipole. Can I use the twinlead, and if I can, what value of a terminating resistor should I use? I have a antenna tuner.

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Date: Fri, 30 Mar 2001 11:12:56 -0500  
From: "AI2Q Alex" <ai2q@adelphia.net>  
Subject: RE: [R-390] T2FD

If I remember correctly, the terminating resistor in a T2FD is about 400 ohms, and I believe the feedpoint impedance is also about that value. So, why not simply feed it with 450-ohm balanced line and dispense with the balun ? Alternatively for receiving-only, how about using cheap and readily-available 300-ohm "TV-type" twinlead? I don't think that that will present a severe mismatch, however you could then adjust the value of the terminating resistor experimentally (or try modeling the antenna with NEC and varying the values from there).

If you're going to use a tuner, I assume you will feed the antenna with a balanced feeder, and then your tuner will also be a balanced affair. If you do that, why bother with a T2FD at all? Why not simply use a center-fed wire (there are also some off-center possibilities that are just as good), making it as long as possible, and feed it via a balanced feedline, and use your balanced tuner to adjust it. That would also make the flat top lighter (one wire) and eliminate the need for the T2FD's spreaders. Typically, in a such a doublet, if the length of half the "flat top" plus the feeder is at least a half-wave on the lowest frequency of interest, you'll be all set. In practice, I've used such an antenna very effectively even if that constraint isn't met.

Moreover, you can also tie the balanced feeders together for some frequencies, and operate with the "shorted" feedline as a vertically polarized Marconi antenna, working against your station ground via a single-ended tuner. That makes the antenna configuration even more versatile; the horizontal portion acts as a capacitive loading "hat" in this case, so that the vertical portion formed by the feedline doesn't necessarily have to be a quarter-wave long at the lowest frequency of interest. The top hat makes the antenna electrically "longer." Mine works this way on 160 meters and the BC band. These are just some thoughts off the top of my head. Why complicate matters? Keep it simple. A balanced tuner is easy to make. No baluns or transformations from balanced lines or balanced feed points to unbalanced coax feeders are needed. I have one here that uses a swinging link, a set of plug-in coils, and clip leads to tap the main coil. It uses a short length of coax to feed my R-390A and other station equipment. The only thing to deal with is bringing the feedline into your shack. I use porcelain/steatite feedthrough insulators at my window for that purpose, using a section of Plexiglas in the sliding window. By the way, I also use this antenna for transmitting, and it works very well for

most conditions. It's great to be able to sharply peak up on the noise with the tuner (more front-end selectivity). It really works well with my R-390A on 160 meters and ten meters, and all points in between.

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Date: Fri, 30 Mar 2001 21:51:33 -0800 (PST)  
From: Bob <enigma\_y\_2000@yahoo.com>  
Subject: RE: [R-390] T2FD

I built a T2FD and now I know why it is know as the antenna that the Navy forgot. I used it on receive only and had quite poor results with mine. Not nearly as effective on receiving as my 5 slinky "Beveradge", or my Alpha Delta DX-A or even my 40 Meter dipole at 20 feet. I did not try changing the terminating resistor, perhaps that would have improved things. BTW the slinky "Beveradge" is very hard to beat. If you have the space to string 4 to 7 slinkys together, 6 feet off the ground, it will work like crazy for you.

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Date: Sat, 31 Mar 2001 05:25:15 -0800  
From: Leo Jormanainen <lexa@mail.island.net>  
Subject: Re: [R-390] T2FD

First, I want to thank everyone for the advice. My "regular" antenna is a Alpha-Delta Dx Sloper, before that I used a Antenna Supermarket Eavesdropper dipole. That came with 100' of 75ohm twinlead. I live right on the saltchuck and the eavesdropper rusted away. I've got nothing but time on my hands right now, so I thought I'd try building the T2FD after hearing so much praise about it.

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Date: Fri, 6 Apr 2001 22:29:00 -0000  
From: "Michael P. Olbrisch" <kd9kc@elp.rr.com>  
Subject: RE: [R-390] 6080/6082 cooling and tube life

Diversity training, as in learning how to connect TWO R-390As for fade-free operation. Wouldn't mind going to that training myself.

Date: Wed, 2 May 2001 11:10:29 -0400  
From: "Chuck Rippel" <avsl@erols.com>  
Subject: Re: [R-390] Twinnax Pics (for Deerhopper and beyond)

Whats the hub-bub? Thats just a \$4 computer networking cable connector.

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Date: Mon, 13 Aug 2001 22:55:27 -0400  
From: Norman Ryan <nryan@intrex.net>  
Subject: [R-390] Antenna Coupler

Anyone familiar with this antenna coupler at W J Ford's up in Canada?  
<<http://www.falls.igs.net/~testequipment/M-50-8.html>>

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Date: Tue, 14 Aug 2001 08:10:47 -0400  
From: "Ray Vasek, W2EC" <[w2ec@attglobal.net](mailto:w2ec@attglobal.net)>  
Subject: Re: [R-390] Antenna Coupler

Yes, I bought one while I was at Fords last year and had a chance to look at it up close before purchase. These are new manufacture, not surplus items. It works great and is currently feeding some of the receivers on my BA rack (except for the 75A-4 which shares a common antenna with the KWS-1 via the relay). Currently connected to the M-50 are: HRO Sr, SX-110, BC-348Q, R-391, SP-600, RBB and RBC. You can just barely see it in the picture at the start of my home page:

"[http://www.geocities.com/ac\\_cars/W2EC.html](http://www.geocities.com/ac_cars/W2EC.html)". It is on top of the O'Scope which is just to the right of the Collins KWS-1 RF deck. I've done no technical measurements, just "A/B" comparisons using an antenna directly connected to the receiver then switched thru the M-50 and there is a definite audible improvement using the M-50. Plus no noted degradation as more receivers are added to the load. I've noted no overload or other problems occurring in the receivers with the KWS-1 keyed up. Seems to do just what it is intended to do. I'm pleased with mine.

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Date: Tue, 04 Sep 2001 11:55:01 -0400  
From: Roy Morgan <[roy.morgan@nist.gov](mailto:roy.morgan@nist.gov)>  
Subject: Re: [R-390] Pictures of my R-390A

UG-970's are available at RF Connections for about \$25 each. These are the "coveted and rare" UG-970 Twinax male to SO-239 female adapters ... silver plated new, mil spec. made by Kings. I don't think you can get them anywhere else for less than \$50 each. [www.therfc.com](http://www.therfc.com)

(He also has type C - to - BNC and lots of other kinds.)

Date: Tue, 4 Sep 2001 18:24:52 -0500  
From: mikea <[mikea@mikea.ath.cx](mailto:mikea@mikea.ath.cx)>  
Subject: [R-390] Twinax connectors

Well, I went to the local big electronics supply house and got a pair of twinax plugs for \$3.75 each. They do fit the R-390A balanced antenna connector. No manufacturer name, no lettering of any sort, very generic, looks like cad- or chrome-plate. Solder-cup pins, which I like. Now I've just got to hook the blamed thing up. Where's my iron?

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Date: Tue, 18 Sep 2001 11:07:03 -0500  
From: "Scott, Barry (Clyde B)" <[cbscott@ingr.com](mailto:cbscott@ingr.com)>

Subject: [R-390] To ground or not to ground

I'm wiring a back panel for the cabinet in which my R390A resides. I'm taking the antenna connections to convenient BNC connectors and the question I have is whether to ground one side of the unbalanced connector. I've seen Chuck's page where the left-hand pin is grounded, but in my case, I can use insulated BNC connectors that prevent either side from being grounded. Should this be necessary? I'm using a matching network from the "twin-ax" connector to a BNC and that system is floating above ground so I thought I would keep it that way, but it involves obtaining a "floating" BNC connector (which we have locally) for the back panel.

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Date: Tue, 18 Sep 2001 11:36:33 -0700  
From: David Wise <David\_Wise@phoenix.com>  
Subject: RE: [R-390] R-390A Restoration Bulletin 6: reassembly

Update: In an ovens-off R-390A, a CL080 has 2.5 or 3V across it, depending on HR202's state.

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Date: Tue, 18 Sep 2001 15:38:08 -0400  
From: Tom Leiper <twleiper@juno.com>  
Subject: Re: [R-390] To ground or not to ground

No. If you are already going from balanced to unbalanced properly, the unbalanced line (BNC) can be grounded at the bulkhead connector.

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Date: Tue, 18 Sep 2001 16:30:50 -0500  
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
Subject: RE: [R-390] To ground or not to ground

I'm not sure if it's going from balanced to unbalanced properly or not. I have a "magic" adapter I bought from someone on the list that adapts from twin-ax to BNC (probably something for networking -- don't know). It is supposed to have some impedance matching ratio, but it's not exactly 125 to 50 -- but somewhat close. I don't know how it's done internally. It's in a sealed container and I don't have any paperwork on it.

I checked and I don't think it's a matching transformer since I'm getting continuity from the BNC to the pins. It could be just a resistor network -- I don't know. The thing that I was concerned about is whether it's important which pin of the "twin-ax" on the R390A is grounded. It didn't appear from the schematic that it was important, but I wanted to check with the group.

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Date: Tue, 18 Sep 2001 16:38:30 -0500

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
Subject: RE: [R-390] To ground or not to ground

Sounds good. I didn't want to modify the R390A's rear panel. That's why I made a second panel to which I'm feeding the antenna, etc. It will give me the balanced, unbalanced, and IF to BNCs as well as RCA jacks for the diode load and local gain (fed through a matching transformer mounted to the inside of the panel). I included a "computer-style" line input that goes to a fuse and main cutoff switch that feeds two extra 115VAC outlets as well as a line filter with another outlet to the inside that the R390A plugs into. This way I still didn't modify the R390A. I can use one of the extra outlets to power an SSB adapter and still have another one free. I'm thinking of adding a simple 12VDC power supply in it to give me power for some small fans. Fun, fun, fun.

Barry - N4BUQ

> -----Original Message-----  
> From: NE7X@aol.com [mailto:NE7X@aol.com]  
> Sent: Tuesday, September 18, 2001 2:40 PM  
> To: Scott, Barry (Clyde B)  
> Subject: RE: [R-390] To ground or not to ground  
>  
>  
> Yes, the case side is bolted to the relay switch. Here is what I did.  
> I removed the relay switch with the two ant connections,  
> relay, and three output connections. I put it into a vice and removed the  
> two connectors from the relay frame by squeezing them in the vice. I  
> then used a  
> Greenlee hole punch and enlarged the holes. I then mounted the SO-359  
> connector to the relay case. I removed the relay. I then took apart a  
> 75/300 ohm TV balun case, removing the balun. I soldered the balun,  
> one side of the input and one side of the output to ground, then the other  
> side to the center tip of the SO-359 and the relay output connector. The  
> relay is not needed. All it does, if you look at the schematic, is short the  
> ant connections to ground when  
> the receiver is placed into the stand-by mode. Now I can use any PL-259  
> antenna connection to my R-390A receiver. Works great. You will need  
> to play with it, study it, and mechanically make it match up to the cabinet  
> mounting holes with some shims. I used longer screws and washers for  
> spacers between the relay and the cabinet.  
> Good luck, Tom...  
>  
> > Is one side of your SO-239 grounded?  
> >  
> > > -----Original Message-----



> > > From: NE7X@aol.com [mailto:NE7X@aol.com]  
> > > Sent: Tuesday, September 18, 2001 1:23 PM  
> > > To: Scott, Barry (Clyde B)  
> > > Subject: Re: [R-390] To ground or not to ground  
> > >  
> > > I converted mine to a SO-259 and used a 75 ohm TV antenna balun transformer. Works >>> great! Tom NE7X...

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Date: Tue, 18 Sep 2001 19:47:48 -0400  
From: Tom Leiper <twleiper@juno.com>  
Subject: Re: [R-390] To ground or not to ground

> important which pin of the "twin-ax" on the R390A is grounded.

No, not important.

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Date: Tue, 18 Sep 2001 21:07:54 -0400  
From: Bob Camp <bob@cq.nu>  
Subject: Re: [R-390] To ground or not to ground

The standard adapters are set up to ground one side of the balanced connector and to connect the signal to the other side. This is not a perfect way to do it but it does work. The main trick involved is that you have to align the radio with the adapter in place.

A better way to do the trick would be with a broadband balun to get you from the unbalanced input to balanced coax. I've built one but I'm not sure it's worth the effort. First I did a 125 ohm to 125 ohm common mode choke. That ran into a normal 4:1 impedance ratio balun. Now you are at  $125/4 = 31.25$  ohms. Take that into a 3:4 turns ratio auto transformer and you come out fairly close to 50 ohms. A 50 ohm to 50 ohm common mode choke then goes to the coax.

The net result is a pile of four toroids and a bunch of wire. Bandwidth was ok for a 390 (< 0.5 db loss from 500 KHz to 30 MHz). The problem is that the finished part is big enough to need it's own box. As far as I could tell the radio worked no better in terms of sensitivity and only a little better in terms of front end selectivity with the contraption on it. After all the work I went back to the easy way of doing it ...

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Date: Tue, 18 Sep 2001 19:56:57 -0700  
From: "Bob Tetrault" <rstetrault@home.com>  
Subject: RE: [R-390] To ground or not to ground

It can be a balanced auto-transformer. They work fine, just don't isolate.

---

Date: Wed, 19 Sep 2001 01:24:42 -0400  
From: Tom Leiper <twleiper@juno.com>  
Subject: Re: [R-390] To ground or not to ground

> Why not just do field change 5 for the R-390A ?  
A very good idea. The Navy way.

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Date: Wed, 19 Sep 2001 08:58:19 -0500  
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
Subject: RE: [R-390] To ground or not to ground

The adapter I bought from Hank is really compact and gets me to 93 ohms and to BNC all in one unit. Pretty handy!

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Date: Sun, 23 Sep 2001 06:27:14 -0700 (PDT)  
From: MICHAEL OBRIEN <mikobrien@excite.com>  
Subject: [R-390] WJ Ford surplus RF antenna multicoupler box

I live in a condo and cannot use a outside antenna so I use a Mckay DA100E active antenna which does work rather well. I used to switch that antenna by hand between my 4 active receivers (yaesu frg-7 and frg-8800, drake sw8 and hummarlund hq-145a, my r-390a and hq-180 are still being restored) Now I use a WJ Ford surplus RF antenna multicoupler box. It can handle 8 receivers, uses BNC inputs and outputs @ 50 ohms and is built well. I cannot tell any difference between using the box or just using the mckay. The price is reasonable ( aprox \$150.00 USD)as compared to universal radios's one (\$499 ?). It works well for me and I thought I would put in a good word for it. It is good for someone who has 1 antenna a lot of receivers and wants to hook them all up without switching

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Date: Sat, 06 Oct 2001 02:22:17 -0400  
From: eengineer <eengineer@erols.com>  
Subject: Re: [R-390] TwinAx right-angle elbows

None of them I believe. I use Trompeter connectors at the office all the time. I looked in their catalog today and nothing matches the R390A. The connector on the R390A is a twin axial connector, called a TYPE C. Look at the two pictures below off of my webpage.  
<http://users.erols.com/eengineer/conn.html>  
<http://users.erols.com/eengineer/balanced.html>

See the SO239 on the first picture next to the TYPE C? The TYPE C connector is huge, and bigger than anything Trompeter sells. The Connectors shown adapt the BALANCED input to a SO239 (PL259 mate) For those interested, the UG636A adapter mates to the UNBALANCED input and adapts it to a BNC. I have a few of these also (not for sale!)

Date: Sat, 06 Oct 2001 11:30:23 -0400  
From: eengineer <eengineer@erols.com>  
Subject: Re: [R-390] TwinAx right-angle elbows

>Jeff, The UNBALANCED connector (J103) is a 'type C', not the balanced connector >(J104). The BALANCED connector (J104) is a 'twinax' connector.

Larry's correct, my mistake late at night - got them reversed.

>In spite of popular lore, these are not difficult to get. They are the same connectors that were used on the balanced coax cables in some computer networks. Lots of network suppliers stock them. Here's one:  
<http://www.iec-usa.com/twinaxm.html> You can also get twinax to BNC baluns from network suppliers. I've used these for several years on R390As with good results. Black Box is one place that sells them.

Agreed, the Mil adaptors are getting harder to find though - like the UG636A and the UG-970 and UG-971.

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Date: Sat, 3 Nov 2001 08:37:53 -0800 (PST)  
From: <jlap1939@yahoo.com>  
Subject: [R-390] 390 antenna

I have a question that I might answer from the web, but felt someone may give me a quick answer here... I have changed my listening location... Have already took down the "poor" abbreviated Beverage, and have an old but non-compromised comm. dipole, and a 100 ft long wire up. (Both at about 20-25 feet) The prob is lead-in...I have a commercial lead-in for the dipole, but wonder what I should do about the long wire... What size, insulation etc??? What kind of wire? I am going to have to go 25+ feet from the window I could get the antennas near, to where the radios have to be... Same is going to be a prob. for the ground, and I am UPSTAIRS.. Can I just use the housewire ground?? Suggestions? Have a great weekend..

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Date: Sat, 03 Nov 2001 15:02:49 -0500  
From: Bob Camp <bob@cq.nu>  
Subject: Re: [R-390] 390 antenna

Here's one solution and the reasoning behind it: Take your nice long wire and put a ground lead under it. Call it a radial, call it what ever you want, it's going to be your ground. Run the antenna down to the ground lead and connect them through one side of a 9:1 (3:1 turns ratio) or 16:1(4:1 turns ratio) balun. Acutely it will be an un-un when your are done with it, but you get the idea. Run a piece of 50 ohm or 75 ohm coax up to the

balun and then into the shack. Feed it into the radio through an isolation choke (50 ohm un-un). Here's the why: Your shack is full of all kinds of nasty noise sources. These include noise on your local ground. You want your antenna to be as quiet as it can be. Ground it far away from the shack and it will be more quiet. A long wire at most frequencies of interest is going to be a high impedance device. What ever you can do to high Z match it into the radio is a good idea. Assuming you are with me so far, here's how to make it better: Throw all the stuff above away and start from scratch. Wind a 3:1 un-bal and connect it to a chunk of 125 ohm shielded twin lead. Do not connect the shield at the antenna end. Connect the antenna and the antenna ground to the hi-z side of the transformer. That should give you a bit over 1,000 ohms on the primary. You could probably get away just fine with a 2:1 and 500 ohms. Run the cable in to the back of your R-390 or R-390A through the balanced wire connector provided for the purpose by the thoughtful designers at Collins. Now the radio will reject all the local stuff in your shack and will be a nice high z match to the antenna. Antennas are so much fun ...

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Date: Sun, 4 Nov 2001 11:51:15 -0500  
From: "AI2Q Alex" <ai2q@adelphia.net>  
Subject: FW: [R-390] 390 ant.

Once you realize that the antenna is the \*most\* important part of your receiver set-up, you then can start looking at it from an optimization point of view. When I tune (adjust) my antenna, it peaks received signals many times. Basically, I use a totally balanced antenna and a balanced antenna tuning unit, or ATU. The ATU permits the antenna system to operate on any frequency from about 1 Mc. to 30 Mc. It can also serve below 1 Mc (more below on that).

The wire antenna itself is about 150-ft. long, and about 65-ft. high. It's made of #12 insulated copper house wire. It is well insulated with large (long leakage path) ceramic insulators at either end, and uses a 5-in. long glass center insulator. The balanced open-wire feedline is homemade, and consists of 2-inch fiberglass spreaders at a distance of every 8-inches. The feedline wire is flexible #16 gauge bare copper.

A balanced lightning arrester is at the point where the feedline meets the house, however there's also a home-made jack bar at that point which permits me to quickly unplug the feedline from the house during the summer thunderstorm season. I then lower the feedline to the ground with a short halyard.

Speaking of halyards, the entire antenna is suspended by a system of brick counterweights and Nylon ropes at either end that go up and down as the trees that support it as they sway back and forth. Other halyards hold

bronze pulleys that the counterpoise lines pass through.

The ATU or "tuner" uses large (5-in. diameter) plug-in coils, each mounted on an insulated jack bar and equipped with large banana plugs. The jack bars plug into banana receptacles that connect to a wide-spaced split stator capacitor. A smaller capacitor tunes out the reactance of a swinging link. This entire ATU is balanced, and requires no ground per se. That can make it usable on upper-floor installations where you may not be able to establish a good earth ground. The tuner has an unbalanced (coaxial) low-impedance output that feeds the UNBAL input of the R-390/As.

When receiving, I insert the appropriate plug-in coil (I have a set of five coils) and peak the two capacitors. It's amazing how much signals come up---way, way up---into the R-390 and R-390A as the controls are tweaked!

Also, this tuning scheme provides yet another stage of high-Q LC circuitry ahead of the receiver, improving its front-end performance by discriminating against out-of-band signals.

To operate below 1 Mc. I tie the two balanced feeders together in the shack, and operate the antenna as an end fed wire in an unbalanced mode, adjusting an unbalanced tuner against a good earth ground. The flat-top then acts as a very efficient top-loading capacitor. This is the Marconi mode of operation. In concluision, I would advise against using an antenna system that cannot be "tuned" or adjusted for the exact frequency that you're listening to. It makes a BIG difference.

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Date: Mon, 5 Nov 2001 08:16:13 -0800 (PST)

From: <jlap1939@yahoo.com>

Subject: [R-390] Ants. (and other bugs...)

Friends, Want to thank those replying about antenna lead and ground problems, in particular Bob and Alex, who wrote a lot of detailed information! Actually I am o.k. on the dipole, as it is very good, and is cut for a couple of freq. I use it for the 20 M and a few other bands with the 390, and have antenna switching in place as well, (so I can use it w/600 if I want). It was a once expensive unit I got from a ham, and he was certain it had not degraded... The longwire I was going to use to assure best poss. reception on the SP-600, for cruising..I will try to incorporate your information. I have never been in a blind place, and tried to run in a lead-in and ground; thankfully I have some great solutions from you..I put up the longwire, as I always thought it was the best compromise for a lot of different freq...(??) Thanks for the other answers to my other, I know sometimes puzzling postings!! With apol. to the person from whom I got my 600, I am going to slowly start replacing a few parts..so... How about a meter? Mine is a little stained..Do you ever see them better? and; The

small, all metal knobs; Mine are a little "battle scarred". Can they be had? Still interested in crystals... I also want to comment on the Halli. S 38 series. The FIRST radio I ever owned was the S 38. As a child I learned to operate it correctly, and receive the limited amount of SSB that was around..It does much better than you would ever suspect... Also, Where can a person find a copy of the Electric Radio article on the EK-07? I would very much like to see that. Can it be had on the web? Sorry this is so long..

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Date: Mon, 05 Nov 2001 19:26:54 -0600  
From: blw <ba.williams@home.com>  
Subject: Re: [R-390] Ants. (and other bugs...)

You are right about the S 38. I did a little to it, had to restring the dial, and reinsulate the cabinet from the chassis, but nothing major. I think the headphone jack is inop, but I have the dual plug now to go and see if it works with that. I'll probably replace the caps one day soon just to do it and get it finished. I was always surprised at how much it pulled in. Okay, no selectivity worth mentioning, but very sensitive. SSB worked surprisingly well. I need the large knob, the bandscan knob. I have several of the smaller knobs to trade if anyone will ever contact me. I've been asking around a long time for that. Mine has a chip out of it.

Wire antennas are something that you just have to shoot up and try. I liked that brick suspension comment yesterday. I've put up all kinds of wire with some unexpectedly good results and had Beverages crap out on me. Actually, I never got a Beverage to be worth the work. I ran a 1000' one several years ago. Terminated it, variable terminated it, and finally took it down. I'm using 2 dipoles right now, one for n-s and one for e-w. I used a weird combo wire antenna design for many years with great results. This antenna came about due to tall trees, small lots, and what land I had available to me. I had 300' of wire and shot the first leg as a sloper up into a tall pine tree. I guess that used up about 120'. Then, I ran the wire vertical back down to the ground over the limb I had shot. That used about 60' more. The rest I ran horizontal whatever direction I had. That style of antenna pulled in a lot of stations and I logged some weak DXs for an online DX weekly that the editor wouldn't run because he didn't believe my logs. I knew some other guys on the publication and they eventually vouched for me. I've shot that kind of antenna up about 4 times now every time I move and want a fast antenna up in the trees. They always get the stations and it came about from going out and shooting up wire and seeing what would happen.

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Date: Tue, 4 Dec 2001 11:20:37 -0600  
From: mikea <mikea@mikea.ath.cx>  
Subject: Re: [R-390] R-390

<snip>.....

> And last,:: Due to the above, I want to install a shielded lead-in for my very high and long longwire (shot from an arrow, as suggested I think by, (uh oh)...was it Barry...?) The antenna is o.k. , if I roll the rack to the window, (abt. 28') the noise level is acceptable.(?) The prob. is that although the antenna is perpen. to power lines, I can't get the single wire lead-in that way, and it probably picks up from house wire as well...(BOY, too much for a simple question,

> I'm sorry,), so:: "DO I GROUND THE lead in anywhere else, or just let the radio connection ground it?" also..ANY OTHER SUGGESTIONS about the noise (which is unacceptable for DAYTIME reception...I am almost limited to only after about 6 p.m. ....Anyone help?.....

I would ground the coax shield to a deep-driven ground rod as close to the receiver as I could get it, using the biggest wire that I could get to fit. Others may have different ideas, and I'm open to them and the reasoning behind them. I sure as hell don't know everything. Use really, really good coax to reduce losses. And, of course, I would ground the receiver to that ground rod as well.

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Date: Tue, 4 Dec 2001 11:38:35 -0800

From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>

Subject: [R-390] FCC Noise

<snip> Almost any PC you roll over and read the model tag on will say it is FCC compliant. It is. devices NOT interfere with communications This is one of those hypothetical what does it mean responses. Page after page in book after book about how to keep the our armature transmitters out of other peoples things. Where are the pages on how to keep other peoples things out of our receivers and stuff. For every one who comments here that their computer and R390 work and play well in the same room we can get ten more asking how did you manage that. And the response is with lots of toroid restrains. Some thing out of a box from no known source and no known way to reproduce. It's tuned to the shack. Hell no its not moved around and tested. Your milage may vary yada, yada, yada.

A long length of wire strung up where we can is the norm for us R390 owners. No way in hell do we get an antenna field full for rhombi. Who gets a dipole tune to more than a couple of ham bands. So you get a big quad on a tower and 200Kz of tuned band width. Where the hell you going to get a dipole 50 foot in the air? 20 foots a good bet. 100 Ft of wire if you get from end to end in the yard. 60 is more likely.

Probably got the power feed lines out there some where. If you power line is under ground, then the locals are not likely to let you hang an antenna

out their in sight. Computer noise in the receiver is a real problem. So is that damn power line hash. Ground!!!? The antenna is closer than the ground. Counter Poise !!!? where do I lay that on the floor? We got some real problems. And in the context of feeding an R390 specifically from .5 to 30Mhz and getting it to play well with a computer so we can do RTTY. Packet, CW and PK31 FAX and the other assisted modes (not AM, SSB or CW with a key and quill). Not a problem at my shack is not helping. Please go listen to your receiver and enjoy yourselves. We will join you there as soon as we solve a few technical difficulties.

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Date: Tue, 4 Dec 2001 12:12:03 -0800  
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>  
Subject: [R-390] Power Line Noise.

>Friends, A comment, and a few questions::: "DO I GROUND THE lead in anywhere else, or just >let the radio connection ground it?" also.. ANY OTHER SUGGESTIONS about the noise >(which is unacceptable for DAYTIME reception...I am almost limited to only after about 6 p.m. ....Anyone help? I am tired of dealing w/power people and would just rather get around it.. >I know some of this is on the net somewhere, but my time 'till after the 1st of year is very >limited on the computers...Forgive me...  
Regards to all, John

Yea Please tell John and I where to find this noise fix. Knowing we have a long wire with the worst possible impedance match Murphy can manage feeding a R390 receiver, tuning from .5 to 30 Mhz, what makes a good high pass filter with a cut off at about 200 - 400 KHz. It should kill the 60 Hz, the Horizontal deflection harmonics and lamp dimmer crud on the antenna wire. I put my receiver in a desk top chassis box. Grounded the box. Use twinax from the receiver to the chassis box where I have a twinax feed through. I use head phones on the front panel. I put a line filter on/in the chassis box wall and wired the receiver to the filtered side. This helps get the airborne computer trash and some line trash out of the receiver.

I think I have a lot of trash on my ground. It's a long way from my receiver to real terra firma. Real terra firma is not near to me. Thank you for concrete slabs and modern buildings. Using the ground wire works better than just using two wires. I think its just a better balance at the receiver. Not a better ground. 20 foot of RG-8 across the floor to the water pipes is no better than 20 foot of power cord to the wash machines power outlet and using the third wire grounded.

The two together make no improvement for me. Shifting the center conductor and shield connections on the RG-8 make not sufficient difference to cure my problems. My best results is to have the center



conductor and shield both grounded at the water pipe. At the receiver the shield is open and the center conductor is grounded. If the RG-8 comes into my chassis box and is grounded to the receiver, this is a bit better. The overlap of the box around the open end of the RG-8 shield and center conductor helps to keep the 60HZ off the center conductor. This is better than sticking the center conductor or shield or both to the front panel of the receiver.

I have yet to try and terminate the RG-8 to the chassis box with a proper feed through type connector and then ground the center conductor inside the box to the receiver. The box is aluminium. Would a steel box be better? As soon as the wire gets applied to the antenna input, all effort is negated. The noise is on the antenna wire and into the receiver. What to do, Oh what to do?

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Date: Tue, 4 Dec 2001 16:15:22 -0500  
From: twleiper@juno.com  
Subject: Re: [R-390] Power Line Noise.

<snip> {Frustrating experiments with noise suppression... suppressed. }

This sounds like a perfect application for twisted pair feeding from a dipole to your balanced input. Especially true if the noise is local, meaning garbage of your own manufacture. You could test it out using one pair within an ordinary piece of CAT-5 network cable...amazing but true. The stock line filter on the 390\* is pretty good, but the relatively high leakage may be contributing to your noise problem if the ground is poor. You could "shorten the antenna" by using an isolation transformer at the receiver with the secondary either end or center-tapped to a ground common to your case and the system ground.

This way the filter leakage only circulates the short path through the secondary rather than a long (and radiant) path back to your service entrance and back. If you can weld your tongue to the case while grabbing a sweaty hand to a water pipe, you probably have high leakage and poor ground, and you should have your widow send me the radio for proper repair. Just think of it this way, the only place you want noise to enter the system is at the antenna. Balanced feedline goes a long way toward canceling out random noise, and making sure you have no common mode problems can clean up noise lurking in the power end.

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Date: Tue, 4 Dec 2001 17:10:55 -0500  
From: "Joe" <joe.amp@verizon.net>  
Subject: Re: [R-390] Power Line Noise.

I cured this problem by building a 8 foot Shielded loop antenna out of RG-6

CATV cable and PVC pipe. It hangs from a tree on a rotor, I null out noise and interfering stations. Feed with this balun [http://www.hard-core-dx.com/nordicdx/antenna/feed/4\\_1balun.html](http://www.hard-core-dx.com/nordicdx/antenna/feed/4_1balun.html)

and forget the preamp It also workes indoors  
[http://www.io.com/~n5fc/loop\\_schem2.jpg](http://www.io.com/~n5fc/loop_schem2.jpg)

for the idea.

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Date: Tue, 4 Dec 2001 19:06:32 -0500  
From: twleiper@juno.com  
Subject: Re: [R-390] Power Line Noise.

> I cured this problem by building a 8 foot Shielded loop antenna out of RG-6 CATV cable and PVC pipe.

Another good idea. And Fair Radio has a nice active DF loop antenna in their fall supplement with remote tuning and gain for \$225. It has a 25DB null, which ought to cancel out the worst street lamp with a bad ballast. Speaking of those, I had one outside my place that would re-start every ten minutes and throw out all kinds of trash for about another ten minutes...even trashed my cable reception. After half a year of trying to find who was in charge of replacing it, I finally went out and shot it so it doesn't even try to light up. Been quiet for the last two years, and my telescopes work better too. Somebody should buy one of those loops so I know it is worth it, but you may find that a properly installed bullet can be just as effective.

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Date: Tue, 04 Dec 2001 19:49:13 -0500  
From: Bob Camp <bob@cq.nu>  
Subject: Re: [R-390] R-390

Here's one way to do it. There are others: Since it's a 390A use 120 ohm shielded twin lead / coax for the lead in wire. It is the same stuff that the computer people use for IBM Token Ring LAN's so you can probably find it locally. Ground the shield of the coax at the radio but not at the antenna end. Let it float out at the antenna. Lay down a counterpoise wire under the long wire. It will act as a more or less ground for the antenna. Hook one side of the twin lead to the antenna Hook the other side of the twin lead to the counterpoise. Keep the hookup point at least 20 feet away from the house and from any power lines. Same thing goes for the counterpoise wire. Stake down the counterpoise wire at a few points so it doesn't blow away or trip anybody. It's also ok to push it down a couple of inches in the lawn. Best time to do it is after a nice heavy rain. What this accomplishes is to set up a sort of balanced antenna. It uses the built in balancing circuits in the radio to reject the power line crud in the area. If you want to

get fancy put a 2:1 balun between the coax and the antenna. That will give you a bit more bandwidth.

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Date: Tue, 04 Dec 2001 19:15:37 -0600  
From: blw <ba.williams@charter.net>  
Subject: Re: [R-390] R-390

I had a neighbor who went through this in Florida a few years ago. Also, I know that if you mention Public Service Commission around here that gets people a bit more motivated. There has been some personal tales written in the hobby magazines and they basically all say the same thing. Call the power company and document your complaint and who you spoke to. Write down their response. If you have a handheld radio, take it out with a loop and try to get as close as you can to the source of the noise. Maybe the local ham club will help if you belong to it. Being able to take someone to the source of the noise really helps. If it is the PSC and you can show them the noise, then you just won your battle. The power company knows that they have power line problems. They don't want you to know about it and they rarely admit anything. Having local hams help in ferreting out the noise would help your credibility with the FCC.

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Date: Tue, 4 Dec 2001 22:41:49 -0800  
From: "Bill Smith" <billsmith@ispwest.com>  
Subject: Re: [R-390] RF Amplifier Tubes - R-390A RF Deck

I just wound a "junk box" balun. About 23 tri-filar turns on a yellow toroid core of unknown origin, but think it is close to a type 43 mix. Think size is similar to a FT50-43. Wire size is also unknown (grin), came from a solenoid winding. Probably around No. 28. Used the following information as a rough guideline:

<http://kg8ih.cit.cwru.edu/w8edu/projects/anderson-baluns.html>

At any rate, this seems to be a 1:1 balun, and works very similarly to the TV baluns. BCRFI around 160 meters is totally gone, and bands are generally cleaner. Notice there is a signal dropoff at 560 KHz (KSFO), so believe there needs to be more inductance or perhaps a different mix in the balun assembly. Perhaps two cores would be better. As before, needed to ground the coax shield with a wire connected to the receiver chassis. Poked around and found the ground right at the antenna connector may not be the best connection. With the coax shorted (not selected in the Delta-4 selector switch), the weakest best AM signal seemed to be received when the ground wire was nearest the power plug. Considering the RF filter on the power line, this may be the best location. Or, this may be too much fiddling to make any sense! A balun does seem to improve the antenna coupling to the input of the receiver, however.

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Date: Wed, 5 Dec 2001 10:12:43 -0800  
From: "Bill Smith" <billsmith@ispwest.com>  
Subject: [R-390] Re: Baluns

Well, I have a confession to make. **It turns out an antenna tuner was in the antenna feed line. It produced two effects, the first was great signal attenuation at the low end of the broadcast band (at 560 KHz), and general attenuation across the entire broadcast band.** When I removed it, the signal strength from AM stations actually increased over the direct feed I was using before. Several strong stations now pin the carrier meter, and the receiver is obviously overloaded. Spurious signals are now present again below 500 KHz and also in the 1925 KHz region due to the overload. They seem to be tamed, though by attenuation, I can null the antenna trimmer and remove some of the junk. With the antenna tuner in (random tuned, not peaked) the intermodulation products disappear. If the antenna switch removes the antenna from the receiver it (almost) falls silent. It does absolutely so on many frequencies, though some bleed comes through on strong AM channels and also at higher HF frequencies. The balun obviously needs to be shielded, it is dangling at the moment from the twinax plug (I don't have a jack) and is enough antenna to pick up very strong signals. I have measurements to take also, as at this stage don't know what the balun's low frequency cutoff is. Will have to think about an attenuator also, although the antenna tuner is serving well in that role at present.

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Date: Wed, 5 Dec 2001 17:04:14 -0800  
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>  
Subject: [R-390] This intermod thing.

Also, this receiver did experience a failure in the power regulator circuit, and full B+ (400+ volts) was applied to the entire set. The receiver wasn't on very long in that mode, but don't know if I should poke around a bit to see if any resistors were unnecessarily stressed. Overall, while there are a few "PM" needs, and the PTO seems to be in need of adjustment, the set appears to be working OK.

Do not panic. R390s had this happen to them many times in their lives. Do look into the 47 Ohm resistors under the power supply deck. Do look into the AF deck also under the regulator tubes. In general (YMMV) R390 accept these regulator failures well. If it really really goes bad send it to Barry, He says he will take care of any old R390 for any one.

Yes you could have a trash noise source in your area.

"I am getting very strong meter indications on the MW broadcast band, and, judging by the intermod, the receiver is overloading. Note, however, the intermod is off-channel (where the receiver is not tuned to a strong station),"

If one of your neighbors has a real problem computer monitor running you can be under a real curse. You never can find who it is. And if you do, even presenting them with a very nice new replacement will not help because they will give old one to the kids who will leave it on even more hours. And you should be so lucky as to have only one in the neighborhood.

Read post with us on antenna line filters and noise problems. You could have a signal in you area that is overloading whole bands pushing the receivers whole noise floor up and in general making your receiver enjoyment less than it could be.

Hang a signal generator on the antenna input, a DC volt meter on the diode load. A 600 ohm resistor and a AC volt meter (power meter) on the audio output then do a signal to noise test.

- A.) Your receiver is good and your problem is external.
- B.) Your receiver is less than wonderful and you will fix it with some maintenance action.
- C.) Both A and B are true and you solve each problem separately.

A good round of PM will get you pointed in the right direction. If you need help with know-how, books, equipment, parts, ask here. Some of the stuff can come from tubes that test good on a tester and perform badly in circuit.

Pick up the Y2K manual and work through your receiver. Yea. the Y2K is R390A, but IF is IF and RF is RF and PTO is PTO there is a lot more in common than there is different.

Do not get hung up on exact equipment numbers. Any signal generator and attenuator will work. If you can turn the mod on and off it will do. A DC meter is a DC meter. A power meter is an AC meter with a built in resistor and a meter scale that dose the volts to power math for you. A 600 1 watt resistor 2 1200 ohm 1/2 watt is really better (average the tolerance error)and a AC volt meter will be about all you need.

Once you get the receiver up to grade on a signal generator then you know the residual problems are external. In reality the same problems we had with these receiver in the 50's and 60's are the same ones you have today. Tubes, Tubes, and the Tubes. Only today its harder to find good tubes than it was 30 years ago. Then when I wanted a good tube I only had to walk to

the supply room and ask.

Today I can find em for a buck each as NOS at the swap meet. While every one will in fact be a new never used tube not a damn one will get past the signal to noise test in circuit in the receiver.

I have 6 real hot Raytheon 6BA6 new in the box. Every one is so noisy it can not be used in a receiver. I have as many 6C4's that are just as bad.

In 1999 I got 3 6C4's built and boxed in 1946. I was not even around in 1946. Two of them were the best 6C4's I ever used. The 3rd one was OK as good as the 1960's JAN tubes.

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Date: Wed, 5 Dec 2001 21:26:56 EST  
From: DCrespy@aol.com  
Subject: Re: [R-390] Power Line Noise. Grounding

Just a quick comment that worked for me in my Texas QTH (where I had some noise problems). This one was in the ARRL Handbook. An open wire to ground (or to a water pipe connection that is physically far from real earth/dirt ground), just becomes another antenna and picks up more noise! I used coax all the way to a point where the water pipe went into the soil.

The inner/center conductor (only) connects this point to the radio chassis. A 0.01 uF disc cap is connected between the outer shield and the center conductor at both ends of the coax. The shield is therefore above DC ground, but it apparently protects the ground wire from becoming another antenna. It worked for me!

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Date: Thu, 6 Dec 2001 09:00:32 -0800  
From: David Wise <David\_Wise@phoenix.com>  
Subject: Meter Cal (was RE: [R-390] Re: Baluns)

(Note: I didn't hear you compare below-8 to above-8.)

ISTR that the meter starts moving at around 1uV. If you take that to be 0dB, 100dB would be  $1\mu\text{V} * 10^{(100/20)}$  or 100mV. You are reading higher than expected. Either the meter is off (and it's normal for it to be off by 5-10dB somewhere on the scale), or your generator is leaking. If it's not a lab-grade unit, it almost certainly is leaking and radiating all over the place. Some generators are also quite sensitive to termination impedance.

My Triplett (no accuracy claimed!) expects 75 ohms; its output doubles if it's open-circuit. How are you determining the generator's output?

Finally, if the generator output isn't shielded all the way to the antenna connector (balun included), there can be false pickup there too.

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Date: Thu, 6 Dec 2001 09:43:06 -0800  
From: "Bill Smith" <billsmith@ispwest.com>  
Subject: [R-390] Re: Baluns

>From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
> 1000uv = 0.001v, not 0.01v, right?

Whoops, yes! Well, then the carrier meter reads 100 at 0.01v (10,000uv)  
We have more than a few very strong MW AM stations. A friend of mine  
has a crystal radio which drives an old speaker horn. One of the local  
stations can be heard anywhere in the room.

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Date: Fri, 7 Dec 2001 08:16:22 -0600  
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
Subject: RE: Meter Cal (was RE: [R-390] Re: Baluns)

Okay, someone please set me straight on this. To find the voltage required  
for a 100dB gain with a given 1uV as the beginning point,  $100\text{dB} = 10 \log$   
 $(x^2/y^2)$

where x is the unknown voltage and y is 1uV. Unless I'm doing the math  
wrong, this doesn't work out to the right value for x. Have I set the  
problem up incorrectly?

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Date: Fri, 7 Dec 2001 08:27:45 -0600  
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
Subject: RE: Meter Cal (was RE: [R-390] Re: Baluns)

Never mind. It works out correctly. I had a sign incorrectly placed. X  
comes out to 0.1V (100mV). Sorry for the unnecessary post.

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Date: Fri, 7 Dec 2001 20:26:36 -0600  
From: "Cecil Acuff" <chacuff@datasync.com>  
Subject: [R-390] powerline noise

<snip> At all cost avoid vertically polarized antennas....most all man made  
electrical noise is vertically polarized....that's why vertical antennas  
always seem to have a higher background noise...

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From: "Kenneth Crips" <w7itc@hotmail.com>  
Date: Tue, 01 Jan 2002 11:23:56 -0700  
Subject: [R-390] great site for SWL

In my cruising around I found this site. <http://www.hard-core-dx.com/> It

is a great resource. be sure to look at the links. There is a bunch of antenna stuff. Check out the photo of the beverage antennas on the home page. can you imagine what an R390 would be able to hear hooked up to these monsters.

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From: "Kenneth Crips" <w7itc@hotmail.com>  
Date: Thu, 24 Jan 2002 22:47:30 -0700  
Subject: [R-390] cheapo twinax connectors

Cheap twinax connectors  
<http://www.4beacon.com/VideoConTwinax.html>

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Subject: Re: [R-390] More dweedle-dweedle  
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>  
Date: Fri, 25 Jan 2002 09:07:02 -0800

Confirm that a flat panel monitor is the way to go. I just had S9+ spikes every 60kHz until I got mine (an el cheapo 12" monitor made in Taiwan costing around \$400 a few years ago.). I did some tests on conventional monitors using a scanner and found that there are quite a few that also have acceptably low levels of RF. Also found my firm's Dell laptop puts out a lot of sharsh. The R390-A seems to be much less affected by computer noise than other radios (A result of the balanced input ?). - Bryce

Fellows, Back before Christmas I was crying about the computer and noise in the RF. One of the fine fellows here suggested I take the balanced shielded antenna input all the way out side to the antenna and not use an un balanced coax line in the shack. It was suggested that some CAT 5 line (balanced twisted shielded pairs) be used. As life would have it, when I went shopping I found a 100 ft of twin ax at 30 cents a foot which was cheaper than the cat 5 cable. Once I put the twinax connector on the coax and got the other end of that antenna cable out the door of the shack away from the computer, all the computer crud dropped several orders of magnitude. Out side the coax shield is bonded to the ground rod. I have one conductor grounded there (a CAP did not act different than a hard DC ground) and the other goes to 60 feet of wire up 20 feet in the air. What a change in signals getting the balanced shielded line carried far enough away from the computer hash. I now have a good computer case and power supply. I went through several to find a good one that did not make noise. My monitor is kind of OK. Again I have been through several to find a quiet one. My Kamtronix is also a noise source. I had to install a good shielded cable between the computer and the Kam with metal back shells and good ground bounds all the way through the cable.

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Date: Fri, 03 May 2002 21:47:42 -0500  
From: blw <ba.williams@charter.net>



To: R-390 List <r-390@mailman.qth.net>  
Subject: [R-390] 1000' vertical delta loop

Here is how I made and raised a 1000' vertical antenna with a delta shape between 2 trees. One point of the antenna was towards the ground and the other 2 points were at the top for suspending between the trees. The bottom point was tied to a stake. This was a very good point for controlling sway and twisting forces in high wind conditions. I also untied the bottom a few times when the weather was extremely destructive here in Alabama to give the antenna room to sway with the trees. It remained in good condition for 2 years and never tore.

Each side of the antenna was the same length and not assymetrical. I had 2 trees that were about 50' apart, so that gave me roughly about 12' on each side to suspend the antenna. I'm not sure of the measurements at the moment, but I think each side was 24' long and I had 12 wraps of wire all the way around. This was a problem at first because I lived in the country and didn't have anyone to help raise it once I built it.

I put 3 stakes in the ground for the outer dimensions that I wanted. 2 of these stakes were in line with the trees I wanted to use. I tied a short line to each stake with an insulator egg on the end of the line. This was to provide a suspension line point and to begin the first wrap of wire for the outside of the antenna. I wrapped each egg twice for strength with the first turn of wire. This gave me the outer shape.

Doing the inner turns meant using weather resistant wire ties. I got the thickest I could find. Each subsequent turn was several inches inside of the previous turn for spacing. At each point of the antenna I put a loop of wire tie to give stretching room and that inch or so of spacing. The next turn I would tie the wire tie loop to the previous tie like a chain. I periodically pulled the wire a bit taut to keep the shape and the antenna off of the ground.

I ended up with each turn going inward towards the center. Each point of the antenna was a large wire tie loop tied to the previous wire tie loop. You can pull the wire tight as you unreel it from point to point to keep a good shape and to keep the wires from crossing over each other. You have big problems if that happens and you don't correct it right away.

I had painted 9 thick wooden dowels for spreaders. I used the wire ties to tie off each turn of wire to the dowels, 3 dowel spacers per side. This took the most time in the construction process, but this worked well over several years. I've thought that if I build another one I should drill however many holes for the turns in the dowels instead of using wire ties.

I could put the spool of wire on a stake and pull the wire through the holes as I build the sides. That probably would be best if long term stress and pulling evened out throughout the wire. It seems that it should work and balance out. I would have to tie some of the wire to the dowel spacers to keep them from sliding, if you can picture what I'm talking about.

Once I had the antenna finished it was only a matter of getting the lines over branches and pulling each side up a few feet at a time. I would tie off the line temporarily and go do the other side. After a few iterations of this the antenna was up in the air and the top side was straight and taut. I tied off the bottom point to a stake. My feed point was one of the top corners so that I could pull the wire at a 90 degree angle away from the face of the antenna. I wasn't completely sure about the feed point part of this, but I did get 90 degrees angle away from the antenna.

I used this antenna for a lot of HF and MW DXing. It did get some noise but nothing that I couldn't live with. I chalked it up to a good gain. It worked well as a general purpose antenna and even better for MW. It was never planned based on frequency formulas as I just bought a 1000' spool of wire and wanted a 1000' antenna. I had built a 1000' Beverage and was completely disappointed in it. I'm sure that this isn't the best way to approach things for everyone, and maybe my next one will be cut to a length somewhere in the 160m band for MW. You can get some impressive logs from random lengths like mine on LF, so length isn't all that critical. Maybe I'll go for 2000' if this is going to be a permanent LF/MW antenna. I didn't have my RBL-5 back then, but I bet I would have had some good logs. It seemed directional, but not sharply so when I checked stations with other antennas.

The thing that always surprised me about this antenna was the small size of it and how hard it was to spot from a short distance away. Sides of 24' is not all that big. It was always hard to believe that there was 1000' of wire in the small triangle shape. The spacing of either 2 trees or 1 tree and the side of a house isn't that critical either. I think you could run long lines to the closest trees and still have good support. the other  
other Barry

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From: "Joe's chartermi.net" <joefalcone@chartermi.net>  
Date: Sun, 26 May 2002 22:32:54 -0400  
Subject: [R-390] AMPHENOL 82-5589

Does anyone know where to get the Twinax connectors for the R390A?  
From: "Damon Raphael" <w7md@gci-net.com>  
Subject: Re: [R-390] AMPHENOL 82-5589  
Date: Sun, 26 May 2002 20:30:36 -0700

From a supplier of computer network cable connectors. Those connectors are used on certain IBM network setups.

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Date: Sat, 01 Jun 2002 21:00:09 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Break-in relay

>I want to Thank all for the help with past messages. I was lucky enough to find two R-390A's here local. One is in very nice shape and the other needs a little work.

You did, of course, buy BOTH of them, didn't you????

> if it is possible to run a QRP transmitter and use the R-390A as a receiver?... Yes, of course.

> I am wondering if the 5 watts would harm the front end of the R-390A?

No, it probably won't

>Also is there a way I can mute the receiver of the R-390A while im transmitting.

A terminal strip on the back allows you to mute the receiver and ground the antenna input by closing an external contact. The contact carries 6.3 volts at about 40 milliamperes AC.

It is labeled "Break-In". The front panel switch labeled the same must be on for this to work. Here are the details I posted recently on this topic. In short, during normal receive operation, the Break-In switch in the ON position a connection to ground at TB103-9 will shut off both audio channels and short the antenna connectors to ground. (With no connection to TB103-9, nothing will happen no matter what you do with the Break-In switch.) Here are the details:

One side of the break-in relay coil is connected to the 6.3 volt filament line (AF SubChassis connector P619-10) The other side of the break-in relay coil is connected to the Break-In Switch S-103 terminal 2 through P619-1. When the Beak-in Switch is in the ON position, terminal 2 is connected to terminal 1, which goes to the Break-In terminal on the rear terminal strip TB103 -9. If the Break In switch is in the ON position and terminal TB103-9 is grounded (with a wire to a ground terminal, or through relay contacts on a transmitter) the Break-In Relay will be energized. When the Break-In Relay is energized it does two things:

1) It grounds the AF Line which is the cathode output of the audio cathode

follower (V601B) and the top end of both the Line Gain and Local Gain pots. This shuts down all audio output from the receiver, both line output and local audio.

2) The antenna relay is energized and causes the both the balanced antenna and the Unbalanced antenna connector pins to be grounded. This disconnects the rf signal input.

Note: If the Function switch is in either the Standby or CAL position, and the Break-In Relay is de-energized, the Antenna Relay is energized which causes the both the balanced antenna and the Unbalanced antenna connector pins to be grounded.

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Date: Sat, 1 Jun 2002 21:21:30 -0700 (PDT)  
From: John Kolb <jlkolb@cts.com>  
Subject: Re: [R-390] New R-390A owner

> > I am wondering if the 5 watts would harm the front end of the R-390A?  
>> No, it probably won't

The operative word here is probably. When I was a Navy radioman aboard light cruisers, we had two 500 watt HF transmitters keyed continuously. The receive antennas were at some distance from the transmitting antenna, but we could light a small florescent bulb by touching one lead to the rx antenna jack. The ET's replaced open RF coils on the R-390's with some regularity. 5 watts with close spaced antenna may not be completely safe.

> >Also is there a way I can mute the receiver of the R-390A while im transmitting.

Roy described the 390 break in very well, but note that it mutes the receiver completely. Using an external relay on the receive antenna to short it and disconnect the rx would have the advantage of being able to monitor your own keying with the 390.

I find it hard to send CW without hearing myself send - of course, I find it hard to send CW even if I can hear my own keying :)

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Date: Sun, 2 Jun 2002 05:08:47 -0700 (PDT)  
From: "Tom M." <courir26@yahoo.com>  
Subject: Re: [R-390] New R-390A owner

The five watts nearby will not harm the 390A. The short ant connector (unbalanced) includes a neon lamp in the ant relay, so if you wanted to run

any power at all, you are safe with the unbal connection. You could always switch out the 390A.

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Date: Sun, 02 Jun 2002 09:09:42 -0500  
From: Don Reaves W5OR <w5or@comcast.net>  
Subject: RE: [R-390] New R-390A owner

Welcome to the list, Ronnie. QRP, CW, R-390A? You are going to be the envy of many QRPer's. Why, you might start a panic stampede to ebay and hamfests searching for R-390A receivers to get that listening edge. I can't think of a better receiver for the purpose.

The 390A will toss off your 5 watts like water on a duck's back. You could have full QSK, too, by building up a TR switch or riding the gain control a bit.

Put a couple of 1N4148 diodes back to back on the antenna input. It has been shown that a R-390A receiver is the perfect Field Day accessory to a modern computransceiver, which may suffer from frontend overload, intermod, and general desense amid typical FD locations with adjacent transmitters. Also useful for toning up the back muscles transporting it to the site. </grin>

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Date: Sun, 2 Jun 2002 11:15:51 -0400  
Subject: Re: [R-390] New R-390A owner  
From: Thomas W Leiper <twleiper@juno.com>

> Also is there a way I can mute the receiver.....

The most important thing is to keep the AGC from having to fluctuate wildly, especially when operating CW where often the slow AGC mode is the best to use for reception. I think the best solution for your setup is to use a TR relay in reverse in front of the receiver. The relay switches your receiver input between the receiving antenna and either a dummy load or short piece of wire or rubber duckie antenna. The idea is to be able to use the R-390 as a sidetone receiver, as well as to help tune and net your transmitter, so you attenuate the transmitter signal to the "average" signal level you would be getting while receiving normally off the antenna. You would be switching between a "receiving" receiving antenna (the normal one) and a "transmitting" receiving antenna (the dummy load, short piece of wire, etc.)

Although I do not transmit, I have the same setup on my receiving antenna here to mute (and protect all my gear from) nearby lightning crashes. I made a BC band RF detector and DC amplifier that switches the relay (and receivers) over to a UHF rubber duckie (junk box item) with a

off-delay of about a half second. You could just connect a diode and 10K resistor to your receiving antenna and amplify and filter the signal to drive the relay directly. Whatever, you get the idea. Tom

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Date: Wed, 19 Jun 2002 18:24:49 -0400  
From: Kim Mackey <mackeyka@mac.com>  
Subject: [R-390] Ham Shack Grounding Help!!!!

Hey everyone on the list. I've been quiet for quite a while but I have a question for you all. I am running my R-390A along side of a computer. The problem I've been having is the noise that the computer puts on the radio. I see pictures and hear lots of stories of people running computers in their shacks, so it seems that it can be done. How is it possible? I have so much noise on mine when I turn on the computer that it is impossible to use the radio. It was not such a big problem with my mac but I'm using a PC now as well and it throws the worst noise onto the radio as soon as I turn it on. This is without the monitor being on. The radio and computer are on the same outlet strip. Although the radio and computer were on different outlets for the mac, the two outlets in question are still on the same circuit. One thing I'm thinking might be the problem, but I'm not sure is the wiring in this old house. It has the old two wire system. Would this make a difference as far as hash noise on my radio? If this is so, what am I going to have to do to fix it. I don't want to have to tear into the walls as they are plaster. Help!!!! K. Mackey

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From: "Wayne Hertel" <whertel@onemain.com>  
Subject: RE: [R-390] Ham Shack Grounding Help!!!!  
Date: Wed, 19 Jun 2002 17:38:25 -0500

I have my receivers mounted in a metal rack cabinet between my PC and monitor. All of my antenna cabling is done via coax and BNC fittings, this includes antenna couplers and transfer relays. This is good quality cable. I can detect NO noise originating from either the computer, monitor, or cabling. The cabinet is grounded to a cold-water pipe and is fed via 3-conductor ac power cabling direct from the main circuit breaker panel. Lucky? Maybe good installation practices?

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Date: Wed, 19 Jun 2002 18:49:34 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Ham Shack Grounding Help!!!!

You can take two approaches:

- 1) Get rid of your computer, or never turn it on. This takes strength
- 2) Solve the noise problem. This may take work.

Choice 2) may involve any or all of the following:

- - Put noise suppressor chokes on the computer wires
- - Get a different computer
- - Feed your receiver with good coax the whole way in from the antenna
- - Move your antenna to a place farther away from the computer
- - Rework your antenna situation so it is fed with balanced feed lines, carefully shielded, and with noise suppressors on the coax.
- - Change your antenna completely to a different kind (balanced dipole or  
a loop instead of a vertical, for instance.)
- - Ensure your electrical outlets have good ground wires
- - Run the computer and radio on different power circuits
- - Add a signal ground to your receiver
- - Install noise suppressor outlet strips

The ARRL publishes a good book on RFI and how to cure it.. Some if it is for interference caused by your transmitted signal getting into other equipment but the techniques apply in any RFI situation. If your case is difficult to solve, I suggest you get that book.

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Date: Wed, 19 Jun 2002 19:25:47 -0500  
Subject: Re: [R-390] Ham Shack Grounding Help!!!!  
From: blw <ba.williams@charter.net>

There could be another answer to this. The good news is that it isn't your monitor. It could be that you just don't have enough shielding inside of your computer case. That flimsy tin metal around CDROM enclosures work pretty well. I run my Mac G-3 right next to the rack and my receive coax runs right along side of the computer. I get no noise at all. The one thing I've noticed on the G-3 is that the case has good, solid shielding on the sides, front, and back. My wife's iMac is about 3 feet away and it doesn't produce any noise either. That has a little motherboard in a tray construction that is heavily shielded. I remember having a drive that would produce momentary hash when it would spin up to speed. That was a few computers back and I don't remember the details except that it was one drive in particular. Maybe you can turn your case or tower some and see if the hash changes or goes away. That sometimes works well if you get out of the radiation path.

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From: Llgpt@aol.com  
Date: Wed, 19 Jun 2002 20:48:30 EDT  
Subject: Re: [R-390] Ham Shack Grounding Help!!!!

Same here, no noise from my iMac,

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From: "Kurt" <r390auser@cox.net>  
Subject: Re: [R-390] Ham Shack Grounding Help!!!!  
Date: Wed, 19 Jun 2002 17:47:01 -0700

A simply thing to check is the shield connections on your antenna coax fittings. When the shields work loose on the bnc's that I use I get serious computer noise. Tightening up the connection solves the problem every time. There are two computers plus a network hub and cable modem all in the radio room and in general I have very little noise. The switching power supply for the monitor is the worst and the "wake on LAN" signal from the mother board has some discrete frequency interference. It is possible for radios and computers to peacefully coexist. Good Luck, Kurt Holbrook

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From: "Jim Temple" <jetemp@insightbb.com>  
Subject: Re: [R-390] Ham Shack Grounding Help!!!!  
Date: Wed, 19 Jun 2002 20:57:50 -0400

A couple of years ago I installed a computer in my shack. When the computer was on it wiped out the radio frequencies. I tried all the recommended fixes and spent a lot of time wrapping cords in ferrite, etc. This helped a LITTLE, but I simply got around the problem by running the computer as little as possible. THEN ONE DAY, a lightning surge damaged the computer. The shop replaced the computer power supply and the problem completely went away. It appeared that the computer power supply was the problem all along. I would try to replace the power supply with a new one. They are not very expensive and might solve the problem with little effort.

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From: Mike Sullivan <vze344qr@verizon.net>  
Reply-To: kc2kj@mac.com  
Subject: Re: [R-390] Ham Shack Grounding Help!!!!

But that's the ticket, an iMac. Very well made.

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From: "Jim Shorney" <jshorney@inebraska.com>  
Date: Wed, 19 Jun 2002 21:31:25 -0500 (CDT)  
Subject: Re: [R-390] Ham Shack Grounding Help!!!!

FWIW, I run vintage IBM PS/2 microchannel machines for ham apps. I have never had any detectable RFI on any band from them, and I've had up to four running at a time. These are the most RF-tight machines you can find. They won't run anything Win2K or newer, but the later models run Win9x/NT4 very well. Not to mention, OS/2 and Linux.... One of my favorites: <http://ohlandl.ipv7.net/> If the PS/2 Model 95 can be called the



'Ardent tool of capitalism', then the R390A must surely be the "Ardent tool of Democracy'. It's a shame IBM never built any...

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From: "Jon & Valerie Oldenburg"  
<jonandvalerieoldenburg@worldnet.att.net>  
Subject: Re: [R-390] Ham Shack Grounding Help!!!!  
Date: Wed, 19 Jun 2002 22:13:19 -0500

Try to isolate wther the noise is the computer or it's monitor. If its the monitor you might try increasing the shielding. There was a post early on in this group and he had his shielded the monitor using a conductive paint that was a GE product. The computer box can be moved using extension cables and maybe additional shielding there too. Mouser has braided sheild copper "tubing" to pass cables through if nessasary also. Jon AB9AH

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From: "Kenneth A. Crips" <w7itc@hotmail.com>  
Subject: Re: [R-390] Ham Shack Grounding Help!!!!  
Date: Wed, 19 Jun 2002 21:49:47 -0600

Sounds to me like you might have a rotten switching power supply in the computer. My R390 sits about a desk width from this system (850 Duron, ChainTech mobo,) no problem. You also might check to see what the clock crystal's frequency is on the MoBo there are a number of them who's frequency fall with in the listening area we use.

From: "Kenneth A. Crips" <w7itc@hotmail.com>  
Subject: Re: [R-390] Ham Shack Grounding Help!!!!  
Date: Wed, 19 Jun 2002 22:01:17 -0600

I don't know why I didn't think of this in my earlier note. I don't know how old your computer is but take a look at where I get my stuff from

<http://www.aberdeeninc.com>

they have bare bone systems that you can install your hard drive and such for cheap. They have a assembled and tested barebone system with a MSI motherboard an 950mhz Duron from AMD in a mid-sized 300 watt tower for 200 bucks.

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Date: Thu, 20 Jun 2002 08:48:54 +0200  
From: "Bryce Ringwood" <BRingwoo@csir.co.za>  
Subject: Re: [R-390] Ham Shack Grounding Help!!!! (Warning - sand mentioned)

In my case the the thing that made a huge difference was changing from a tube type display monitor to a small LCD monitor. Good if you suffer from allergies too. I did some experiments with an R2 rx (Yeah, I know its full

of sand, but I wasn't feeling strong enough to carry the 390A around that day) - this supports what the people on the list say - the amount of hash put out by different makes of computer and monitor varies hugely. - Bryce

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From: "AI2Q Alex" <ai2q@adelphia.net>  
Subject: RE: [R-390] Ham Shack Grounding Help!!!!  
Date: Thu, 20 Jun 2002 09:38:13 -0400

Kim: You might also want to try using different ground wires from each piece of equipment (rig, computer, monitor, etc.) to a \*single\* ground point, as in a star pattern. Running ground lines in a daisychain fashion invites ground loop noise.

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From: "Drew Papanek" <drewmaster813@hotmail.com>  
Subject: Re:[R-390] Ham Shack Grounding Help!!!!  
Date: Thu, 20 Jun 2002 16:07:42 -0400

I had a computer noise problem with an old IBM PC-XT a few years ago. I narrowed the problem down to a specific peripheral (the keyboard) by disconnecting peripherals one at a time and noting a change in noise level. The main unit turned out to be clean. I disassembled the keyboard and used grocery bag paper to insulate the entire back side of the circuit board. I then cut a piece of aluminum foil to cover the insulated area, plus a "tail" which I wrapped around the bare cable shield braid where it entered the housing. This backplane completely eliminated the noise problem. Simpler would have been to just try another keyboard (they are cheap and plentiful nowadays).

Date: Fri, 21 Jun 2002 18:30:37 -0400  
From: Kim Mackey <mackeyka@mac.com>  
Subject: [R-390] Re: Shack Grounding

Well, I'm getting lots of good stuff here. My situation here fits quite a bit of what I'm hearing. First the computer is an inexpensive one with a \$30.00 ATX case. Probably have some internal ground problems there. Second, and most important at this point is the house wiring situation. No ground what so ever, I'm sure. So step one is to get the house properly wired. That in itself may (or may not) take care of a lot of the noise I get. Checking some of the other potential problems could be an unnecessary exercise in futility. Why chase down other problems that may not even exist. I sure do dread what I'm going to hear. The house is a large two story house (plus an attic and full basement). I doubt the estimate will be \$1.50. I'll keep you all posted.

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From: "Richard Biddle" <theprof@texoma.net>  
Date: Sat, 6 Jul 2002 23:09:24 -0500

Subject: [R-390] Balun for balanced antenna connector

It seems to me that a balun on the balanced antenna connector would be a better way to feed the R-390 and still get the benefit of the extra stage in the RF deck. Being a frugal type (cheap) I decided to kludge something together. I removed the 75 ohm to 300 ohm balun from one of the "transformers" that come with most VCRs (a 1" x 1/2" x 1/2" with an F-connector and two screws). I figure 300 ohm to 75 ohm should be close enough for government work. Rather nicely built. I used an Amphenol 82-5589 twinax connector. I sawed the threads from the RG-58 UG-175/U reducer used for PL-259 connectors. I soldered this into the back side of the twinax connector. I was able to fit the balun into the connector and ran RG-58 to the antenna switch box. I have not run any objective tests on this, but it does seem to help reduce the hash picked up inside the shack. The signal generator in the shack with a whip on it seem to generate a stronger signal on 10.5 MHz then when I ran an unbalanced antenna into the balanced connector. I'm not sure how well this tiny thing would do on the low end of things, but it seems to work pretty well. <snip>

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Date: Sun, 07 Jul 2002 10:52:51 +0100  
From: Vittorio De Tomasi <ik2czl@amsat.org>  
Subject: Re: [R-390] Balun for balanced antenna connector

Been there, done that... I used an Amidon toroid for building a 200 ohm balanced -> 50 ohm unbalanced transformer, and I found an easy way to encase it. I got a 35 mm film can, and drilled a 5/8" hole on the bottom of it. The twinax threaded part is inserted into the hole, and screwed into the connector, so that the film can is kept firm between the connector and the threaded part. A RCA female connector is mounted on the cap of the can, and the transformer is housed into the can. I checked the device with my HP8640B and the guy has a very flat response 0.5-30 MHz. I will put a photo of the device someday on my web site, together with the modification I did to the input line filter of my R390a....

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Date: Sun, 7 Jul 2002 09:22:16 -0400  
Subject: Re: [R-390] Balun for balanced antenna connector  
From: Thomas W Leiper <twleiper@juno.com>

What happens when you run the unbalanced antenna into the unbalanced input? (What a shocking and avante-garde concept!) Also, there is a simple Navy mod (somebody else can elaborate) that involves putting a shorting connector into the balanced input to ground one side and simply swapping the min-bnc cables to put the other balanced side onto the unbalanced connector. I do this on all of mine and it works excellent with 75 ohm dipoles and feedline. I also have a radial array that uses four dipoles oriented in the four cardinal directions and, rather than using a

remote switch, I simply ran a piece of CAT5 network cable and used the four twisted pairs contained therein. A simply DPQT rotary switch at the radio end feeds the unbalanced input on my Non-A directly with excellent results. These things really like twisted pair feedline and doublets...an easy field configuration.

---

From: "Bill Smith" <billsmith@ispwest.com>  
Subject: Re: [R-390] Balun for balanced antenna connector  
Date: Sun, 7 Jul 2002 10:54:57 -0700

A question, and a goal at the station here. I use a Alpha Delta antenna switch, which shorts unused switch positions to ground. Don't know if that is necessary, but the goal is to have all receivers fall absolutely silent when they are not connected to an antenna. One reason is to insure that the power line and local devices such as computers don't find themselves acting as signal sources.

The only way I have discovered is use of balanced feeds into the receiver. I run unbalanced (coax) line to the set, then ground the coax shield to the receiver chassis, and connect a balun primary to the shield and center of the coax. The balun secondary is connected to the balanced inputs of the receiver. Short leads are very important. I use TV baluns (300-75 ohm) on some receivers where the AM band isn't very important. From measurements here, they don't work very well below 2.5 Mhz or so, and really dive below 1 Mhz.

That can be an advantage, and usually the receiver gain can overcome performance on 1.8 Mhz, where 160 meter operation appears normal. A homespun balun is used on the R-390 that works over a wider range of frequencies, in fact I am still suffering overload on the AM broadcast band. The antenna is a multi-band, parallel dipole where 160, 80, 40, and 20 meter dipoles are all connected to a single RG-213 feedline. The grounding system here should be ok, the radio room is only three feet or so above ground. I run 2-1/2" copper strap to two ground rods and to the house water pipe where it comes in from the street.

The house is old, so there should be metal at least to the meter. Receivers are dead on all bands except the AM broadcast band, where some stations can still make it weakly into a receiver (use Hallicrafters SX-62, HRO, BC-779, AR-88, R-390, TS-440) The question is can you silence your receivers by switching away the antenna, and if so, what approach to you take?

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Date: Sun, 07 Jul 2002 13:19:59 -0500  
From: Terry O'Laughlin <terryo@wort-fm.terra.com.net>  
Subject: [R-390] Twinax feedline available

I have three pieces of twinax feedline with connectors. If anyone is interested I can measure them out and get back to you with a price.

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Date: Thu, 11 Jul 2002 21:45:01 -0500 (CDT)  
From: Dave Merrill <r390a@enteract.com>  
Subject: Re: [R-390] FS Balanced Antenna Connectors (male)

There seems to be a little uncertainty on the list regarding these connectors. They mate with the 2-pin 'Balanced Antenna' input on the R-389, R-390, R-390A and R-391. For a scan, click:  
<http://www.enteract.com/~r390a/ForSale/TwinAx.jpg>

(No Hammarlunds were abused in the making of this picture.) At this writing, there are still connectors available.

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From: "Jim Shorney" <jshorney@inebraska.com>  
Date: Sun, 14 Jul 2002 01:42:56 -0500 (CDT)  
Subject: Re: [R-390] Balun for balanced antenna connector

>It seems to me that a balun on the balanced antenna connector <snip>

Found an Ortronics OR-601002444 Twinax-to-RJ-11 (or screw terminals) balun in one of my computer junqueboxes. I'm going to give that a try. If it works reasonably well, it shouldn't be too hard to whack the plastic telephone nonsense off the end and put something more 'radio-like' there. Thick ethernet phaseouts can be our friend. Now that scout camp is over with, maybe I can get started on this beast. After I sleep for a week....

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From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
Date: Thu, 18 Jul 2002 08:20:26 -0500  
Subject: [R-390] Antenna question

What is/was the recommended "standard" antenna and feedline for the R390A? Is there 150-ohm feedline (ladder line perhaps)? I figure there were some standard antennas used with these things on board ship, etc., and I would like to build a similar antenna and feed it with the "proper" feedline. I currently use a dipole and an impedance matching device that gets close to the right impedance, but I wonder if there is a "correct" way to do this.

Date: Thu, 18 Jul 2002 12:39:17 -0400  
Subject: Re: [R-390] Antenna question  
From: Thomas W Leiper <twleiper@juno.com>

There is no recommended standard because the radio was used in so many

applications. The only installation documentation I have ever seen showed unbalanced was for whip antennas and the balanced for a doublet (if you are under fifty read "dipole") fed with twisted pair. I use twisted pair and even CAT5 cable with multiple dipoles and get excellent results with good zeroing of the antenna tuner on all bands. The twisted pair also has the added (and primary) advantage of making the antenna system immune from noise not detected by the antenna elements, such as the PC computers in the shack that everybody is always complaining about, because twisted pairs cancel out induced currents... which is why the phone company can smash thousands of them together in a bundle, and why your CAT 5 cable works at 100 Mhz without any shielding... imagine that.

Running an unbalanced feedline invites local noise, and using a balun to then feed it into the balanced input accomplishes nothing more than adding more loss and yet another tuned artifact into the system. If you really want the extra stage gain on the unbalanced input, do the Navy mod, which grounds one side of the balanced input (making it unbalanced) and feeding the other side out the unbalanced bulkhead connector. That gives you an unbalanced 75 ohm system which not only allows you to use cheap TV coax like RG-59 or RG-11, but also just happens to be the impedance at the feedpoint of a resonant half wave dipole.

WOW...Isn't that exciting? Now, listen to this...magnified ninety two thousand times, the sound of the viscious Afgan panther lizard visiting the chemist...

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From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
Subject: RE: [R-390] Antenna question  
Date: Thu, 18 Jul 2002 13:25:17 -0500

I'd like to try this. Curious about a few things, though.

1. Isn't the impedance of a plain-old dipole somewhere near 50 - 75 ohms instead of 150? I realize this isn't too bad for a receiver, but just wondering if there's a way to get a better match. I know a folded dipole makes for about 300-ohms at the feedpoint, but that's not much better.
2. Not familiar with CAT5. Is it possible to take some good, insulated wire (I have a large spool of 26-ish gauge, stranded, teflon coated wire -- good quality stuff) and twist my own twisted pair? Something along the lines of 2 to 4 twists per inch maybe?

Thanks for the suggestion. I would like to have a separate receiving antenna so I can run my xcvr without changing the antenna everytime.

---

Date: Thu, 18 Jul 2002 12:35:23 -0600  
From: Jordan <jordana@nucleus.com>  
Subject: Re: [R-390] Antenna question

Hi have used Hy-Gain BN-86 baluns to feed the balanced input through the matching Amphenol Twin Ax connector with excellent results for years... aligning the balanced transformers using the same method as described in the R-390 non"A" manual is crucial. Aligning the input using a pair of 62 ohm resistors fed from the URM-25 . to each of the balanced input connectors. The center conductor goes to the junction of the resistors, and the ground lead goes to the chassis.... It works every time for me...

---

Date: Thu, 18 Jul 2002 12:44:39 -0600 (MDT)  
From: Richard Loken <richardlo@devax.admin.athabascau.ca>  
Subject: RE: [R-390] Antenna question

Catagory 5 refers to a standard for multi-pair telephone cable: it is 26Ga solid wire using the telco's favourite colour code (things like white/blue paired with blue/white) and it twisted more like 20 twists per inch. Sounds like a lot of work to imitate to me...

> > fed with twisted pair. I use twisted pair and even CAT5 cable.....

Sounds like a great plan. Just one question: will it handle full output from my T-368 or will I have to lower the output a bit? :)

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Date: Thu, 18 Jul 2002 18:18:31 -0700 (PDT)  
From: John Kolb <jlkolb@cts.com>  
Subject: Re: [R-390] Antenna question

Yep, that's how we fed them on the Navy ships I was on - a right angle connector which plugged into the twinax connector, shorted one side to gnd and output the other to the center pin of a type C connector. We mostly fed them with 35 foot vertical whips, through long runs of coax, but also had a couple of long wire available, also connected with long coax.

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Date: Thu, 18 Jul 2002 20:25:42 -0500  
From: Don Reaves W5OR <w5or@comcast.net>  
Subject: RE: [R-390] Antenna question

I'll send you a short piece of CAT5 cable (< 100ft) should you not be able to find any locally. But it is ubiquitous (ahh, finally a chance to use that word!) and a visit to \*any\* network install crew should net you plenty of free short runs to experiment with. CAT5 cable will give you 4 pairs per cable. It won't last long out in the sun. The losses at these impedance mismatch levels are very small.

> 2. Not familiar with CAT5. Is it possible to take some good,  
> insulated wire (I have a large spool of 26-ish gauge, stranded,  
> teflon coated wire -- good quality stuff) and twist my own  
> twisted pair?

Something along the lines of 2 to 4 twists per inch maybe?

---

Date: Thu, 18 Jul 2002 20:32:45 -0500  
Subject: Re: [R-390] Antenna question  
From: blw <ba.williams@charter.net>

Let me get this straight. I'm not trying to be ornery. Are you saying that CAT-5 ethernet cable is better than coax? Ethernet cable isn't that expensive. I bought a 100' roll at Rat Shack to run a long line under the house for networking to the router.

I did discover that coiling the extra 10' of cable at the computer slowed the data down to a crawl. I lopped off the extra cable, made a new connector, and Internet speeds jumped up to where they were supposed to be.

I wonder why coiling CAT-5 will slow things down so much. I would have to feed 2 dipoles. I guess the extra twisted pairs would be good for additional antennas this fall.

Okay, here is another problem. I read the RFI thread a few weeks ago and found it interesting. I had no problems then. Very quiet with 2 computers within a few feet of the radios. Now, I seem to be having a new problem.

The new TV in the den is causing light RFI every 15 kc up and down the bands. The TV is 3 rooms away!!! My coax runs outside about 20' away from the blasted thing, but it would seem to not be the source of the problem. Any ideas before I tell my kid the new TV is broken at night and to go use the one in his brother's room?

I don't transmit, so receiving is the only problem here.

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From: "Wayne Hertel" <whertel@onemain.com>  
Subject: RE: [R-390] Antenna question  
Date: Thu, 18 Jul 2002 20:39:11 -0500

Where I was, being a dry land sailor, we had rhombics oriented every 30 degrees feeding walls of multicouplers (CU-168s) feeding racks of patch-panels, feeding lots of R-390As, and one lonely SP-600. Forgot where. Had a memory wipe when I left. Are those black helicopters I hear?

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From: DCrespy@aol.com  
Date: Thu, 18 Jul 2002 22:23:09 EDT  
Subject: Re: [R-390] Antenna question

Whenever we get into these discussions, I cringe. We start sweating whether we have a 75 ohm or a 150 ohm antenna and feedline to match the balanced or unbalanced antenna connection on the radio. Fact is for receiving with one antenna, we will be lucky at low frequencies to have a match for a few hundred kcs. At higher frequencies we might get 500 kcs. Everywhere else the match will vary from a few ohms to a few thousand. The coax impedance, does not correct for the antenna impedance. In fact the radio sees the antenna impedance (I think they call this "conjugate matching"). The radio is wired (antenna to RF amp) for link (inductive) coupling for the "balanced input" and capacitive coupling for the "unbalanced input". If I remember this right, theoretically, you should get better dynamic range with the "balanced" and better tolerance of mismatches through the "unbalanced". That is the only real difference. I'd just be sure to decide which you plan to use and use that connection for alignment. Otherwise it really shouldn't matter much. I think Chuck Ripple has some data that overall performance is better using link coupling. Finally, pick the feedline for best isolation from noise, not for impedance. RG-6 is very good with a foil shield. The twisted pair discussion also seems a good solution. Finally and unrelated, if enough of us are hams, would there be any interest in an R-390 net some time?

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Date: Thu, 18 Jul 2002 23:38:34 -0400  
Subject: Re: [R-390] Antenna question  
From: Thomas W Leiper <twleiper@juno.com>

> 1. Isn't the impedance of a plain-old dipole somewhere near 50 - 75 in free space or a wavelength above ground,

YES. 75 Ohm.

> 2. Not familiar with CAT-5.

Cheap network cable. You can go to a scrap yard and get all you want for pennies. It has four twisted pairs and is just fine for receiving. As to UV exposure, you can rplace it every year for ten years and it will be cheaper than using a good 50 ohm cable like RG-55 or RG-9. I use a run of CAT 5 to hook up to four dipoles that are oriented in two directions and on two bands. A simple 2P4T wafer switch is at the receiver end to select between the antennas.

> Is it possible to take some good, insulated wire...and twist my own twisted pair?

I wouldn't waste that fine wire or your precious time on that. The 100 Mhz CAT 5 has twisted pairs that are actually bonded together and the twists are very consistent. You might find some nice old thermostat or doorbell wire that is twisted, and also of heavier gauge...about 16 to 18, just in case you want to transmit as well. If nothing else, ordinary "zip" type lampcord makes a dandy balanced line...and the neatest thing is that all you have to do is put a tie-wrap one quarter wavelength from one end and "unzip" it back...instant dipole with no connections in the weather. But like ladder line, you have to be more cautious about where you run the zip cord...best is straight out the window. It's great for portable outdoor operation, however.

> Thanks for the suggestion. I would like to have a separate  
> receiving antenna so I can run my xcvr without changing the antenna  
> everytime.

All the above will work for you.

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Date: Fri, 19 Jul 2002 00:15:27 -0400  
Subject: Re: [R-390] Antenna question  
From: Thomas W Leiper <twleiper@juno.com>

> Are you saying that CAT-5 ethernet cable is better than coax?

It depends upon what you want. If you are only receiving or transmitting at QRP levels, using a receiver with a balanced input available, want to effortlessly null out any currents that are not induced in the antenna elements, want to use several antennas without having an antenna switch or relay outside and up high, don't want to care if lightening zorches your expensive feedline, and have boxes of the stuff laying around...yes, CAT 5 is better.

> I wonder why coiling CAT-5 will slow things down so much.

Because "coiling" can allow induced peaks and nulls to develop in the line. Remember, those signals have very high bandwidth so many resonances can develop along with imbalances. If you had instead simply stuffed the cable into a milk jug in a random fashion you would not have had a problem. I've run into this problem all the time with network installers who are too tidy and like to leave extra cable coiled up in the ceiling. I just undo the tie-wraps and scramble it into a nice ugly ball.

>I would have to feed 2 dipoles. I guess the extra twisted pairs would be good for additional >antennas this fall.

Yup. And you can just make a plexi disk with eight posts around and wire up your four dipoles in a radial or fan array.

>Okay, here is another problem. ...The new TV in the den is causing light RFI every 15 kc up >and down the bands. The TV is 3 rooms away!!!

The question is how close it is to the antenna. Your receiver may be doing it's job and the TV is simply a piece of shit. I would first stick a wire in the unbalanced connector and see if I could get that TV marker generator directly, and, if so, work on cleaning up the TV. How do you do that (I hear you cry)? First make sure the HV anode connection (in the piece of shit) is good and there isn't a leak somewhere, next put an RFI filter on the power cord of the TV, and finally, trade it in for a couple of good books. The kids need to read more anyway.

---

From: "Barry Hauser" <barry@hausernet.com>  
Subject: Re: [R-390] Antenna question  
Date: Fri, 19 Jul 2002 01:15:13 -0400

I dunno how to break this to you, but some famous old (and dead) guys have hijacked your email identity and are posting the reflector with it. I could tell because they left out the codewords "twit" and "HAMMARLUND." All seriousness aside, there is some variety in CAT 5 cable. Some is intended for runs in ceilings and walls from switches and hubs to outlets and is typically made up of four twisted pairs of solid core wire so it works in punch-down telco style connections. The stranded variety is usually intended for cordsets with the modular plugs on each end to hookup from outlet to PC. It was mentioned that the CAT 5 cable won't hold up long with exposure to the sun's rays. However, the high-end plenum cable has a teflon jacket. I don't know if the cost has come down on that type -- it tended to be rather pricey. But, I'd think it might hold up better with long term outside exposure.

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Date: Fri, 19 Jul 2002 20:14:35 -0500  
Subject: Re: [R-390] Antenna question  
From: blw <ba.williams@charter.net>

>> Are you saying that CAT-5 ethernet cable is better than coax?  
>

> It depends upon what you want. If you are only receiving or transmitting at QRP levels, using a receiver with a balanced input available, want to effortlessly null out any currents that are not induced in the antenna elements, want to use several antennas without having an antenna switch or relay outside and up high, don't want to care if lightning zorches your expensive feedline, and have boxes of the stuff laying around...yes, CAT 5 is better.

>

Yep, just receiving. I'm sort of antenna poor at the moment with 2 dipoles up. A temporary octalloop came down this spring and the permanent amplified loop somehow never got built before summer hit in full force. I need that for the RBL-5. I tried both balanced and unbalanced in the past. I stick with balanced antennas.

>> I wonder why coiling CAT-5 will slow things down so much.

>

> Because "coiling" can allow induced peaks and nulls to develop in the line. Remember, those signals have very high bandwidth so many resonances can develop along with imbalances. If you had instead simply stuffed the cable into a milk jug in a random fashion you would not have had a problem. I've run into this problem all the time with network installers who are too tidy and like to leave extra cable coiled up in the ceiling. I just undo the tie-wraps and scramble it into a nice ugly ball.

I didn't think about it being twisted wire. I did know it was low impedance. I needed that extra bit for a connector later anyway.

>> I would have to feed 2 dipoles. I guess the extra twisted pairs would be good for additional antennas this fall.

>

> Yup. And you can just make a plexi disk with eight posts around and wire up your four dipoles in a radial or fan array.

>

>> Okay, here is another problem. ...The new TV in the den is causing light RFI every 15 kc up and down the bands. The TV is 3 rooms away!!!

>

The question is how close it is to the antenna. Your receiver may be doing it's job and the TV is simply a piece of shit. I would first stick a wire in the unbalanced connector and see if I could get that TV marker generator directly, and, if so, work on cleaning up the TV. How do you do that (I hear you cry)? First make sure the HV anode connection (in the piece of shit) is good and there isn't a leak somewhere, next put an RFI filter on the power cord of the TV, and finally, trade it in for a couple of good books. The kids need to read more anyway. Otto Von Helsing

I agree about books being better than vegetating in front of the TV.... unless it's news. I'm going to cover the TV some tonight with a large, heavy cookie sheet and see what top shielding does. My coax feed slopes away from the TV, but I went out and looked this morning I saw that both dipole centers were just about right over that cheap TV. Rotating the TV table didn't help any last night, so I'm thinking a heavy metal sheet on top may help. If not, I have some thin zinc sheets that I can bend until I find a good shield shape. Dropping the TV and saying, "oops" would sure be a lot

easier and more satisfying. I'll do the wire in

---

Date: Sat, 20 Jul 2002 22:10:54 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Antenna question

<snip> There ARE genuine twinax coaxial cables available. I have two samples here, but you'll likely never find these particular product numbers. They came from computer local area network systems:

Henricks Technologies Inxc. #7362211 E67179 20AWG (UL) CL2 80C  
Phalo/Belden 7362211 AWM Style 2498

Call or email Joel at RF Connections. He'll fix you right up  
www.therfc.com

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From: "David Faria" <dave\_faria@hotmail.com>  
Date: Fri, 2 Aug 2002 16:23:57 -0700  
Subject: [R-390] Nice AM Loop Antenna(off topic)

GE list. I thought this might be something worth mentioning. Radio Shack is closing out their AM loop antenna for \$20. I bought one and hooked it to my Sony 2010. Really nice sharp nulls. I'll try it on my 390 to night. My home made 12 turn/3ft. diagonal loop does not have as sharp nulls. I probably need to try changing the coupling cap. on the pick-up loop. Anyway for \$20 it weighs 1lb. and 12in. diameter its worth the time if u listen for am dx. Monitoring Times has a review of the loop and it was good. Radio Shack part number is #15-1853. Its a passive loop no amp.

---

From: "David Faria" <dave\_faria@hotmail.com>  
Date: Sat, 3 Aug 2002 15:13:12 -0700  
Subject: [R-390] Test of Nice AM Loop Antenna(off topic)

GE list. I tried the antenna and theses are the results:

1. Computers, TV's, and light dimmers cause serious noise on the receiver. I know thats not a new comment but, I thought I should mention it.
2. I took a R-392 outside(it is easier to carry that a 390A) about 50yards from the house. The antenna was connected to the BNC connector. The antenna tuned broadcast band from 535khz to 1700khz as started in the specs.
3. The antenna was not able to null completely local stations but I did reduce signal strength.

4. Radio stations in San Antonio(90 miles away) I was able to null to the point where they were not a problem.

Your mileage may vary but, I'm happy for \$20

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Date: Sat, 03 Aug 2002 19:07:29 -0500  
Subject: Re: [R-390] Test of Nice AM Loop Antenna(off topic)  
From: blw <ba.williams@charter.net>

I went and bought one today too. Very nice plastic shell. I have only tested it a bit in daylight, but it sure seems to be picking up some AM stations on the SP-600 that only come in at night. I was impressed with that, especially a weak TIR station out of Orlando, Fl. for travelers on 1680 (TIS). I later hooked it up to the RBL-5 and was more impressed. It seems to be picking up the carrier hets of longwave stations out of Europe which I never got with an Octalooop or dipoles during the day. I'm going to give it a workout later tonight. Some beacons did not come in as expected, but I'm using it way under the 535 kc design. It does seem to null a little bit; maybe it will show more nulling tonight. I'm thinking of buying the last one they have for use on some radios around the house and to open up and see what is inside. I'm will probably try to amplify one some day.

---

From: "Glen Galati" <eldim@worldnet.att.net>  
Subject: Re: [R-390] Hello New to list- More questions  
Date: Fri, 9 Aug 2002 02:24:09 -0700

Hello Mike, Your main Antenna for your FT-990 should also exit on the RX Ant Output of which you would connect to the UNBALANCED type C connector on the rear of the R-390/391 or the BNC ANT Jack on the R-392. I would use the Type UG-636/U RF Adapter which accepts a standard BNC male connector plug and mates with the Type "C" UNBALANCED ANTENNA Connector on the rear of the R-389, R-390, R-390A, and R-391 HF Receivers. This way you only need a small length 50 Ohm Coax cable with a RCA male plug to mate with your Yaesu FT-990 to a BNC male connector plug that will mate with your other receivers. Of note: Is must have the front RX ANT Push switch engaged. Please consult your FT-990 Manual and see if the REC ANT OUT Jack is "Muted" or grounded-out during Transmit. If this is true, then you won't have to use your AUX Receiver "BREAK-IN" FEATURE. I'm not positive about the latter and maybe some one from the group can add the correct info on this ornate comment. I haven't had my radio on line since '75.

---

From: "Michael Young" <myoung76@bellsouth.net>  
Date: Sat, 10 Aug 2002 17:32:15 -0400  
Subject: [R-390] 'Burbs antenna

What do you guys use for receiving antennae (general HF coverage) in suburbia where (alas) there is no room for rhombics, vee's and other cool things that I grew up with

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Date: Sat, 10 Aug 2002 15:14:03 -0700 (PDT)  
From: Joe Foley <redmenaced@yahoo.com>  
Subject: Re: [R-390] 'Burbs antenna

I just ran 500' of 10 guage THHN down the side of the rifle range in the back yard, that runs north, another 500' runs generally west, kind of a beverage sort of thing. The inverted "V" is hanging between two tall trees. I have no idea what they do "farther out" in the woods. But I don't think they do much with anything complicated like radios.

---

From: "Bill Riches" <bill.riches@verizon.net>  
Subject: RE: [R-390] 'Burbs antenna  
Date: Sat, 10 Aug 2002 18:22:33 -0400

I live in a rural area and have room for wire antennas but I also have a Dressler active antenna that is mounted above a non-functional weather vane about 15 feet above the ground. It works quite well - however do not use the wall wart power supply that comes with it - the diodes hum modulate received sigs at times - use 12 volts dc from a different better source.

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Date: Sat, 10 Aug 2002 20:49:05 -0400  
From: Scott Bauer <ody@radicus.net>  
Subject: Re: [R-390] 'Burbs antenna

Hi, I use a magnetic bal-un with a 51 foot wire. It works great. I feed it with RG-8.

---

Date: Sat, 10 Aug 2002 20:28:31 -0500  
Subject: Re: [R-390] 'Burbs antenna  
From: blw <ba.williams@charter.net>

You didn't mention if you have any trees to use. If so, get some kind of wire up there to start off. Vertical wire antennas work well. Loop the wire over a tall limb and tie the free end off a bit away from the vertical part that goes up to the limb. No trees at all? Maybe you can run some wire out the window and toss it over your roof to hang down the other side. Run the wire around the house at the rain gutter level for a horizontal loop. Run it up and down the chimney several times for a vertical. Run it out the window and let a lot lay on the ground. I've never done this, but I've read some incredible logs from guys who have done just that.

Make a loopstick antenna. Wrap multi strand wire around something like a broom handle. Tie the ends together to make one long length of wire. Find a good spot and orientation outside to attach the stick. Neighbors have trees but you don't? Get the kid's bow, tie the end of some wire to an arrow and shoot it over the neighbor's tree.

Retrieve the arrow and leave the wire drooped over the top of his tree. In the unlikely event said neighbor notices the wire running into your window, you can do one of two things. Tell him it is the neighborhood lightning strike protection system. What? He isn't protecting his neighbor the same way? Or, you can look stunned and accuse him of spying on you. Put him on the defensive. Maybe you can eke out a nice tower in lieu of a nasty lawsuit. I used a MFJ amplified HF antenna indoors for a few weeks. It worked great. I read where a guy in a radio-unfriendly neighborhood cemented some poles in tires. He made a fake badminton net between them. One pole actually had several slopers running from it. The neighbors never noticed.

---

Date: Sat, 10 Aug 2002 20:39:42 -0500  
From: Tanker <bloper5@comcast.net>  
Subject: Re: [R-390] 'Burbs antenna

Has anyone used the B&W BWD 1.8-30 (T2FD), any comments on it

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From: "Michael P. Olbrisch" <kd9kc@elp.rr.com>  
Subject: RE: [R-390] 'Burbs antenna  
Date: Sun, 11 Aug 2002 01:52:05 -0000

DO NOT ASK ABOUT THIS ONE ON THE ANTENNAS LIST !!!!! I have one. It does what I want it to do, that is to cover all ham and MARS freqs on one feedline with acceptable SWR. It is not a GREAT antenna, and the dB purists will poo-poo all about it. To them, if it isn't a ladder-line fed dipole, it sucks. But it does work, and I will continue using it till I leave MARS, and have room for a separate dipole for each band.

---

Date: Sat, 10 Aug 2002 21:16:04 -0400  
From: James Miller <JamesMiller20@worldnet.att.net>  
Subject: Re: [R-390] 'Burbs antenna

> Has anyone used the B&W BWD 1.8-30 (T2FD), any comments on it

If it's what I think it is (folded dipole), it's junk. It has a shunt resistor at the feed point to give the illusion of a wide bandwidth match. I was suckered in by it years ago.

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From: "Michael P. Olbrisch" <kd9kc@elp.rr.com>  
Subject: RE: [R-390] 'Burbs antenna  
Date: Sun, 11 Aug 2002 02:18:03 -0000

> If it's what I think it is (folded dipole), it's junk.....

There you go !!!

---

Date: Sat, 10 Aug 2002 22:32:13 -0400  
From: "Gregory W. Moore" <gwmooore@moorefelines.com>  
Subject: Re: [R-390] 'Burbs antenna

Just one question. I just got one, and was going to erect it as a inverted V in my somewhat restricted size property. I really don't want to alarm the (ignorant) neighbors with it, as they complain about everything, radio or not (I live in a row home and have quite a few antennas already on the roof LOL).. They tried to raise heck about my reloading activities explosives! they said in the basement, but got nowhere, they are also somewhat antagonistic toward me not only because of radio but because of my Second Amendment proclivities](... Does anyone have experience with this configuration and the radiation pattern, gain, etc. I wanted to have a horizontally polarized antenna (at least as horizontal as I can make an inverted V) in addition to my GAP Titan and see what difference it actually made, as well as the 160M capability, which I don't have with the Titan.

If anyone has mounted this in a relatively small area, let me know, I have to go high in the center with a wooden tower on the roof, and the steeper the better on the angles. I am kind of forced to use two existing trees as endpoint anchors.

---

Date: Sat, 10 Aug 2002 19:40:03 -0700  
From: Walter Salmaniw <salmaniw@shaw.ca>  
Subject: RE: [R-390] 'Burbs antenna

Fellas, I think it's important to differentiate the T2FD for receiving and transmitting. I've used my home brew T2FD for about 5 years for **receive only** purposes, and it's served me extremely well. It displaced all of my other antennae 90% of the time. Wasn't it the USN that came up with this antenna at it's shore based receiving installations during or after WW2 resulting in their giving up on most other set-ups. It's very economical on the real estate. Having said that, now that I've come across the K9AY, it's blown away the T2FD. I'm now considering taking down the T2FD.....Walt.

---

Date: Sat, 10 Aug 2002 22:02:34 -0400  
From: James Miller <JamesMiller20@worldnet.att.net>

Subject: Re: [R-390] 'Burbs antenna

I tried one of the B&W folded antennas several years ago. Spent a day erecting it, turned on the rig and yep the SWR was real flat on all bands, but reception sucked. And on the air reports showed a 10-15 dB lower signal as compared to my old dipoles. After a few contacts, it quit working altogether ehwn the "magic" shunt resistor burned up. It was also as ugly as can be hanging up there with big PVC pipe spacers. Neighbor started asking questions. Save yourself the effort, send it back for a refund, try something else.

---

From: "Michael P. Olbrisch" <kd9kc@elp.rr.com>  
Subject: RE: [R-390] 'Burbs antenna  
Date: Sun, 11 Aug 2002 02:41:01 -0000

BTW, it is NOT a resistor at the "FEEDPOINT" !!! It IS a balun. Run it through a network analyzer, and you will see.

---

Date: Sat, 10 Aug 2002 22:13:10 -0400  
From: James Miller <JamesMiller20@worldnet.att.net>  
Subject: Re: [R-390] 'Burbs antenna

The balun was just a PVC pipe filled with ferrite cores and the coax ran through the centers. The big PVC center piece, conveniently filled with permanent potting umpumkumpy, contains a high wattage resistor bridging the two ends of the loop. Its easy to get a flat SWR when you're driving a resistor! Yes it advertised performance "quieter" than a dipole. Sure, my dummy load is quieter too! In case you haven't guessed, I have a bad taste in my mouth about this product from B&W.

---

From: N4ue@aol.com  
Date: Sun, 11 Aug 2002 11:15:43 EDT  
Subject: [R-390] burb antennas

Barry good suggestions. However, use a slingshot instead of the bow. Less chance of a lawsuit. I recently made one from Wal Mart stuff:

1. slingshot (about \$10)
2. closed face reel w/ 20 lb test line (\$ 8)
3. piece of broomstick
4. couple of hose clamps

Sure beats paying \$100 (!!!!) for the ones advertised in QST.... Now there's mark-up. Must be from an old military contractor...

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Date: Sun, 11 Aug 2002 11:45:58 -0500  
Subject: Re: [R-390] burb antennas  
From: blw <ba.williams@charter.net>

I have only used a wrist slingshot myself. I'm pretty good at wrapping lead tire weights in tape to shoot. But, the arrow suggestion is for longer range targets. I have a friend who used the arrow method on a neighbor's tree. I've aimed for a limb way up high in a tree and actually hit the limbs solidly with the weights several times instead of just getting it to go over the thing. Sort of gets me mad when the weights bounce off of the limb. I always use Shakespear 20 lb line sold at Walmart for about \$1.80 for 700 feet. I just lay the reel on the ground and let the line pay out freely.

---

From: "Tom Warren" <wwarren1@nc.rr.com>  
Date: Tue, 3 Sep 2002 21:52:38 -0400  
Subject: [R-390] Input impedance of R390A

Has anyone actually measured the input impedance at the balanced feedline connector of the R390A? Yes, I know they specify 125 ohms as the working impedance for the antenna/feedline, but that doesn't mean that the actual input impedance looking into that port is 125 ohms. I'm pretty sure they don't specify a conjugate match (then meaning that the input impedance is 125 ohms). So the question stands, has anyone measured the input impedance at a number (even one) frequencies. Curiosity still gets to this cat!!

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Date: Tue, 03 Sep 2002 22:38:59 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Input impedance of R390A

>Has anyone actually measured the input impedance at the balanced feedline connector of the >R390A?

Yes. Dallas Lankford (I think) told me not long ago that he had done such measurements. The values varied from band to band and across each band. The numbers were roughly from 80 ohms to 350 ohms. I don't remember if he did reactance measurements ( $R + jX$ ) or not. My suspicion (not having done it ... yet) is that the input impedance will vary according to the way the input circuit is tuned and according to the mechanical alignment. So a set of measurements would not hold after you did an alignment on the front end.

---

Date: Tue, 03 Sep 2002 21:11:34 -0700  
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>  
Subject: Re: [R-390] Input impedance of R390A

I posted on my website (with permission) Dallas Lankford's dissertation on noise and sensitivity of the R-390A which includes an excellent discussion on the input impedance of the receiver. Tune your browser to

here:

<http://www.jamminpower.com/jam/main/noise.jsp>

and scroll down to the bottom half of the page. Enjoy!

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From: "Bob Camp" <ham@cq.nu>  
Subject: Re: [R-390] Input impedance of R390A  
Date: Sat, 7 Sep 2002 09:37:00 -0400

Hi, This gets a little weird but here it goes: let's say you have two systems set up - System one - a 50 ohm generator running into a 50 ohm matched radio input..... System two - a 50 ohm generator running into a high impedance radio input

In both cases the generator is set to the same \*indicated\* signal level. In the first case since you are matched half the voltage out of the generator is dumped by the divider action of the source and the load. In the second case you do not dump half of the voltage. The result is that you have twice as much voltage on the input of the radio in system two. Since signal generators measure a high level voltage (at the input to a big attenuator) even though the second system has twice the voltage on it the signal generator meter reads the same both times. Seems a bit odd. The reason it's odd is that most antenna's work the same way. As a matter of fact any 50 ohm source works this way provided it's a matched output. Still with me so far I hope.

Now for the fun - noise in a resistor is a constant power function. The voltage goes up as the square root of the resistance. The noise voltage on the second system is 3 db higher than the noise voltage on the first system. Since the signal voltage is 6 db higher (twice the voltage) the best case signal to noise ratio is 3 db better on the second system. Of course the actual signal to noise depends on a lot of things, but the best you can do is still 3 db better on system 2.

What does this all mean about radios ? If you have a really hot receiver the input impedance may not be anything like 50 or 125 ohms. If your antenna does not behave like a matched source who knows what will happen when you hook antenna A up to system B. End of strange but true tale ....

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Date: Sat, 07 Sep 2002 09:44:40 -0500  
From: Terry O'Laughlin <terryo@wort-fm.terra.com.net>  
Subject: [R-390] The Tube is Dead. Long Live the Tube

There is great story on vacuum tubes in the latest issue of "Invention and

Technology" (Fall 2002). The anecdote from a Jean Shepherd radio show about why transistors will never replace vacuum tubes is terrific.

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From: DJED1@aol.com

Date: Sat, 7 Sep 2002 13:48:17 EDT

Subject: Re: [R-390] Input impedance of R390A

Sorry, but you're not quite right. The best power transfer is always when you have a conjugate impedance match. You might get twice the voltage with a much larger Rx impedance, but the power delivered to the Rx is voltage squared over R, where R is the Rx input resistance. R must be much greater than 50 ohms to double the voltage. Try a few examples. The noise power from the antenna scales the same as the signal power from the antenna, so no benefit to S/N. Sometime you can get a better NF by mismatching the antenna, but this depends on the details of the Rx first stage. Ed

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From: "Tom Warren" <wwarren1@nc.rr.com>

Subject: Re: [R-390] Input impedance of R390A

Date: Sat, 7 Sep 2002 14:19:02 -0400

Ah, in the great spirit of stirring the pot on this reflector and putting in my \$0.02 worth, here goes. (Disclaimer -- I haven't done any RF engineering for about 37 years and though I have too many EE degrees, I'm still learning about these 390 beasts and trying to remember things that are supposed to be at my finger tips. Dr. Jerry, where are you when we need you????)

1. Bob, I think you're right on about your statement "If your antenna does not behave like a matched source who knows what will happen when you hook antenna A up to system B. because there will be some impedance combination looking into the receiver that results in the lowest noise figure (noise factor) and when looking back to the generator (antenna or not) should result in the highest SNR. I remember seeing curves of noise figure (noise factor) versus driving impedance (generator or antenna) for transistors, but I don't think I've ever seen the same thing for tubes. Could be that the physics are so simple and weren't taught when I came along and the bottom line answer is that if you're running Class A (which an RF stage ought to be), then the optimum impedance for lowest noise figure is an infinite resistance (when then corresponds to placing the grid at the top of a parallel tuned tank circuit).

2. Conjugate matching (i.e., making the driving impedance the conjugate of the load impedance) is much over touted in my mind. First off, the guarantee is that half the power is lost in the driving impedance -- not what you want, as an example, in a power grid or for an audio amplifier

(oh, I can hear the EE gods clammering to straighted me out -- genuinely I ask that you do so!!). Secondly, conjugate matching into the front end of a 390A, IMHO, doesn't mean squat in terms of best SNR. (So there, EE gods!!!) ..... and.....

3. (from a private note I sent Roy this morning) "Actually, I believe the technique on pp. 134-135 of TM 11-5820-358-35 is a pretty robust technique of comparing the 390A receiver to a standard where the technique yields good comparison results to a receiver set up properly in a lab environment yet the technique can be applied readily in the field. What I mean by that is using the 50 ohm to 125 ohm pad gives a pretty good impedance match to the URM-25D (depending on the input impedance of the actual receiver at the frequency in question, but the pad the ameliorates those variations as seen by the signal generator). The receiver is definitely seeing a 125 ohm driving resistance (note that I didn't say impedance) looking through the pad back to the signal generator. Using the 16 kHz bandwidth has two implications: 1. these receivers were actually used in the 16 kHz bandwidth for multi-channel RTTY, so that's one good reason to measure with that BW, and 2. in the 16 Khz BW mode, measurements are easier in that with the other filters, at least I fuss with tuning to recover maximum audio (thus SNR) and since the 16 kHz filter is broad and very flat compared to the other filters, one doesn't have to fuss with the tuning much if at all (which is my experience). Thus the technique is robust (although it gives "bad" numbers like 4 microvolts up to 14 mHz and then 5 microvolts after that) because it's hard for some young E-2 through E-5 to mess the technique up, yet it yields a valid comparison to the measurements made back in the lab where they really knew what they were doing." So there, EE gods, let the fun begin.

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Date: Sun, 08 Sep 2002 21:54:39 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] Input impedance of R390A

Hi, Ahhhh, but that's the whole point. One system has a 25 ohm impedance at the input to the radio the other has a 50 ohm impedance. The first system has half the voltage on it as the second, not due to power but due the the way the setup is defined. In other words it's not a constant power question at all. The noise voltage in the 25 ohm resistance is 0.707 times the noise voltage in the 50 ohm resistance. Again not constant power as much as that's just the way the formula works. The ratio of signal voltage to signal noise is better in the second case. Of course that says \*nothing\* about the radio you could or could not build and how it would perform. All it realy says is that you can get good signal to noise without matching the input of the radio to the source.

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Subject: RE: [R-390] ANDREW HJ8-50B 3 inch heliax  
From: Richard.McClung@Dielectric.spx.com  
Date: Mon, 9 Sep 2002 11:48:27 -0400

Well you could run the 3" heliax from the antenna entrance panel [That serves your R-390(\*)'s] out to the 2-30MHz, dual-mode, omnidirectional antenna that you use to listen to the world of HF. It would deliver more signal than that lossy 50 year-old, sun baked, RG-58 that you're using now.

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From: "Michael Young" <myoung76@bellsouth.net>  
Date: Sun, 10 Nov 2002 16:35:27 -0500  
Subject: [R-390] Computer RFI and R390s

How do you guys keep out computer hash from your listening/receiving? Turning the computer off isn't viable, since one of the programs I use is a RTTY program. In addition, I am in suburbia so no room for big antennae. Just long wire in the attic. Plus the Radio Shack ferrite core ant that was talked about on this forum this summer.

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From: "Bill Smith" <billsmith@ispwest.com>  
Subject: Re: [R-390] Computer RFI and R390s  
Date: Sun, 10 Nov 2002 15:35:21 -0800

Hopefully, the noise you hear is from your computer, and not from a neighbor's or a computer in another room. In the latter case, you can still quiet it down. A neighbor's may be more difficult unless you can gain access to the equipment. First, switch off the computer, or any other suspected source of noise to establish whether that equipment is really the source of interference.

(1) Keep the display away from your receiver. The high voltage and high magnetic fields generated by the monitor are shielded better in newer models.

(2) Ground everything well. 2nd story grounding situations can be problematic.

(3) Invest in Radio Shack 273-104 Snap-together chokes. Wrap several turns of wires from every connection in and out of the computer as close to the computer as practical. If you wish, start by hooking only the minimum connections to the computer to see if that initially helps noise, then connect attachments one by one, with and without cores to see whether the cores help.

(4) Wrap the power cord to the radio equipment through a choke. Note

that each turn through the choke counts as another choke in the line, so more turns wrapped through the core the better.

(5) You may need to wrap your antenna coax through a choke. Yes, noise signals can travel on the outside of a coaxial cable into the receiver, especially if you are operating with a high SWR.

(6) Feed the receiver with a balanced line, i.e. a balun at the end of the coaxial line if you use coax. This is difficult in a R-390 series receiver since the center of the balanced input in those receivers is grounded and it is hard to match the ground point in the receiver to an external ground without developing a ground loop (and defeating the effort). You can test your feed to the receiver by attaching a section of coax to your balun (for example a ten-foot line from the receiver to a coax switch), and shorting the open end. The receiver should fall silent. If it doesn't, the coax not working as coax, but is acting as a local antenna and will pick up local noise such as from your computer.

(7) Start with the simplest combination - a minimum of external connections to the computer and the receiver. See if you can minimize noise with that configuration, then gradually add connections, testing each time to determine whether noise is added. Resolve each line before adding the next. Your receiver will work better overall.

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From: "Jim Shorney" <jshorney@inebraska.com>  
Date: Sun, 10 Nov 2002 17:59:04 -0600 (CST)  
Subject: Re: [R-390] Computer RFI and R390s

That depends. I use 'vintage' IBM PS/2 server machines with IBM XGA-2 monitors from the same era for ham apps. This is some of the best shielded computer gear ever made, and I have yet to detect any hash from this stuff. Of course, the new shack and R390A are both still disassembled, so I haven't tested that particular equation. Bottom line, consumer grade monitors tend to have poor shielding, despite what they want you to think.

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From: Llgpt@aol.com  
Date: Sun, 10 Nov 2002 19:11:44 EST  
Subject: Re: [R-390] Computer RFI and R390s

My Mac is always on, never a problem.

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Date: Sun, 10 Nov 2002 16:25:58 -0800 (PST)  
From: "Tom M." <courir26@yahoo.com>  
Subject: Re: [R-390] Computer RFI and R390s



A couple of things . . . A) you must get the antenna to a low noise area, away from the house. The rx should be fed with good quality coax all the way to the ant. The ant does not necessarily have to start at the house. You can bury the coax and start the ant somewhere out in the yard. (B) you should choke off all of the transmitters, that is, all of the cables coming off your computer with iron toroids or equiv. But the main thing is it is coming in the antenna and your ant is in a high noise area. This may not elim the noise but should help.

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From: "Richard Biddle" <theprof@texoma.net>  
Subject: RE: [R-390] Computer RFI and R390s  
Date: Sun, 10 Nov 2002 22:21:25 -0600

If you are connecting the R-390 to the computer audio card, you may also want to try a 600ohm/600ohm isolation transformer in the audio line. I had a ground loop problem that cleared right up when I did this. I also put a Topaz line isolation transformer on the primary of the radio before the Variac.

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Date: Mon, 11 Nov 2002 00:02:58 -0500  
From: "Jim M." <jamesmiller20@worldnet.att.net>  
Subject: Re: [R-390] Computer RFI and R390s

Switching to a laptop might help. Modern laptops tend to use low voltage logic (3 volt) which may naturally radiate less. Also, the LCD screens would tend to radiate less I would guess. If you use a "build it yourself" computer or something assembled by a local shop from generic parts, you also run the risk of more interference. Computers sold by name brands like Dell, HP, etc. are required to meet FCC certification for RFI.

Something assembled at the local hacker shop may or may not meet certification. Otherwise, all the suggestions about ferrite cores on all wires into and out of the computer are good ones. And distancing the antenna from the operating area as much as possible. An antenna in the attic just above the shack or in the same room is not good.

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From: "Drew Papanek" <drewmaster813@hotmail.com>  
Date: Mon, 11 Nov 2002 12:41:54 -0500  
Subject: [R-390] Computer RFI and R390s

Some on this list have reported good noise reduction results by using a balanced antenna/ feedline connected to balanced antenna input. For feedline, twinlead, twinax (data cable), twisted pair, and even cheap CAT 5 networking cable have been used. If going this route, make sure that connections from antenna relay to RF deck are in original specified locations. There is a "mod" which swapped two of these connectors to

facilitate unbalanced use of RF deck balanced input.

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From: "Drew Papanek" <drewmaster813@hotmail.com>  
Date: Mon, 11 Nov 2002 13:00:00 -0500  
Subject: [R-390] Computer RFI and R390s

>If you are connecting the R-390 to the computer audio card, you may also  
>want to try a 600ohm/600ohm isolation transformer in the audio line.

.....

Very good point regarding use of audio transformer for isolation. Telephone line coupling transformers salvaged from computer modems work well for this and audio work. I recently tested one flat within 3 dB over 30Hz - 40KHz with 600 ohm source and load (has 1:1 turns ratio and electrostatic shield between primary and secondary). You can accomplish the same result by using the Line Output of the R-390x (being balanced it is already isolated).

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From: "Bob Tetrault" <r.tetrault@attbi.com>  
Subject: RE: [R-390] Computer RFI and R390s  
Date: Mon, 11 Nov 2002 10:54:17 -0800

The best implementation is to use balanced shielded pair between the 390 and the PC line input, with the ground shield connected at only one piece of equipment to avoid ground loops. As a kinda useful connection, one may use CAT5 cable, using a true color coded pair and then all others as a ground or shield. Real shielded twisted pair is hard to find at the Shack. The modem transformers are a good idea; they are extremely well made as Drew pointed out. I used to design them and Ethernet transformers for a living. The 100B Ethernet transformers on network adaptor cards are typically flat from 100kHz to 100MHz and very good impedance match to 100 Ohms. Quite good for 390 service. Not to mention, the modem and Ethernet transformers are Hi-potted to better than 1500VAC Primary to secondary.

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Date: Mon, 11 Nov 2002 14:42:05 -0800 (PST)  
From: Rodney Bunt <rodney\_bunt@yahoo.com>  
Subject: Re: [R-390] Computer RFI and R390s

Lap top computers have very little hash coming from them, I use an OLD laptop to run the RTTY prog.

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From: "Jon & Valerie Oldenburg"  
<jonandvalerieoldenburg@worldnet.att.net>  
Date: Thu, 14 Nov 2002 22:50:39 -0600  
Subject: [R-390] Coaxial extremes!

I've been finally assembling an amplified receive antenna project here. I have obtained a broad band amplifier with a coverage of 5-mhz to 1500-mhz, which uses SMA connectors. I will be mounting the amp in a weather proof feed with 1/2 inch hard-line to the steel box on the mast of the antenna. The box will be provided with "n" chassis mount jacks. The big question is on the SMA connectors to the amp. The connectors I have obtained appear to be of a crimp-on type, with a knurled shield crimp area having a diameter of .168 (OD) inch, and a crimp sleeve provided to fit over it of .197( ID). The box for this installation is rather small and since the coax runs are only 2 or 3 inches I was going to use RG-174. The crimp/ contact area seems wrong, but the center = conductor -ok, maybe RG-58 is required? On the other extreme-( he-he !!! ) I just obtained a brand new 150' roll of Andrew LDF7-50A Hard-line. Will be using this as the feed line on my tower project in Townsend WI. If any one has a line on reasonable priced "N" female fittings for this 1 5/8" foam dielectric cable I'd appreciate the tip.

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From: "Cecil Acuff" <chacuff@cableone.net>  
Subject: Re: [R-390] Coaxial extremes!  
Date: Fri, 15 Nov 2002 09:17:27 -0600

Concerning the SMA connectors...my documentation indicates the closest crimp connector to the sizes you have mentioned are for RG-58. I think the standard is to measure the outer diameter of the the crimp sleeve or ferrule...which is listed as .213 for use with RG-58. That's an RF Industries part number...the AIM Electronics part which is more common at electronics parts stores is .210 for RG-58...so both are very close to the ID measurement you listed. My guess is that they are for RG-58.

Sounds like your best bet would be to put the SMA connectors you have on the best quality RG-58 you can find and put some crimp on Type N male connectors for RG-58 on the other end and use a couple Type N female Bulkhead feedthroughs for mounting in your weatherproof box. The Bulkhead feedthroughs are available with O rings mounted to seal the opening made through the box. Works real nice. The added loss incurred from using these instead of a crimp on N female bulkhead is negligible at the frequencies you are working and it allows you to change the equipment or cables in the box without having to disturb the connection through the box once you have it sealed.

1 5/8 foam connectors are expensive as you have found....besides that the feedline will need to be attached to the tower in a way that will support its weight...cable ties won't get it! You need to use a hoisting grip attached to the tower at the top to support some of the weight and probably hose clamps at 15 or 20 foot intervals with maybe some cable ties in between.

It is usually installed using round member adapters and butterfly or snap in hangers down one tower leg if the tower is not already punched for snap in hangers. But all that gets expensive for Amateur work so hose clamps to the tower leg would work fine.

The connectors are upwards of \$200+ each for N female, which is probably what you will want. A low loss Type N M-M jumper is usually used at the top and bottom ends to connect to the antenna and equipment. I will look around and see what I can find for connectors.....

You know of course that for HF frequencies....1 5/8" feedline is way overkill.... you don't gain much over using 1/2" foam hardline for example. 1/2" has .357 db loss per 100' whereas 1 5/8" has .109 db loss per 100' both at 30 mhz. Less than a quarter of a db per 100', you could not tell the difference on the air...but the cost to implement is much higher with the 1 5/8". Connectors for 1/2" can be picked up easily for \$10-\$12 each. Hanging it is easy as well. But...I am sure your decision is based on the fact that you already have the 1 5/8" cable, which by the way, weighs nearly 125 lb all by itself...so hopefully it's not going on a light weight Rohn 25G tower. Of course at frequencies of 450 mhz and up all this changes....1/2" becomes more lossy and the 1 5/8" begins to shine!

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From: "Jon & Valerie Oldenburg"  
<jonandvalerieoldenburg@worldnet.att.net>  
Subject: Re: [R-390] Coaxial extremes!  
Date: Fri, 15 Nov 2002 23:24:09 -0600

Hello Cecil & the Group: I have had my gut feelings that the SMA connectors where for RG-58, so I will change to that. I am familiar with the installation requirements for 1 5/8 heliax, working as a municipal construction inspector, I have over seen a couple of cell tower installations with lets say a greater than normal amount of time & interest allocated. The tower for this project is a Rohn HDBX-48 ( 48' self supporting tower rated @ 16sq ft load). The antenna plan is stacked KMA log periodics, the lower one a 20 - 10 meter unit, the upper a 50-1300mhz unit. Will top mount a 440 antenna for a GE Mastr repeater, and have a side mount for a 2 meter fm Quad. I am still considering between using a remote antenna switch or getting some 7/8 hard-line for the H.F. antenna. I think it will be real interseting to get a R-390A on a directional antenna instead of a long wire! Thanks for your help  
Subject: Re: [R-390] OT: Antenna question  
From: Richard.McClung@Dielectric.spx.com  
Date: Thu, 19 Dec 2002 10:25:30 -0800

The Polarization of Ionospheric Waves is a Function of Magnetic Latitude.

A wave entering the ionosphere typically separates into two waves because of the interaction of the free electrons in the ionosphere and the earth's magnetic field. The two waves are called the ordinary (o-) and the extraordinary (x-) waves. When the direction of propagation is along or parallel to the earth's magnetic field, the two waves are circularly polarized, in opposite senses. When the direction of propagation is transverse to the earth's magnetic field, the electric field of the o- wave is polarized parallel to the earth's magnetic field and the electric field of the x- wave is polarized perpendicular to the earth's magnetic field. In the splitting of the two waves the MOF of the x- wave is typically higher than the MOF of the o- wave. In general the o- wave is the dominate wave having less attenuation through the ionosphere compared to the x- wave.

In the Northern Magnetic Latitude the o- wave travels up from the transmitter in a right hand elliptical polarization (RHP) mode and arrives down to the receiver in a left hand elliptical polarization (LHP) mode and is typically the strongest wave. The x- wave travels up from the transmitter in the LHP mode and arrives down to the receiver in the RHP mode.

At the Magnetic Equator the o- wave is linearly polarized along the magnetic NS for a wave travelling up or down (transmit or receive). The linear polarization for the x- wave is along the magnetic EW for a wave travelling up or down (transmit or receive).

In the Southern Magnetic Latitude the o- wave travels up from the transmitter in the LHP mode and arrives down to the receiver in the RHP mode and again is typically the strongest wave. The x- wave travels up from the transmitter in the RHP mode and arrives down to the receiver in the LHP mode.

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From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
Subject: RE: [R-390] OT: Antenna question  
Date: Fri, 20 Dec 2002 08:33:11 -0600

Uhh, a simple "yes" or "now" would have been okay :) BTW, thanks for the serious reply to the silly question. That's some pretty interesting "cipherring".

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From: "Jon & Valerie Oldenburg"  
<jonandvalerieoldenburg@worldnet.att.net>  
Subject: Re: [R-390] Hammarlund HX-500 Help Needed  
Date: Wed, 25 Dec 2002 15:02:19 -0600

.....your post on the R-390 list and was interested in your HyGain antenna. I've been contemplating buying a HyTower and was curious

about your experiences in usage, installation, and quality. I've been a fan of verticals for a long time and this one seems like the most durable. Just curious.....

Hi John: I just finished the basic antenna installation on 12/23, having started 10/31 (been real busy). The kit is well made, good instructions, nice quality materials etc. At this point I don't have the radials in, the ground froze here a couple of weeks early this year. I left a tail of wire at each ground rod though, and will be using that as a ground ring. The plan is to run 36 radials cut for 80 meter phone as described in the manual which will be silver soldered to the ground ring. I have installed the band switch, static protection & lightning protection as described @ <http://www.webbworks.com/crstrode/18ht/18-ht.htm> The site also has great info on installing radials. The band switch is only necessary for the 160 coil which I will add next month. The antenna is performing as advertised, no tuner needed on 80,40, & 20. I need to add a small amount of load capacitance on a tuner to keep SWR under 1.8/1, but I haven't went and adjusted the stubs for those bands yet, so it should be a no tuner required antenna. Have had good solid reports on signal (running a TEN TEC Delta 580 barefoot @ 100 watts). The antenna seems to be well worth the effort, and besides it is an awesome appearing antenna to boot! '73'Jon

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Subject: RE: [R-390] A question  
Date: Mon, 24 Feb 2003 12:10:58 -0800  
From: "David Wise" <David\_Wise@Phoenix.com>

.....break in function on the 390A how is it suppose to work.....

A relay contact closure between the break-in terminal and ground will disconnect (and ground) the radio from the antenna, and mute the audio.

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From: "Merle" <lal@metrocast.net>  
Date: Thu, 27 Feb 2003 16:17:28 -0500  
Subject: [R-390] Connectors

Hello to the list Would anyone know the name of the place in Miami that sells antenna connectors and coax etc.? They used to run an ad in different publications but I haven't seen it for some time.

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From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
Subject: RE: [R-390] Connectors  
Date: Thu, 27 Feb 2003 15:20:17 -0600

Are you possibly thinking of Skycraft in Orlando?  
<http://www.skycraftsurplus.com/coaxcable.htm>

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From: W2ZR@aol.com  
Date: Thu, 27 Feb 2003 17:07:42 EST  
Subject: [R-390] connectors in miami

it's Nema Electronics. They have a web site.

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From: "Merle" <lal@metrocast.net>  
Date: Thu, 27 Feb 2003 17:40:57 -0500  
Subject: [R-390] Connectors

Thanks to all who responded to my question about who in Miami sold connectors and cable etc. W2ZR came up with the answer, it was Nema Electronics..

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From: "Damon Raphael" <w7md@gci-net.com>  
Subject: Re: [R-390] Connectors  
Date: Thu, 27 Feb 2003 23:47:22 -0700

If you are looking for a Twinax coax connector for the antenna input, it is a modern standard connector that is used in certain IBM computer networks. Look for one at a site that sells computer networking hardware. It should run you about \$8.00 at most.

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From: "Drew Papanek" <drewmaster813@hotmail.com>  
Date: Wed, 12 Mar 2003 15:02:17 -0500  
Subject: [R-390] Break-In Function

Roy Morgan wrote: <snipped>

> - The grounding of the antenna inputs depends on the condition of the antenna relay contacts >and also the condition of the antenna relay supply rectifier and filter cap (there \*is\* a filter >cap, right?) Low relay voltage may cause high closed contact resistance.

The R-390A antenna relay is powered from the 25 VAC supply via a selenium full wave bridge rectifier. There is no filter capacitor. It is fairly common for that rectifier to fail either open or in an increased resistance mode. If relay armature pulls in and makes solid contact with coil's iron core, original rectifier is at least temporarily functioning well enough. The rectifier can be replaced with a silicon full wave unit. The style rated at 4 amps or so having a mounting hole and all 4 terminals exiting at 1 end conveniently bolts on to the original bracket. Silicon has a lower forward voltage drop and so relay coil will see higher voltage than with original rectifier. If that is a concern, you can add series resistance. No list members have reported problems with excessive coil heating when using silicon replacement. To read more on this topic, goto r-390a.net Click on References, Pearls of Wisdom, Power Supply. You will find a collection of

power supply related postings gleaned from this list over the past few years.

(Aside: 25 amp "block" style bridge rectifier makes a good replacement for selenium in older car battery chargers. Mount to metal case for heatsinking.)

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Date: Wed, 12 Mar 2003 15:35:41 -0800 (PST)  
From: Joe Foley <redmenaced@yahoo.com>  
Subject: RE: [R-390] Break in function

You will still have to turn the Rf gain down to keep a T-368 in the same room from registering on the carrier meter when on the same freq.

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From: "Kenneth Crips" <w7itc@hotmail.com>  
Subject: Re: [R-390] Break-In Function  
Date: Wed, 12 Mar 2003 19:40:26 -0700

Thanks for the info on the break in function I will check it out to see if the relay is pulling in all the way. Now that I have been making use of the Y2K manual in earnest it strikes me how nice it would be to have some sort search engine embedded in the manual

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Date: Thu, 13 Mar 2003 05:54:51 -0500  
From: Jim Brannigan <jbrannig@optonline.net>  
Subject: Re: [R-390] Break in function

I used an R-390A as a second receiver with a Collins S-line driving a 2KW amp. There was never a problem with bleed through or over load when using the break-in function.

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Date: Wed, 30 Apr 2003 19:54:27 -0400 (EDT)  
From: William Patrick Smith <smithw@WPI.EDU>  
Subject: [R-390] Balanced and Unbalanced antenna leads.

Hi, The r390a that I own had a simple mod done to it, usually Cable p207 goes to j107, p206 to j106 and p205 to j105... mine has p205 to j106 and p206 to j105... one of the balanced going to the unbalanced-in and the unbalanced going to the balanced-in... Schematic Dia fig 5-13 shows the radio with either configuration... Which one is right? At the moment the reciver is basically deaf from the balanced input with the cables either way but hears fine from the unbalanced whip input.

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Subject: RE: [R-390] Balanced and Unbalanced antenna leads.  
Date: Thu, 1 May 2003 10:05:03 -0700  
From: "David Wise" <David\_Wise@Phoenix.com>



I didn't vet your cable swaps for correctness, but this sounds like a standard field mod that was done at some installations, primarily shipboard IIRC. Normally, the balanced antenna jack goes to the primary of the 1st RF transformer while the whip antenna jack goes to the (tuned) secondary. If you use a really long whip, the secondary is pulled so far off that the ANT TRIM control cannot compensate. In situations like that, the mod is done, which connects the whip to the primary and (not that anyone cares) the balanced input (which is no longer balanced) to the secondary. Now your whip will be treated as untuned. You also get a little more gain due to the transformer stepup. Basically, it saved them from having to use an external adaptor. For home use, I'd say it's only useful if your antenna coax ends in a C connector.

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From: "Bill Hawkins" <bill@iaxs.net>  
Subject: RE: [R-390] Balanced and Unbalanced antenna leads.  
Date: Thu, 1 May 2003 13:02:00 -0500

Dave Wise gave a good answer, but left the deaf balanced input. If the plug and jack numbers match up, then the Balanced input really is balanced. This means that it rejects common mode signals. A single wire antenna, being unbalanced, produces a common mode signal that is rejected. That, or the plug is shorted. Try a dipole antenna with one lead to each balanced input pin. Or, ground one pin and connect the long wire to the other.

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Date: Sat, 05 Jul 2003 10:57:37 -0400  
From: Barry Hauser <barry@hausernet.com>  
Subject: Re: [R-390] New 390A owner & fan

<snip> The balanced twin connector is still on pushed-in wires though as the >proper plug is unobtainable here. The cover that goes over the crystal >oscillator subchassis is missing.

You should be able to find them easily -- they are "twinax" connectors commonly used in IBM-type networking (token ring?). They are usually available new and cheap as most networking has gone 10-base and 100-base-T which is twisted pair with modular (telephone style) plastic plugs. You can also find an adapter that goes from twinax to C or something else. These have one side of the pair grounded internally. Might be able to get one from Fair Radio or watch the "e-place".

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From: "Jim Shorney" <jshorney@inebraska.com>  
Date: Sat, 05 Jul 2003 13:06:57 -0500 (CDT)  
Subject: Re: [R-390] New 390A owner & fan

>You should be able to find them easily -- they are "twinax" connectors  
>commonly used in IBM-type networking (token ring?).

Thick Ethernet, actually. Very common, if you know where to look. I even have one that has a built-in balun to an RJ-11 jack.

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Date: Sat, 19 Jul 2003 00:55:38 -0500  
From: "Dave Kamp, KWOD" <kwOd@netexpress.net>  
Subject: [R-390] Proper Muting

After reading the tech manual, it appears that all I need to do to make the R390A operate amidst tranceiver architecture, is to connect TB 103's term 9 (Brk In) and term 16 (Gnd) to my Dow-Key's auxiliary contacts, and set the Break-In switch to break-in position... Is this all there is to it, or is there something else? Does it automatically mute itself when the contacts are closed, or open?

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Date: Sat, 19 Jul 2003 09:55:45 -0700 (PDT)  
From: Joe Foley <redmenaced@yahoo.com>  
Subject: Re: [R-390] Proper Muting

Yup, that's all there is to it, test it by grounding either of the terminals to make sure the relay is working, it should mute the LINE and LOCAL amplifiers and ground the antenna input. You may still have to reduce the RF GAIN while transmitting though, this will show on your modulation monitor(scope).

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Date: Mon, 21 Jul 2003 11:08:57 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Proper Muting

>Yup, that's all there is to it, test it by grounding either of the terminals <snip>

Notes: 1) The relay is operating on 6.3 volt filament current supply and uses about 40 ma of current. One side of the circuit is ground. The thing is in MUTE mode when the terminal 9 on TB 103 is grounded and the mute relay is energized. The MUTE relay is in the audio deck. (The Antenna relay is also energized at this time.)

2) The entire radio ahead of the audio amplifier stage is operating normally.

3) The antenna connections (both UNBALANCED and BALANCED) are grounded, but strong signals from transmitters will get through, as Joe notes above. Roy

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Date: Mon, 21 Jul 2003 13:54:07 -0400

From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Proper Muting

Roy is entirely correct! I run a BC-610 and an R-390A for AM operations. I have a Kenwood SM-220 Station Monitor with Panadaptor attached to the BNC connector on the rear of the R-390A. Even with the use of the muting function AND an EF Johnson T/R switch, I have to keep the RF gain rolled back enough to prevent feedback into the microphone. There is PLENTY of RF at these power levels. I've also applied toroids on the mic cable, the muting wires, AND the coax from the T/R switch to the R-390A.  
Bob Bethman - NODGN

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From: "William Sheehy" <WSHEEHYPLLC@twmi.rr.com>  
Date: Mon, 28 Jul 2003 09:16:15 -0400  
Subject: [R-390] Need Info on antenna Coupler

I have an old CU 286 FRR 33 antenna coupler which appears to be something that was used with the R 391 autotune sets. It works but doesn't seem to be up to snuff. It runs off 24v DC and has several connectors on the back to hook to the radios. It appears that if properly connected, it would autotune to the presets on the radio. It has provision for two antennas (A & B) and outputs for two sets so that the sets had the option of using either the A or B antenna. Anybody have or know where I can get a manual for this or any other useful information in order to get it back up to specs (whatever they may be).

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From: "wjneill@lcc.net" <wjneill@lcc.net>  
Subject: RE: [R-390] Need Info on antenna Coupler  
Date: Mon, 28 Jul 2003 13:05:09 -0400

1 There is no TM for the CU-286/URR=2E It is described completely in the TM for the AN/FRR-33, for which I have a copy issued by Collins and a USAF copy of the Army TM=2E

2 The top cover of the CU-286/URR has a complete schematic wiring diagram

3 I have a CU-286/URR and while it is my rack, I've never used it. I made up sets of twin-ax cable many, many years ago to be used with my R-390, R-390A's, R-391's, and R-725 but never made the time to provide a power source

I don't know how accessible my thousands of TM's are (I've moved five times in nine years and am still recovering) but I might be able to find one of the TM's for the FRR-33 so if you'll give me your mailing address, I'll photocopy what I can and send it on to you  
Bill Neill

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Date: Mon, 28 Jul 2003 13:41:46 -0400  
From: tbigelow@pop.state.vt.us (Todd Bigelow - PS)  
Subject: Re: [R-390] Need Info on antenna Coupler

I'd be interested in more info as well. I also have one in the rack, twin-ax connectors in a box, along with the C-1012 Control Monitor sitting along side on the floor missing its tags and covers. By just glancing, I'd guess you would need one of the control monitors in order to utilize the CU-286 properly. Not sure where the voltage to drive the auto tune motor in it would come from, perhaps the R-391? If not, then a remote power supply? My '286 looks like it has a standard AC power connector on the back for the rest. Sure would be nice to get it all lashed up together and working. I think Hank also has most if not all of the pieces by now for one of these stations. 73 de Todd/'Boomer' KA1KAQ

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Date: Mon, 28 Jul 2003 15:24:30 -0400 (EDT)  
From: "Paul H. Anderson" <pha@pdq.com>  
Subject: Re: [R-390] Need Info on antenna Coupler

The CU-286 is controlled either manually, or by the C-974 controller, which seems to be the hard part to come by. Hank has all the pieces but the cables (William Perry "the connector guy" has all the connectors). The autotune in the CU-286 is very similar if not exactly the same as the R-391. The power for both come from the PP-629 28V power supply. The C-1012 is (I think) the triversity receiver controller, and monitors and controls the AGC from three receivers as opposed to the 2 that the C-975 does. As far as I know, it doesn't have the outputs to control the autotune on either the CU-286 or the R-391. The unique part of the C-974 that controls everything is a motor driven servo/relay unit that is a fancy state machine for decoding channel and rack system control pulses from the dial on the face of the C-974 (local) or the remote C-973 controller. I've got most of the pieces, but am looking for a CU-286 and the C-974 to buy or trade towards.

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From: "Craig McCartney" <craigmc@pacbell.net>  
Subject: RE: [R-390] Need Info on antenna Coupler  
Date: Tue, 29 Jul 2003 06:32:06 -0700

I have a copy of the Collins IB in my collection, it is marked TM 11-871 prelim. Since it is loose-leaf and in a manila envelope, I am sure it came from Fair Radio, so you might try there. Pay any reasonable price since the copying charge on this double-sided, one-inch thick document will not be low!

From: "Bill Smith" <billsmith@ispwest.com>

Subject: Re: [R-390] Re: Line filter issues?

Date: Tue, 5 Aug 2003 21:56:41 -0700

Welcome to the world of low-frequency interference troubleshooting! You will run across a number of strange stories and experiences, all as grey as the plains of Kansas in the Wizard of Oz. They're all caused by the Wicked Witch of the East and her switching broomstick. First of all, the noise sources you are hearing are generally produced by square waves. Sources are a sparking contact, a light-dimmer turned almost all the way on (maximum current switching = good transmit power), a defective part that is arcing, etc. The signal has many harmonics, and is generally coupled to the power line in the house. Of course it travels right outside the house to the power pole and down the street. It generally is a very complex wave, thus has many peaks and nulls. You'll have quite a time mapping it with a transistor radio on broadcast frequencies. Phasing and intensity will give you all sorts of indications, particularly when filtered through the ferrite-loop antenna of the radio which is itself very directional. Try walking down the street some time with a bad street light. You'll discover all sorts of peaks and nulls that seemingly have nothing to do with the offending pole (assuming you have already spotted the dimming light). The secret is to use your 2m handheld tuned to the aircraft band. Or at any rate, a high-frequency receiver with an AM detector. The higher harmonics are attenuated somewhat, and are more easily adsorbed thus don't travel as far. Thus you will have a better chance of zeroing in on the real source of the noise. If you can attach a small 3-element beam to the antenna, so much the better. This is essentially what is used by the electric company when a representative comes out with a noise sniffer. The unit is a regenerative receiver tunable from 300-350 MHz mounted on the end of a 4-element beam.

There are two ways of eliminating noise. One is to divert it, adsorb it; another is to attempt to ignore it.

Diversion, if you will, can be accomplished by good grounding. Remember, though, that any wire exhibits inductance with length. Even a 3-foot ground wire from a receiver to earth ground may be too long to provide a good "drain" because of its inherent inductance. Naturally, a 20-foot ground line from a second story to ground will not improve things, in fact, will not be effective except perhaps for frequencies below, say, 500 KHz. A good ground is never-the-less the first thing to install.

Another way is to attempt to adsorb the noise before it gets into the receiver. Radio Shack interference filters can be very effective. I don't have a catalog number handy, but look for the square devices. They are actually two "C" shaped sections held together by a snap-together plastic shroud. Wire is wrapped through them (as many turns as possible). Make

sure the ends of two ferrite halves meet together, otherwise currents cannot not circulate in the ferrite and the filter won't work as well as it might. They can be installed in line cords, speaker wire, control wire, even coax can be wound through them. If you install them on the back of a radio, keep the wiring between the filters and the radio as short as possible. The wire between the filter and the radio is unsheltered antenna!

They are also great for suppressing noise from a computer. Start by grounding the computer case. Then, unplug everything from the computer, turn it on, turn on the receiver, and plug in computer cables one by one, noting any increase in noise. Install filters on offending connections as close to the computer as practical. If you can't get them to make a difference, somehow the noise is traveling through another path and you'll have to search to find it.

You can attempt to "ignore" noise by use of common-mode approaches. This approach makes use of something called a balanced line. You will notice that the antenna input connections to the R-390 are balanced, and so are the audio output connections. A full explanation of this approach is better found in text books, but basically the idea is that noise will be induced equally in two balanced lines. If the lines are connected properly, the noise can be nulled out. Wire telephone lines make good use of this approach.

Unfortunately, Collins took the balanced line approach very seriously and established a ground at center of the two balanced antenna inputs. In fact, instructions to adjust a capacitor divider that establishes this ground are provided in the alignment instructions. The ground point in the receiver is away from the back of the cabinet, and there are all sorts of sneak paths that may be particular to an installation which disturb the balance at RF frequencies. At any rate, while not perfect, it doesn't hurt to attempt to feed the receiver with a balun at the balanced antenna terminals. You will know if you are effective, if you can short a section of coax that feeds the antenna line to the balun and the receiver falls absolutely silent on all frequencies. The receiver here is quiet, although some strong broadcast stations can still be heard when the receiver is tuned on frequency.

The same approach can be used on the power line and the audio lines. Power Isolation transformers are used in some commercial broadcast installations to balance power lines. There, the center-tapped secondary of the isolation transformer is grounded. If you have an isolation transformer without a center tap, a virtual ground can be established with capacitors (.5 mfd, AC rated) from each secondary line to ground. The capacitor value isn't critical, but make sure the caps are rated for very high peak voltages. Good to protect them with MOV's too.

Audio lines are probably better protected with Radio Shack filter chokes, but hum (developed from "ground loops") and some noise can be eliminated by use of transformer input to external amplifiers. Hope this helps, or at least provides food for discussion.

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[duplicated under pwr supply]

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From: "Kenneth G. Gordon" <keng@moscow.com>  
Date: Fri, 08 Aug 2003 17:04:51 -0700  
Subject: [R-390] Re: Noise...(somewhat long)...

> .....I am getting an impulse type noise at aprox 5.2 /sec.....

I have been reading your e-mail describing this problem. Although your e-mails aren't totally clear, to me at least, when you are describing what is going on, I think I can make some suggestions:

1) First of all, you must determine positively that the noise isn't coming from something inside your house or on your property. So, with a battery operated portable radio tuned to the noise go to your breaker or fuse panel and turn off breakers or remove fuses one at a time, leaving them off when you do the next one, until ALL are off, or until you determine that one of the fuses or breakers eliminates the noise. If, when turning off a breaker, the noise goes completely away, trace that out till you find the source. If you still have noise, even if it is weaker, go to the next step.

2) Get a portable radio of some sort with a built-in loopstick antenna. If you choose a multi-band portable radio, keep in mind that the loop-stick is usually only connected to the input stage on the standard AM broadcast band. The rod antenna is the used for the SW bands and possibly for the FM band, so don't use either SW bands or FM band. The radiation pattern for a loop stick is broadside to the loop-stick (in most cases), and there is a fairly sharp null off the ends. You can determine which direction the null is pointing by tuning in a fairly strong local station, which you know the direction to, and turning the radio around on its center axis until that station is nulled. You may have to open the radio up to see what the orientation of the loop is. In some radios it is horizontal near the top under the handle. In others it is vertical to the radio. Tune the radio to a quiet spot in the band (best to do this during the day) and, then, starting in one corner of your property, swing the radio back and forth with the loop HORIZONTAL until you get a null on the noise. The length of the loop will be pointing AT the noise source. Mark the direction somehow. I use a crude, hand-drawn map of my place. Walk to another corner and repeat. Do this for all 4 corners. IFF the noise is on your property, you should be able to get a pretty good idea of where it is coming from.

3) If the results of this "triangulation" technique are either inconclusive, or you find them pointing TO A POINT off your property, you will have to take things a step further.

4) If you determine either that the noise is coming from someplace OFF your property, or are unable to determine exactly where it is coming from, visit your neighbors and ask them if they have started experiencing noise or static on either their radio or their TV sets recently. Tell them that you are trying to track it down and any help they give you would help both you and them. At this point, I would most strongly suspect a problem with the power company's equipment. Power companies use aluminum wire to connect from the transformer to your house in most cases, and this is notorious for failing. In fact, after reading what you told us, I immediately suspected that the connections from the power line to your panel AT THE PANEL, or the connections at the transformer that feeds your house, or the connections from the transformer to the main power line, are loose and arcing. To fix this, you will have to call your power company, and be REALLY insistent that they come take a look. DO NOT try to fix this yourself unless you are a licensed electrician. I know of at least one incident wherein when the power company opened the pad-mounted transformer door, they found a puddle of molten aluminum on the floor.

In my own case, I had been troubled with terrible noise for a number of years. It would come and go, pulse, get louder and softer. I tried to triangulate it and I found several nulls up and down the power line which follows the street in front of our home, yet the strongest noise was right at our panel. When I turned ALL the breakers off, the noise diminished, but was still audible. A few months ago, in the process of adding a new bedroom, we had the feed from the pole to our house, the downlead from the roof to the meter base, the feed from the meter base to our panel, and the complete panel replaced with all new parts. We discovered that the cable from the meter base to the panel, AND that from the meter base to the roof jack, AND that from the roof-jack to the pole, ALL of which was aluminum, had never been installed properly, or had deteriorated with age. There were burned or arcing marks under the sealant in several places.

Now my noise is completely gone and I can listen in blessed silence.

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Date: Fri, 8 Aug 2003 21:46:47 -0700 (PDT)  
From: Robert Meyer <meyer\_rm@yahoo.com>  
Subject: Re: [R-390] Re: Noise...(somewhat long)...

There may be another answer. It seems that some areas are testing broadband over power lines with somewhat disastrous results for the Ham community and HF. Check out the article from slashdot.org:



<http://slashdot.org/article.pl?sid=03/08/08/2020237&mode=thread&tid=137&tid=193>

Is this possibly the problem that you're having???

From: "Bill Hawkins" <bill@iaxs.net>  
Subject: RE: [R-390] Re: Noise...(somewhat long)...  
Date: Sat, 9 Aug 2003 13:26:32 -0500

Ken gave some good advice about locating the direction. If the noise is diffuse (same within a few miles) and it is not heard outside of 16 +/- 2 MHz, then it isn't local power line arcing. It is consistent with RF induction heating, though I don't know what industrial process uses that frequency. It seems to be heating 5 parts per second. Possibly the RF heater no longer has power line filters so the interference is radiated by the industrial power line serving the factories behind the fences. Or maybe you haven't gotten close enough to the source. The 16 MHz signal may be a harmonic of the heater's operating frequency that resonates with some structure in or near the factory. The wavelength is about 60 feet.

I'd build a loop antenna a foot or two in diameter and resonated to 16 MHz, and couple it to the antenna input of a portable SW receiver. Then I'd drive around and look for spots where turning the loop causes changes in signal strength, and see if you can triangulate a position. It really helps to have an S meter on the portable radio. That, or find a local ham who knows what a "fox hunt" is.

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From: "John KA1XC" <tetrode@comcast.net>  
Date: Mon, 8 Dec 2003 00:36:18 -0500  
Subject: [R-390] The R-725 and the DF story?

Since we're on the subject, I'd like to bring up a question that's been on my mind about the reported purpose of the R-725 and its DF friendly IF deck. Is DF use really the case, or is this just a story that gets repeated? While I've often read this explanation, I've never seen any documentation referring to what actual DF equipment or systems the R-725 was used with. I'm very familiar with the need for carefully characterizing the IF phase or group delay characteristics for particular applications, but I am unfamiliar with any needs for DF. Maybe I don't understand this requirement but could there be another explanation? The following is my reasoning. DF'ing to me means determining the location of an emitter. From what I know about the major HF DF systems used (such as the giant Wullenwebber arrays that were deployed world-wide) they could be simplified into three parts:

i) the antenna array which is used to receive and resolve the emitter

bearing

ii) the receiver which allows you to listen in and provides a conditioned IF output

iii) the display processing equipment which takes the IF signal and extracts the amplitude information and puts it in a form which can be used to create a rotating polar display. This gives you the familiar DF scope with the propeller shaped display indicating bearing.

The whole point of this is that it is the emitters amplitude which is being plotted against bearing, and I just don't see the emitters phase components, or the IF's, coming into the equation. I've also heard stories told by DF and intercept operators of such centers being filled with racks and racks of R-390's, R-390A's, and R-391's, but don't recall R-725's being mentioned much if at all. Perhaps I'm missing something in the above explanation, but I DO have some applications in mind where linear IF phase would be handy.

1) Radio-location, defined as determining where the \*receiver\* is located based on known transmitters. The transmitted signals contain precisely timed pulse information which can be translated to distance, so having an IF that preserves the phase (and therefore the timing) of the pulses is important. But there was lots of specialized radiolocation receiving equipment built and sold; why would you use an R-725 (plus other equipment), and why buy an expensive receiver that covers all of HF when radiolocation utilizes lower frequency ground wave? This doesn't make much sense to me.

2) Data communication, involving something more complex than the usual multi-channel TTY, but have not seen any references to this.

3) ELINT, Electronic Intelligence gathering, a big time Cold War activity. This is where you are interested in the actual RF signal itself so that it could be analyzed and information extracted, or so that it's "signature" could be determined. Back when the NSA was formed, they (and their various agencies) started analyzing all the foreign signals they could from DC to light, and continue to do so today. Wide-bandwidth analog recorders had arrived on the scene and remote listening posts, planes, subs, and ships hugging other countries borders were filled with all kinds of receiving gear quietly listening in and feeding these wideband recorders signals straight from their IF outputs. Miles of tapes were routinely recorded every day, then rushed to centralized analysis labs for study. That is one of the main reasons surveillance receivers have IF signal outputs. This is one application where keeping all of an unknown signal's

amplitude and phase components intact would be the highest priority, since the goal would be to record the desired signal in its original form with the minimum distortion possible. For this special purpose the R-725 would fit the bill, the few hundred built could have been all that was needed. ELINT was routine on VHF up through the microwaves, so why not HF too? Could HF ELINT have been the real purpose for this radio? The DF story might be just that, a very believable cover story used to explain the procurement contract, brought to you by the cloak and dagger folks that like to keep their real business quiet. Perhaps I've just been typing into the wind, but just maybe there is someone reading who could chime in and perhaps shed some light on this.

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Date: Mon, 8 Dec 2003 05:12:07 -0800 (PST)  
From: "Tom M." <courir26@yahoo.com>  
Subject: [R-390] TRD-15, Was The R-725 and the DF story?

The DF set used with the R-725 was the TRD-15 (and one other that escapes me at the moment). The R-725 was prototyped by Motorola, and then the rigs were modified by Arvin and Servo. Arvin and Servo took existing 390A depot dogs, removed the IF decks and salvaged certain parts (such as the BFO, crystal filter and a few others) and built up new IF decks called "SERIES 500" decks to drop in. They also added a transformer to use for hum-bucking on the PTO. Important: The SERIES 500 deck and the R-390 deck are not interchangeable. The filament voltages and IF hookups are different, but mechanically they are 95% the same. I'm told the reason the R-725 was sold for DF purposes and not the R-390 was that Collins and the Signal Corps jumped into the R-390A with both feet. The use of the R-725 over the R-390 was a face saving measure to stay within the R-390A concept. This was probably also justified by training, documentation and parts drivers as well. The Army cut the cord on the R-390 and didn't go back. Servo is still in the DF business... see: <http://www.servo.com/>

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From: "Dottor Federico BALDI" <federico@dottorbaldi.it>  
Subject: R: [R-390] TRD-15, Was The R-725 and the DF story?  
Date: Mon, 8 Dec 2003 14:32:36 +0100

A quite common problem on the R-725/URR here in Europe come from the fact that we here employ 220 Volts instead of 110 Volts; in the R-725/URR isn't enough (if I remember well) to change the wiring of Power Supply transformer for 220 Volts as in the R390A/URR, you must change the wiring of the little transformer that supply tensions needed for the series "500" IF DECK. Some people don't know this particular and so I saw some R-725/URR with the little transformer gone for the survoltage.

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From: "wjneill@lcc.net" <wjneill@lcc.net>

Subject: RE: [R-390] TRD-15, Was The R-725 and the DF story?  
Date: Mon, 8 Dec 2003 08:39:56 -0500

TM 11-5825-231-10 covers AN/TRD-15 AND AN/TRD-23. The R-725 is mentioned only as a component of both sets and there are no instructions for operation or maintenance. In other words, there is no stand-alone TM for the R-725 nor are there higher level maintenance manuals for the AN/TRD-15 or AN/TRD-23.

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Date: Mon, 08 Dec 2003 05:42:45 -0800  
From: Dan Merz <djmerz@3-cities.com>  
Subject: Re: [R-390] The R-725 and the DF story?

John, I liked your typing into the wind, as you humbly put it. This provokes the idea that there may be more than one truth (= the best exposition of the known facts) about the R-725. I have excerpts from the "Direction Finder Sets AN/TRD-3, AN/TRD-23A and Direction Finder Sets AN/TRD-15 and AN/TRD-15A" TM-115825-231-24, August 1973, that pertain to the R-725. I don't know what else is in this manual outside of the parts I have on the R-725 or what the type of direction finder equipment is involved. This information was provided to me by Tom when I became interested in modifying the 390 IF chassis to fit my 390A, which was completed. Maybe this will help, if someone else can look at the complete manual for details on the DF equipment. Dan.

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Date: Mon, 08 Dec 2003 05:46:20 -0800  
From: Dan Arney <hankarn@pacbell.net>  
Subject: Re: [R-390] The R-725 and the DF story?

John, Your theory makes a lot of sense and it is probably still very BLACK. Just more modern equipment.

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Date: Mon, 8 Dec 2003 09:17:02 -0800 (PST)  
From: "Richard M. MC Clung" <wa6knw@sbcglobal.net>  
Subject: Re: [R-390] The R-725 and the DF story?

If you want to know where the R-725 was used you can see it all in TM 11-5825-231-10, Direction Finder Set AN/TRD-15/23. The fact is that the mechanical filters caused phase distortions which provided for inaccurate bearing readings in the goniometers.

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From: Usafssx2@wmconnect.com  
Date: Mon, 8 Dec 2003 16:40:23 EST  
Subject: [R-390] Re: R-390 digest, Vol 1 #920 - 6 msgs

I don't know if this info helps your arguement, but I sat DF (when my

automated position was up and running on its own) at one of the biggest overseas sites (now de-activated) and I don't recall anything called an R-725. R-390A's were everywhere, morse intercept operators and voice guys used the model with the familiar turn knob on the BFO. Positions working with radio-teletype (my specialty) used the model with the mechanical BFO that was much more precise with a readout in the center.

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Date: Mon, 08 Dec 2003 16:27:05 -0500  
From: JMILLER1706@cfl.rr.com  
Subject: Re: [R-390] The R-725 and the DF story?

Where is a copy of this TM that can be had? Sounds interesting. I think the goniometer was in fact a rotating antenna inside a shield/can with a small opening or aperature, with continuous angle readout as it rotated (?) Or did the can and aperature rotate? So you would tune the radio to the signal of interest, turn on the gonio to start spinning, then a processor of some sort would detect the pulse at the IF output as the gonio slit swept the direction of the target, then read out the gonio angle. That then was the heading to the target. Pretty cool. They do it these days with fixed antennas and interferometric techniques. So if the filters had a lot of ringing or delay distortion, that could throw the timing off.

Date: Mon, 08 Dec 2003 15:15:45 -0500  
From: JMILLER1706@cfl.rr.com  
Subject: Re: [R-390] The R-725 and the DF story?

For some reason my last post was truncated. Let me summarize that I believe that DF can be determined by measuring phase or time of arrival differences from multiple receivers / and fixed antennas at known positions... usually in the form of collocated vertical elements in a constellation of some kind. If the 725 was used like this, there would probably be one dedicated to each of several antenna elements, then the IF outputs processed to measure phase differences and calculate a bearing to the transmitter. The original mechanical filters probably distort phase information (due to steep skirts/ringing) making precise/repeatable emasurement difficult - thus the change to the analog IF filters. Also, the multiple receivers and receive paths would have to be "calibrated" to account for differences in delay and phase response. So I suspect there were 3 or more receivers, with matched IFs, and one IF post processor doing the bearing calculations. Any thoughts?

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From: "Cecil Acuff" <chacuff@cableone.net>  
Subject: Re: [R-390] Re: R-390 digest, Vol 1 #920 - 6 msgs  
Date: Mon, 8 Dec 2003 17:45:22 -0600

Just a thought....unless one looks closely it's hard to tell you are looking at an R-725. It would be easy at quick glance to mistake one for an R-390A. It's possible most ops didn't know there was a difference...they just saw racks of what appeared to be R-390A's. (not to take anything away from the ops) My Dad mentioned the ability the guys had to do DF with the large Elephants cage antennas...Flair 9's is what I am told they are designated. Probably had dozens of receivers tied to that thing to resolve an accurate fix. The antenna was a fixed array so DF had to be by measuring levels and/or phase angles. Not sure what was used back when Dad was there...could have been anything from SP-600JX-17's to R-725's I would guess. He did mention that the ops had a rotary switch of sorts mounted below the desk top that would allow them to select which receiver they were listening to. Wish I knew more!

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From: "Bob Tetrault" <r.tetrault@comcast.net>  
Date: Mon, 8 Dec 2003 23:21:08 -0800  
Subject: [R-390] Elephant Cages

The Elephant cages had enormously complicated (but so what? to Uncle Sam) coax lead/lag phase switching tied to that circular array. They could be steered just like a rotary beam and had accurate directivities of a degree or so, besides being able to change beam angles nearly instantaneously. It really didn't take dozens of receivers; just one, but it would take several widely spaced arrays to triangulate a particular emitter. There's a brief overview of these Wullenweber arrays in the ARRL handbook with some theory. More to be found elsewhere should you care to Google.

From: Kg4gxs@aol.com  
Date: Tue, 9 Dec 2003 07:39:17 EST  
Subject: [R-390] R-725's

Stationed at two ASA sites in Turkey in the mid 60's I recall never seeing anything but R390-A's and a few R-390's at either the DF or Intercept positions. Trained as a DF op, these positions were not very active so I personally did mainly CW Intercept. Detachment 27 used Rhombic's and other assorted wires and Detachment 4 - 4 used the Elephant Cage

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Date: Tue, 9 Dec 2003 06:47:10 -0600  
From: mikea <mikea@mikea.ath.cx>  
Subject: Re: [R-390] Elephant Cages

The \*entire\* maintenance manual for the Elephant Cage is available on the Web. I got a copy about 2 months back, just for old times' sake,

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From: Kammer George D Contr SMC DET 11 /MCL  
<George.Kammer@cisf.af.mil>

Subject: RE: [R-390] Elephant Cages  
Date: Tue, 9 Dec 2003 06:00:44 -0700

I was in USAFSS in the late '60s/early '70s in Anchorage, Udorn, Thailand, and San Vito, Italy, using the AN/FLR9-V antenna at all three locations in CW intercept and RDF. Thought you might like to learn a little more about the "Elephant Cage" AKA "Dinosaur Cage" AKA "Flair 9". Lotsa memories in there from the Viet Nam era. The stories we could tell....

<http://www.fas.org/irp/program/collect/an-flr-9.htm>

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Date: Tue, 9 Dec 2003 05:06:25 -0800 (PST)  
From: "Tom M." <courir26@yahoo.com>  
Subject: Re: [R-390] R-725's with 390A tags

In response to your note, I've seen R-725's with R-390A tags. While the R-725 MOD drawings required changing of the tags, and both Arvin and Servo did this, for whatever reason some had been re-badged with R-390A tags. Don't know the how or why.

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Date: Tue, 09 Dec 2003 11:21:07 -0500  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] The R-725 and the DF story?

Yes, some: In one system I read about, the multiple antennas were fed to a phasing network which was adjusted by hand or by automatic system to produce two RF signals exactly in phase. The R-390 balanced input circuit allowed for in-phase signals to cancel in the input transformer. One part of the R-390A alignment is to adjust the input transformer trimmer cap to achieve maximum balance and thus maximum null for two equal in-phase signals. It could very well be that the IF output was used in such an automatic nulling system and that flat phase vs. frequency characteristics at the IF were needed to make it work well. One article that tells of early DF equipment was in October, 1944 QST. It tells about the radio stations used by the Army Air Corps to guide aircraft over Canada and Alaska to the western Pacific. Adcock arrays were used. I can't remember if they were steerable or if they were fixed with adjustable phasing networks in the feed system. In any case, my reading of that article made me want an example of the SX-28's shown in use. Now I have two of them, both awaiting restoration. I have no plans for Adcock arrays here. Sooo many projects, sooo little time.

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Date: Tue, 09 Dec 2003 11:33:45 -0500  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] The R-725 and the DF story?

>Where is a copy of this TM that can be had? Sounds interesting. I think

>the goniometer was in fact a rotating antenna inside a shield/can with a  
>small opening or aperature, with continuous angle readout as it rotated  
(?)

One definition at: <<http://www.bartleby.com/61/2/G0190200.html>> is: "A radio receiver and directional antenna used as a system to determine the angular direction of incoming radio signals. " This is little help here. As I understand it, the Goniometer is a rotating coil located with respect to two (or more) other coils so that it can couple to the others in a continuously variable way. If the energy in the other coils has certain phase relationships, the movable coil can be adjusted to create a null or a peak in its output signal. Likely the goniometer was in a shielded place (can or room) so as to avoid unwanted pickup of signals other than from the antennas. The "rotating coil" function was implemented in either software or software controlled reactive elements in later systems.

> So you would tune the radio to the signal of interest, turn on the  
> gonio to start spinning, then a processor of some sort would detect the  
> pulse at the IF output as the gonio slit swept the direction of the  
> target, then read out the gonio angle.

The processor here could be a CRT with a trace which follows the angular rotation of the goniometer element. Early radar and ECM direction indicators worked this way. A bump (or perhaps a null) on the circular trace of the "PPI" showed the angle from which the signal was arriving.

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Date: Tue, 09 Dec 2003 12:34:33 -0500  
From: Roy Morgan <[roy.morgan@nist.gov](mailto:roy.morgan@nist.gov)>  
Subject: Elephant Cage:

>My Dad mentioned the ability the guys had to do DF with the large  
Elephants  
>cage antennas...Flair 9's is what I am told they are designated.

List members, The list server thinks my list of 8 or 10 web links about the Elephant Cage antennas is spam and refuses to post it. I'll be glad to send it directly to anyone who wants it.

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From: "Tony Angerame" <[tangerame@earthlink.net](mailto:tangerame@earthlink.net)>  
Date: Tue, 9 Dec 2003 10:50:57 -0800  
Subject: [R-390] RE: Elephant Cage

Then there was the night in Turkey that a Tech in the blockhouse in the center was listening to AFRS with a portable transistor radio. We actually df'd the harmonic of his local oscillator and were surprised to place it directly above the site. UFO? Russians? No...just a bunch of 18 year olds a



long way from home hihi

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Date: Tue, 09 Dec 2003 13:49:06 -0500  
From: JMILLER1706@cfl.rr.com  
Subject: [R-390] Using/Aligning Balanced Input (WasThe R-725 and the DF story?)

Your mention of the balanced input trimmer alignment raises a question for the list (not related to DF). I connect to the balanced input connector in the manner documented on most 390 web pages, that is ground one balanced input and feed the center conductor to the other. Hence the second trimmer cap in each RF input coil has no effect when it is tweaked. Is this normal? Is any sensitivity lost by doing it this way. Some discussions have talked about using two 56 ohm resistors (one in each input pi), tied together to feed signal for alignment. Any benefit to doing this for normal operation? Have also read discussion of using dual center conductor coax (like they use for ethernet cables I believe) to feed a balanced dipole antenna in the manner which was intended, which tends to help reduce common noise. Any thoughts on whether or not this is worth the trouble to build up such an antenna?

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From: "Bill Smith" <billsmith@ispwest.com>  
Subject: Re: [R-390] Using/Aligning Balanced Input  
Date: Tue, 9 Dec 2003 14:06:38 -0800

Using an unbalanced antenna feed necessarily introduces the ground (chassis) of the receiver into the antenna circuit. This allows currents from the power line and other connections to become part of the antenna. The test is to connect a short coax line to the receiver, shorted or preferably terminated with a 50 ohm resistor - the set should remain silent. If it doesn't, then the receiver obviously has an antenna. Unfortunately this may not be the intended antenna, and all sorts of spurs and spurious signals can get into the set through "back doors". One solution is to build a small balun to present a balanced feed to the antenna connector. I have used a TV 300-75 ohm balun sucessfully, but presently use an unknown (junkbox) core with two windings of twenty or so turns, each. The coax feed line shield and one end of a winding is grounded to the receiver. The other end of this winding is connected to the "hot" or center coax conductor. Each of the two wires from the other winding are connected to the receiver's balanced input. The coax ground connection is surprisingly critical, it must be short and an optimum grounding location on the set may need to be found by trial and error. This is especially true in the R390 because of the grounded center-tap of the antenna winding, where the chassis still plays a part in the antenna circuitry. A good earth ground is also desirable. An alpha-delta antenna switch is used to select several receiviers here, and when the switch is switched away from any

set, that set falls silent (with exception of strong local AM stations). The primary motivation for all this is to reduce interference on 160 meters from AM broadcast. Local computer and other electronic noise reception from inside the shack has been greatly reduced.

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Date: Wed, 10 Dec 2003 08:42:40 -0500  
From: Gord Hayward <ghayward@uoguelph.ca>  
Subject: [R-390] Balanced input

The trimmer in each input coil set goes from one side to ground and there's a fixed cap from the other to ground. Thus, if you use the described coax input and you get the wrong side as the centre, the trimmer will have no effect. I like the balun idea, and the 75-300 ohm will probably be about right if the unloaded inductance inductance is high enough. Its on my "to do next" list.

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From: Kammer George <George.Kammer@cisf.af.mil>  
Subject: RE: [R-390] DF  
Date: Wed, 10 Dec 2003 07:11:30 -0700

As a prior USAF Security Service morse (and DF) type, I've followed some of the links that have taken me back to where I put the R390, R390A, and the Flair-9 to such extensive use. And YES!...we DID call it the FLAIR-9 in Anchorage, Alaska, Udorn, Thailand, San Vito, Italy. The following links are for your navigating pleasure. The first is the USAFSS Web Ring, the second is a great shot of the AN/FLR-9(V) at San Vito. The third is the National Security Agency site with a litany of information across the board. Finally, for the "GRUNT" (Ground Roving Unit, Non-Trainable ... to us Air Force types), the Army Security Agency web site is provided.

<http://www.usafss.org/>  
<http://w3.trib.com/~wrp/sunnysv.htm>  
<http://www.nsa.gov/>                      <http://asa.npoint.net/>

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From: "Dave Faria" <Dave\_Faria@hotmail.com>  
Date: Mon, 15 Dec 2003 10:56:36 -0800  
Subject: [R-390] Antenna

GM list. I want to build a Folded Dipole antenna for my station. I can wind the balun but, cannot find a suitable terminating resistor. Can anyone point me to a source for a non-inductive 400ohm or 800ohm resistor 300 watt?? I can build a combination of resistors to meet the resistance and wattage if necessary.

Date: Mon, 15 Dec 2003 15:08:27 -0800  
From: "Kenneth G. Gordon" <keng@moscow.com>  
Subject: Re: [R-390] Antenna...folded dipole...

No folded dipole I have ever seen in antenna books or other literature, or that I have built, ever needed a terminating resistor. If you plan to use this antenna with an R-390, my understanding is that the R-390's input impedance is already 300 ohms, balanced, and a properly built folded-dipole exhibits 300 ohms impedance, balanced, at the resonant frequency. Of course, the folded dipole is resonant only around one frequency or band, so you would have to have several depending on what bands you intend to listen to. Terminating resistors are only needed for antennas such as rhombics, Beverages (sp?), and the like, not for a folded-dipole.

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Date: Mon, 15 Dec 2003 20:45:25 -0600  
From: "Marshall M. Dues" <mmdues@hal-pc.org>  
Subject: Re: [R-390] Antenna...folded dipole...

There is an antenna called a Terminated, Tilted, Folded Dipole (T2FD) that has a terminating resistor. You can do a Google search on T2FD antennas and come up with a number of sites on this antenna. For example, see the following web site: T2FD design -- antenna special on hard-core-dx.com<<http://www.hard-core-dx.com/nordicdx/antenna/wire/t2design.html>>  
From: "Bill Smith" <billsmith@ispwest.com>

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Subject: Re: [R-390] Antenna...folded dipole...  
Date: Mon, 15 Dec 2003 21:54:16 -0800

A couple of things to think about:

(1) If the terminating resistor must be large (10-200 watts), then the resistor must be called upon to dissipate a significant amount of power. The power source is RF energy generated by a transmitter. That power is dissipated as heat and is not radiated as a radio wave.

(2) The antenna will provide a match over a wide range of frequencies. This is the major advantage of the antenna. Nothing is said how efficient the antenna is over that same range of frequencies. The antenna may indeed be more efficient off resonance, when compared to a mistuned dipole. Still, it can be very inefficient, especially when compared to a resonant antenna at the operating frequency.

(3) The military (and government) uses this design when establishing local communication paths with oversized transmitters. The antenna will work well in this application, where operators are not expected to know how to work with technical equipment, particularly transmitters and antenna tuners.

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From: "Kenneth G. Gordon" <keng@moscow.com>  
Date: Mon, 15 Dec 2003 21:38:00 -0800  
Subject: RE: [R-390] Antenna...folded dipole...

Ah! I'll bet you're right. I hadn't thought of that one. I was thinking of the standard folded-dipole.

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From: Poil721@cs.com  
Date: Tue, 16 Dec 2003 06:11:25 EST  
Subject: [R-390] Re: R-390 digest, Vol 1 #929 - 7 msgs

If you want to build the same type of antenna as B&W has on the market, you will need an 800 ohm non ind resistor and a 16/1 balun...( there in lies your problem, building the balun )... The antenna can be anywhere from 60 feet to 190 feet depending on the lowest freq you will be interested in. The balun goes at the feedpoint and the resistor goes on the opposite end,( you can use 50 ohm coax to the shack ) just use 1/2 in PVC as spreaders and they should be about 18" in length.( not critical ) I've built 2 of them...One 90 ft the other 190 ft...They work good for what there intended for, BROADBAND/NO TUNING... But you might be better off with a a ZEPP with open wire feeders into a tuner.!! If you go to the US PATENT OFFICE you can get all the specs on the B&W antenna. They make a good receiving antenna because there a closed loop (quiet).

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From: "Dave Faria" <Dave\_Faria@hotmail.com>  
Subject: Re: [R-390] Antenna...folded dipole...  
Date: Tue, 16 Dec 2003 07:41:13 -0800

Thanks everybody for ur comments. I was using the B & W nomenclature calling the antenna a folded dipole - sriry if its wrong. I live in a restricted neighborhood on 1.5 acres where everybody looks over the fence(keep up with the Jones's syndrome). I, so far, have hidden a 40m dipole in the location where I'm going to locate this antenna. Thanks agn for the input.

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From: "Cecil Acuff" <chacuff@cableone.net>  
Subject: Re: [R-390] Antenna...folded dipole...  
Date: Tue, 16 Dec 2003 09:40:41 -0600

Maybe he's building a T2FD....doesn't it use a terminating resistor...and if it is to be used for transmitting as well it may need to be of a large wattage? Just reading between the lines a bit...may be waaaay off base!

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From: "Cecil Acuff" <chacuff@cableone.net>  
Subject: Re: [R-390] Antenna...folded dipole...  
Date: Tue, 16 Dec 2003 09:47:20 -0600

Well it looks like you guys had already figured this out....I am just a few days behind on my email... Sorry about that!

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Date: Tue, 16 Dec 2003 11:41:58 -0500  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Antenna...folded dipole...

> > GM list. I want to build a Folded Dipole antenna for my station.....  
> ...No folded dipole I have ever seen in antenna books or other literature, or that I have built, ever needed a terminating resistor.

I think he meant the Tilted Terminated Folded Dipole, "TTFD" which does have a terminating resistor opposite the feed point and is described quite fairly at:

<<http://www.radiohc.org/Distributions/Dxers/ttfd2.html>>

There have been many "animated discussions" (aka arguments) about the principles, use, and performance of these antennas. Some such discussions I have read included reports from fellows who use them in VietNam with success. Apparently a commercial supplier made them for the armed forces. (Was it B&W, perhaps?) As described at the link above, the thing has wide spacing between the parallel wires, a non-inductive terminating resistor that dissipates up to one third of the applied power, and performs best with a 6:1 balun at the feed point and coax transmission line. I have neither built one nor talked with anyone who's used one.

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Date: Tue, 16 Dec 2003 13:46:33 -0500 (GMT-05:00)  
From: tirevold@mindspring.com  
Subject: Re: [R-390] Antenna...folded dipole...

I use TTFD dipoles - and have for over 20 years. I currently have two of them. They are NOT as efficient as a 'tuned' dipole, but on HF, I find the tradeoff of 1-2 'S' units of gain for fast QSY and broadband operation acceptable. My R-390A's can't even tell the difference between a TTFD and an ordinary dipole - until you get down to really really small differences in signal and noise. W4RNL (L B Cebik - <http://www.cebik.com/>) has a couple of really fine articles about them - they are very enlightening. My operational findings agree closely with his assessments. No- I don't want to get into any arguments about something else that is better - TTFD's are 'good enough' for me.

Date: Tue, 16 Dec 2003 14:57:49 -0500 (GMT-05:00)  
From: tirevold@mindspring.com  
Subject: Re: [R-390] Antenna...folded dipole...

AND - The ME-165 SWR meter originally used with the T-368 transmitter contains TWELVE very nice 600 ohm, 50 watt non-inductive resistors - so you can 'roll your own' terminating resistor for that TTFD. They also make nice terminating resistors for wire Vees and rhombics. Fair radio has them : <http://www.fairradio.com/associ.htm>  
(pic: <http://www.fairradio.com/me-165.html>)

I found one all beat up with a broken meter for \$5 at a hamfest - the resistors were undamaged... a bargain for high-power noninductive R !!!!!

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From: Poil721@cs.com  
Date: Wed, 17 Dec 2003 07:33:09 EST  
Subject: [R-390] Re: R-390 digest, Vol 1 #930 - 11 msgs

I'm not sure, but i think there's a difference between the T2FD and the wideband folded dipole...!! The T2FD might be fed with 300 ohm line instead of the 16/1 balun. You can go to W4RNL's info site on the matter.!! He has a very interesting web page.!! Oh .!! Yes, i dont think you will need more than a total of a 150 watt resistor (s) for 1kw CW/SSB...!!

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Date: Wed, 17 Dec 2003 17:11:18 +0100  
From: "Clemens S.Ostergaard" <clemens@it.dk>  
Subject: [R-390] T2FD-antenna

Like Al Tirevold I have been using a T2FD for my R-390A's. and they like it. When I switch among various antennas I often find that the T2FD gives a little more intelligibility, and it is easy on the ear over longer hours. I can understand why prof operators like it. It also is useful for utilities-DX'ing, with its general coverage. Not much joy on tropical band and downwards, though, At least not in the dimensions I have, (RF Systems from Holland, stocked by Universal

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From: "K3PID" <k3pid@comcast.net>  
Date: Fri, 23 Jan 2004 19:46:44 -0600  
Subject: [R-390] Antenna Input Modifications

On my R-390 someone removed the twinaxial socket on the balanced input and replaced it with an SO-239. The center conductor of the new connector passes thru to the high side of the transformer while the other side is now grounded. Was this a common mod? why wouldn't you just replace the connector on the unbalanced input with the SO-239?  
Comments? Issues?

Date: Mon, 26 Jan 2004 00:38:48 -0500  
From: Barry Hauser <barry@hausernet.com>  
Subject: Re: [R-390] That's more like it!!!

I see that Meir answered your first question as he posted his reply to the list. I don't see a reply to your second question. It appears that the general activity level of the list has diminished. Part of this may be due to the practice of replying off-list -- perhaps to conserve bandwidth, keep a low profile, or, I dunno -- maybe solar flares wiping out the band? Anyway, there is the tendency to think -- well maybe the guy got his answer, or I have an idea, but someone else out there is more expert or whatever. As for the first question -- I, for one, did not know the answer. As for the second (about why some guy swapped out the balanced connector for an SO-239 instead of the balanced one), that sounded like the courtroom scene in the movies where one of the sides yells out "Objection! Calls for a conclusion!" or conjecture, etc.

Anyway, here goes nothin':

> ANTENNA INPUT MODIFICATIONS 1/23/2004

>

> On my R-390 someone removed the twinaxial socket on the balanced input and replaced it >with an SO-239. The center conductor of the new connector passes thru to the high side of the >transformer while the other side is now grounded. Was this a common mod? why wouldn't you >just replace the connector on the unbalanced input with the SO-239?

I can't say with any assurance as to why the anonymous modder chose to replace the balanced connector instead of the unbalanced with an SO-239, however: It is/was procedure to ground one side of the balanced connector when connecting an unbalanced line to the balanced connector, even when using a twinax connector on it. Also, there are adaptors around that convert from twinax to C-connector (like the unbalanced). One side of the twinax is grounded inside the adaptor. Most (maybe all?) of these adaptors are right angle/elbow shaped. There may be variants that go to something other than a C-connector -- perhaps an SO-239 or an N-connector? So, it may have been a common mod in the functional sense, but doubtful that many changed out the connector altogether. If a made-up adapter is difficult to find, it's an easy matter to make up a twinax to SO-239 cable, or a longer coax going from a twinax plug (with one side grounded inside) to a PL-259 plug.

I can offer two theories as to why the Unknown One chose to replace the balanced connector: A. The unbalanced one looked more "normal" and thus likely to be found one day, and/or B. Rumor or conventional wisdom had it that the balanced connection was better. This may really have depended on which was used during alignment. However, any inherent superiority may have been undone by grounding one side. Twinax connectors are now

commonplace and cheap as they were used for computer network cabling. This may not have been the case or known to the modder at the time.

Of course, this is all conjecture and further persuit may get us into the areas of Boatanchor Archeology, Boatanchor Anthropology and even, yes .. Boatanchor Forensics. These are rather unusual fields of endeavor. (generally recommended that one keep his or her day job ;-) On the other hand, perhaps someone will unearth an article entitled "Replace that Weird Balanced Connector with a Good Ol' SO-239" among some crumbling scrolls or musty magazines which would shed further light on the motivations at play at the time. In the Day's of Yore it was customary and fashionable to perform what are now considered abominations upon vintage and historical objects and there were numerous heretical tracts in circulation. The pendulum has swung back in the direction of orthodoxy, such that authenticity is prized over practicality, to the extent that artifacts such as original knobs, tags, and even dynamotors are much sought after.

If you wish to restore your R-390 (non-A?), you may be able to fit a standard twinax panel connector, or, if not, get another antenna relay assembly. I have a supply of R-390A type available, plus some odd ones that include a gas discharge tube. I forget now what the difference is between the R-390 and R-390A versions. However, on an electrical/functional basis, what you have there is a fairly standard setup.

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Date: Mon, 26 Jan 2004 16:09:21 -0500  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Covers & Cabinet

Somewhat common, but it it means removing or butchering the antenna relay. This mod was probably not done by the military or other government agency. The twinax connector is part of the antenna relay. It is not clear from your post whether or not the antenna relay is present in your radio.

>why wouldn't you just replace the connector on the unbalanced input with the SO-239?

Because \*\*\* without the field change that re-arranges the coax connections to the antenna relay\*\*\*, the unbalanced input goes to a spot in the circuit AFTER the antenna coils and results in reduced selectivity of the front end, and also reduced sensitivity.

>Comments? Issues?

Comments: The field change involving re-connecting the coax connections



is detailed on Chuck Rippel's site, (and possibly in the Y2K manual). The circuit connections of the antenna relay and the points in the circuit at which the two antenna connectors are connected to are shown in the radio schematic. Issues: Use of the UN-balanced antenna connector without re-configuring the relay's connections will reduce both front end selectivity and receiver sensitivity. (This assumes the antenna relay is present.) If the field change is accomplished, these things are not true. The normal unbalanced antenna coax connector requires an adapter to use normal connectors (BNC or "UHF"), or a mating coax connector. Both are available at RF Connections ([www.therfc.com](http://www.therfc.com)) among many other places.

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From: "g4gjl" <[g4gjl@btopenworld.com](mailto:g4gjl@btopenworld.com)>  
Subject: Re: [R-390] That's more like it!!!  
Date: Mon, 26 Jan 2004 21:12:55 -0000

I cannot answer your first question as I (sadly) have no T-368 experience! Any one wishing to rectify this situation by donating a T-368 to me is most welcome!! However, the mod antenna relay you described is part official and part homebrew, it seems to me. True, there will be an impedance mismatch at the 50 -ohm SO-239, but in reality this is of little significance to most people. The relay unit might be one from another similar application in another type of receiver else has been locally modified. I think some of the R-390 (no A) relays use removable coax connectors. All the 390-A versions I have seen have the body of the relay assembly and the coax connectors and an integral casting. The electrical mod of grounding one side of the RF input transformer was first specified by the Navy, as one of their numbered modifications. A web search will most probably uncover a copy of the official document.

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From: "Drew Papanek" <[drewmaster813@hotmail.com](mailto:drewmaster813@hotmail.com)>  
Date: Mon, 26 Jan 2004 16:35:19 -0500  
Subject: [R-390] Antenna Input Modifications

The unbalanced antenna input is connected to the grid side of the RF input transformer and hence is high impedance. That was intended for use with a short whip antenna. The balanced input is low impedance but many of us do not use balanced feedline. Grounding one side lets one use the other side as an unbalanced low impedance input. There was a Navy "modification" which consisted of juggling the 3 internal BNC's (or MBNC's) to use the unbalanced input connector as low impedance in the aforementioned fashion.

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From: "Dave and Sharon Maples" <[dsmaples@comcast.net](mailto:dsmaples@comcast.net)>  
Subject: RE: [R-390] That's more like it!!!  
Date: Wed, 28 Jan 2004 09:40:58 -0500

I'm with you on the antenna connector. That's what someone did to this R-390A. BTW the unbalanced connector is a Type C, I believe, so an adapter can be obtained pretty easily if you don't want to remove the connector.

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From: "Danny Lunstrum" <dlvnstru@netins.net>  
Date: Wed, 17 Mar 2004 09:51:14 -0600  
Subject: [R-390] Balanced Lines

Can someone tell me what the RG# or Belden# or something similar is for the cable used with the balanced antenna jack for an R-390/R-390A. I would like to try feeding it with a trap-dipole that I have cut for the International Shortwave bands. I have the connectors I need for it. It is a two-conductor cable with shield.

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From: "Steve Hobensack" <stevhobensack@hotmail.com>  
Subject: RE: [R-390] Balanced Lines  
Date: Wed, 17 Mar 2004 18:15:21 -0500

Dan, it is Belden M 9207 1000 ohm twinax. You will have good or better results by just installing two pieces of RG-58 or RG-59 coax in the balanced line R-390 connector. keep both lines EXACTLY the same length. Tie the shields together and bond to rcvr chassis. Tie the shields together at the antenna but do not connect the shistation on the beach and a site t the center conductors to the antenna each side the of the center insulator. The RG-58 will have less weight and a lot less cost. I've seen the Navy use either the twinax or two pieces of RG58.

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Date: Wed, 17 Mar 2004 21:31:30 -0800 (PST)  
From: GARY WEBB <garylandsusanawebb@prodigy.net>  
Subject: Re: [R-390] Balanced Lines

My R390A (Motorola) came from another Ham and has an adaptor for the balanced line. Basically a wideband transformer with a Twinax on one side and a BNC on the other. It works fine. Gary L. Webb NI9V

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From: "Robert Jarnutowski" <k8rj@hotmail.com>  
Subject: RE: [R-390] Balanced Lines  
Date: Sun, 21 Mar 2004 11:40:04 -0600

>Can someone tell me what the RG# or Belden# or something similar is for the cable used with >the balanced antenna jack for an R-390/R-390A. I would like to try feeding it with a trap->dipole that I have cut for the International Shortwave bands. I have the connectors I need for >it. It is a two-conductor cable with shield.

Try Allied 1-800-433-5700 for Belden type 9207 Their catalog # 216-0364 at \$36.27 for a 100 ft roll in my two year old catalog. Or, if you like to pay more a little or maybe don't like Allied, try Mouser 1-800-346-6873 their catalog # 566-9207-100 for the same cable at \$54.25 for 100 ft.

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From: "Drew Papanek" <drewmaster813@hotmail.com>  
Date: Mon, 22 Mar 2004 18:57:27 -0500  
Subject: [R-390] Balanced Line

If you want to go balanced on the real cheap, you might try CAT-5 networking cable. A member of this forum tried that and reported good results a while back. <snip>

From: hdalexander@att.net  
Date: Fri, 02 Apr 2004 19:38:15 +0000  
Subject: [R-390] Antenna relay

I've been a member for about a year. I have learned alot from all of you. Thanks. I have a Motorola R-390, serial #4812, order #14214-PH-51-93. I don't think that the antenna relay is working properly. When I put the function switch to CAL nothing seems to happen. What should happen? Should I see, or at least hear, the relay energize? Also, I just don't seem to pick up anything on the higher bands (above 20Mhz). For now I only have a 35 foot wire strung IN my house. Could my problem simply be that I need a significantly longer and higher antenna? I would welcome any advice on antennas. The R-390 was my 60th birthday present to myself. I want to get back into HAM radio, having let my novice license (WN1LTJ, dated 1956!) expire long ago. Thank you in advance for any words of wisdom you can provide.

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Subject: Re: [R-390] Distribution Amplifier  
To: Jim Brannigan <jbrannig@optonline.net>  
Date: Tue, 20 Apr 2004 10:48:20 -0400

I read the article and was quite impressed so I ordered the "Kit" mentioned in the article Friday night. It arrived Monday here in Boston! I was even more impressed at the quality of the materials in the kit. I may have to get some new components to build it up, as stuff from the junk boxes just won't do this thing justice. I'm looking forward to building it. I had been on the lookout for a mil-surplus unit for some time without luck. Perhaps this light weight item will allow me to bring in another boat anchor to my shack and use the weight I was reserving for the RX multicoupler. If there is any interest, I'll post my results here. (don't expect anything quick!)

>The May issue of QST has a very neat EIGHT receiver distribution

amplifier  
>as the feature article.

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From: "pete wokoun, sr." <pwokoun@hotmail.com>  
Subject: Re: [R-390] Distribution Amplifier  
Date: Tue, 20 Apr 2004 05:33:25 -1000

You folks got me really interested in seeing that article on a long-sought accessory to the shack! Our QSTs to Hawaii won't get here until about May 10. Does the author give any noise floor or max signal specs for it?

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Date: Tue, 20 Apr 2004 11:34:21 -0700  
From: "Marshall M. Dues" <mmdues@hal-pc.org>  
Subject: Re: [R-390] Distribution Amplifier

The author and designer of the multicontroller has a neat web site that describes the project pretty well. Go to:  
[www.w8zr.net/multicontroller/](http://www.w8zr.net/multicontroller/)

In speed reading the QST article just now, I did not see a noise floor specification mentioned, but he is using new Maxim MAX497CPE video amplifier ICs each containing four 275 Mhz low-noise amplifier/buffers. I, too, am very interested in getting his kit and building it for all my receivers.

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Date: Tue, 20 Apr 2004 13:01:46 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Distribution Amplifier

The web site says: "...Each amplifier has an open loop voltage gain  $A_v=2$  (6dB), an input resistance of 1.2 Mohm and an output resistance of 0.1 ohm. The output noise is specified as less than  $5.6\text{nV}/(\text{Hz})^{1/2}$ , which corresponds to about 0.16 uV measured in a 1 kHz bandwidth..." It sounds like these amplifiers will deliver better performance than the old tube type or even later solly state multicouplers. I would expect that in any but the most serious noise free locations (such as in the \*middle\* of the outback in Australia) this thing will not contribute any detectable noise to the signals you will receive. (As if I \*need\* another project, I am considering building one of these.. Can anyone report the approximate cost of the Mouser order for parts???)

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From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>  
Subject: RE: [R-390] Distribution Amplifier  
Date: Tue, 20 Apr 2004 12:04:57 -0500

Looks like a really well-designed project; however, I'm afraid if I built it, I'd

start looking for 6 more receivers...

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Date: Tue, 20 Apr 2004 19:45:12 -0400  
From: Ron Hunsicker <ronhunsi@ptd.net>  
Subject: [R-390] Distribution Amplifier

The Mouser bill comes to \$123 or so, but I'm not sure if the includes the back orders. I, too, received the kit from the developer and the quality is very high.

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Date: Tue, 20 Apr 2004 21:50:32 -0400  
From: Bob Camp <pb@cq.nu>  
Subject: Re: [R-390] Distribution Amplifier

Well don't throw out all the glow in the dark stuff quite yet .... The video amplifiers that form the heart of the ARRL project are pretty darn nice little chips. However they are not rated for IMD and their harmonic distortion numbers begin to climb as you go past about 10 or 12 MHz. That isn't to say they fall apart. Far from it they probably work pretty darn well considering what they are. What they are not is the tuned RF front end on an R-390. I would be very interested to see how they do when attached to a couple hundred feet of wire with the bands open ...

From: "Dennis L. Wade" <dwade@pacbell.net>  
Date: Tue, 20 Apr 2004 21:35:40 -0700  
Subject: Re: [R-390] Distribution Amplifier

Bob brings up a good point that I think is easily overlooked. The project has two area in which gain is applied, the distribution section, and an optional rf amp ahead of that. In correspondence with the author, I expressed my concern that unknowing builders would carelessly include as much gain as they could before the front end of their receivers and I suggested some article language cautioning its use. As I'm sure all of us know, most HF receivers seldom need another rf stage, not to mention the '390 series. As Bob points out, IMD and other bad things are more likely to happen even without the added gain block. I hope potential builders of the distribution device keep that in mind.

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Date: Wed, 21 Apr 2004 07:43:04 -0400  
From: Jim Brannigan <jbrannig@optonline.net>  
Subject: Re: [R-390] Distribution Amplifier

Good points. An attenuator ahead of the amplifiers should help with any overload problems. The author includes filters for AM and VHF in the basic design. Also, many BA receivers of lesser pedigree than Collins need help above 20 Meters or so.

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From: "Don Reaves W5OR" <w5or@comcast.net>  
Subject: RE: [R-390] Distribution Amplifier  
Date: Wed, 21 Apr 2004 08:58:22 -0500

Jim Garland, creator of the distribution amp project, probably tried it out on an EAC R-390A. I saw one at his well equipped shack/lab a couple of years ago. Jim is an amazing fellow, holding a doctorate in solid state physics, prolific radio project designer/builder, president of a university, vintage radio restorer, active ham. I don't think he ever sleeps.

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Subject: Re: [R-390] Distribution Amplifier  
From: flood@Krohne.com  
Date: Wed, 21 Apr 2004 10:40:16 -0400

Yes, I agree, I'm sure that is why the developer designed the pass filter to cut off above 75MHz. I won't change the filter values to allow for the 150 MHz cutoff as I'm sure that the R390A and SP600-JX would be confused by high power paging signals. I haven't given up on the valves yet. I've just not been lucky enough to find a dist. amp. here at the New England flea markets.

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Date: Thu, 22 Apr 2004 21:07:52 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] Distribution Amplifier

A couple of things you could do with the ARRL distribution amplifier:

- 1) The MAX 496 is a direct drop in for the MAX 497. The 496 has the same spec's except it has half the gain and significantly less distortion above 10 MHz.
- 2) Change out the 75 MHz high pass filter for one that cuts off at 30 MHz. If you are running into a '390 there's nothing good going to happen with signals and distortion above 30 MHz.
- 3) C14 is the input blocking capacitor. The guys who did the AMRAD whip antenna came up with the fact that making this cap smaller trades off lightning protection for low end response and noise figure. If AM radio is not an issue dropping this part back to 0.001 or even less might be a good idea.
- 4) In the same way putting a coil of some sort in the location shown for R2 could help for ESD and lightning. Of course a DC short can cause problems of it's own.

Please don't take this as a bash of the design. It looks like a \*very\* well done design. I suspect it works very well just like it is shown in the article. All I'm trying to suggest is that it might be possible to optimize it for R-390 type use.

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Date: Fri, 23 Apr 2004 18:35:35 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Distribution Amplifier

>I have been reading with great interest the discussion on the distribution  
>amplifier. I have two military units that are marked: CU-1872, these  
appear to  
>have one input and eight outputs and are quite heavy. The back is marked  
>"Autec Project" Does anyone know anything about these ?

I can tell you what the "Autec Project" is: In the Bahama Islands, Andros Island is the largest one and among least populated. It hosts the AUTEK fallibility of the US Navy. Atlantic Underwater Test and Evaluation Center (or some such name.) Between Andros Island and Grand Bahama Island is a very deep (one thousand fathoms) piece of ocean about 50 miles wide and 100 miles long. It is used for submarine exercises and torpedo firing training. The place has a small number of shore stations with tracking equipment and a control station to keep track of what's going on both on and under the water. Most likely your distribution amplifiers came from the communications part of the place.

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From: "Schluensen" <schluensen@freenet.de>  
Date: Wed, 5 May 2004 04:32:25 +0200  
Subject: [R-390] Twinax Antenna Input 390A

How is the way to make an Adapter-Cable from Twinax to normal RG213/RG8 cable? (for using the "Balanced-Antenna-Input" of the 390A with my normal Amateur-Antennas...)

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Date: Tue, 4 May 2004 23:06:42 -0500 (CDT)  
From: jhhaynes@earthlink.net  
Subject: Re: [R-390] Twinax Antenna Input 390A

Some of use a little gadget made for IBM-style computer networking. Has a Twinax plug on one end, and a transformer in a little plastic housing and a modular telephone jack on the housing. I haven't made any measurements, but the things seem to work fine across the HF range. I don't know if they are still used. At one time you could buy them from companies that deal in miscellaneous computer stuff, and also at surplus stores.

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Date: Wed, 5 May 2004 06:54:42 -0500  
From: mikea <mikea@mikea.ath.cx>  
Subject: Re: [R-390] Twinax Antenna Input 390A

.....little gadget made for IBM-style.....

Aso, twinax is still used by various IBM minicomputers (AS/400, S/36, S/38), and twinax plugs are readily available from large-enough parts houses -- even here in te Oklahoma City area.

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Date: Wed, 05 May 2004 13:52:17 +0200  
From: "Bryce Ringwood" <BRingwoo@csir.co.za>  
Subject: Re: [R-390] Twinax Antenna Input 390A

There is a lot of earlier correspondence on this. I'm using a balun (well, actually an 'unbal', I suppose) inside the IBM connector housing (The twinax connector was used on old-style IBM networks and is readily available, even here in South Africa). I think I'm using 20+20 turns, bifilar wound on a small high frequency ferrite toroid, available in many places. Take the opposite ends of the windings to make the centre tap and connect the co-ax outer and ground. Take the coax centre to one of the ends. Connect the two ends to the pins of the twinax connector. I checked that the gadget was working with a signal generator and scope. Look up 'balun' on Google. A lot of the people prefer to use twin feeder as intended.

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From: "Gary H. Harmon, Jr." <gharmon@idworld.net>  
Subject: RE: [R-390] Twinax Antenna Input 390A  
Date: Wed, 5 May 2004 06:56:51 -0500

Contact Hank at hankarn@pacbell.net. I believe he makes and sells them.

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Date: Thu, 24 Jun 2004 01:58:21 EDT  
From: ToddRoberts2001@aol.com  
Subject: Re: [R-390] r390a balanced input connector

>Does anyone know the UG number for J104, the balanced input connector?

There are several different balanced connectors and adapters that will fit J104. The most useful connector/adaptor as far as I am concerned is the UG-970/U. This is a right-angle adapter that connects to J104 and converts to a female SO-239 standard coax connector. There is a slight mismatch when converting from a 125 ohms balanced to 50 ohms unbalanced input but 99% of the time the difference will not be noticed.

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Date: Sat, 26 Jun 2004 12:34:11 -0400



From: "Walter Schulz" <k3oqf@localnet.com>  
Subject: [R-390] R-390 Balanced Antenna Input

Regarding the balanced Antenna Input. Western Electric use to make WE754 Cable which was double shielded and used for the transmission of video. DB loss per 100 feet at 148 Mhz was less than 1DB. There were two leads, white was the tip, and blue was the ring side. The connectors were made by AMP connectors, and would assume they are still available. Using for WE754 for ham radio or unbalance, simply twist the white and blue wires together and solder. The input impedance becomes approximately 52 ohms. I thought this might be helpful to all who own R-390A receivers.

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Date: Sun, 27 Jun 2004 00:48:08 -0700  
From: "Glen Galati" <eldim@worldnet.att.net>  
Subject: Re: [R-390] R-390 Balanced Antenna Input

Was this WE754 CABLE SHIELDED AND WHAT IS THE IMPEDANCE?

I have a balanced coaxial cable jumper that is RG-22B/U and is terminated with UG-421 Amphenol TWIN-AX male connectors. The Impedance is 95 Ohms @ 16 pfd/ft. This coax was made by I.T.&T. Federal Cable. I know that the velocity of propagation increases with impedance increases. Most of our RADAR equipment used RG-62 coax when outside the waveguide environment. In all my years in the Air Force I never saw balanced antenna lines used. I may have missed some important thread explanation on the subject of the R-390 Balanced Input, so I'm not up to speed on which produces the best results.

QUESTION: On a side by side comparison with say two dipoles cut to the same frequency WITH one using balanced feed-line and the other coax, which would win out? There is an interesting coax by Belden 9857 (MIL-C-17F) RG-63 that is 125 ohms, 84% V.F. It has two shields (1-copper & 1 tinned copper) very low loss 1.5 db/100 ft. The center conductor is solid 22 AWG and is a copper clad steel. There are also two Belden 124 ohm Twin-ax #9271 (66%VF) & 9860 (78% VF). I haven't seen this coax and anyone with an interest can surely get all the specs from the Belden website.

Date: Sat, 03 Jul 2004 19:47:28 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] Reply to my Ballast Tube Question

Ahh ... and that brings up a question: What were the antenna couplers used on the CVA-19 at that time? It's been a while I know, but I just had to ask. There is an ongoing discussion about input impedance of the radios and how they attached to antennas in military service ...

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Date: Fri, 9 Jul 2004 10:26:11 -0500  
From: Tom Norris <r390a@bellsouth.net>  
Subject: [R-390] Balanced Antenna Connectors Available

Someone asked about the twinax antenna connector availability offlist, and I will pass along the info here. This is a standard IBM Twinax Network cable connector and is still being produced (regardless of occasional ebay listings selling them as "rare" for \$20 each.) There are two part numbers that are current with Amphenol.

Amphenol 82-5589  
Amphenol 82-5589-RFX1

The two connectors are identical but for price. The first one is fairly expensive, the second number is listed as a "low cost commercial version" of the first number and the last couple I bought were purchased locally for a bit under \$5. Mouser lists them in their catalog under those same part numbers. ([www.mouser.com](http://www.mouser.com)) AMP/Tyco also produces this connector, and I have gotten them locally for about \$3, but can't seem to find the part number for them.

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Date: Sat, 10 Jul 2004 16:05:08 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: [R-390] Small Voodoo Antennas and Maxwell's Equations

If Maxwell is right (and in better than a century nobody's proved different) then you can make some pretty neat smaller antennas. The problem is that nobody has ever figured out how to do a good enough job of it. This actually gets back to another R390 issue I keep fishing around on. One of the ways to do a "compact dipole" is with a small resonant loop. The output impedance of these things can be almost anything depending on their design. They are inherently a low noise balanced antenna and you mess them up a bit when you convert them to a balanced line. The lowest noise configurations are generally shielded and balanced. Now let's see, shielded balanced antenna that may have an unusual impedance. What radio's antenna input does that bring to mind? So far I have found absolutely no evidence that such an antenna ever figured into the design of the 390, but I keep fishing.

Date: Sat, 10 Jul 2004 17:07:42 -0400  
From: Rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Small Voodoo Antennas - a Vertical!

Take this in another direction. Using one of those 50 ohm antenna connectors, I attached two fiberglass arrow shafts. I joined them together

with a 1/4" dowel. I wound its length with #26 enameled wire VERY tightly and closely wound. I have NO idea as to its impedance. BUT - my den is mostly below ground level. The reception is AS GOOD as an outdoor antenna of either dipole or any other I've strung! The R-390A loves it and performs flawlessly. YMMV. But it sure works for me!

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Date: Sat, 10 Jul 2004 18:13:32 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: [R-390] Small Voodoo Antennas

The wire wound arrow shaft antenna working well is actually a proof of Maxwell's fifth equation which more or less states "the antenna you count on the least will always work the best". Most of us go (myself \*very\* much included) go overboard on receiving antennas most of the time. Transmitting antennas are a bit of a different story. A lot of the theory we are taught applies only to a transmitting antenna. Which parts of the rule book apply to which kinds of antennas is rarely made clear either in the text books or in class. Often the reaction of anybody who has used an antenna is "electromagnetic theory is bunk". It's not bunk, it's just so complex that they rarely teach it in a comprehensible fashion. If you sprinkle a bit of salt (maybe a bit more than most people would ....) on a damp piece of yarn (say very damp) looped over the back of a chair (a large chair) and hook it to your R390 whip antenna input. It is acting as an adequate antenna \*if\* the radio noise level (front end noise + antenna noise) rises when it is connected to the radio. It may not be the best antenna you could have but it is doing a job for you. For the full recipe and other exciting details on this dish please visit our web site ....

A lot of modern antennas are amazingly small by the standards of days gone by. One excellent example of this is an amplified whip antenna that a bunch of the guys from this list came up with. It uses a very expensive FET running hot enough to cook an egg. Very good performance from sub 100 KC up through 30 MHz (it even does that little trick as well ...). Most Loran-C antennas are \*very\* small when you consider the wavelength of a 100KHz signal.

Most of us have more trouble from local noise than we used to. A small antenna located far from, or maybe at right angles to a noise source may be a better bet than a nice big one that runs right into the noise. Soon by virtue of broadband over power lines we all will be able to get a \*lot\* more experience with this sort of thing. Or I suppose we could just stop playing with radios. Then we could turn this into a full time humor list ....

Date: Sat, 10 Jul 2004 18:21:24 -0400  
From: Rbethman <rbethman@comcast.net>  
Subject: [R-390] Re: Small Voodoo Antennas

I am a LIVING experiment of BPL! Manassas, VA is running it currently. I hear EVERY burst from 2Mc up through 30Mc! I HAVE to get out the reel to reel tape deck and start recording for both the ARRL and the City Council. Maybe even the FCC! It very DEFINITELY detrimental to the HF bands as a whole. FEMA definitely WILL have problems, along with us. I agree that almost ANYTHING makes one darn good receiving antenna. My own little arrow shaft vertical was more than proof to me. The thing that started that project was looking at the collapsible whip on TOs and my Mohican.

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Date: Sat, 10 Jul 2004 18:58:44 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: [R-390] BPL

Hi I have no doubt that a lot of government services that still rely on HF will be impacted by BPL. Their boss has signed up for the plan and they know who calls the shots ....

The "service" is nicely set up so it avoids the AM broadcast band and stops before it gets to the low end of the VHF FM public utility band. Somebody knows who not to bother. The public utility stuff still includes the police (Headline "BPL allows felon's escape ...") and the AM band has Howard Stern as a defender.

I am amazed that there has been no obvious reaction to this stuff from the short wave broadcasters. Obviously the BBC is gone, but there are still a few out there from countries that we talk to .. ( hmmm , may be a short list ...).

The military has been going to satellite in a big way so HF is not as big a deal for them. I suspect that one of these days the lack of a working HF backup system will get them though. How many R390's did they haul out in the Gulf War ? Those radios were \*not\* talking to satellites.

The shame of it is that cable is getting so much faster year by year that they will be selling 9600 baud modems by comparison when they roll the thing out. I keep wondering if their main desire is to legally control their own equipment rather than sell the service to others.

Obviously this is a hot spot with me .... sorry for the rant.

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Date: Wed, 14 Jul 2004 20:55:16 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] Antenna Trimmer

Yes the R-390A does have an antenna trimmer, and no nobody knows what it's characteristics are. I realize that sounds a bit much, but like a lot of stuff on these radios it's true. We really do not know what range of impedances the little knob will work with. What is known is that just about any antenna you hook up can be "peaked up" with the antenna trimmer. Like a lot of other things, it works even though we aren't quite sure why. You could do a bunch of math and figure out what's going on, but that's better done in the winter when there are fewer other things to do. I would bet that the thing will tune out a couple hundred ohms of reactance, either inductive or capacitive. Hopefully that's the information you were looking for. If not just yell at me ... everybody else around here does :)

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Date: Thu, 15 Jul 2004 07:28:14 -0500  
From: "Laird Tom N" <LairdThomasN@JohnDeere.com>  
Subject: [R-390] RE: Antenna Trimmer

> the R-390A have an antenna Timmer? If so, what is it's characteristics?

here are some old posts from my archives: Tom Laird WC9MMoline, IL.

>Got around to installing the worm gear assembly back onto the antenna  
>trimmer bracket so I could adjust this from the front panel (I had been  
>turning the gear with my fingers from the top). I now notice something:  
>if the teeth of the gears are engaged, the signal increases about 10  
>to 15dB. I noticed this when I rocked the knob back and forth. It goes  
>from engaged to not touching to engaged in the other direction with the  
>signal drop occurring during the disengaged portion.

There are a couple of things you need to watch out for on the antenna trimmer. One is that the insulating bushing and thrust washer for the shaft that goes to the front panel are intact and oil and residue free. The second is that the insulating washer for shaft that enters the can itself isn't cracked or mispositioned. It's got a tiny little step on it that is supposed to center it in the hole. It usually doesn't. I've seen number of RF decks where it was mispositioned and would allow a short when the gear was loaded in one direction or the other resulting in sensitivity going South. Kill the power to the set and measure the resistance of the shaft and gear that goes into the can to ground. I don't have the manual in front of me but it should be very high, hundreds of K maybe. Keep the lead on the center of the shaft/gear and start rotating the trimmer knob. If the resistance reading drops, you've probably got a misaligned insulating washer or some debris in the can.

-----more-----

The worm gear on the shaft was touching the shaft, thereby grounding it. I left the gear too far forward allowing it to touch the shoulder on its

shaft. Not only did this ground the gear, it left way too much axial play in the shaft. I loosened the locking screws and pushed the gear away from the shoulder (about 1/16" or more) to where there is almost no axial play in the shaft. This stopped the intermittent grounding and now the shaft stays in the same position along its axis.

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Date: Thu, 15 Jul 2004 12:13:31 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] RE: Antenna Trimmer

>... the insulating bushing and thrust washer for the shaft

Are there to insulate the rotor of the capacitor from ground. The antenna trim cap is connected across whichever RF input transformer is selected by the band switch. The RF Transformer secondary winding carries the AGC voltage to the grid of the first RF Amplifier tube. Note: That shaft is then a convenient place to test the AGC voltage that is getting to the 1st RF stage in trouble-shooting the AGC system. Use a VTVM of the old style with a 1-meg-ohm resistor in the probe to avoid detuning the stage. The 11 or so megohms of most DMM's or VTVM's may not affect the DC values much, but be alert for that happening to some degree. Test point E-208 is tied to the first RF Grid through a 470K resistor and is meant for just this purpose. It would help you confirm an open RF transformer, or bad contacts on the transformer plug pins or the band switch.

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Date: Tue, 20 Jul 2004 19:34:27 -0400  
From: "Michael Murphy" <mjmurphy45@comcast.net>  
Subject: Re: [R-390] Help with info on a STRANGE SP-600

Concerning Diversity operation at HF, R390A, SP600 or otherwise, you have the right idea. Using two different types of antennas should work OK. There are three ways to use Diversity at HF.

1. Simple Space Diversity - Here we need two identical antennas, that is the same polarization, gain, and arrival angle. These could be a couple of dipoles at 100 feet. They should be spaced out several wavelenths apart (!!) however for diversity to really work.
2. Polarization Diversity - This setup purposely uses two different kinds of antennas, like what you were suggesting, a Carolina Windom and an inverted L. The antennas should not have drastically different gains, or the system will not "vote" properly. Better choices might be a Marconi vertical or sloper dipole and a regular dipole.
3. Arrival angle Diversity - Requires the use of a receiving antenna with discrimination in the vertical plane. For this reason it does not appear to

be a method that is in common use for HF. With a vertically steerable array comprising short vertical monopole or active loops, worthwhile improvements are possible by isolating the different ionospheric mode and using them in diversity.

Date: Tue, 20 Jul 2004 21:30:23 -0500  
From: William J.Neill <wjneill@lcc.net>  
Subject: Re: [R-390] Help with info on a STRANGE SP-600

There's a fourth way, which I used quite a bit when in the US Army 37 years ago. It's frequency diversity. The same traffic is transmitted on two different frequencies, thereby minimizing fade. Works quite nicely, especially on long skips.

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Date: Wed, 21 Jul 2004 05:15:18 -0500  
From: Tom Norris <r390a@bellsouth.net>  
Subject: [R-390] Celebrating Diversity (reception)

>1. Simple Space Diversity - Here we need two identical antennas, that is the  
>same polarization, gain, and arrival angle. These could be a couple of  
>dipoles at 100 feet. They should be spaced out several wavelenths apart  
(!!)  
>however for diversity to really work.

If you have hundreds of acres, this would work well on AMBC and 160 heehee..

>2. Polarization Diversity - This setup purposely uses two different kinds of  
>antennas, like what you were suggesting, a Carolina Windom and an inverted  
>L. The antennas should not have drastically different gains, or the system  
>will not "vote" properly. Better choices might be a Marconi vertical or  
>sloper dipole and a regular dipole.

I have used simple crossed dipoles for this. Even when I was trapped in an apartment, I set up such an "orthogonal" antenna on the balcony. The R-390A's and the SP-600 for that matter, have sufficient gain to work with shorter antennas. Orthogonal antennas or loops/vees/dipoles at 90 degrees are a simple solution and work quite well for this. Keeping up crossed antennas here lately has been a chore with all the recent winds. I can't tell much difference between my recent "two dipoles on a pole" and the horizontally mounted very short dipoles that I had at the apartment. Both work(ed) wonderfully eliminating fade on SW and MW AM signals. A

pair of R-390 or 390a's work for diversity "right out of the box" simply by tying the diode load and agc lines together and using separate antennas per the directions in the manual.

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Date: Wed, 21 Jul 2004 08:28:09 -0400  
From: Sheldon Daitch <sdaitch@ibb.gov>  
Subject: Re: [R-390] Help with info on a STRANGE SP-600

Let me mention two other methods of diversity...

Frequency - using two (or more frequencies), not generally practical at HF, but can be done, provided the transmitters are at the same site and use the same "programming" audio. One application that we used was for our WWV monitor, one RX was on 15 MHZ, the other on either 5 or 10 Mhz, so we did not have to worry re day or night time propagation. Frequency diversity is really useful at microwave frequencies. We also used audio frequency diversity on HF RTTY with the Northern Radio tone units, using a high set of AFSK tones and low set of AFSK tones, in the audio channel, and the tone demodulators had a voting methodology to determine mark or space, if the two channels did not agree. If I remember correctly, it was level driven. (Remember, selective fading in the audio channel.) Time - Generally related to data. Barry Research had some RTTY products which used 7 tone channels for the same RTTY data, only each channel was shifted in time slightly on transmit, and the matching modem, reshifted them in time, and used a voting methodology to decide if it was a mark or space, depending on number of channels indicating that "time" item was a mark or space. This way a static burst would take out different data bits, because of the time shifts. This BR stuff was fairly high dollar gear, I think.

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Date: Wed, 21 Jul 2004 13:11:21 -0500  
From: Harry Joel <hcjoel@direcpc.com>  
Subject: [R-390] Xtal Set/Antenna Follow-Up

This is an follow-up to my July 10 story about my longwave antenna installation for my crystal set. The designers of quality crystal sets, without the benefit of modern circuit theories, applied features to get the most 'output' to the headphones with no amplification. To mind comes the use of 'honey-comb' wound tuning coils (often the plug-in type).

After installing my flagpole long wire, I realized that a good ground connection of the antenna tuned circuit was mandatory. But alas, my beside set was too far from any metal water pipe. AC outlets were the two wire type with no ground. In an experimenters magazine I came across the expression 'counter point' to replace a ground connection. On a hunch I made a good connection to the steel spring frame under the mattress and



it worked like a champ. My theory is not up to snuff on this. It seems that the counter-point was the third element in the series connection of longwire-tuned circuit-counterpoise. Any ideas from the gurus? My music teacher (organist at a church two blocks from his apartment) used a no longer used private phone line to the church office as a super-duper long wire. He picked up a really strong signal. Glued a large seashell to this earphone and the volume was good enough for listening across the room! Being a radio aficionado he also had build a superheterdyne receiver.

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Date: Sat, 7 Aug 2004 09:58:31 -0500  
From: mikea <mikea@mikea.ath.cx>  
Subject: Re: [R-390] not yet

Saw that post. Brave man, but also an enterprising one. Do you have the set of R-390A TMs yet, and the Y2K R-390A manual? If you need the R-390A TMs, you can go to LOGSA, or you can do the easy thing and get them off my site: <<http://mikea.ath.cx/R-390A>>. It's case-sensitive until I get in and set up some lowercase links.

> II have been wondering about the antenna.....

Different. The unbalanced connector is a "C", which is like a BNC on too much steroids. The balanced connector is fairly common and easily procured, since IBM uses it on S/400 minicomputers.

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Date: Sat, 07 Aug 2004 11:04:00 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] not yet

Sometimes the process of coming up with a radio takes a while. This is especially true around the opening days of deer season or when it gets real hot in the shop in the middle of summer .... If the radio is coming from Fair then they very definitely run a pull one and check it routine. The first check is to see if they can at least hear something on some band at each of the filter settings. Next is a quick check of the BFO and maybe the noise limiter. If it makes it past that they then try to get a radio with both the AM broadcast band and a couple of the HF bands working. Last time they explained it to me it sounded like the tech had a certain amount of discretion about what did and did not constitute a working radio. The good news is that if they mess up you can get them to make it right without much hassle at all. There are different opinions on what to do about the RF connectors on the R-390. As it came stock from the factory the BNC antenna connector goes to the whip antenna input on the RF deck. The balanced antenna connector (an IBM LAN connector) goes to the main antenna input on the RF deck. Things that have been known to work:

- 1) simply stuff a piece of wire into one side the twin lead connector and ground the other side of the connector.
- 2) modify the cables from the back panel to the RF deck so the BNC goes to the main antenna. This is a Navy mod if I remember right.
- 3) The LAN connectors are < \$2, so buy the right connector and wire it up to the right cable (twin conductor coax - weird ...).
- 4) Get an adapter from the LAN connector to a SO-239. This is certainly the best looking solution.
- 5) Make a 50 ohm to 120 ohm balun, put it in a box, mount it on the back of the radio, cable it with the right connectors .... ugg...
- 6) Just use the whip antenna input (not as good for RF overload)

There are probably other things that also work, but you get the general idea. On a radio fresh out of the box I would just use option one above and get playing with the new toy.

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Date: Sat, 07 Aug 2004 16:16:56 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] not yet

There is a error in the previous post. The BNC connector you swap the cables over to is the one that is normally the IF output jack on the back of the radio. The whip antenna goes in through a C connector. The Navy mod moves the balanced input over to the C connector rather than the --BNC. Sorry about that!

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Date: Tue, 31 Aug 2004 21:26:04 +0100  
From: Charles B <ka4prf@us-it.net>  
Subject: [R-390] Matching network

What can I do to get a better match of balanced antenna (dipole) to my R390A. At the moment the antenna is attached to J106 and in the same configuration as shown on <http://www.r3980a.com/html/feedpoint.html> top picture.

Would an antenna tuner help such as the MFJ 959B?

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Date: Tue, 31 Aug 2004 19:56:16 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] Matching network

If the purpose is general listening then a "matched" antenna may not be the best bet unless you have room to put up lots of them. If you are like most people you have limited room and the real question is how to get the most out of the antenna you have. More or less a dipole is at it's minimum impedance at resonance.

The magnitude of the impedance goes up as you go away from resonance. If your objective is to get as much out of the antenna over as wide a band as possible then you want a higher impedance on the antenna. Simply put 120 ohms will work better than 75 and 75 will work better than 50 ohms. This holds true up to about 200 ohms or so for normal dipoles. After that point the bandwidth does not get any better.

This is not to say that you will get more signal out of the dipole at resonance when you load it in 120 ohms. In fact at resonance you will get a bit less. The point is that by say 20% off resonant frequency you will be even with the matched load and past that you will beat it.

The total difference is the square root of the ratio of the impedances so for a six dB change in signal you would go from 50 ohms to 200 ohms. Even with a fairly compact antenna you should have enough to get a R-390 going below 10 MHz in the evening with either feed impedance.

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Date: Tue, 31 Aug 2004 21:11:46 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] Matching network

If this list took the stand of "leave well enough alone" then 99% of what we do would be off limits ..... I'm only suggesting that the improvement may not be quite as much as you would think. A lot depends on how far off resonance the antenna is.

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Date: Fri, 15 Oct 2004 17:58:16 +0000  
From: "Gene Dathe" <dathegene@hotmail.com>  
Subject: [R-390] Rhombics

All right; that's it--somebody said something about lurking so I guess I better speak up... Could someone give me some advice as to how to set up a rhombic into my R390A? I have the real estate, what do I need for poles, wire and feedline? If you could point me in the general direction.....

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Date: Fri, 15 Oct 2004 14:04:11 -0500 (CDT)  
From: jhhaynes@earthlink.net  
Subject: Re: [R-390] Rhombics

You're just in time. The November 2004 issue of QST just came, and has an

article on rhombics.

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Date: Fri, 15 Oct 2004 15:51:15 -0400  
From: "John KA1XC" <tetrode@comcast.net>  
Subject: Re: [R-390] Rhombics

The feedline isn't critical, open-wire line or ladder line connected directly from the antenna to the balanced input of the 390 would be excellent. Never had the real estate for a rhombic myself but here's a few links to get you going.....

Rhombic Antenna Homepage  
<http://www.mindspring.com/~cumplings7/rhombic.html>  
also check out Cebik's excellent analysis of large wire loops, not rhombics but it may be to your liking as well.....

Horizontally Oriented, Horizontally Polarized Large Wire Loop Antennas  
<http://www.cebik.com/at11.html>

And then of course is the classic 14 rhombic antenna farm of W6AM.....  
<http://home.swipnet.se/dx/porthole/w6am1.htm#top>

Tons more info on the web, just Google search for "rhombic antenna".

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Date: Fri, 15 Oct 2004 13:29:02 -0700 (PDT)  
From: David Medley <davidmed82@yahoo.com>  
Subject: [r-390] For your R-390 notebook

I am working on what will be my second last R-390 restoration. I have worked for months on this radio and it is now almost like it came out of the factory. Problem was its sensitivity was just awful no matter what I did. Just this morning I discovered the problem was in the antenna relay, I believe faulty connectors. Replacing this whole assembly resulted in a very sensitive radio. Never struck this problem before.

---

Date: Fri, 15 Oct 2004 14:50:30 -0600  
From: <jay\_coward@agilent.com>  
Subject: RE: [r-390] For your R-390 notebook

Wasn't there a thread long ago on this problem? Or was it a different issue concerning this relay?

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Date: Fri, 15 Oct 2004 17:56:25 -0500 (CDT)  
From: jhhaynes@earthlink.net  
Subject: Re: [r-390] For your R-390 notebook

I sent a receiver to Rich Mish for refurbishing several years ago, and the antenna relay was one of the things he replaced.

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Date: Fri, 15 Oct 2004 19:29:46 EDT  
From: ToddRoberts2001@aol.com  
Subject: Re: [r-390] For your R-390 notebook

Glad you found the problem Dave. Another related sensitivity problem I have seen once was a friend's R-390A that had very low sensitivity and the trouble turned out to be a bad UG-970/U antenna connector - the elbow style connector that adapts the twinax input to an SO-239. Somehow the center-conductor was open circuit. Replacing with another UG-970/U cured the problem. It pays to check the low-tech items first. 73  
Todd Roberts WD4NGG.

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Date: Fri, 15 Oct 2004 18:47:11 -0500  
From: "Bill Hawkins" <bill@iaxs.net>  
Subject: RE: [r-390] For your R-390 notebook

Interesting. Refurbishing is what you do to relay contacts to make them conduct again.

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Date: Fri, 15 Oct 2004 18:00:45 -0600  
From: <jay\_coward@agilent.com>  
Subject: RE: [r-390] For your R-390 notebook

I believe it is called "burnishing".

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Date: Mon, 25 Oct 2004 10:32:58 -0400  
From: Rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] SP-600 - NRC Type 159 - Radio R-450/FRR-28

Perhaps the documentation makes more sense then. The diversity antenna system recommends the use of rhombics BEFORE talking about others. With what you've just written, that MAY be the reason.

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Date: Mon, 25 Oct 2004 12:45:12 EDT  
From: Llgpt@aol.com  
Subject: [R-390] Trying to id a navy multicoupler

A friend recently acquired a couple of multicouplers. I'm unable to find any info on the Internet and was wondering if there are any more of these out there? Here is the information on the nomenclature tag on the front panel.

Serial No. A4        28355 - 0135929

MF/HF MULTICOUPLER  
CU - 2279/BRC  
DES. ACT.: NAVALEX CTR, CHARLESTON, SC  
CONTRACT N00612 - 84 - D - 0105

It has 2 N connectors for inputs on the rear panel. Each input has 4 bnc outputs, plus a bnc test output for each channel. The front panel has a on-off power switch, a fuse and channel A and B buttons. It is rack mounted, and 3-1/2" high. Operates off of 120 volts. Beautifully built, operates from 100 kc to about 12.8 ghz. no loss apparent when not turned on and approximately 6 db gain when on. Any information out there?

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Date: Mon, 25 Oct 2004 13:38:20 EDT  
From: Llgpt@aol.com  
Subject: Re: [R-390] Trying to id a navy multicoupler

A correction, it operates from 100 kc to 1.8 ghz.

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Date: Mon, 25 Oct 2004 18:17:45 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] SP-600 - NRC Type 159 - Radio R-450/FRR-28

So if this was all planned - are there any references to hooking up these radios to 120 ohm systems ? If they are out there I sure have not seen them.

---

Date: Sun, 23 Jan 2005 10:06:54 -0600  
From: Tom Norris <r390a@bellsouth.net>  
Subject: [R-390] Good source for Twinax connectors

Just got a handful of Twinax connectors this week so as to have some on hand. Amphenol p/n 82-5589-RFX are only \$3.95, discount for quantity. That's nearly half the price of Mouser. Where?

Randolph and Rice Electronics in Nashville, TN.  
<http://www.randolphandrice.com>  
Click on "Email Us here" to contact a salesman. (Best salesmen - Scott or Mike)  
Phone 615 255-5601 (no 800 number) They cheerfully do mail orders to anywhere.

They have decent prices on Cannon MS connectors as well, less that Allied or Newark.

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Date: Tue, 22 Mar 2005 00:16:03 EST  
From: Flowertime01@wmconnect.com

Subject: [R-390] Looking for CU 872 Antenna Coupler

I am looking for a CU 872 antenna coupler. About 20 dual triodes, a nifty panel meter. One is receive only. One antenna in and eight receivers out. You could run these about 3 deep and fan out to 512 or so receivers off one antenna. They were used with R390 R390/A and covered the range. You could get a little higher than 30 megs. They have a low pass filter that cut the bottom off at 2 MHz. This filter could be bypassed with a BNC barrel connector. The gain of these was zero. The noise was not worse than not having one in line. Using them two or three deep did not loose any signals. If you could hear it with an R390 off the antenna, you could hear it with 1, 2, or 3 CU 872s in line. The unit has gain as it spread the input out to 8 outputs. I would like to rewire one as an RF amp. I know some of you fellows need all eight outputs and could likely use more than 1 unit. However I would be happy to use only 4 outputs. Thanks Roger L. Ruskowski KC6TRU

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Date: Sun, 17 Apr 2005 17:17:42 -0700 (PDT)  
From: djmerz@3-cities.com  
Subject: [R-390] 390 ant balanced connector

Hi, I'm looking for the 82-5589-rfx connector and a short piece of appropriate coax twinax cable to use with my 390. Mouser, Newark, Surplus Sales and Wallco have the connector with Wallco lowest at \$4. But I still need to come up with the cable. Someone sold me a made up item for under \$10 a few years back when I was getting the 390a up and running - I thought maybe someone here might know or be a source for such a combo, so I don't have to buy some large quantity of coax, thanks for help,

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Date: Sun, 17 Apr 2005 20:33:27 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] 390 ant balanced connector

The cable is used for IBM token ring network installations. This isn't exactly a common thing to be putting in these days, but it once was. Your local electrical supply company may have a spool sitting in the back room under about six inches of dust. Once they find it they may sell you the entire spool cheap.

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Date: Mon, 18 Apr 2005 12:20:25 -0700  
From: Chuck <ka6uup@pacbell.net>  
Subject: [R-390] CU168 Multicoupler Question

Somewhere, I remember reading that it is possible to bypass the high pass filter in this unit so it covers the AMBC band.. Can any one help me with

the details?

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Date: Mon, 18 Apr 2005 15:32:19 -0400  
From: "Veenstra, Lester" <Lester.Veenstra@intelsatgeneral.com>  
Subject: RE: [R-390] CU168 Multicoupler Question

Yes but then you run the risk of overloading the amp with excessive signal levels.

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Date: Mon, 18 Apr 2005 15:36:59 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: RE: [R-390] CU168 Multicoupler Question

That sounds like good advice, depending on your location. I think Les has a medium power AM antenna at the end of his street, and there's one about 4 miles from my place. A tuned suck-out circuit (series tuned resonant circuit) across the input might reduce any troubles you find.

---

Date: Tue, 19 Apr 2005 14:00:05 -0400  
From: "John KA1XC" <tetrode@comcast.net>  
Subject: Re: [R-390] CU168 Multicoupler Question

I believe you're thinking about the CU-872 multicoupler, it has a high-pass filter module fitted with BNC connectors under the chassis which is very easy to bypass. The CU-168 does not have this, it's simply transformer and choke coupled all the way through. It is flat down to 2 MC, so it'll probably work on the top end of the broadcast band.

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Date: Tue, 19 Apr 2005 11:20:49 -0700  
From: David Ross <ross@hypertools.com>  
Subject: Re: [R-390] CU168 Multicoupler Question

I had a couple of CU-168s, tried 'em both on the AM broadcast band. Compared to their output at 10 MCs, response on both units was real close to 3db down at 2 MCs. I fussed with them a little and could not come up with a good way to lower that bottom 3db point. Whatever high-pass filter there is in the CU-168 seems to be built in the balanced line signal distribution scheme in the unit - it is certainly not as simple as bypassing a single filter module. The CU-168 high-pass filter is not a brickwall filter - if I remember, response at 500 KCs was only like 20db down from that at 10 MCs. Good luck with it, please post details of any success you have getting the CU-168 to work well down to 500 KCs.

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Date: Mon, 25 Apr 2005 15:11:20 -0500  
From: mikea <mikea@mikea.ath.cx>  
Subject: Re: [R-390] R390 progress



> > I still need a male twinax connector for the antenna socket.....

Me again. The twinax connectors I have are Amphenol 82-5589-RFX. They work just fine on an R-390 or R-390A.

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Date: Mon, 25 Apr 2005 15:54:51 -0500  
From: "Don Reaves W5OR" <w5or@comcast.net>  
Subject: RE: [R-390] R390 progress

Dan, you need a new local electronics junk collector. Check with any computer network company that has been around for a while. If they haven't thrown away all their TwinAX connectors they will likely be happy to give you a few. Some will have a nice chunk of coax attached ready for whatever you want to put on the other end. If all else fails, I'll send you a couple for postage.

---

Date: Mon, 25 Apr 2005 20:24:08 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] Twinax From IBM Used

The IBM twinax connectors go onto the R390 antenna relay just fine. I have been using them for years. The Twinax coax works fine also. You can ground one of the conductors and feed the other conductor from the antenna. If you have some ferrite that covers the frequency range you like, you can wind a simple balun to provide a balanced input to the R390 from the antenna. If you have a balanced line or balanced antenna match the twinax can be feed from that device. If you are going to have to buy some coax, buy enough twinax to get you outside the shack. Buy a couple Twinax feed through of cable splice connectors. Run the twinax from the receiver to outside the shack. Place the matching device outside in a weather sealed container and ground the outer shield of the twinax outside. This works to keep shack noise out of the R390 antenna. It made a world of difference for me in my San Diego California garage with all my computer stuff

running. You can find the twinax as IBM token ring cable as used stuff. It is recognized as good coax worth saving and just wondering what to use it for. The heavy duty serious computer support places may have several lengths collecting dust complete with connectors. A right angle adapter is also useful if one is to be had. Just ask for the IBM token ring cable and connectors. Skip the Radio part. The computer Geeks do not understand radio.  
Roger KC6TRU

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Date: Mon, 25 Apr 2005 20:50:47 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] Line Noise and Balanced Antennas

Yes, a balanced input can help. However YMMV. If you have lots of Rf noise hitting your antenna, balancing the feed line is not going to be the saving grace. I just put up a post earlier about using some IBM twinax to feed an R390. My noise was from my own equipment in the garage with my receiver. The use of a balanced line and dipole antenna helped me with some of the other neighborhood noise. I was never able to cure it all. However, the trouble of installing the Twinax between the receiver and a match box outside where the coax came down from the antenna was really worth the effort for me. Maybe just getting that much shielded cable as a ground strap between the receiver and a good ground was as much help as anything. Been there done that, think it was worth doing.

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Date: Wed, 4 May 2005 14:25:11 -0700 (PDT)  
From: Jack Sullivan <jsullivan10512000@yahoo.com>  
Subject: [R-390] Post to List

For R-390 (non "A"), I just saw old original data sheet from MARS, showing, among other things, changing to ham type antenna connectors, suggesting removing the break-in relay at the back of the antenna connector box. This relay, when set is on break, grounds all three of the antenna terminals. I think it best to keep this relay, so terminals are grounded during break times when transmitting. Am I wrong, and is the relay really needed for ham use?

---

Date: Wed, 4 May 2005 18:39:54 -0400  
From: "John KA1XC" <tetrode@comcast.net>  
Subject: Re: [R-390] Post to List

Hi Jack, that must be the "R390 Cookbook" in the FAQ site your referring to. That thing pisses me off, it should be renamed "How to Butcher An R390" as it has some bad mods in there. All he was doing was eviscerating the ant relay box so that SO-239 connectors could be installed in place of the original antenna input connectors which he didn't like.

There's nothing official at all about that document except for the fact that it was typed on MARS stationary. Fortunately the R-390s I've seen come from MARS had none of those mods. I like the fact that the RX input gets disconnected from the ANT contacts during Standby or break-in; it protects the input coils from mishaps and prevents the AGC from getting clobbered by the loud TX signal which it would then need to recover from when switching back to receive. <snip>

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Date: Thu, 5 May 2005 00:08:00 EDT  
From: Flowertime01@wmconnect.com

Subject: Re: [R-390] Post to List (Antenna Relay)

>I think it best to keep this relay,.....

Most fellows using R390 or R390/A for Ham use are also running a transmitter. The relay gets used for break-in operation. Some fellows have TR switches, but these can bleed RF through, so having the antenna get grounded is good. Some of the TR switches just swap the antenna via relay between trans and receive. Some just cut the receiver signal off by driving a tube or transistor into cut off.

Some TR switches actually ground the break-in circuit on the R390's and use the antenna relay to ground the receiver input. Of course in these circuits you cannot also feed the whole transmitter output into the R390 input, some other switching action has to occur. The receivers offer a single ended coax for input. The better balance input is just a Twinax IBM network type cable. The connectors and coax are very available.

The receivers also were operated with an adapter from twinax to grounded one side and single center conductor coax feed. Any of these work real good. Just Chuck Ripple's R390 Page  
<http://www.r390a.com/html/history.htm>

As Les keeps it going. Chuck did a "how to hook any wire to the input of an R390". It has been working for fellows for a long time. No need to hack the antenna input on any receiver.

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Date: Thu, 05 May 2005 08:24:10 +0000  
From: rbethman@comcast.net  
Subject: Re: [R-390] Post to List (Antenna Relay)

KEEP THE ANTENNA RELAY PACKAGE! I use a Johnson T/T SW, the R-390A is sensitive enough to pick up what is being transmitted. Lord, I've had it on the bench with the antenna disconnected, and had a HAM a half mile away key up and come booming through the audio output! You WILL get reception on the RCVR IF you don't use the break-in!

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Date: Thu, 12 May 2005 18:43:09 -0700 (PDT)  
From: "W. Li" <wli98122@yahoo.com>  
Subject: [R-390] Re: little things

Over the years, I have made some little additions to my trio of R-390A's that may be of use to you guys. Most are obvious and simple (about my speed nowadays). Most are not original with me, but have been mentioned in earlier posts through the years.

## Antenna input

I used Chuck Rippel's suggestions for the balanced input. What I did was house his circuitry into a small aluminum box that bolts onto two existing rear panel screws. Has both a SO-239 and a BNC socket with a 0.01uf blocking cap. Makes a neat and tidy installation. An Asante coax transceiver case is about the right size.  
<snip>

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Date: Fri, 13 May 2005 10:27:52 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Re: little things

Bravo! This is the kind of post that helps both the new folks and the experienced-encrusted graybeards. Thanks for the summary of Tips.

> Antenna input I used Chuck Rippel's suggestions

I plan to experiment with little toroid baluns - small enough to fit inside the Twinax connector. A reducer of some sort and a piece of coax fitted with a female BNC cable mount connector will finish the job. <sip>

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Date: Fri, 13 May 2005 22:58:06 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: [R-390] R390 Baluns

The use of baluns with R390's is a topic that comes up fairly often. The first implicit assumption is that it is necessary to match the input impedance of the receiver to the antenna in order to get optimum performance. The second implicit assumption is that the balun will handle the real impedances of the radio and antenna. A lot of what we learn about antennas comes from working with transmitters. They don't really work the way we think but the math works out anyway. In order to make a transmitter work properly you do need to supply it with the load impedance that it was designed to operate with. If we get too far away from that impedance bad things will happen. The issue is that the output stage in the transmitter has voltage and current ratings. If you exceed them smoke comes out. Baluns are a bit like transmitters. You design them to work with specific resistive impedances on both side of the device. In a transmitter application loss in the balun equals heat in the core. If things get hot enough they explode. Balun explosions sound like a joke but they have killed some pretty famous people. The difference between 0.1 db and 0.3 db in a transmit balun can be a big deal. So far all of this stuff is pretty well understood. It's also pretty important to understand so we spend a lot of time teaching it. A lot of people learn it as "gospel" without

fully understanding that it applies specifically to transmitters. Receivers are different than transmitters. One clue to this is when we rate them the units are microvolts and not something watts. Another more subtle clue is when we check the specifications on a well documented receiver (like the R390) the input impedance is given as a range rather than as a specific number. One way to look at this is that you get more voltage out of a given source if you run it into a high impedance load rather than a matched load. If volts are what counts then that's the way to get volts. Receive antennas are different than transmit antennas. We rarely have the room to put up great big broadband antennas (like a rhombic). The antennas we work with are generally end feed or some kind of dipole. In either case we can't afford to cut one for each band we operate on. Since these antennas are commonly used there is a lot of data on what their impedance looks like over frequency. The data is available from a number of sources ranging from modeling programs to data on the web. The short version of the story is that these antennas are a lot more likely to be high impedance than low. So far hopefully so good. This is all stuff That pretty much makes sense or can be quickly checked out. Here's the first part that gets bizarre. When you match a source you cut the voltage available in half. That gets you 6 db of loss. When you do the match you cut the impedance in half. That ideally drops the noise figure by 3 db. The net result is that the signal to noise varies by about 3 db or so as we match or don't match the antenna. A 0.1 db to 0.3 db variation in loss is not a big issue on a receiver. One other way to look at this is that a 10 or 20 db signal to noise is needed for reasonable reception. With the detectors in an R390 the output signal to noise is approximately the input signal to noise. The difference between a 10 and a 10.2 db signal to noise is not going to be a big issue. Transmit baluns have a tendency to saturate the core. When they do this you get some extra harmonics. A harmonic 40 or 60 db down is a problem. With a receiver a distortion product 120 or 140 db down can be a major issue.

So what's this all mean.

Receiving baluns are different than transmit baluns.

1) You would think that they could be pretty small. The distortion requirements make this less so than you would think. Big cores are a good idea.

2) The transmit formulas give you a required inductance. In a receive application the optimum inductance (and impedance) on a typical receive application is actually higher than for the transmit application (like two or three times higher). This is especially true since the inductance impact is greatest at the lowest frequency. That's also where the antenna impedance is highest.

3) With a R390 balance is an important part of the front end design. It also needs to be part of the balun design. This likely will drive you to a dual core design. The same impedance boost requirements apply to both cores.

4) Evaluating a transmit balun is fairly easy, run it and see if it gets hot. Since our ear responds to loud rather than good evaluating a receive balun with a real antenna is not so easy.

5) Multi wire magnet wire works pretty well for low impedance baluns and for transmit baluns. Twisted teflon insulated small diameter hook up wire works better for receive applications.

That's the easy part. Now you need a non-integer transform .... Take Care!

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Date: Sun, 22 May 2005 23:20:30 -0500  
From: "Brad Huff" <huffb@avalon.net>  
Subject: [R-390] Tube receivers and long wire antennas

I recently put up a long wire antenna approx 125' long and was amazed at the static buildup and arcover as I started to put a coax connector on the end of the feedline during a storm. I am told that the static during a snowstorm is amazing as well. Now to my question for the group-The arc between the center conductor and the ragged end of the just cut braid was probably a kilovolt or so during that storm, a storm that was a couple of miles away. Now I don't intend to leave the antenna hooked up to the radio when it is not in use but I'm still concerned about front end damage while I'm using it. What does one do about this? I don't know if an in line lightning arrester would do the trick or possibly a neon bulb from the center conductor to ground or both. The schematic shows a neon bulb across the unbalanced input but nothing across the balanced one. I don't think that a solid state rig would survive. I've asked a few vendors of antenna supplies about this and they don't have an answer, since I didn't invent the long wire antenna I'm sure someone has dealt with this before. Any help would be appreciated.-Brad

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Date: Mon, 23 May 2005 00:44:13 EDT  
From: ToddRoberts2001@aol.com  
Subject: Re: [R-390] Tube receivers and long wire antennas

Brad - One thing you can do is wire a standard Rf choke across the center conductor of the coax and the shield braid (ground). In order to work properly the shield braid must be connected to an earth ground. By standard Rf choke I mean something with a value of 2.5 - 10 millihenries (not microhenries) - these were commonly used in small to medium powered tube transmitters as a safety choke across the output side of the

pi-network. These chokes are still commonly available. The choke gives a DC path to ground to bleed off or short any static charges to ground and will keep the center conductor of the coax at DC ground potential but has a high impedance to RF so it will have little effect if any on the RF signal level going to your receiver antenna input. 73  
Todd WD4NGG

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Date: Sun, 22 May 2005 21:45:22 -0700  
From: Buzz <buzz@softcom.net>  
Subject: Re: [R-390] Tube receivers and long wire antennas

I had the proverbial "bolt out of the blue" hit the power line behind my house from a storm about 10 miles away. I normally disconnect my antennas and pull the line cords, but I thought that it'd be a while before the storm reached us so I hadn't disconnected anything. All of the receivers/transmitters, both tube and solid state, were fine. The computers were fine except for the modem boards. Both of them had cinders where the input resistors had been. I credit the good results to a lucky day.

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Date: Mon, 23 May 2005 08:27:24 -0400  
From: Mark Huss <mhuss1@bellatlantic.net>  
Subject: Re: [R-390] Tube receivers and long wire antennas

Yep, been there, done that! first, get a TV Coax Lightning Arrester. Place it in series with the coax lead-in where it enters the house. Drive a ground rod at that point and connect with at least #12 wire. Bigger is better. Shorter is also better, since you want to short the high-frequency components if the lightning strike. This will not protect your radio, but will probably save the house!

Second, you need to provide a way for static build-up and induced currents (from nearby strikes up to half a mile away) to drain to ground without going through your receiver. This depends on the type of receiver, whether solid state or tube. Tube receivers are rugged devices. Heck, where a Nuke will take out every solid-state receiver for hundreds of miles, a tube receiver won't even notice!

Protection for these often consists of nothing more than an NE-2 neon tube. If voltage on the antenna exceeds 82 volts, it will conduct and drain the charge off the antenna. It also makes a sobering display during thunder and snowstorms. There is usually a one-meg resistor across the neon tube which handles slower buildup.

Transistors, and espically FET's are more delicate. Normal static buildup can take out a solid state front end easily if no protection for the input is

provided by the manufacturer. Sony 2010's are famous for this. RX-320's are a bit better, but I have seen it happen. Protection for these must be provided if you have an outside antenna. two 1N914 diodes wired back-to-back in parallel (cathode of D1 to anode of D2 to shield, cathode of D2 to Anode of D1 to center conductor) is a common solution. Problem with this is local radio stations. They can cause the diodes to conduct, and you get birdies. if this is a problem, you can stack them, i.e. wire several diodes in series before wiring them in parallel. Also add a 10K resistor in parallel with the diodes to drain slow buildup of static. you also need to replace this simple circuit annually, as a nearby strike can take out the diodes. MOV's can also be used, and are a bit more rugged, if more expensive. You will need this even if you impliment solution number three.

Solution Three, which I have put on all my antennas, is to use an isolation transformer at the point the feedline from the antenna reaches the ground. Drive another ground stake at that point. Then isolate the antenna from the feedline to the house using an isolation transformer. This provides a low impedance to ground at lower frequencies, preventing static build-up and grounding the higher power components of a lightning-induced charge. I build my own, not only because it is cheaper, but because i always use 12 to 14 gauge wire and a big torid (FT-43 material) rather than the 28-30 gauge wire commonly used for receiving isolation transformers.

First, the bigger torid reduces saturation from local AM radio stations. Second, the larger gauge wire will handle a nearby strike without burning out. The third thing the isolation transformer does is to cut down significantly on interference generated in the house! It is worth installing just for that. Note that this does NOT replace solution number two, the diodes,. The diodes will handle the high frequency components of the strike, and also handle the leakage into the coax from the strike. It all sounds complicated and expensive, but with an investment in a drill, a cheap Radio Shack Soldering Iron, and \$20-30 for parts, you will save at least the \$100 a repair WILL cost you, or trying to explain to the Insurance company why you did not have a lightning arrester on you antenna after your house is burned to the ground!

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Date: Mon, 23 May 2005 09:26:50 -0400  
From: "Bill Levy" <levyfiles@att.net>  
Subject: Re: [R-390] Tube receivers and long wire antennas

In the period of 1973-5 I ran 700 feet of wire between two 40 foot surplus signal corp poles. I was in Africa and the big game used to walk around the guy ropes. Elephants were very respectful. The long wire was on an L network feeding an early Ten Tec and the last Hallicrafter Safari FPM300. Both solid state. When not in use I would remove the long wire from the L



network and ground it to my station ground. Nothing more complicated than that. Never had a problem, survived lots of storms.

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Date: Mon, 23 May 2005 14:15:22 -0400  
From: Sheldon Daitch <sdaitch@ibb.gov>  
Subject: Re: [R-390] Tube receivers and long wire antennas

Far too many years ago, when I worked at the VOA receiver site in Greenville, we had a fair number of rhombic antennas that were used for our receiving systems. Lightning protection for the antennas and equipment were not really exotic, but was effective. With perhaps one or two exceptions, all of the RF feedlines from the antennas to the inner compound fence line were balanced feedlines, and at the inner compound fence line, we had a series of TMC BALUN boxes, 30 or so, with a matching transformer from the nominal 516 ohms balanced line to the 50 ohm coaxial line.

Each of the balun units had fuse clips, so the two inputs to the balun were fused, I think we used 2AMP fast blow glass fuses, and also the coaxial output was fused. Also, each of the balanced legs had a TMC plug-in spark gap unit, part number I have long since forgotten, but it was had a large brown fiber tube, with metal ends, and some type of glass insert filled with some power material. Basically, if the thing didn't rattle it was still good. Later, we were replacing these with modified units that had some discrete spark gap unit installed in the fiber tube. In the event of a hard strike to or near the antenna, sometimes the energy would shatter the glass in this spark gap unit. After a lightning storm, we'd go out to all the balun units with a box full of 2 amp fuses, a handful of the spark gaps and replace all the defective items found. Every now and then, an extremely close strike would open up a winding on the balun and we'd have to replace them, and finally, I suppose it was the early to mid- 1980s, no more baluns were available from TMC. We then started making our own baluns, winding the coils in the shop and fabricating new base plates. We also experiments with graphite ball spark gaps rather than the plug in spark gap units. Also, each of the four steel towers supporting the rhombic antennas were well grounded, as well as the balun boxes at the inner compound perimeter. I can't ever remember that we had any equipment damage inside the building from outside lightning strikes, so, between the fuses and the spark gap units, the system was effective in keeping lightning headed into the ground.

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Date: Mon, 23 May 2005 23:52:53 -0600  
From: "Kenneth Arthur Crips" <CRIPS01@MSN.COM>  
Subject: Re: [R-390] Tube receivers and long wire antennas

for all things to do with coronal discharge voltage in wire go the

Polyphaser they have written the book. their website has a tremendous amount of information on this subject.

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Date: Wed, 15 Jun 2005 20:33:45 -0500  
From: Craig Westerman <westerman@cableone.net>  
Subject: [R-390] Original Antenna Used with R-390 and R-390A

What was original antenna used by the military with the R-390 and R-390A?

What do you current R-390 and R-390A owners use?

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Date: Wed, 15 Jun 2005 21:23:20 -0500  
From: mikea <mikea@mikea.ath.cx>  
Subject: Re: [R-390] Original Antenna Used with R-390 and R-390A

There was no single antenna; you would find everything from a whip on a vehicle-mounted receiver, through shipboard long-wires or dipoles, to the AN/FLR-9 Wullenweber "Elephant Cage". I use a 60' long wire for stuff below 10 meters, and a resonant dipole for 10 meters.

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Date: Thu, 16 Jun 2005 00:23:04 -0600  
From: "Kenneth Arthur Crips" <CRIPSO1@MSN.COM>  
Subject: Re: [R-390] Original Antenna Used with R-390 and R-390A

I just use my G5RV which has been up for years. I have it fixed so I can switch it between radios. This is also my main transmitting antenna. There are other designs I want to try but this one works so well I have little reason to change it

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Date: Thu, 16 Jun 2005 17:20:02 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] Original Antenna Used with R-390 and R-390A

<snip> Today I just have as long a wire as I can get into the air. Roger KC6TRU

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Date: Thu, 16 Jun 2005 20:56:51 -0500  
From: Craig Westerman <westerman@cableone.net>  
Subject: Re[2]: [R-390] Original Antenna Used with R-390 and R-390A

Do you use a long wire balun and antenna tuner or run the long wire direct? I've been looking at these: <http://www.palomar-engineers.com/MLB-1/mlb-1.html>

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Date: Mon, 25 Jul 2005 17:24:33 -0400  
From: flood@Krohne.com

Subject: [R-390] R390(and "A") antenna question

The Dawg thread is almost as dangerous as the no-code thread on the BA list. As I have fueled that fire enough already, I thought that I would ask something that has been on my mind for some time and only now, in an attempt to distract from the a.m. thread, will I ask it.

Is it bad to connect antennas to both the twinax and type C connections at the same time. One is a 300' long wire running along the top of my 6' wood fence in a three sided open-end, almost square loop. the other about 100' wire in an open ended loop in the attic (originally installed by my grandfather for the "new" Grebe Syncrophase he had in the dark days of storage batteries.) While thinking about it ,I realized there would be different issues based on the desired reception frequency and the mechanics of the "array", at that point my brain started to hurt. As far as the radio it self, have I violated one of the R390(and "A") ten commandments? If I have asked this before, please remember that I'm now entering my mid 40's. Tease me about lost memory and tell me how it gets worse and we move on.

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Date: Mon, 25 Jul 2005 22:47:37 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] R390(and "A") antenna question

You can hang any antenna on your R390 any way you want. Do not fool with Mother Nature, however. If the antenna is not in use, observe good operating practice, unhook the antenna from the receiver and ground it in a way that will keep your home insurance agent happy. Lighting strikes are for real.

Hooking up two antennas at once is not a real problem. The type C connection by passes the first stage of tuning. You get a wider band of signal plus noise applied from the antenna into the first RF stage. While we would expect the next stages to filter that excess out of the mix before it gets to the ear, strange things can happen. This will not hurt the receiver. you may or may not get poorer desired signal and more noise. If its not there to cause interference, of course it will not cause interference. But it some strong signal is lurking around your megahertz of choice, you could get more noise than you have to listen to. Even when you consider the antenna impedance mismatch going into the balanced input with one wire and the other side grounded, you often get a better signal. Signal loss through a simple knife switch is not so much you can tell the difference in your ear. A relay or simple switch between receiving antenna's works well. Loading the signal in from the balanced input antenna with the antenna from the C connector is not a real problem. Receivers were used with this type of antenna setup at times. There is a load from the second antenna

presented. If you can tell the difference in your ear with your selected signal may or may not be a healable problem. John, do you have the Y2K manual? Do you know how to run a single ended antenna into your balanced antenna input?

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Date: Sun, 11 Sep 2005 15:07:08 -0700  
From: Dennis Wade <sacramento.cyclist@gmail.com>  
Subject: [R-390] Noise when warm ('390A)

I've noticed lately that after a few hours of operation, a "frying bacon" or "snap-crackle-pop" noise begins to occur, slowly increasing as time goes on. No real difference in band or mode. Any quick troubleshooting hints to isolate to a stage? What is the consensus...more likely a cap or a tube? [full discussion listed under "sensitivity and alinement" section]

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Date: Mon, 12 Sep 2005 12:03:43 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Noise when warm ('390A)

YES. Static electricity building up on the antenna can make such noises. Put an RF choke or moderate value resistor (100 K or so) from the antenna to ground to see if it goes away. The R-390 antenna input transformer primary is isolated from ground for DC, so if you do not have one side grounded (which most of us do) then static electricity on the antenna can build up. (The neon lamp in the antenna relay is across the UNbalanced antenna input jack.)

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Date: Thu, 3 Nov 2005 20:53:28 EST  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] CU-872 Multicoupler

Would you like to part with the CU872 antenna coupler? Do you know if Fair Radio has any more?

The 6922 are industrial grade E88CC/6DJ8

1 in and 8 out, 70 ohms. Wonder what system it was used in and if anyone has experience using it. Plan on using it with my R-390 and R-390A, etc.

If you were ASA educated as a 33B20 Radio repair man you learned to service these items.

If you was an ASA educated O5H you had 1, 2 or maybe 3 of these between your antennas of choice and your receivers. O5H likely had 2 receivers and each receiver was on a different antenna. The place was called a field station. The antennas were called an antenna farm. 15 guys, 30 receivers,

15 mills were in a room called a bay. In the corner of the bay was two racks filled with CU872. The racks had patch panels. The OP could pick a coupler output and patch it over to one of his two receivers. The guy may swap the patch 3 or four times in a 8 hour shift. Some guys had skeds that never needed to have an antenna swap. Some where else was a room where all the antenna leads come into the building. Each antenna feed one CU872. The 8 outputs went down the cable ways to 8 different bays. into a CU872 in the rack in the corner. If more than 8 guys (very likely) wanted to use the same antenna in the bay then one CU872 output would be patched into a second CU872. That way 15 outputs would go to one of two receivers at the 15 operator positions. There were 7 positions down the side of the room that had the two CU872 racks. There were 8 positions down the other side of the room. No one wanted to set the 15 position across from the coupler racks. The coupler racks had blowers and made it cold across from the rack. The racks were also next to the bay doors and you cough all the noise from the hall. At the other end of the room was a supervisor position on one side of the room with 2 more receivers. Across from the supervisor was the traffic analysis desk. Supervisors handed out sked. (your freq, antenna and time) while the analysis tried to make some sense out of who you were copying. Lots of O5 ops copied cut numbers. You hear ditty EISH5 and type 12345. you hear TMO 4 dah and 0 and you typed 67890.

Some ops had RTTY machines and some ops had AN/THN11 tape recorders.

So CU872 antenna couplers will work at least across the R390 spectrum. They will work up to 50 real easy. Good tubes will get you above that. I never had receivers that went that there that I could patch into a CU872 to see how high it went. We had OPS that did this, but I was not allowed to just play with it to see what was what. On the bottom end the CU872 has a filter in the bottom pan that cuts every thing under 2 MHz off. It got the AM broad cast band out of the noise mix. The filter has BNC input and output. you can use a barrel connector and bypass the filter and use the CU872 all the way down to at least the bottom of the AM band. The CU872 is two sets of four amps. you can get inside and uncable one side of the amp and populate only half of the tubes. This will drive 4 outputs. The CU872 was considered zero gain. One output had the same level as the input. As the output was fanned from 1 to 8 the gain was 8.

If you have several receivers a CU872 is nice to have as you can put 8 receivers on one antenna. The Army, Navy, Marines and Air force all used the CU872 antenna coupler in receiving sites. If you were a far end and all your antenna pointed to north America you likely had CU872s for the receivers. Then the transmitters had separate antenna. You likely looked at the propagation charts, clock on the wall and patched the RTTY tape to

the correct transmitter. You can get into the transformer outputs. By bringing the transformer output out without grounding one side (as is done with the N connectors) you can put the phase correct and drive the R390 balanced input from two coupler outputs and get a gain that way. Not something that one could do with military equipment in service. But owning one of your own opens lots of applications for you.

The circuits inside are very redundant. This will help you if you have had a tube go bad and have crispy things to repair. Finding 20 new tubes can be a bite in the pocket book. I took care of these critters at several stations between '68 and '75. If you checked the tubes every 6 months you were OK. The front panel meter is a real nice 50 UA movement. I have two meters that I still use in home built voltmeters.

Roger

KC6TRU

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Date: Thu, 03 Nov 2005 20:14:47 -0800  
From: Dan Arney <hankarn@pacbell.net>  
Subject: Re: [R-390] CU-872 Multicoupler

Roger, Great explanation of the couplers capabilities. I was in USAFSS Hdq. at Brooks AFB in 49/50 in OSD-1 as propagation tech and then antenna rigger. Long before the 872 came around. I have one in my rack along with a 16 output. Then went to ADC at McGuire AFB then Aviation Cadet Pilot Training. Then spent close to 35 years boring holes through the airspace as a pilot with over 20,000 hours of time with a lot of boredom with seconds of shear shark terror. I still say the most dangerous part of flying is going to and from the airport.

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Date: Fri, 4 Nov 2005 09:39:14 +0200  
From: "federico" <federico@dottorbaldi.it>  
Subject: Re: [R-390] CU-872 Multicoupler

Hi Roger, very interesting explanation I owe from many years two CU-872 (see my webspace) with the first feeding the second so I have 15 receivers that get the same signal, this is very useful to test a receiver against another one. Some months ago I bought from Singer two Watkins-Johnson antenna coupler modules solid state (more or less 4 cigarette box each) but I still employ CU-872.

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Date: Fri, 4 Nov 2005 14:17:11 -0800 (PST)  
From: Steve Hound <radiohound2@yahoo.com>  
Subject: [R-390] CU-52 Multicoupler

Can anyone tell me where the CU-52 multicoupler was used? Unit uses plug in coils and covers approximately 100KHZ - 22 MHZ. Uses 6BA6 tubes and has both balanced and unbalanced output ( has at least 5

outputs - don't have in front of me right now). Came to me in heavy wooden box (should say boxes - have 4 units) and only a few of the plug in coils. The coils fit into a 5 pin socket and look easy to duplicate. Any help would be appreciated thanks Ward

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Date: Wed, 9 Nov 2005 20:09:45 EST  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] Another 390A Carrier meter question

We used the R390A with the R390 IF deck for DF.  
Also seen R392 used with loop antennas for field DF.  
And other radios used for field DF.  
They were not calibrated to any extra level.  
You use antenna position and relative dip of meter.  
An exact value was not required.

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Date: Fri, 2 Dec 2005 07:20:46 -0800  
From: "Leigh Sedgwick" <bipi@comcast.net>  
Subject: Re: [R-390] HF Multi-Coupler wanted

I highly recommend this unit designed by Jim Garland. It is an excellent multi-coupler and the pre-amp works great.

<http://www.miami.muohio.edu/president/personal/w8zr/multicontroller/index.htm>

No connection with Jim other than building one of these myself and really liking it!

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Date: Sat, 7 Jan 2006 10:03:50 +0100  
From: "paolo gramigna" <paolo.gramigna@controllo.it>  
Subject: [R-390] Looking for a C adapter or connector

If i want to connect a whip antenna to the unbalanced input of a R-390A, I need an adapter for the C (female) connector J103, or a male C connector. Can't find them from my usual suppliers. Does anybody know of an online source?

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Date: Sat, 7 Jan 2006 05:41:51 -0600  
From: "Walter Rymarczyk" <wrymar@ix.netcom.com>  
Subject: RE: [R-390] Looking for a C adapter or connector

Male C connectors are available on ebay (7548232488) for \$15 each. C adapters to BNC or UHF are hard to find on the used market.

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Date: Sat, 7 Jan 2006 14:06:35 -0600

From: Dave Merrill <r390a.urr@gmail.com>  
Subject: Re: [R-390] Looking for a C adapter or connector

Bill Perry was at the WARAC hamfest today. He had right-angle male C connectors for RG-58 @ \$3 each. I don't know if he ships internationally.  
WILLIAM PERRY CO 702 (rear) Beechwood Road Louisville,  
Kentucky. 40207  
Fax-502-893-9220 Office-502-893-8724  
E-Mail-WMPERRY@COVAD.NET

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Date: Sat, 7 Jan 2006 17:11:13 -0700  
From: "Kenneth Arthur Crips" <CRIPSO1@MSN.COM>  
Subject: Re: [R-390] Looking for a C adapter

Because I have a preference for the "N" connector that is what I use for adapters with the "C" and twinax connectors. I find the "N" connector so much easier to put to gather. One solder point, so with new pins and rubber "O" rings you can reuse an "N" connector body over and over again. Just my 2 cents worth.

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Date: Mon, 9 Jan 2006 01:33:51 -0600  
From: Tom Norris <r390a@bellsouth.net>  
Subject: [R-390] DIY \$10 Twinax to BNC adaptor

With all the hoo-hah about the assorted adaptors out there such as the UG-970 from Fair and other sources, figured I'd mention how easy it would be to make your own. I apologize for the quality of my writing, I've had a headache for some time and it won't seem to go away. To make an adaptor I use a twinax connector and a BNC panel mount connector.

[http://www.fernblatt.net/A/390\\_adaptor/](http://www.fernblatt.net/A/390_adaptor/)  
has a list of unorganized photos of my cheapie special.

Twinax connectors are standard stock items in Mouser and many other electronic catalogs. The Amphenol catalog number is 82-5589-RFX for the lowest priced version. If you can't find them, email me, I'll give you the phone number of my local distributor. First collect all the parts of the twinax connector from the package. Assembly should be fairly intuitive, if not there is an assembly diagram in the R-390/390A manuals.

First, one side of the twinax connector. I do so in a way that provides some physical support for the grounded pin. Locate a piece of tinned steel component lead, such as from a rectifier, or find a piece of steel paper clip. Drill a small hole as far down the body of the connector as possible on the same side of the pin to the grounded -- see the photos. Solder wire to pin then route other end through hole in connector. Solder.



Solder short piece of wire, preferably teflon-insulated to remaining pin, strip and trim wire slightly longer than body of connector, assemble outside screw-on ring of connector and set aside.

Next prepare the BNC connector. Since I'm lazy, on the past couple of these I've ground the threads off the the back off the connector. Again, see photo of example. Solder wire from previous step to center pin. Fill inside of connector with hi-temp epoxy or silicone to hold the connector parts together, insert BNC into end of twinax connector and set aside until epoxy/silicone cures. After this has cured solder the joint between BNC connector and twinax connector, using flux as needed.

This probably isn't the best way of building an adaptor -- I think some folks have threaded the inside of the twinax connectors to accept the BNC connector. Other than the setting time for the glue, it only takes a few minutes to put together. It's ugly. It's cheap. I've got several and no matter how quickly I've put one together they all still work.

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Date: Mon, 9 Jan 2006 07:30:11 -0800 (PST)  
From: Robert Meyer <meyer\_rm@yahoo.com>  
Subject: Re: [R-390] Break In Operation of R-390 & CV-591 Converter

When I set my station up (Central Electronics 200V and R-390A), I pondered this problem to great length. I can't run full breakin on CW but I did manage to get some interesting things done. I connected a pot through a relay to the RF-Gain terminals on the back of the R-390A. I have an antenna relay that allows a tiny bit of coupling across from the transmitter when it's switched to transmit mode (although there's probably sufficient leakage through coax cables to make this unnecessary. When the station is in receive mode, the RF-Gain relay shorts the terminals on the back of the R-390A so that I get full gain on receive.

The benefit of this method is that I can get sidetone through the receiver so that I can tell if I'm getting artifacts on my CW (chirps, etc.), can tell if I'm drifting, etc. Also, if I'm using headphones on SSB, I can hear the side-tone. This has worked well since 1981. I imagine if you wanted full breakin, you could use some kind of solid state switch on the RF-Gain external pot but I have no idea how fast the R-390A reacts to changes in this gain.

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Date: Mon, 09 Jan 2006 10:53:12 -0500  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: RE: [R-390] \$71.00 antenna connector

>Does this connector tie one of the balanced lines to ground and input the  
>BNC to the other balanced line?

Yes it does. But "WHICH PIN?", is the question. I recently made some twinax-to-BNC adapters for my R-39x radios. I started with a twinax connector from Amphenol (normal cost about \$5 ). I drilled and tapped the thread-in cable clamping part to accept a BNC female chassis connector, and solved a couple of little problems about wire and keeping the twinax pins in place. While figuring out which pin to ground I discovered MIL- SPECS for the UG-970 (twinax male to "UHF" female) and UG-971 (twinax to type C female).

According to those mil specs, one of the adapters grounds pin A and the other one grounds pin B. Which is which, I can't remember, but I built my adapters to match a UG-970 I have here. The question remains, does it matter? It may, but I would not expect it matters much. The input circuit of the R-390A has a fixed cap on one side and a variable cap on the other side. This allows for setting the balance between the two connections of a balanced antenna, done by setting lowest received signal for a common-mode input. It seems to me that the low impedance of the antenna system would swamp out any difference brought about by grounding out one or the other of the two caps.

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Date: Mon, 9 Jan 2006 10:31:45 -0600  
From: glwebb@gundluth.org  
Subject: [R-390] Re: Looking for a C adaptor

Tom, I like your twin-ax to BNC adaptor. Here is a description of one I inherited. My R390A came with an adaptor that was made by the previous owner and it keeps the balanced input ungrounded. It consists of a 1 inch cube of double sided circuit board pieces soldered together. One side of the cube is open with a cover of thin metal like is used for magnetic shielding. One side of the box has a female panel mount BNC connector. Inside the box is a two hole ferrite balun core with windings; a primary and a secondary. I haven't checked the ratio of the windings but I presume them to be 1:1. Secondary is connected to two insulated pins from the box spaced to fit the input to the radio. It works very well and doesn't require any difficult to find parts.

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Date: Mon, 9 Jan 2006 10:44:43 -0600  
From: "Barry" <n4buq@aol.com>  
Subject: Re: [R-390] Re: Looking for a C adaptor

Does anyone know if/where the mini-BNC to BNC adapters are available (the kind used for the IF output "jack"). Does Fair Radio sell them?

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Date: Mon, 09 Jan 2006 09:47:43 -0800

From: "Dan Merz" <mdmerz@verizon.net>  
Subject: RE: [R-390] Re: Looking for a C adaptor

Barry, I was never able to get these from Fair. I don't think they have them. There was one source selling them on eBay for a while and I think they finally drifted down to about \$10-\$15 there. They are available new from RF Connection for \$20, Tech Line 301/840-5477 Order Line 800/783-2666, Gaithersburg, MD, MBfemale to BNCfemale, lead courtesy of Roy Morgan with follow up direct contact with them. I never bought any of these and satisfied my need another way with a small junction box using mini MB female connectors (available from Fair) AND BNC connectors. Dan

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Date: Mon, 09 Jan 2006 15:59:51 -0600 (CST)  
From: "Jim Shorney" <jshorney@inebraska.com>  
Subject: Re: [R-390] DIY \$10 Twinax to BNC adaptor

Or can often be had for free from your friendly computer geek. I friend of mine has a couple buckets full of them, he sells them at flea markets for \$0.75 each. Yes, he knows what they are for...

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Date: Mon, 9 Jan 2006 17:33:57 -0800 (PST)  
From: "W. Li" <wli98122@yahoo.com>  
Subject: RE: [R-390] Looking for a C adaptor

There is even a cheaper solution to the Twin-Ax antenna thread. In June 1999, Chuck Rippel posted a simple connection in which he used a bit of bare wire to ground the left hand (looking from the rear) pin jack on the balanced antenna input connector to one of the antenna relay mounting machine screws, and connecting the right pin jack to the center conductor of RG-58/U coax, which was then terminated to a PL-259 connector through a 0.01uFd condenser.

I use BNC's, instead of SO-239's as a matter of preference.

What I did was incorporate this setup into a small two piece surplus aluminum Asante transceiver case 3" x 1.5" x 0.5" that can be had for 25 cents. The gutted case was bolted to the rear chassis using two existing antenna relay screws after filing a hole big enough to pass the R-390A balanced antenna connector. A female panel mount BNC connector was attached to one end. The entire shielded assembly fits neatly under the lip of the rear panel and the BNC line comes out against the rear panel making a neat, inobstrusive, and reversible addition.

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Date: Wed, 11 Jan 2006 14:43:56 -0800  
From: "ELDIM" <eldim@att.net>

Subject: Re: [R-390] Re: Looking for a C adaptor

What I believe that you are looking for is a mini-BNC which is affectionately known as a Type MB Connector or in your case is a MB RF adaptor. Then there is the MALE or FEMALE gender which may not be politically correct and so, a Male would be called a "Plug" and have a pin, and the Female would be the "Jack" and have a socket. I believe that AMP or AMPHENOL made these adaptors. They are rather scarce and I'm sure that they are no longer manufactured, unless someone like PASTERNAK has resurrected them and had a batch made at their overseas plant. So if any one has any PART NUMBERS, I'd be happy to run them and see what turns up. 73, Glen Galati

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Date: Thu, 12 Jan 2006 07:53:04 -0500  
From: "Veenstra, Lester" <lester.veenstra@lmco.com>  
Subject: RE: [R-390] Re: Looking for a C adaptor

"The RF Connection" in Gaithersburg MD has the MB connectors and cable that can be assembled to make MB/MB jumpers. They also have MB to other coax connector adaptors.

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Date: Fri, 13 Jan 2006 09:49:39 -0500  
From: "David C. Hallam" <dhallam@rapidsys.com>  
Subject: [R-390] R-390 Break In Operation

Would there be any problems with the operation of my R-390 or expected damage if I opened the RF gain terminals on the rear terminal strip during transmission for muting during PTT operation? This would open the cathode leads of the RF amplifiers and the 1st and 5th IF amplifiers.

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Date: Fri, 13 Jan 2006 09:44:16 -0600  
From: "Barry" <n4buq@aol.com>  
Subject: [R-390] Antenna Connectors

Not intended to be a "Mish" post, but was interested in the mod I see on the radio displayed on the "Strip Alignment" page:  
<http://www.dxing.com/r390/strip.htm>  
Anyone else decided to remove the antenna relay and replace it with a SO-239?

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Date: Fri, 13 Jan 2006 09:16:04 -0800  
From: "David Wise" <David\_Wise@Phoenix.com>  
Subject: RE: [R-390] R-390 Break In Operation

Assuming you also disconnect and ground the antenna input to avoid frying the RF coil, sure. I'm curious though: why not use the standard

break-in connection? It does exactly that, and mutes the audio line too. It requires a contact closure, which you can probably supply as easily as the contact opening required for your proposal.

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Date: Fri, 13 Jan 2006 12:23:33 -0500  
From: Bill Abate <wabate@verizon.net>  
Subject: Re: [R-390] Antenna Connectors

I replaced the 'unbalanced' connector with an SO-239 but I did it differently. The original connector was bashed in, so I did not have anything to lose. The connector is merely soldered in. I removed it (forcefully) and cleaned up the residual solder in the socket of the relay housing. I then removed the flange of the 239 and trimmed it slightly on a lathe so that it would fit the existing opening. Then I soldered the SO-239 to the relay housing. Then you just have to reconnect the center connector. Not hard but you need a lot of heat for solder to flow on that massive housing. Everything else stays the same. In effect I eliminated an adapter. Then I grounded one pin of the twinax connector. I think I swapped the mini-BNC's as is documented elsewhere to connect the antenna to the RF coils.

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Date: Fri, 13 Jan 2006 11:30:18 -0600  
From: "Barry" <n4buq@aol.com>  
Subject: Re: [R-390] Antenna Connectors

Along the lines of antenna connections, I "discovered" something interesting the other evening. For testing purposes, I have been connecting my RG-58 to the unbalanced input. I decided to switch to the balanced input. When I connect the center conductor, the radio jumps to life; however, when I connect the outer shield to the other pin (not grounding either pin), the received signal becomes much quieter and about a 10dB increase in signal strength (according to the Carrier Level meter). I figure this is because I aligned it to the balanced input (with a lower-than-125-ohm impedance), but I was kind of surprised at the difference I could detect between the two inputs, especially when I disconnected one pin on the input (the coax's shield). One other thing: the antenna input caps (the ones in the first transformers that go across the first transformers) don't do ANYTHING. Is this simply due to too much impedance mismatch?

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Date: Fri, 13 Jan 2006 09:54:12 -0800  
From: "David Wise" <David\_Wise@Phoenix.com>  
Subject: RE: [R-390] Antenna Connectors

It's necessary to involve both pins. If you don't, the coil primary is essentially in series with either the fixed or trimmable balance caps.

Unlike most radios, the R-390x have a balanced, or differential, input. The balance caps contribute to circuit operation in an interesting way ONLY if you are using a balanced antenna lead. In that case, when the caps are trimmed right, the receiver will respond only to the difference between the two conductors, and will ignore common-mode noise. The way most of us have the input set up (single-ended, i.e. one pin grounded), this feature is defeated and the trimmers don't do a thing. Note that use of an "un-bal" (opposite of a balun) at the receiver is futile, since the only common-mode noise that will be rejected is what's picked up between the un-bal and the receiver!

Dave Wise (SWL in

Portland Oregon)

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Date: Tue, 28 Feb 2006 14:26:52 -0500  
From: "Tim Shoppa" <tshoppa@wmata.com>  
Subject: [R-390] Shielded twinax for antenna

I've now got a nice loop antenna in the attic. Right now I use a balun and 50-ohm coax. But... If I wanted to cable it to the twinax jack on the back of my 390A what is a good cheap readily available cable that's a good match? Should I start hanging out IBM mainframe installations looking for a hundred feet of their twinax?

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Date: Fri, 10 Mar 2006 22:51:50 -0500  
From: Scott Bauer <odyslim@comcast.net>  
Subject: [R-390] antenna multi-coupler wanted

Greetings Everyone, I would like to buy an antenna multi-coupler if anybody has one for sale. If I could be choosy, 8 or more ports would be nice with coverage from 100khz-30mhz. I will take what I can get though. I was lucky enough to get one here before so maybe history will repeat itself?? Any sellers? BTW, this is not to re-sell, it is for my personal use.

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Date: Sat, 11 Mar 2006 06:11:23 -0000  
From: <fwbray@mmineternet.com>  
Subject: Re: [R-390] antenna multi-coupler wanted

That brings up an interesting point. What is a good modern unit to buy? While a classic unit is sure nice, those are harder to come by.

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Date: Sat, 11 Mar 2006 04:43:28 -0500  
From: "Jim M." <jmiller1706@cfl.rr.com>  
Subject: Re: [R-390] antenna multi-coupler wanted

I have used this with success: <http://www.stridsberg.com/prod01.htm>

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Date: Sat, 11 Mar 2006 06:29:55 -0600  
From: mikea <mikea@mikea.ath.cx>  
Subject: Re: [R-390] antenna multi-coupler wanted

I agree: the Stridsberg multicouplers are quite nice. They do behave slightly better with all the unused ports terminated in 50 Ohms, but it takes test gear to see the difference.

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Date: Sat, 11 Mar 2006 08:07:38 -0500  
From: "Ed Berbari" <eberbari@indy.rr.com>  
Subject: Re: [R-390] antenna multi-coupler wanted

I have the multicoupler from Jim Garland, W8ZR. It was published in QST (2004) and he sells the boards and provides a parts list- including an uploadable form for the Mouser web site  
<http://www.miami.muohio.edu/president/personal/w8zr/index.htm>

His can be used as instrument to multiconnect other devices as well. I had fun building it.

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Date: Sat, 11 Mar 2006 09:15:53 -0500  
From: roy.morgan@nist.gov  
Subject: Re: [R-390] antenna multi-coupler wanted

It is the surplus place in Canada that sells modern new multicouplers. Likely they will outperform the old ones in some areas. The place is W. J. Ford Surplus Enterprises: <http://www.testequipmentcanada.com/> (new web URL) OOPS: Sold out.. send an email to them to find out if more are expected: # Rf Tech M-50-8 Antenna Multicoupler sold out "Manufactured exclusively for Rf Science & Technology, the M-50-8 includes a 1 year warranty against manufacturer's defects." The cost was about \$225 US. The link to "Rf Sceince & Technology" is: <http://www.falls.igs.net/~rftech/> and inculdes this: "Around mid-1996, we (W.J. Ford Surplus Enterprises) were contacted by a company who wanted a distributor in Canada. After examining the items (and subjecting them to some serious abuse as well) we found that not only were these products priced well below the competition currently on the market, but were extremely well made. To avoid confusing these new items with our surplus inventory, we opened Rf Science & Technology..... If you would like to order any of our items, simply send us an e-mail [rftech@falls.igs.net](mailto:rftech@falls.igs.net) identifying the item, quantity wanted, and where you are located.

We will reply with confirmation of availability and a shipping estimate. You can then place your order (by phone, fax, or e-mail) - we accept both Visa and MC, as well as Postal Money" Reports on their multicoupler have been very good, so I would not hesitate to order one if they can supply it.

Roy K1LKY

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Date: Sat, 11 Mar 2006 07:34:29 -0800  
From: "Leigh Sedgwick" <bipi@comcast.net>  
Subject: Re: [R-390] antenna multi-coupler wanted

I have one of Jim's kits too. Unfortunately, Jim is sold out of the kits and will not be doing any more of them. At least that was the story a few months back!

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Date: Sat, 11 Mar 2006 07:58:56 -0800 (PST)  
From: Michael Melland <w9wis@yahoo.com>  
Subject: Re: [R-390] antenna multi-coupler wanted

I built one of Jim's multi-coupler kits a couple of months ago. IIRC it was one of only a couple he had left. It's one of the best thought-out kits I've ever built... and it works superbly.

I have been using multi-couplers made by Stridsberg Engineering, the active 4-port versions (\$185 each) for both HF and VHF up (to 1 GHz+) and have been extremely satisfied. I first found out about these when they came installed in a surveillance vehicle we purchased years ago at an agency I used to work for. <http://www.stridsberg.com/>

This winter I had one of my 4 year old multi-couplers stop working... I knew it had been blown by me doing something stupid. I sent it to Stridsberg for repair and even though it was out of warranty they repaired it... installed all new guts with an upgraded and better protected input like their new versions... and returned it to me with NO Charge. They even told me I could return my other 4 units for free upgrade too ! You don't often see this level of service.... they are a small firm and they do mostly Gov't contract work, but I sure was happy they also took care of me.

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Date: Sat, 11 Mar 2006 20:20:55 -0500  
From: Scott Bauer <odyslim@comcast.net>  
Subject: Re: [R-390] antenna multi-coupler wanted

I really like these. There is a passive unit that goes down to 100 khz as well as the active unit that does HF. Thanks a lot for forwarding the page. I will place my order Monday.

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Date: 13 Apr 2006 15:58:16 -0000  
From: "n4buq@knology.net" <n4buq@knology.net>  
Subject: [R-390] Balanced Antenna Input



I have seen some adapters that mate a given connector type to the "twin-ax" style used at the balanced antenna input. I might be wrong, but it appears these typically have one connection to the shell which grounds that side of the connection. The balanced connector is designed to work with both sides of the feedline ungrounded, right? If so, don't these adapters defeat some of the proper workings of this input?

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Date: Thu, 13 Apr 2006 09:15:50 -0700  
From: "David Wise" <David\_Wise@Phoenix.com>  
Subject: RE: [R-390] Balanced Antenna Input

The balanced to SO239 adaptors do indeed defeat the purpose of the balanced input. The idea behind the balanced input is that if your shack is a high-noise environment, you can cancel some of it by running a balanced line out to the antenna. That way, any crap picked up by the feedline is applied equally to the + and - inputs (my terminology) and cancelled. This phenomenon is called "common-mode rejection". As soon as you ground either wire, that goes away and you're back to the conventional unbalanced line. (By the way, in this mode there is no point in adjusting the balance caps, since it's not balanced anyway.)

That said, the majority of today's users (and some in the past - witness the Navy mod to swap the rear-panel connectors) go unbalanced, simply because stuff is more available. And remember, in the HF range, if you have a decent antenna and your shack isn't an EMI hellhole, most of your noise will be atmospheric and far-field QRM anyway. 73, Dave Wise (SWL in Portland OR)

Date: Thu, 13 Apr 2006 12:24:37 EDT  
From: DJED1@aol.com  
Subject: Re: [R-390] Balanced Antenna Input

Naaa- doesn't really make much difference. The balanced input was intended for connection to the rhombic arrays typically used in fixed service. They went out of fashion in the 70's. Since then, most equipment has been designed for unbalanced 50 ohms and, in fact, much of the military equipment (DF arrays, multicouplers, etc) used with the R-390s were unbalanced 50 ohms. Some list members have tested baluns and found the difference in signal level to be about 1 dB. You might get a little less noise pickup with a balanced feed and a dipole. And personally, if I had the land and money for a rhombic farm I would do it, balanced feeds and all. But alas, I have to live with my small dipole and unbalanced feedline. Here in suburbia I have external noise which is typically 20 to 40 dB above receiver noise, so I don't worry about 1-2 dB.Ed

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Date: 13 Apr 2006 16:32:59 -0000  
From: "n4buq@knology.net" <n4buq@knology.net>  
Subject: RE: [R-390] Balanced Antenna Input

I wanted to build a "matching" adaptor to use the 125-ohm input, but realized the thing would ground one side of the input if I wasn't careful. I want to feed my radio with twisted pair from the antenna and use the balanced input. It seems this does give a slightly better signal in my limited testing with my unbalanced feedline so I'd like to pursue that. I bought a twin-ax connector, but it looks like I won't really need it now. I plan to build something that I can connect to the balanced input using a BNC connector (yes, I realize that's an unbalanced type connector, but it should work), but it really should be insulated from the chassis. Still thinking...

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Date: Thu, 13 Apr 2006 15:13:38 EDT  
From: DJED1@aol.com  
Subject: Re: [R-390] Balanced Antenna Input

The balanced input will work with any balanced antenna and feed line. I've used it with a balanced loop for MF work, but have not used it with a dipole. I've also seen balanced 100 ohm cable for sale- I think it may be used with Ethernet networks which used the twinax connectors. The main problem, IMO, has been the lack of balanced antenna tuners. However, they seem to have become a hot item again, and at least MFJ sells several balanced tuners for amateur applications. Maybe I ought to give it a try and see if it reduces my local noise level. A BNC will work if you isolate it from ground, but the twinax connectors are pretty cheap, so I would recommend those.Ed

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Date: Tue, 06 Jun 2006 17:37:33 -0400  
From: shoppa\_r390a@trailing-edge.com (Tim Shoppa)  
Subject: [R-390] New favorite listening speaker

<snip>...My new favorite antenna is a two-turn electrostatically shielded (e.g. in copper pipe with an insulating joint) 2.5ftx2.5ft loop in the attic, hooked up to my 390A via Twinax. Far and away this is the best way to suppress local QRM/RFI, even if it is not as sensitive as a longwire.

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Date: Tue, 06 Jun 2006 18:21:10 -0400  
From: shoppa\_r390a@trailing-edge.com (Tim Shoppa)  
Subject: [R-390] Loop antenna details

Several have already written asking for details of my loop antenna. Very simple:

Get one ten-foot length of 1/2" copper pipe. Also 2 copper 1/2" elbows, one copper 1/2" Tee, and one PLASTIC 1/2" elbow. (Not sure exactly about the sizing of the plastic elbow - it's the one that 1/2" copper pipe fits into snugly.) In principle I suppose you could use any sort of small diameter pipe or conduit. I use twinax that I bought for a couple of bucks on E-bay for the lead-in. Twinax sometimes shows up in large quantities if you watch mainframe computer deinstallations. Cut the ten-foot length of pipe into 4 equal pieces. Lay out the 4 pieces on the floor like a diamond. At the top put the plastic elbow. At the sides put the copper elbows. At the bottom put the Tee. DO NOT SOLDER or securely fasten any of the corners yet, if you do so it'll be very hard to run the wire inside the copper pipe! The copper pipe is there to provide electrostatic shielding (it'll be hooked to ground) and the plastic elbow at the top breaks the circuit (so it is not a magnetic loop). Run some insulated wire around the loop one or two or three times and have the two ends come out of the Tee on the bottom. Run twinax from the 390A's balanced antenna jack to the antenna. Center two conductors go to the loop of wire. The shield goes to the copper. It has some directionality and works from BCB up through at least 20MHz pretty well. It is NOT nearly as sensitive as a random longwire strung out for even a short distance. But it does an excellent job of suppressing household RFI (mostly computer monitors and AC blower motors) that plagues my location. The directionality isn't awfully strong in the "forward" direction but there is a sharp null to the sides. My antenna just sits in the attic and I try pointing it in different directions every once in a while, but I suppose you could add some supporting structure (wood? plastic?) and put it on a rotator. I experimented with different numbers of turns and also with adding a resonating tuning capacitor and while there was some difference it was not profound. There are several sites on the net that talk about similar construction loops and they found for transmitting at least that the resonating capacitor was essential.

I suspect that those who are not as plagued by computer and blower RF hash as I am will not get much advantage from the loop over a random longwire. But for me it's the difference between a million screaming banshees and clarity!

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Date: Mon, 11 Sep 2006 13:52:02 -0500  
From: Rick Brashear <rickbras@airmail.net>  
Subject: [R-390] K601

Before I delve too deeply into the audio module of my R-390 I want to ask if anyone has had similar problems or if the symptoms I am experiencing are common. First, I have a wire (black and white) that has been disconnected in the back of the upper deck next to the break-in relay, K602. I am assuming it connected to the coil terminal of K602 with the other black and white wire. The symptoms are: When I use the break in

function to quiet the receiver during transmit the audio does not quiet, only the antenna is grounded.

When I connect the loose black and white wire to the terminal on K602 with the other black and white wire and press PTT I get a buzzing sound similar to a DC relay on AC current. It appears to be coming from K601. This does quiet the audio as it is supposed to, but there is obviously a problem with the relay (K601) or the associated circuitry.

Has anyone experienced this problem? Are those relays anywhere to be found if need be?

I'm sure the defective relay or circuitry is the reason someone disconnected the loose wire. Any suggestions?

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Date: Mon, 11 Sep 2006 15:07:26 -0400  
From: "Tim Shoppa" <tshoppa@wmata.com>  
Subject: Re: [R-390] K601

K601 is supposed to be an AC coil relay. I'm not sure what wire colors are supposed to be where, but one side is 6.3VAC from the filament winding, and the other can be grounded by the transmitter through pin 9 of TB103 if and only if the break-in switch is on. Often when AC coil relays "go bad" they exhibit the buzzing you describe.

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Date: Mon, 11 Sep 2006 15:45:16 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] K601

Tim has it right. The relay operates on the 6.3 volt AC supply. It draws about 40 ma of current, AC. Presumably, it would work on DC if rewired, but I don't know what voltage/current would run it correctly. (Anyone experimenting with this may realize that a relay pulls in at about 80 percent of it's rated voltage. Also, running an AC relay on DC may create more heat in the coil than is desired.) If you turn the front panel "Break-In" switch to the ON position, and ground the correct rear terminal, the receiver should go quiet: the break-in relay releases the antenna relay (which action shorts both antenna connectors to ground) and shorts the audio from the first audio amplifier tube to ground. I, also, don't know the colors of wires in there, however:

If your radio does NOT have the Squelch modification (most or all R-390/URR's do have it, most R-390A/URR's do not), there are some unused wires in that vicinity. At least one comes from the Function Switch, which has an unused position, and is equipped with the needed wire(s) to the audio module to put in the Squelch functions if needed. You may have

gotten ahold of one of these wires. By the way, the two parts hard to find for this modification are the high coil resistance plate relay (possibly 10 K ohms, it operates on a 12AU7 plate current) and the plate to add to the front panel with the extra "SQUELCH" marking. The switch itself is simply locked out from the last position by a re-position-able stop plate.

>Often when AC coil relays "go bad" they exhibit the buzzing you describe.....

Right - if they have some shorted turns, or a poor connection to the supply causing low operating voltage, they will buzz. That black/white wire may go not to ground but somewhere else associated with the squelch circuitry. Try grounding the coil terminal of the relay that does NOT go to the filament supply. Re: the break-in relay coil wires: One goes to the 6.3 volt filament line, and should have that voltage on it at all times (more likely up towards 7 volts.) The other one should show connectivity to the rear panel barrier strip terminal (which Tim says is TB-103 terminal 9) IF the break in switch is ON. Running the radio in break-in mode requires a set of relay or switch contacts that are open in receive and closed in transmit. It may be preferable that the contacts be isolated from the transmitter or control panel ground to avoid ground loops.

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Date: Mon, 11 Sep 2006 15:08:10 -0500  
From: Rick Brashear <rickbras@airmail.net>  
Subject: Re: [R-390] K601

Hi Roy and all... thanks for the insight. I guess I already have the squelch function as the label is on the function switch, but it does not have an added plate. It appears to have come from Collins like this. Maybe I'm not looking at the right thing. I have another dilemma. The relay K602 in the sub chassis of the audio module is marked 6 volt DC on the coil. Could it be someone has modified it from the original? According to my schematic one side of the coil goes to the plate of the squelch amplifier (V601 - pin 1 a 12AU7) and the other side goes to the function switch, pin 11, which I believe goes to the calibrated B+ when in the agc/etc. position. I have the module out and it is definitely K602 that is chattering. When I measured it the coil has about 6.7 volts AC. This is the relay that is marked 6 volt DC on the coil. What do you guys make of this? Did a previous owner replace the AC relay with a DC relay and when it chattered he just disconnected it? If so, I'm still confused as the coil does not go to the filament supply.

The antenna relay (K101) is grounding the antenna, but it is my understanding that it is the break-in relay in conjunction with the squelch relay that grounds the audio portion. I most likely read incorrectly.

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Date: Mon, 11 Sep 2006 16:42:27 -0400  
From: "David C. Hallam" <dhallam@rapidsys.com>  
Subject: RE: [R-390] K601

Have you checked the rectifier CR-801 that supplies the DC for this relay? K101 and K602 are in parallel when the function switch is in AGC, MGC, or Squelch. You should have 14VDC or so on that circuit. They get their power from the selenium rectifier and a tap on the filament portion of the power transformer. By this time in life approximately 100% of the selenium rectifiers have failed. If yours has not failed, replace it anyway. You won't like the odor when it does fail.

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Date: Mon, 11 Sep 2006 15:48:45 -0500  
From: Rick Brashear <rickbras@airmail.net>  
Subject: Re: [R-390] K601

I just got the rectifier out and it is shorted. However, it is not the original selenium, but a one piece bridge that someone had used to replace the selenium rectifier. I'm sure a replacement here will solve the entire problem.

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Date: Tue, 12 Sep 2006 18:43:51 -0400  
From: "David C. Hallam" <dhallam@rapidsys.com>  
Subject: [R-390] R-390 Problems

SO JUST SHOOT ME! After several days of bench work trouble shooting trying to locate a loss of sensitivity problem with my R-390 and introducing several new ones by screwing up the alignment that had to be corrected, I came to the conclusion that I couldn't find anything wrong with the receiver. It passed the sensitivity and selectivity tests with flying colors. Back to the drawing board.

I put the receiver back into the rack and hooked up the coax. Wait a minute, the reception is changing as I wiggle the coax. This was a ready made up RG-8X jumper that I purchased at Radio Shack just before the problems started. Close examination revealed a bad connection in one of the PL-259's. There must be a moral in here somewhere.

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Date: Tue, 12 Sep 2006 21:39:53 EDT  
From: ToddRoberts2001@aol.com  
Subject: Re: [R-390] R-390 Problems

I ran into a problem with an R-390A that may be qualified as similar. A local ham asked me to check his R-390A that had very poor sensitivity. Indeed it was barely receiving signals although everything else appeared good in the receiver. On a hunch I pulled the UG-970/U connector on the back and plugged in another known good one. The sensitivity jumped back

and everything was normal again. The hot lead in the UG-970/U was open circuit and no way to fix it. We threw away the bad connector. Problem solved.

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Date: Wed, 13 Sep 2006 09:25:49 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] R-390 Problems

The topic of Rat Shack products,, and a defective UG-970 remind me of low cost PL-259 "L" adapters. Some time ago it was reported that these things (source unknown to me but likely "the Shack") were made with SPRINGS connecting the two ends of them. The spring formed an inductance that heated up during even moderate power transmit operation, caused a change in the impedance seen by the transmitter, and led to failure of the thing. Dissection after failure revealed the bogus construction. Use good stuff. It pays off.

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Date: Wed, 13 Sep 2006 11:40:11 -0400  
From: Mark Huss <mhuss1@bellatlantic.net>  
Subject: Re: [R-390] R-390 Problems

Tried a new Antenna with better MW reception than the Inverted L I currently use. The RF feed on the new antenna also provides power to the preamp in the antenna. Simply unhooked the lead-in from the transformer at the base of the Inverted-L, and hooked it to the new antenna. Results were less than i expected. Stations weaker than when it was on the bench. Examination with the meter showed that voltage was not getting to the antenna. Result: The cable had gotten yanked some time ago, resulting in the center conductor getting broken inside the connector. Lesson Learned; Ohm out the Antennas every few months to make sure the feedline is not open!

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Date: Thu, 14 Sep 2006 21:14:23 -0700 (PDT)  
From: Perry Sandeen <sandeenpa@yahoo.com>  
Subject: [R-390] Mods and Mods

>Wrote: 5) Antenna Input Conversion to 50 Ohms "To replace antenna input connectors with SO->239 Connectors that mate with standard ham equipment." (In this mod, he removes the >"break-in relay" completely (I think he means the antenna relay actuator), solders jumpers to >various parts of the antenna relay module and connectors, removes the two antenna connectors >and replaces one of them with an SO-239 connector. SHUDDER!!)

Somewhat mild rant follows: I suppose if you are using your receiver with or near a transmitter Having the antenna relay makes sense. For those of

us who are just using them for listening it is really a PITA. By the time you put on a Twin-ax adapter, then another adapter to a BNC or worse a SO 239 you have a 5 or 6 inch monstrosity sticking out the back. This can be a problem when one wants to use it on a table top that's less than the size of the Titanic. For listeners only its probably better to gut the sucker and sell it on ebay while replacing it with a binding post or RCA connector. I do agree that the workmanship should be good. Drake installed two SO-239's on my R8. They are useless.

The rants about "originality" and "value" have gotten to the point of absurdity. These are 50+year old, usually gray, mass-produced radios for the military. Style-wise from the beginning, they were maybe a half step up from an Edsel. Like a Stihl chainsaw, their value is in their price-performance-maintainability parameters. "Museum quality"?? Vomitus ad-nausium! Somebody smokin' dopem' and suckketh canal water.

I want my radios to run well and long. Yeah, I really don't want my radios so ugly that I have to put a paper bag over them when I use them. But give me, or I'll make me, a radio that works excellently. So what if I have to gut it to put in modern caps, low noise non-drifting resistors, and solid state electronically regulated slow warm up power supply? IT MAKES THE RADIO BETTER THAN WHEN IT ROLLED OFF OF THE ASSEMBLY LINE.

BTW, the "original design forever" people are using the black IREC tube shields. It seems very disingenuous to use that "Mod" and curse others. I mean after all, Art didn't install it originally. He used the silver tube wreaking type. Come on now you "Purists", you just can't have it both ways.

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Date: Fri, 15 Sep 2006 03:45:50 -0400  
From: Barry Hauser <barry@hausernet.com>  
Subject: Re: [R-390] Mods and Mods

Not really a problem: Right angle twinax adapters handle that situation nicely and also serve to take strain off the antenna cable. These usually ground one side of the twinax internally and have a coax -- SO-239 or C-Connector, etc. -- on the other end. Any additional adapters will be running downward, not back. If you can't find one, you can make up a "soft" adapter out of a regular twinax connector and a length of coax with the desired type of connector on the other end. But the right angle adapter is worth getting -- it's neater. Often, this a non-issue altogether: Many '390's are in cabinets or racks substantially deeper than the receivers so the back panels are well away from the wall anyway.

Date: Fri, 15 Sep 2006 03:59:38 -0400  
From: Barry Hauser <barry@hausernet.com>



Subject: Re: [R-390] Mods and Mods

I forgot ... actually, if you're just running coax, you could alternatively use the C-connector by means of a C to BNC adapter, or similar, (C to SO-239?) or just get a C plug. That would even be more compact, however, you might need to re-align using the C-connection to optimize performance. Depends on which was used when aligning in the first place -- read it somewhere in the old posts.

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Date: Fri, 15 Sep 2006 10:49:41 -0700 (PDT)  
From: "W. Li" <wli98122@yahoo.com>  
Subject: Re: [R-390] Mods and Mods

Not a problem. I mounted a small aluminum flattish box over the antenna twin-ax using the existing screws to secure it to the rear panel. Both a SO-239 and a BNC connector are mounted on the sides and connected internally as Rippel describes to the unbalanced connector. The entire contraption sticks out only an inch from the rear panel. The antenna inputs do not stick out at all.

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Date: Fri, 15 Sep 2006 11:09:34 -0700  
From: "David Wise" <David\_Wise@Phoenix.com>  
Subject: RE: [R-390] Mods and Mods

There's a Navy mod documented on the FAQ site to reroute the C connector to the transformer primaries (formerly the balanced input), if you have C hardware (but no twinax hardware) in your junkbox. Myself, I made a soft one-side-grounded twinax to SO239 adaptor.

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Date: Fri, 15 Sep 2006 14:20:31 -0400  
From: Gord Hayward <ghayward@uoguelph.ca>  
Subject: Re: [R-390] Mods and Mods

When you do the twinax, which side might matter as the balance trimmer affects only one side relative to ground. I haven't yet tried to optimize the input with this trimmer - I followed the balance method with two resistors aiming for a null as in the book but single sided input might be better adjusted. Any thoughts?

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Date: Fri, 15 Sep 2006 11:23:36 -0700  
From: "David Wise" <David\_Wise@Phoenix.com>  
Subject: RE: [R-390] Mods and Mods

If you run single-ended, the balance adjustment is irrelevant, as is which side you ground.

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Date: Fri, 15 Sep 2006 15:46:58 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Mods and Mods

A while ago I equipped myself to make twinax to BNC adapters. I bought the right drill and a tap, to allow screwing the BNC panel mount connector into the rear cable nut on the twinax connectors. At that time I did a web search for the mil specs that define the UG-970 (twinax to SO-239) and UG-971 (twinax to C). I seem to remember, that at least in the Mil-Specs, the grounded pin of the twinax connector is not the same.

HOWEVER, At Defense Supply Center Columbus, I find this mil spec for between series adapters:

<<http://www.dscc.dla.mil/Downloads/MilSpec/Docs/MIL-DTL-27434/dtl27434.pdf>> and in there, a table tell of Signal Corps drawings:

UG-970 SC-106729

UG-971 SC-106728, neither of which I can locate

And I find the following two Mil Specs for the UG-970 and UG-971:

UG-970 MIL-A-27434/23A mil27434ss23.pdf

<<http://www.dscc.dla.mil/Downloads/MilSpec/Docs/MIL-DTL-27434/mil27434ss23.pdf>>

UG-971 MIL-A-27434/24A mil27434ss24.pdf

<<http://www.dscc.dla.mil/Downloads/MilSpec/Docs/MIL-DTL-27434/mil27434ss24.pdf>>

A close look at these shows that, with the adapter's male pins facing you, and the right angle female part pointed down, the male pins are oriented in a vertical plane: that is, parallel with the female part, and importantly, the key that engages the slot in the chassis mount connector is at the right. Both the UG-970 and UG-971 have the lower pin grounded. That is the pin: - clockwise from the key slot in the adapter as viewed from the end of the male pins.

-counterclockwise from the key in the chassis mount female connector as viewed from the outside.

>I followed the balance method with two resistors aiming for a null as in >the book but single sided input might be better adjusted. Any thoughts?

If you ground the side that has the balance trimmer, it won't do much if anything. If you ground the the other side, it may also not do much. The balance trimmer is adjusted for minimum signal with BOTH sides of the connector fed the SAME signal. The other trimmer in the can is adjusted

for strongest signal: it tunes the secondary of the coil and should be adjusted with one side of the input coil grounded (or fed a signal between both ungrounded pins.)

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Date: Fri, 15 Sep 2006 20:28:33 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] Mods and Mods

>When you do the twinax, which side might matter as the balance trimmer affects only one side relative to ground. I haven't yet tried to optimize the input with this trimmer - I followed the balance method with two resistors aiming for a null ... <snip>

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I have not found a better way to adjust the caps for single sided input. Once you set them up with a pair of resistors that's it. You just have to leave the first cap in each RF octave transformer can alone. With a single ended input, I have not seen a way to meter the change as the cap is adjusted.

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Date: Fri, 15 Sep 2006 21:26:49 -0500  
From: Tom Norris <r390a@bellsouth.net>  
Subject: Re: [R-390] The R-390 Cookbook by A.J. Carmody: Beware!

What I've seen on this last bunch of 390A's that I got a couple years ago was the fellow "made his own" antenna connectors by putting component leads into the center pin of the "C" connector, soldering it in (looks like with an American Beauty) and putting a pigtail on for the antenna. Did the same thing with another, but with the twinax. It surprises me at times that folks still can't find either of those connectors. They're everywhere. Sort of like Chicken Man, but not all places at once.

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Date: Fri, 15 Sep 2006 22:55:02 -0400  
From: "David C. Hallam" <dhallam@rapidsys.com>  
Subject: RE: [R-390] The R-390 Cookbook by A.J. Carmody: Beware!

I agree with you but some of it may have to do with the ridiculous prices most sellers are asking for the adapters. I have about every sort of ,between the series adapters you could imagine from hardline on down for either antenna jack, but I bought them years ago when you could get them for 50 cents at your local surplus electronics parts place. I think I might balk at paying \$30 for an adapter.

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Date: Sun, 17 Sep 2006 09:23:18 -0500  
From: Rick Brashear <rickbras@airmail.net>  
Subject: [R-390] Antenna matching

I am curious as to the different methods in use to more closely match the

unbalanced antenna input on the R-390? I am using, at this time, a Butternut 40/80/160 vertical that has an impedance of approximately 50 ohms. The antenna trim control helps considerably, but it seems more could be done. I have a wire I will be installing soon, but it too has a feed point of 50 ohms. I am assuming the best method would be to use a dipole and ladder line, but I have no plans at this time to do that. Any suggestions?

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Date: Sun, 17 Sep 2006 16:39:53 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] Antenna matching

I am using a short (3foot) twinax cable off the receiver into an antenna tuner. The shield coax out to the metal tuner box and grounded took a bunch of local noise out of my receiver. Let it operate balanced input and the antenna trim works. In the tuner I have a small core and trifilar winding (18 turns of telephone wire nice colors to help sort the windings. This is wired as unbalanced to balanced. The center of the balanced winding are grounded to the twin coax shield and the core is close to the twinax connector into the antenna tuner box. Inside the box is two variable caps and a roller inductor. By doing some circuit switching this will match the R390/A input to the random long wires I have for antennas. I have no clue what the core is. I did several before I found one that worked across the HF spectrum. Its a 1/2 hole and 1 inch OD. about a 1/4 thick. No paint.

I operate SSB with a Ten Tek Argosy II. I run that into a different connector in the Antenna tuner and unhook the R390/A Mostly a good balanced to unbalanced transform works. Try a 75 to 300 core from TV set stuff. Crack the package and just use the core and wire. Use the 75 ohm side into the balanced receiver. This will transform the 300 Ohm receiver input up to 1200 ohm. That will match the high Z from the end of a random wire. A small size variable cap across the wire to ground and peak the cap for max noise.

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Date: Sun, 17 Sep 2006 16:29:37 -0500  
From: Rick Brashear <rickbras@airmail.net>  
Subject: [R-390] Coax

Where can I find Twinax cable to use with the balanced antenna on the R-390? What is the number of the cable?

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Date: Sun, 17 Sep 2006 17:37:37 -0400  
From: Larry Kirkland <lkirkland@sc.rr.com>  
Subject: Re: [R-390] Coax

How long of a piece do you need? I think I have 15 or 20 feet. I've forgotten the number (RG-93 maybe ???).

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Date: Sun, 17 Sep 2006 18:26:50 -0400  
From: "TChirhart" <sparks@codepoets.com>  
Subject: RE: [R-390] Coax

Rick, the twinax I have is CPH Amphenol RG-22/U

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Date: Sun, 17 Sep 2006 18:30:01 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] Coax

You visit the best old computer shop in town and ask for some IBM twinax for use in an IBM star or ring topology network. They may have a couple chunks laying around in the stash pile. You use the same twinax connectors. You may look up the cable in a computer book and get 6 or 12 foot cable with a connector on both ends. That should be a life time supply. This will be IBM network cable. It has the connectors to mate with the R390 or R390/A balanced input. It may be called twinax or two conductor coax. It is about 3/8 OD like fat coax.

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Date: Sun, 17 Sep 2006 18:06:20 -0500  
From: Tom Norris <r390a@bellsouth.net>  
Subject: [R-390] Re: [Milsurplus] Coax

It's Belden 9207, IBM twinax network cable. Mouser, Newark, Allied, etc carry it and the connectors. You might also check around for local electronic distributors that have been around a while and may have some around they would just love to get rid of for next to nothing. I was able to get the 50 foot end of a 1000 foot roll if I promised to take the spool with me... (they hadn't sold any in a decade)

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Date: Sun, 17 Sep 2006 14:50:52 -1000  
From: "pete wokoun, sr." <pwokoun@hotmail.com>  
Subject: RE: [R-390] Coax

I just came into some of the stuff, maybe 500 ft of it. It looks like Trompeter type TWC-124-2. You can view a .pdf file of its specs here:

<http://www.trompeter.com/assets/product/pdf/twc-124-2.PDF>

It's a balanced 124 ohm shielded cable, about 1/4-inch in diameter. I know I'll never use it. It's not pristine clean but it looks unused, maybe just warehouse dirt. It is a nice blue color! I don't have any idea of its value...offer me 10 cents a foot plus shipping from 96706 and I'll send you

some.

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Date: Sun, 17 Sep 2006 20:34:02 -0500 (CDT)  
From: "Jim Shorney" <jshorney@inebraska.com>  
Subject: Re: [R-390] Coax

Or "thick ethernet" cable.

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Date: Sun, 17 Sep 2006 21:35:47 -0500  
From: Tom Norris <r390a@bellsouth.net>  
Subject: Re: [R-390] Coax

Hey, that's "Watkins Johnson" twinax. Somewhere I have a dozen of the "polarized" BNC connectors for it. Who knows where...

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Date: Fri, 06 Oct 2006 11:10:39 -0500  
From: Rick Brashear <rickbras@airmail.net>  
Subject: [R-390] Verify

I remember this discussion from a couple of weeks ago and want to be sure I am recalling it correctly. When connecting a 50 unbalanced antenna such as a vertical to the 125 ohm balanced input of the R-390, it doesn't matter which of the two center conductors you use for the center of the coax, is this correct? I never did take advantage of any of the offers for the twinax coax, so I will be using RG8X with the connector. The sensitivity of the balanced input over the unbalanced input even when using a 50 ohm coax seems considerable. Thanks for any verification you can offer.

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Date: Fri, 13 Oct 2006 23:24:42 -0400  
From: Mark Huss <mhuss1@bellatlantic.net>  
Subject: [R-390] RCA Spider MW and SW Antenna

Browsing through Nostalgia Air, I ran across this interesting antenna sold by RCA in the Thirties. Does anyone have any information, such as dimensions, on this antenna? Or perhaps is familiar with NEC enough to do a little reverse engineering? I like to study old antennas for ideas. Back before WWII, stations were few and far between. And receivers were much less sensitive than today. So the antennas had to be better.

<http://www.nostalgiaair.org/Resources/808/M0015808.htm>

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Date: Mon, 06 Nov 2006 16:37:18 -0800  
From: "Dan Merz" <mdmerz@verizon.net>  
Subject: [R-390] SWL antenna

Hi, I'm moving in about 6 mo to new house being built and am considering how to install a simple antenna for am broadcast band and HF receiving (no transmitting). Currently I've got a 50 ft longwire outside at about 20 ft height with some Radio Shack twin lead, the cheap stuff, coming down to a hole in the basement wall. It's been good enough. In the new house I'm thinking of a couple of options, about a 40 to 50 feet of wire about 3 or 4 feet off the roof using a couple of pvc pipes for support and serving as the insulators with the transmission line connected on one end.

I may be able to put it higher but that depends on how strictly one of the covenants is enforced. I've gotten the ok for what I'm describing. But I've been wondering about the transmission line across and inside the attic house about 40 feet across and down about 16 feet into the basement. My first idea was to use one of the better .240 diam coax types either 50 or 75 ohms but then I starting reading about losses when mismatch exists and thought maybe RG8 might be worthwhile.

Or will I be just as well off using the cheap 300 ohm foam twin lead that I now use. I don't expect much noise from things in the house but do know the current washer is a problem when it's on - probably has more electronic controls than the older one that I had for years with mechanical switching. My current system picks that up because the lead-in wire drapes over toward the laundry room. But I can hear it on a portable am radio operating on its internal antenna as well. I usually lose interest in listening when the washing machine is running.

The new house will have some foil-covered sheathing on the roof to lessen attic heating. Does anyone have experience with this stuff with respect to antennas nearby. I don't think the metal volume is actually very great?

I was also considering putting the antenna below the roof in the attic since there's a long span over the garage and part of the house but wonder if this

sheathing might be a killer. If there was a reliable way to connect to it, perhaps it would make a good antenna itself. That's about as big a can of worms as I can open, thanks for any ideas. Maybe I should just lay a long wire on the ground !! Dan.

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Date: Mon, 06 Nov 2006 22:11:20 -0800  
From: John Kolb <jlkolb@jlkolb.cts.com>  
Subject: Re: [R-390] SWL antenna

>maybe RG8 might be worthwhile. ....<snip>

The RG-8 won't work any better than the smaller coax and will be a lot stiffer and harder to handle

> current washer is a problem when it's on... <snip>

Coax instead of twin lead should help with pickup from local QRM such as washing machines. Noise of your current washer probably comes from the motor, not the controls.

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Date: Tue, 7 Nov 2006 09:15:45 EST  
From: DJED1@aol.com  
Subject: Re: [R-390] SWL antenna

Regarding antenna alternatives: I would think the sheathing may be a problem, but it's hard to tell without knowing all the details. If it acts like a big metal roof then you may have a problem with an antenna close to the roof or in the attic. I think fundamentally a 50 foot long wire is OK for SWLing, especially with the R-390 antenna trimmer in the radio. You might want to Google "invisible" antennas. One option is to use a very fine wire and run it from the house to a tree or other support. Another is to make a vertical flagpole and feed that at the base (needs a ground system to work well).

As far as the feedline, I would vote for coax, because modern houses have so many sources of electrical noise. Of course, the coax works best with a matched and balanced feed, so it's not a perfect solution. Remember you only need enough antenna to have the external noise override the radio's internal noise, and that's pretty low in the R-390. Good luck Ed

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Date: Tue, 7 Nov 2006 08:57:48 -0700  
From: "kurt" <tem14me@usa.net>  
Subject: Re: [R-390] SWL antenna

I lived many years in suburban Phoenix and used a wire antenna 50 to 100 feet long depending on where it was in the yard. My experience is the further from the house, everybody's house the better and use a matching network between the coax and the antenna. The best matching network for me is the I.C.E. unit. This will allow you to change the impedance for the best match by changing taps on the transformer. I eventually modified the unit to isolate the antenna ground from the shield of the coax for better noise reduction. I found the height above ground had little affect on the signal strength.

Over time I was able to vary the height from 6 feet to about 25 feet, I had to hide the antenna in the trees, which in my case would be about where you are talking about putting your antenna. I spent most of my "antenna time" minimizing noise from the neighborhood as I tried real hard to keep my own household noise to a minimum. As a reference most of my



listening was utility signals not the big swl broadcasters. There were very few signals that I could not hear that my ham friends with serious antennas could hear. The secret is noise reduction.

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Date: Tue, 07 Nov 2006 13:01:38 -0500  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] SWL antenna

Consider these points:

- - transmission line impedance matching is not very important in receive-only situations
- - for multi-frequency listening (SWL) feed-line matching is not practical
- - loss in coax due to mis-matching at HF over 100 foot runs is negligible
- - your biggest challenge, and opportunity for improvement may well be combating locally generated noise
- - coax has many advantages in combating noise from local sources
- - coax varies in cost from \*very\* expensive to cheap. The most cost effective may well be cable TV coax: RG-6, and it comes at cheap (bad) or moderate cost (much, much better).

Here are my suggestions about what to do:

1) Download, print and read this document. It tells about choke baluns, why you need some, and how to make them: "Common-Mode Chokes" by Chuck Counselman, W1HIS  
<<http://www.yccc.org/Articles/W1HIS/CommonModeChokesW1HIS2006Apr06.pdf>>

2) Buy enough "RG-6 Quad" coax to make the run(s) you have in mind, and buy enough extra to wind some choke baluns out of the coax. Get a few good crimp-on connectors and whatever fittings/adapters you need.

3) Put up whatever wire you can as high as you can, as far away from the house as you can. Number 14 or 16 single wire is nearly invisible if it's away from the road or other folks who might complain. Use thick fishing line for the end tie/insulator: it is invisible in and near any tree or bush. Run the feedline from the antenna to the radio via whatever route is easiest. Put some sort of choke balun AT the antenna end, in the middle if you can, and at the receiver end.

4) You did not tell us whether you have an R-390 (of whichever sort) or not. If you do, also get a couple or three TV Feedline baluns of different sorts. Try them at the input to the R-390 to see if they improve reception. Fool around with grounds and the grounding of the feed line to see what

works best.

(The following are partly tongue in cheek and partly serious. Do them if you can!)

5) Take all but one of the computers in the house out to the curb where the junk collector will pick them up. Cut off all power cords and monitor cables and get every one of the ferrite choke cores off the wires. Put the choke cores on your feed line, receiver power cord and the like. The remaining computer should be under your control and turned OFF and unplugged when you are listening to the radio.

6) Send an email to W1HIS to add more information to his article about sniffing out sources of noise. In the meantime, use your portable radio to ferret out from your house every source of offending noise. Either cure the source or throw it out. Keep in mind that some sneaky gadgets make noise even if they are turned off, while they are still plugged in.

Some miscellaneous notes:

The worst RG-6 TV coax you can find is available at Radio Shack and seems to cost \$50 per 100 foot lengths (with connectors already on). It may be the 92 percent shielded kind, and likely will let in any and all noise from your house and the neighbors, too.

The best such coax you can find can be bought at The Rf Connection <http://users.erols.com/rfc/index1.htm> , "RG-6/QUAD CATV", for \$20 per 100 feet. DUHHH!! You can also get very nice connectors for it and adapters with the money you save. This kind of wire is 100 percent shielded, has extremely low loss, and will last a very long time even outside. They will be glad to put a GOOD crimp connector on one end (or both ends) of your wire for you.

Having a roll of coax sealing tape ("B SEALING TAPE, 1" x .030" x 30ft. #44 Neoprene weather-proofing tape \$3.00") is a very good idea for any connection outside. The Rf Connection also has insulators of many kinds. Number 14 THNN (?) solid house wire in light sky blue color can be had at about \$15 per 500 foot role at your local home store. You can use it for antennas, grounding wires, and balun transformers if you care to make them. After a year or so in the sunlight, the clear outer covering comes off but the stuff will work fine just the same. (Note, I am a happy, and local, customer of The Rf Connection.)

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Date: Tue, 7 Nov 2006 13:53:17 -0700  
From: Transmaster <22hornet@gmail.com>  
Subject: Re: [R-390] SWL antenna

One thing you can try is see if the metal roof can be used as an antenna. If this doesn't work make a folded dipole out of regular "zip" cord the beauty of Zip cord is it has 100 ohm impedance which nicely matches the twinax balanced antenna feed on a R390A.

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Date: Wed, 08 Nov 2006 08:55:26 -0500  
From: "Tim Shoppa" <tshoppa@wmata.com>  
Subject: Re: [R-390] SWL antenna

To build on top of what John and Roy have said:

Even better than coax is twinax or whatever they call shielded balanced line today. I got a bunch and it works wonders on MW and LW along with a magnetically shielded loop antenna.

Loops have a very real advantage in that they have a deep null that is useful for eliminating a single point source of interference. For the higher SW bands I have a dipole in the air connected via the twinax. In all cases the reduction in local RFI is profound compared to coax (worst) or coax and a balun (slightly better than just coax but still not wonderful). And the twinax is wonderful for use with the 390A, with it's balanced antenna jack.

You're using it exactly as it was designed. Remember that the 390A was often used with noisy mobile generators and in environments with lots of noise. Twinax is often found surplus (meaning you should dumpster-dive!) from IBM mainframe deinstallations, or you can buy it in quantity and new on E-bay or other places.

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Date: Wed, 08 Nov 2006 10:06:11 -0800  
From: "Dan Merz" <mdmerz@verizon.net>  
Subject: RE: [R-390] SWL antenna

Tim, the use of twinax interests me. Can two lines of coax be used and be equivalent to twinax ? It might be easier for me to find coax than shielded twinax at reasonable cost It would seem the usual problem with coax is that the sheath brings the noise in from whatever noise source it goes by, because the sheath is involved in getting the signal from the antenna as part of the ground return for the antenna.

It would seem the users of coax argue that putting the ground return out of the local house noise field at the antenna helps eliminate this problem, with a transformer at that location and no direct connection to the coax sheath at that point. Shielded twinax puts both legs inside a shield and to the extent that the shielding works seems a more direct approach rather

than relying on a dirt/soil ground connection for the antenna circuit with the receiver. I'm thinking all this has been beaten to death before but I still need some education and appreciate the responses. I have one 20 ft length of the shielded twinax that I obtained to get the two connectors to mate to my 390 and 390a receivers.

It's about .330 in. diam. and I use it with a jumper to connect to my twin lead coming from the antenna I now have. Dan.

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Date: Wed, 8 Nov 2006 11:22:08 -0700  
From: Transmaster <22hornet@gmail.com>  
Subject: Re: [R-390] SWL antenna

You know something that is a excellent idea. I happen to be rebuilding my transmission HF dipole antenna and am looking through all of the possible designs and I found Fair Radio sales has twinax cable. here is the catalog description; .

Twisted Twin Axial RF cable with braided silver shield Both conductors are 24 gauge with 19 strands per conductor. Cable rated at 77 ohm impedance. Light blue jacket. #WT-24, \$25.00/100ft; \$95.00/500ft.

The search term I used was to find this item is "antenna wire"

Now I have a question; Has anyone out there used field telephone wire for antenna wire? I am looking at this stuff it is cheap. the conductors are some kind of steel. It isn't the easiest stuff work with but I have seen this stuff in the field that has been in use for decades. You can get this wire in mile long spools for a really cheap price.

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Date: Wed, 08 Nov 2006 17:56:53 -0800  
From: "Kenneth G. Gordon" <kgordon2006@verizon.net>  
Subject: Re: [R-390] SWL antenna - field telephone wire.

Unless the specs have been changed since I was in the Army in 1960, the wire is made up of a certain number of strands of steel and and a certain number of strands of tinned copper. The steel is to give it strength, and the copper is to lower the resistance. The way we used to determine which of the strands were steel and which were copper when we wanted to make a splice was to strip about an inch of insulation off an end, then brush a finger across the tops of the wires: those that were copper would bend, while the steel ones wouldn't. We would make our splices with the copper ones, as I remember it. I can't remember what we did with the steel ones. That was 40 years ago. The copper solders easily, but the steel wires are "difficult".

> It isn't the easiest stuff to work  
> with but I have seen this stuff in the field that has been in use for  
> decades. You can get this wire in mile long spools for a really cheap price.

It makes excellent, non-stretching, antenna wire, but is somewhat difficult to work with, as you say.

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Date: Wed, 08 Nov 2006 20:47:37 -0600  
From: Barry Williams <ba.williams@charter.net>  
Subject: Re: [R-390] SWL antenna - field telephone wire.

That would be WD-1 wire. You can also get cheap wire by the spool at farm supply shops. They sometimes stock a lot of wire. Some is uninsulated for long runs of electric fences.

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Date: Wed, 8 Nov 2006 20:51:54 -0700  
From: Transmaster <22hornet@gmail.com>  
Subject: Re: [R-390] SWL antenna - field telephone wire.

That is true, another thing that might be worth trying for a stealth antenna is bronze MIG welding wire. once you get this stuff up in the air is just about disappears. If you want to increase it's size run as many strands as you like and use a cordless drill to wind it up.

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Date: Wed, 08 Nov 2006 21:55:07 -0600  
From: Barry Williams <ba.williams@charter.net>  
Subject: Re: [R-390] SWL antenna - field telephone wire.

I've found that black insulation is the hardest to pick out. Clear shines and reflects. For some reason, green stands out too. There are a number of ways of making something stealthy.

Date: Fri, 10 Nov 2006 05:23:14 -0500  
From: shoppa\_r390a@trailing-edge.com (Tim Shoppa)  
Subject: Re: [R-390] SWL antenna

> Twisted Twin Axial RF cable with braided silver shield Both conductors  
> are 24 gauge with 19 strands per conductor. Cable rated at 77 ohm  
> impedance. Light blue jacket. #WT-24, \$25.00/100ft; \$95.00/500ft.

This cable is great for receiving, but for transmitting don't try going beyond a few tens of watts because those conductors are really really skinny and the insulation is not very thick either. If you've got a really really low SWR and no standing nodes anywhere you might get lucky! Now, getting good balance on transmission is a good thing if you've got stray ground currents running around your house making RFI, but

otherwise I would recommend using more heavy-duty coax.

The more heavy-duty TV twinlead (do they even still sell it? I guess so!) is good to the hundred watt or so level, and above that if you want balanced line for transmission you either go to open line, or to two-wires-in-a-hollow-circular-jacket stuff.

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Date: Sun, 19 Nov 2006 02:28:59 -0700  
From: Transmaster <22hornet@gmail.com>  
Subject: [R-390] Ceramic antenna insulators

I have been looking for decent antenna insulators and I have come across this outfit they have a collection of real nice porcelain insulators for antennas. They have a free print catalog if you are interested.

<http://www.daburn.com/index.html>

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Date: Sun, 19 Nov 2006 09:24:56 -0800  
From: "Dan Merz" <mdmerz@verizon.net>  
Subject: [R-390] Copper clad/copperweld ant. wire

Hi, I'm homing in on using #18 copper clad steel wire for my new 390 wire antenna to achieve a long span with small sag low on the roof. Does anyone know if the genuine "copperweld" wire is worth the extra cost, seemingly about 4 times as much, as some other 30% (conductivity?) copper-clad varieties available as antenna wire for less money. The two sources I've identified are Wireman and Davis RF. It seems that the proprietary copperweld has been around forever but cladding steel wire with copper should not be rocket science. It would be nice to know if the cheaper stuff would hold up for a while though. It may not take much of a coating to achieve 30% conductivity and I'm wondering whether anyone has had the cheaper stuff up for a while and knows whether it's worth putting up. Our climate is very dry here in eastern WA so corrosion won't be rampant. Dan.

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Date: Sun, 19 Nov 2006 12:39:38 -0500  
From: "David C. Hallam" <dhallam@rapidsys.com>  
Subject: RE: [R-390] Copper clad/copperweld ant. wire

There are three methods to make copper clad steel wire. One method is to cast molten copper around a steel ingot and then roll the ingot to rod and draw to wire. To my knowledge, this method is no longer used due to expense. The second is to cold roll to pressure bond copper strip to the steel rod and draw. The third method is to electroplate copper on a steel wire and draw. Which is best? They all have to pass corrosion tests, or are supposed to. Wire that is the registered trademark Copperweld is strip

bonded.

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Date: Sun, 19 Nov 2006 12:56:40 -0500  
From: "bill riches" <bill.riches@verizon.net>  
Subject: RE: [R-390] Copper clad/copperweld ant. wire

What I use is #12 THHN black wire that I purchase from the local electrical supply house. It is economical, not too visible, and lasts forever. My 40 and 80 meter center fed dipoles have been up for 10 years with no problems. If you are end feeding the wire you probably can get by with #14.

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Date: Sun, 19 Nov 2006 11:07:25 -0700  
From: Transmaster <22hornet@gmail.com>  
Subject: Re: [R-390] Copper clad/copperweld ant. wire

I can tell you copperweld is great stuff. The sold wire is a little hard to work with but it pays off in a very durable antenna. Here in Cheyenne, Wyoming we have constant wind. It is common to have winds blowing greater than 50 mph. As you can believe this it very hard on any type of antenna. There are hamradio operators here in town who have had Copperweld antennas in the air for 30+ years with out any problems. I have just ordered the makings for a new dipole from The Wireman and I specifed 19 strand insulated Copperweld. I don't know if you have priced pure copper wire lately but CopperWeld because of it's steel interior is actually cheaper. The Choice is a no brainer. Go here for the spec's on the wire: <http://www.copperweldbimetallic.com/1024203.html>

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Date: Sun, 19 Nov 2006 10:42:57 -0800  
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>  
Subject: RE: [R-390] Copper clad/copperweld ant. wire

Your mileage will vary due to location/QTH. I've lived in dry climates with little or no winds to speak of. Problem there was air pollution which would eat the copper. Then our desert rust would take care of the steel in a year or two. At another home, the Ohio Valley, we had all four seasons with air pollution. Copper coated wire lasted one year and I had to start patching the skywire. Now living in the Pacific Northwest, southern end of the Willamette Valley, and I'm back to using solid copper #14 AWG for dipoles or any color insulated stranded #14 from a big box hardware store for antennas with a bend. Lots of wind and rain here on this side of the Cascade Mt range.

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Date: Sun, 19 Nov 2006 15:19:41 -0500  
From: "David C. Hallam" <dhallam@rapidsys.com>  
Subject: RE: [R-390] Copper clad/copperweld ant. wire

If you are looking for corrosion resistance as well as strength, use aluminum clad steel wire. It is used for the strength member in ACSR power transmission cable.

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From: Transmaster <22hornet@gmail.com>  
Subject: Re: [R-390] Ceramic antenna insulators

I just dropped Daburn a note and asked them if they can point me in the direction of someone who resells their ceramic products. Those through (the wall) insulators would be perfect for neatly bringing a balanced feed in to the shack. What is interesting is the insulators I like best are intended for the wire bracing on old airplanes. By the way does this forum have hot links blocked I sent a couple of notes with them and they where rejected. No big thing I can change the URL.

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Date: Mon, 20 Nov 2006 09:37:32 -0500  
From: "Charles A Taylor" <wd4inp@isp.com>  
Subject: [R-390] Copper clad/copperweld ant. wire

ACSR=aluminum cable, steel reinforced. Consists of central strands of steel wire, surrounded by aluminum strands. Very conductive and very cost effective over copper conductor. It's cost effective to string large cables for future growth; so much so that the power transfer is now limited by the inductance of the cable, rather than the resistance. Which leads to the strange situation that power at the far end of a lightly-loaded line can rise higher than the source due to capacitance of the conductor to ground and surrounding conductors. Thought I'd throw that in.

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Date: Mon, 20 Nov 2006 20:09:32 -0000  
From: "Lester Veenstra MOYCM" <mOycm@veenstras.com>  
Subject: RE: [R-390] Copper clad/copperweld ant. wire

The "power" can rise? Voltage I could swallow, but "power" is sticking a bit.

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Date: Mon, 20 Nov 2006 16:28:33 -0500  
From: Mark Huss <mhuss1@bellatlantic.net>  
Subject: RE: [R-390] Copper clad/copperweld ant. wire

Ah, Yes. The wonders of High Power Transmission!!!  
<http://205.243.100.155/frames/longarc.htm>  
The first MPEG shows what happens when you try to disconnect an open line.

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Date: Wed, 22 Nov 2006 11:18:14 +1100  
From: "Bernard nicholson " <vk2abn@bigpond.net.au>



Subject: [R-390] Antenna wire

I have found that the best WIRE for antennas is galvanised iron fencing wire ! People worry about resistance etc. but when you have very little current flowing resistance isn't a problem, even when used as a transmitting antenna, the difference in radiation efficiency over copper is around 4% in dB terms this needs pretty good instrumentation to measure. When one looks at commercial antenna suppliers one finds that their range of wire antennas such as Broadband deltas and logperiodic arrays etc. come in three versions, HARD DRAWN COPPER , GALVANISED IRON AND STAINLESS STEEL, the last being for corrosive areas by the sea, #8 gauge fencing wire is cheap and doesn't stretch, I have a 160 meter dipole at 90 ft between a couple of big trees. It is a 280ft span and I have nearly half a ton of tension on it; it's been up there with no trouble since 1991. I regularly hear and work the US from Australia on 160M using this antenna , On the subject if insulators They are sold here in Australia in Farm Produce stores for Electric fences both ceramic and high impact plastic, they are very good and very cheap , The galvanised iron is a bit harder to solder to but with a hot 300W iron not too difficult, you need a nice big pair of electricians pliers to handle it and you need to make sure you don't kink it, That's about it. Not rocket science , Regards to all Bernie Nicholson Vk2abn

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Date: Tue, 21 Nov 2006 20:56:20 -0700  
From: Transmaster <22hornet@gmail.com>  
Subject: Re: [R-390] Antenna wire

Well I once loaded up a ten mile long stretch of barbed wire fence. It was amazing I was miles away from any power lines. I had a King Kong signal despite the fact the top fence wire was about 4 feet off of the ground.

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Date: Wed, 22 Nov 2006 08:04:07 -0600  
From: mikea <mikea@mikea.ath.cx>  
Subject: Re: [R-390] Antenna wire

Out in the sticks southwest of where I live, a friend has a 2-mile straight-line stretch of decommissioned Rural Electric Co-Op power line. At least he says it's decommissioned. If I had some way to make *\*Absolutely\* \*Sure\** that it was cold and would *\*stay\** cold, I'd be willing to try it as an antenna. That's a big piece'o'wire.

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Date: Wed, 22 Nov 2006 08:20:37 -0700  
From: Transmaster <22hornet@gmail.com>  
Subject: Re: [R-390] Antenna wire

There was a Ham up in central Wyoming that had a similar situation

except his piece of abandoned REA wire was about 15 miles long. It got out like gang busters but he told me the problem he had was unknown lightning strikes from thunderstorms down the line nailing his equipment. He decided to go back to more conventional sized antennas.

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Date: Wed, 22 Nov 2006 12:31:15 -0600  
From: "Don Reaves" <don@reatek.com>  
Subject: RE: [R-390] Antenna wire

A fellow in West Texas reported good results chasing lowfer signals by attaching to an abandoned railroad line, several miles long. Worked well as a Beverage, unterminated. Hard to change directionality, though. I have a 10,000 foot spool of radial tire wire. It is steel wire, bronzed. No place to safely pay it out but someday...

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Date: Wed, 22 Nov 2006 15:07:14 -0800  
From: "Ed Zeranski" <ezeran@ezeran.cnc.net>  
Subject: RE: [R-390] Antenna wire

I've seen a similar stretch of abandoned power line in the Yuha desert in Southern Calif. We drove the pole line road in the Jeep and , yep, the ends are in the dirt. The line runs just south of due east-west abt 35 ft above the desert more or less parallel to interstate 8. Its a back burner project but I'd like to try that wire with battery run RAK/RAL.

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Date: Wed, 22 Nov 2006 16:08:12 -0700  
From: Transmaster <22hornet@gmail.com>  
Subject: [R-390] Re: Good deal!

here is the home page to this site: <http://www.murphyjunk.bizland.com/>

This is a great outfit.

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Date: Wed, 22 Nov 2006 18:30:36 -0500  
From: jcoward5452@aol.com  
Subject: Re: [R-390] Antenna wire

Happy Turkey Day! I'll be having microwaved Hotdogs. I just got off the roof from re-hanging my 60' long wire. The rope tying the insulators up to the support poles rotted away so got some new nylon stuff that should last a while. The wire itself was Rat Shack stranded copper bought long ago when they actually sold radio stuff. It looked fine after maybe 15 years. Seems to work fine too.

Even when it was sagging close to the roof I was able to hear the St. Helena broadcast with the EAC R-390A, but could not copy due to excessive noise.

Getting ready for MRCG? My VW still has all the stuff that didn't sell last one still in it! Just have to throw in the camping gear and I'm good to go!  
Jay

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Date: Fri, 1 Dec 2006 17:32:26 -0500  
From: "rbaldwin14"  
Subject: [R-390] Antenna Relay???

I have a dead R-390A, but when I connect the antenna directly to the antenna lead removed from the antenna relay, the radio comes alive and works very well. So, my problem must be with the antenna relay. I am sure someone else has experienced such a problem and can give me a little push in the right direction. Do I take it apart and clean it up or is it getting power that it's not supposed to be getting from the break in circuit and shorting out the antenna input?

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Date: Fri, 1 Dec 2006 18:57:57 -0800  
From: "Craig C. Heaton"  
Subject: RE: [R-390] Antenna Relay???

First take it apart, inspect, then clean. My relay, I've had it apart, has gold plated contacts. A small amount of DeOxit should do the job if nothing is broken. Going from memory here, Y2K is out in the shack, power from the selenium rectifier is used to power the relay. When powered the antenna contacts are grounded. Only a small screw driver is needed to remove the covers, have fun.

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Date: Fri, 01 Dec 2006 20:42:37 -0700  
From: DW Holtmnan  
Subject: Re: [R-390] Antenna Relay???

The first thing that I would try is to check voltages from the selenium rectifier. I have had two of them go out and had to solid state the bridge. Both times, they started chattering in the standby and Cal positions. They still operated in the AGC and MGC (de-energized) positions, so it might not be the rectifier, but I would still check it out.

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Date: Mon, 4 Dec 2006 18:38:14 -0700  
From: Transmaster <22hornet@gmail.com>  
Subject: [R-390] the Wireman

I have to say I can see why The Wireman (thewireman.com) has been in business since 1976 a great place to deal with. I have completed the construction of a new Dipole and I am letting the silicone sealant cure and waiting for a clam day to get the yard arm and pulley installed on the tower so I can pull it up and we will see how it works. What I built is a

conventional dipole using covered 18 gauge 19 strand copperweld wire, a W2DU balun, and I am feeding it with milspec JAN RG-9U coax which I had on hand. The real treasure I received from The Wireman is their book entitled "Wire Book IV". This book is a great read with a bunch of very useful information about coax, antenna wire, baluns, etc. The book is not so much about building antennas as it is a discussion on the stuff you use to build a wire antenna with. I highly recommend it.

Date: Sat, 09 Dec 2006 09:12:31 -0800  
From: "Dan Merz"  
Subject: [R-390] Underground connection sealant/insulation

Hi, I'm now dealing with putting in some ground points at various locations for my 390 receiving antenna system and am looking at using some type of sealant/insulation over a few connections that will be in the dirt or within the concrete of the footings. I want to cover the connectors with something that will for the most part prolong the connections, which are mechanical, clamped connections between copper wire and iron rebar/galvanized hog wire. I can't get these connections above grade which would make the connection more reliable. I'm trying to bury the grounding rather than driving a rod into the ground. I picked up some GE Silicone II "Blacktop and Roof, black" stuff in a caulking container at the local hardware and read a little about RTV/silicone materials online and decided the stuff I got was the more desirable alcohol curing type and not the not-for-electronic use acetic acid curing, vinegary smelling type. Is there a hardware variety type that might be better than this or something that is commonly used for such connections? My first idea was to find some asphalt base material since I know asphalt has great longevity and there was one caulking material that was asphalt base but I opted for the Silicone II figuring it might cure faster and endure as well. Any thoughts appreciated,

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Date: Sat, 9 Dec 2006 11:32:13 -0700  
From: Transmaster <22hornet@gmail.com>  
Subject: Re: [R-390] Underground connection sealant/insulation

You really do not have to worry about the silicone sealant that has the acid component the acid dissipate quickly and is gone by the time silicone finishes curing. Are you putting in a ground plane for your antenna? If so galvanized chicken wire is fantastic, and cheap. bury it a couple of inches below the ground and forget about it. Ken de W7ITC

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Date: Sat, 09 Dec 2006 13:35:06 -0800  
From: "Dan Merz"  
Subject: RE: [R-390] Underground connection sealant/insulation

Ken, I wondered about the acid problem; the online caveat seem to relate to applications where an item was sealed up before the acid could dissipate but evolved into a general statement not to use the acid type on any electronics, maybe not a justified conclusion as you state. My ground is not being used for transmitting, the antenna is to be an end-connected wire not too high off the roof. The hog wire I bought is one level away from chicken wire, 14 gage. I figured if I buried it where I probably would never be able to get to it, I should have a little more wire thickness for connection using some small galvanized nut/bolt/angle iron connectors I found for electric fence applications in the local ranch and home store. How did you connect to the chicken wire? Dan.

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Date: Sat, 9 Dec 2006 15:02:13 -0800 (PST)  
From: Joe Foley  
Subject: RE: [R-390] Underground connection sealant/insulation

You should be using solid copper wire Cadwelded to the solid copper ground rods. Anywhere there are dissimilar metals touching in the ground they will corode in no time! Covering them MAY help, but won't be a long term solution. Some electrical contractors will have the equipment to do the welding and can give you more information and suggestions on how to proceed.

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Date: Sat, 9 Dec 2006 16:24:48 -0700  
From: "Sam Letzring"  
Subject: Re: [R-390] Underground connection sealant/insulation

I always use copper plated ground rods and then copper clamps to clamp the copper ground wire to the ground rod. Ground rods should be available at any electrical supply or maybe even Home Depot or Lowes.

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Date: Sat, 9 Dec 2006 19:31:43 -0700  
From: Transmaster <22hornet@gmail.com>  
Subject: Re: [R-390] Underground connection sealant/insulation

With the chicken wire unravel part of it and bring this length of wire above ground to make your connections to the antenna. As for grounding go to Polyphaser they wrote the book on it. [www.polyphaser.com/productdata.aspx?class=HAM](http://www.polyphaser.com/productdata.aspx?class=HAM) I have found plain old #6, or #8 steel rebar works great for grounding rods, and you can find this stuff at a metal scrap yard for cheap.

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Date: Mon, 15 Jan 2007 11:42:04 -0600  
From: "Don Reaves" <don@reatek.com>  
Subject: RE: [R-390] Pictures of my Motorola R390A

><http://www.knology.net/~thelanding/R390A/>

Nice pictures, Barry. I like the way you right angled the balanced antenna input to a Twinax balun. That lets you use less depth for a cabinet. Have you noticed any signal loss through the balun vs a direct connection?

---

Date: 15 Jan 2007 19:08:50 -0000  
From: "n4buq@knology.net" <n4buq@knology.net>  
Subject: RE: [R-390] Pictures of my Motorola R390A

> you noticed any signal loss through the balun vs a direct connection?.....

I haven't done any real measurements. I seem to recall not hearing much if any difference with or without it. I use it primarily for a convenient way to get to a BNC connection. A little impedance matching along the way doesn't hurt either. I don't know if I forwarded it to the list, but the little box on the inside of the back panel houses a line filter and 12VDC power supply for the little fan. There's another plug for another fan if I ever decided to put one on top.

It's a bit hard to make it out, but the black square in the upper left hand corner is the main power switch. It saves the R390A's microswitch. The three BNCs on the back were intended for both antenna inputs as well as the IF output. I never got around to hooking up the unbalanced input connector.

The two RCA jacks are for Local (through the matching transformer) and Line output and the wingnut is for ground. I wanted the back panel to be a "cleaner" version of the back panel on the radio with just the necessary connection points with quick-disconnects for them. I took the pictures for someone who might be interested in a swap for a KWM-2. Not sure if I'll do it, though. I put a lot of work into it and it works great so I might just miss it too much.

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Date: 15 Jan 2007 19:10:34 -0000  
From: "n4buq@knology.net" <n4buq@knology.net>  
Subject: Re: [R-390] Pictures of my Motorola R390A

> > That is one awesome clean panit job on the front panel. Roger  
AI4NI

Thanks. It's the same color used on the Collins S-Line front panels. It's not original by any means, but I liked it.

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Date: Fri, 19 Jan 2007 21:37:51 -0500  
From: "Dave Maples" <dsmaples@comcast.net>

Subject: RE: [AMRadio] Looking for antenna multi-coupler

> Have four, possibly five boatanchor receivers to feed from the same  
> antenna port - looking for a 50-ohm multi-coupler to accomplish.....

All: I used a spectrum analyzer and tracking generator to sweep a 2:1 TV splitter down below the specified 5 MHz minimum. I agree--they are fine with minimal additional insertion loss above the norm even down in the AM broadcast band. If anyone's interested in the pictures I can post them in a few days (extra-heavy work schedule right now).

---

Friday, January 19, 2007 2:40 PM

To: 'Discussion of AM Radio in the Amateur Service'

Subject: [Johnson] RE: [AMRadio] Looking for antenna multi-coupler

Use TV splitters. They have excellent isolation between ports. You won't notice the small loss. Don't worry about them being 75 ohms as your receivers are not 50 ohms anyway. No preamp needed unless you split many times. They are cheap and so are the connectors.

---

Date: Thu, 1 Feb 2007 01:26:43 -0700

From: Transmaster <22hornet@gmail.com>

Subject: [R-390] Interesting Twinax connector/balun

Found this interesting twinax adapter. it is a a twinax connector to which a balun has been attached to let you use regular "twisted pair" telephone wire. This would be a cheap alternative to using regular twinax transmission cable for an antenna feed line. . looking at the top section of the balun it looks like there is a couple of screw lugs. If this is what these two screws are for this would be a great place to attach some 300 ohm flat wire and use it as your feed line. This connector has a reasonable price \$11.50. The link is below change the Z's to W's so the link will work.  
[ZZZ,pacificcable.com/Picture\\_Page.asp?DataName=BA3](http://ZZZ.pacificcable.com/Picture_Page.asp?DataName=BA3)

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Date: Thu, 1 Feb 2007 07:46:56 -0500

From: Bob Camp <ham@cq.nu>

Subject: Re: [R-390] Interesting Twinax connector/balun

The twinax to twisted pair converters were a very common way to cost reduce an IBM LAN. They date to an era when 5 or 10 MHz was high speed for data.

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Date: Thu, 1 Mar 2007 19:14:06 -0600

From: "Barry" <n4buq@knology.net>

Subject: [R-390] Diversity Operation?

Does anyone know where there's an illustration of how to hook up two R390As in diversity mode?

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Date: Thu, 1 Mar 2007 21:16:40 EST  
From: DJED1@aol.com  
Subject: Re: [R-390] Diversity Operation?

It is covered on page 3 of TM11-856A. AGCs are tied together through the DIV connection, the diode loads are tied together (term 14). The main receiver retains the jumper between 14 and 15, and that receiver provides the audio output. Obviously, separate antennas. I'd definitely go with a pair of rhombics.

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Date: Wed, 21 Mar 2007 08:57:13 EDT  
From: SHELLY199@aol.com  
Subject: [R-390] mech. filters

Recently, someone on the list seemed to have a keen interest in rebuilding filters. He was offering 5 bucks for defective filters. Not that I'm interested in making big money selling bad filters but would like to discuss some of my experiences with filters. If he could reply I'd appreciate it.

Barry, I see you have a noisy ant trimmer. You may get lucky and possibly save yourself from pulling the rf deck. The ant trimmer shaft is insulated from chassis by a fiber washer under the nut securing it to the bracket. The nut is directly below the ant gear that turns the ant trim shaft. By loosening the nut and lifting the trimmer upwards you can get in there with a small brush and clean crud from the washer. Also tuner cleaner may help dislodge and dirt that may be there. It's worked for me on at least one occasion.

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Date: 21 Mar 2007 13:36:10 -0000  
From: "n4buq@knology.net" <n4buq@knology.net>  
Subject: Re: [R-390] mech. filters

I'll have to try that. I didn't know that was possible. It sure would save me a lot of work. I removed the cross-drive shaft (the one that goes to the front panel) and turned the trimmer by hand and I didn't notice as much noise. I figure some of the problem may be in the insulating sleeves and washers for that assembly. I do notice that when I turn the trimmer CW, the noise is much less than when turning it CCW. A CW rotation forces the shaft against the fiber washer whereas a CCW rotation forces the shaft against the metal washer on the outside of the assembly (where the E-ring fits into the groove on the shaft). This seems to indicate there is some conductivity from the gear through the shaft but I have all the pieces in



place so not sure why that would be. I wonder if I need a fiber washer between the E-ring and the frame? I don't recall seeing one there but maybe I'm missing something?

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Date: Thu, 22 Mar 2007 08:12:38 -0400  
From: Mark Huss <mhuss1@bellatlantic.net>  
Subject: Re: [R-390] mech. filters

From your description, it sounds like the thing may be shorting to the case. This is NOT supposed to happen.

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Date: 23 Mar 2007 19:31:06 -0000  
From: "n4buq@knology.net" <n4buq@knology.net>  
Subject: [R-390] (no subject)

Is there a right and a wrong way to feed the balanced input with unbalanced coax? I found two different versions and wonder if it makes any difference which way it's done.

<http://www.qsl.net/k5bcq/r390/r390.html>  
<http://www.r390a.com/html/feedpoint.html>

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Date: Fri, 23 Mar 2007 16:25:19 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] (no subject)

Those two methods wind up with the same result. Here are some comments: It may matter which pin you ground. Here's why:

MIL-A-27434/24, 28 September 1960 describes the UG-971, twinax to type C adapter. This MIL-Spec show the index slot in the inner shell of the connector as being to the LEFT as you view the pins of the twinax connector and the other end of the connector downwards.

MIL-A-27434/23, 28 September 1960 describes the UG-971, twinax to "UHF" (or SO-239) adapter. This Mil Spec shows the index slot in the inner shell of the connector as being to the RIGHT as you view the pins of the twinax connector and the other end of the connector downwards.

HOWEVER, I have a photo showing one each of these adapters and both of them have the slot to the RIGHT as you view the pins of the twinax connector and the other end of the connector downwards. What this means is that depending on which of these two adapters you have, OR which way your particular adapter is made, you will be grounding one or the other of the twinax terminals and the other goes to the center of your coax. Whether this matters, I do not know! It could be that the adjustment of the Antenna Input Balance capacitor on the RF input transformer

would make a difference. It could be that if the thing is adjusted per the book (RF fed equally to both pins and adjust for a null in received signal) that it won't matter which one you ground. I suggest you try it both ways and let us know. An easy way to change it once you have your coax lashed up to the twinax connector, no matter how you do it, is to reverse the two coax wires to the RF deck from the antenna relay which carry the balanced RF.

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Date: Fri, 23 Mar 2007 17:10:51 -0400  
From: Mark Huss <mhuss1@bellatlantic.net>  
Subject: Re: [R-390] (no subject)

For what it is worth, Navy Field Change EIB-664 shows that the pin that goes to J107 of the antenna relay module is grounded. As an aside, one can swap cables P205 and P206, so that P206 goes to J105. This places the static and lightning/static protector on the antenna input, and saves you an adaptor as the usual balanced adaptor needs a SO-239 to C, and a C to Twinax. Just use the whip input C connector as your unbalanced antenna input, and stick a grounded wire into the proper pin socket of the j104 jack

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Date: Fri, 23 Mar 2007 21:47:07 -0400  
From: "Bob Young" <youngbob53@msn.com>  
Subject: Re: [R-390] using the balanced input with unbalanced antennas

I use UG-970/U connectors which are twinax to SO-239 90 degree connectors with one pin grounded for unbalanced antennas, you get a lot more gain this way than using the unbalanced input as the radio is aligned using this input. I forgot where I read it but it matters which pin is grounded. If you face the receiver from the back the 90 faces right on a 390A and that is the correct way. If I remember I'll check which pin in the connector is connected to ground tomorrow and post it. These connectors are still available at the RF connection BTW and are really nice, I ordered 4 today. I do believe the righthand pin as you face the back of the radio is the one that is supposed to be grounded, not positive though which is why I'll check the connector.

---

Date: Mon, 26 Mar 2007 13:09:37 -0400  
From: Mark Huss <mhuss1@bellatlantic.net>  
Subject: Re: [R-390] R-390 zero adjust problem fixed and have more questions.

<snip>

(3) is the antenna relay. It is designed to switch the antenna input from grounded to input, normally grounded. With little current through the

contacts, they gather oxidation, so you might have to tke one apart. Also, they are designed to close at 26VDC. The rectifier for the coil circuit is a selenium rectifier. It has a voltage drop of about 1.2 volt per plate. And this voltage slowly increases with age. So check the voltage at the coil. If it is less than 24 volts DC, you need to change it. Make sure you put a resistor in series with the silicon diode so that the voltage at the relay is no greater than 26.5VDC (average, there will be half-wave ripple at the pin)

(4) Squelch I can't help you with. Except to explain what is already in the manual

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From: "Bill & Becky Marvin" <wmarvin@hickorytech.net>  
Subject: [R-390] I just Bought

I just bought both antenna adaptors (New) for the 390A with BNC out for \$50 on ePay. Sold as one item as a "Buy it Now". I'm happy,

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Date: Thu, 26 Apr 2007 13:57:21 -0400  
From: JMILLER1706@cfl.rr.com  
Subject: Re: [R-390] I just Bought

Last year I bought two "dual pin" connectors from my local junk dealer for \$5. They are actually old style Ethernet connectors, often found on the ends of junked Ethernet coax cables. Just go to your local computer surplus dealer and ask for old Ethernet cables and connectors. Cut the coax and strip the insulation, then wire it into a normal PL-259 connector out to the antenna.

---

Date: Sat, 02 Jun 2007 19:25:28 -0700  
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>  
Subject: [R-390] Whazzat? Mystery Antenna in San Jose, CA

At the end of the runway of the airport in San Jose, California, there is the oddest antenna. It looks for all the world like a mini-Wullenweber "Elephant Cage". What it is doing in suburban San Jose I'll never know. Here are some pix:

<http://www.jamminpower.com/images/Antenna/Antenna.html>

Anybody know what this is all about? It doesn't seem to be connected to the airport.

---

Date: Sat, 02 Jun 2007 23:02:03 -0400  
From: Barry Hauser <barry@hausernet.com>  
Subject: Re: [R-390] Whazzat? Mystery Antenna in San Jose, CA

It might not be a good idea to run a thread about airport installations at this particular time, all things considered (check the breaking news) ;-)  
Could it be some kind of ILS thing? Or have they phased that out. (ILS for glidepath guidance when landing, as I recall.)

---

Date: Sat, 2 Jun 2007 22:24:56 -0500  
From: mikea <mikea@mikea.ath.cx>  
Subject: Re: [R-390] Whazzat? Mystery Antenna in San Jose, CA

VOR/DME antenna. See <<http://www.trevord.com/navaids/lam.htm>>

---

Date: Sat, 2 Jun 2007 22:36:24 -0500  
From: "Bill Hawkins" <bill@iaxs.net>  
Subject: RE: [R-390] Whazzat? Mystery Antenna in San Jose, CA

I've seen them elsewhere. It looks like an electronic (rather than rotating) directional beacon. Used to know how it worked, but in general the whip in the center provides a reference frequency while the little orange guys are energized one at a time. An aircraft instrument decodes the signals into a heading relative to the beacon. They were a major navigational aid years ago. Think the Wullenweber-like stuff is just supports for the ground plane. The frequency would be around 130 MHz.

---

Date: Sun, 3 Jun 2007 05:58:49 +0200  
From: "paolo gramigna" <paolo.gramigna@controllo.it>  
Subject: R: [R-390] Whazzat? Mystery Antenna in San Jose, CA

It seems to me the antenna of the EAD (automatic direction finder) of the airport. It works on the aeronautic frequencies. The antennas in the ring of orange balls are switched electronically, thus creating a doppler effect that indicated the direction of the incoming signal. The central whip is used as a reference source, for the purpose of eliminating ambiguity between the two possible directions of the max doppler.

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Date: Sun, 03 Jun 2007 04:31:10 +0000 (GMT)  
From: sdatch@mor.ibb.gov  
Subject: Re: [R-390] ILS Antennas

ILS is still alive and well. The two main components are the localizer (center line of the runway) and glideslope (glide path to the approach end of the runway). The localizer antenna is at the far end of the landing runway, and consists of several antennas in a line perpendicular to the centerline of the runway. The glideslope antenna is located at the near end of the landing runway, and is the (normally) vertical tower structure to one side of the approach end, and the radiating elements are on the approach side of this short tower structure.

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Date: Sun, 03 Jun 2007 00:08:16 -0400  
From: Mark Richards <mark.richards@massmicro.com>  
Subject: Re: [R-390] Whazzat? Mystery Antenna in San Jose, CA

That's a VOR array if I ever saw one. No big mystery.

---

Date: Sun, 03 Jun 2007 06:40:33 +0000 (GMT)  
From: sdaitch@mor.ibb.gov  
Subject: Re: [R-390] Whazzat? Mystery Antenna in San Jose, CA

This antenna structure, unless I've made an error in looking it up, is the SJC VOR-DME, on 114.1. The structure is located on what appears to be on the extended centerline north of the 11R-30L runway at the Norman J. Mineta San Jose International Airport.

It has the classic Wullenweber structure of concentric circles. You can see the inner array clearly. They seem to have some kind of weather cover over the elements. It is hard to tell what frequency they are looking at.

---

Date: Sun, 03 Jun 2007 06:24:26 -0400  
From: Roger Gibboni <rgibboni@lmdulye.com>  
Subject: [R-390] Mystery Antenna

I think that's a VOR antenna with the cone removed. Maybe out of service? What you think is the elephant cage is the platform. Notice the small radiators at the top that appear to be forming a compass rose. You can check local NOTAMS to answer that question.

---

Date: Sun, 03 Jun 2007 13:25:33 +0000  
From: "Gene Dathe" <dathegene@hotmail.com>  
Subject: [R-390] Whazzat? Mystery Antenna in San Jose, CA

Look up --Distance Measuring Equipment-- in Wiki. How they did it with real radios in the days before GPS...

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Date: Sun, 03 Jun 2007 11:23:16 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Mystery Antenna

That is indeed a VOR system. You tune in your VOR, (Variable Omni-Range) instrument to the specified frequency. It, by needle deflection, tells you whether you are on course to THAT location. Very many are located around the country. You navigate by them and with dual VORs in the aircraft can determine when you have arrived at an intersecting point

along your path. However, general aviation aircraft 'normally' do NOT have the DME (Distance Measuring Equipment) instruments. Learjets, Military, and Commercial aircraft do.

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Date: Sun, 03 Jun 2007 09:18:34 -0700  
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>  
Subject: Re: [R-390] Mystery Antenna

Thanks to all the answers! It may not be a mystery to you, but it sure was to me. Plus, I learned a lot more about aircraft navigation than I ever knew. Anybody know what power those transmitters are? I wonder if the local folks pick it up on their Bose Wave Radios. I know my car radio reception goes wacky right about there. This airport is right in a combination industrial/residential area.

---

Date: Sun, 03 Jun 2007 13:05:27 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Mystery Antenna

I really don't know what the power output is. I know that from 100 NM and 6500 ft Alt., I always got a SOLID signal. The 'funny' part is that the polarization is HORIZONTAL. Look at a Cessna or Piper - on the vertical stabilizer you'll see "V" shaped horizontal antenna - one half on each side of it. That's the VOR antenna. The aircraft ONLY receive VORs. I can pick them up on the ground with my CEI Type 906A1 at home. You'll never make ANY sense out of what you hear. And - NO - my Bose wave radio does NOT get bothered. I live about three miles from one at my local airport. Manassas, VA - HEF, (FAA designation for the airport.). Dulles is IAD, and I'm not too far away as I'm under their approach lane(s). Once again the CEI can pick it up, BUT neither my car system or Bose are bothered.

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Date: Sun, 03 Jun 2007 13:09:19 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Mystery Antenna

On another note. One list member made reference to 'NOTAM'. This is put out by the FAA when you get your pre-flight WX and other info. It stands for 'Notice To AirMan'. This info gives us the knowledge as to NAVAIDS, parachute activities, and a whole BUNCH of things we MUST know and consider for our flights.

---

Date: Sun, 03 Jun 2007 17:15:04 +0000 (GMT)  
From: sdaitch@mor.ibb.gov  
Subject: Re: [R-390] Mystery Antenna

I never correlated any interference from aviation nav aids to the AM or FM

broadcast bands, but I have received signals on car radios. If my memory serves me correctly, the Emory NDB (EMR) at Augusta is on 385 kHz and is easy to pick up along 15th Street, on the second harmonic. In Greenville, NC, the localizer was at the low end of the NAVaid band, and I could easily pick it up on my analog tuning FM receiver. Even though the localizer is an AM signal, I could hear the tones on the FM receiver, although quite poorly.

---

Date: Mon, 4 Jun 2007 02:26:46 -0700 (PDT)  
From: "Daniel Arney, Jr." <hankarn@pacbell.net>  
Subject: Re: [R-390] Whazzat? Mystery Antenna in San Jose, CA

Guys, The antenna is a VOR/DME Doppler Correcting antenna array. They do this due to close proximity of buildings so VOR/DME

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Date: Wed, 6 Jun 2007 06:25:13 -0400  
From: "rbaldwin14" <rbaldwin14@nc.rr.com>  
Subject: [R-390] R-390 Antenna Relay

A quick review of a recent purchase from the Durham Flea Market shows that my newest acquisition, a non-A R-390 has a very modified, and probably unrecoverable, antenna relay. Parts are missing and bad substitutes have been made. Does anyone have a spare antenna relay or can you point me to somewhere what I could obtain one? I don't have it completely apart yet, so a question is: Are they the same as the R-390A relays?

---

Date: Wed, 6 Jun 2007 11:30:19 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] R-390 Antenna Relay

Old war stories come to mind.

The R390/A relay is mini BNC.  
The R390 relay is BNC.

The R390 relay frame is part of the chassis and not part of the relay.  
The R390/A is all one assembled part.

The R390 relay was listed in the parts TM as several parts.  
The frame was not a listed part.  
Once upon a time I discarded a R390 receiver relay frame.  
That receiver is likely still setting on a dead line rack never to operate again.

You could do a lot of parts crafting.

If any one has a R390 Relay and the small metal frame around it you can fabricate the relay leaves from other relay leaves.

You could make a butch plate to go between the R390 and a R390/A relay. The relay voltage is not a big problem.

You could make up some short mini BNC to female NBC to adapt the R390/A relay to the R390 harness cables.

If you are not going to do full break-in with the receiver in a transmitter shack, then a butch plate and some BNC feed through connectors on the back panel may be just as good. A SO 239 feed through and a BNC to SO 239 adapter on the inside may install and look clean. You can just leave the single end whip open and terminate one of the balanced inputs with a shorting plug. Then bring the other balanced input out to a feed through on the back panel.

I hope someone can offer you a R390 relay and the frame part. I do not know how Dave Medley is doing or who is looking after his inventory of R390 parts. But a mail to Dave is in order to see if he has a relay and frame.

Roger L. Ruszkowski </HTML>

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Date: Fri, 27 Jul 2007 15:36:38 -0400  
From: "Tracy Fort" <beerbarrel@cox.net>  
Subject: [R-390] Digging around at work

I was digging around at work last night and came across an unusual connector. It's not unusual in the fact that it is a UG-421B/U connector. It does fit on the Balanced 390 connector properly. I'm sure most of you know that. What's unusual is that this particular connector is used as a bus terminator on the Digital audio bus in some equipment that we maintain. It looks as though I can remove the rear of the connector and extract the pins which have a 128 ohm resistor soldered between them. I'm think that I can make a short adapter to hook up to a BNC cable or such. I might be able to get a few more of these things too. I'll let you know.

---

Date: Fri, 27 Jul 2007 14:52:15 -0500  
From: mikea <mikea@mikea.ath.cx>  
Subject: Re: [R-390] Digging around at work

The balanced twinax connectors are used on IBM AS/400 (and, IIRC, on IBM System/36 and System/38) minicomputers, as network connectors. They're easy to find here in the Oklahoma City area. I never heard of them



being used in any audio gear at all; they seem awfully bulky for modern gear.

---

Date: Fri, 27 Jul 2007 16:15:15 -0400  
From: "Tracy Fort" <beerbarrel@cox.net>  
Subject: RE: [R-390] Digging around at work

I had no real clue what their exact application was. When I found the terminators, I was surprised. I was informed, that they are used in Digital Comm on an Aircraft believe it or not. They are the very nice silver plated looking connectors. They seem to be very high quality. At least I now have a source for 390 connectors.

---

Date: Mon, 20 Aug 2007 09:13:26 -0400  
From: Steve Byan <stevebyan@mac.com>  
Subject: Re: [R-390] Look for poser connector.

> I recently acquired a CU-1388/Flr-9 Multicoupler... <snip>

I just replaced the line filter on mine with a new filter with an IEC AC connector. No idea where to find the mil power cord connector.

> I'm also trying to locate a manual for the same, ...<snip>

I haven't found a TM for the CU-1388 yet, but it turns out to share much of its circuitry, including the amplifier modules, with the AM-4213/FLR-9(V). The TM for the AM-4213/FLR-9(V) is available from the Bunker of Doom <<http://bunkerofdoom.com/lit/flr9/index.html>>.

Watch out for the power supply. Mine gave up the ghost and took out a bunch of PNP RF transistors, which are basically made of unobtainium nowadays. When I opened the supply, the PC board had evidence of extensive ECO or FCO activity. I replaced the supply with a 24 volt open-frame linear supply cranked down to about 21 volts, and the PNP RF transistors with 2N5160's. I run mine with the cover removed; it's made for forced-air cooling from an external blower but I didn't want to rig up the duct-work, so I just leave the cover off and depend on convection cooling. Don't run it in the cover without a blower.

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Date: Mon, 20 Aug 2007 10:10:16 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] Look for poser connector for CU-5069/FRD-10 (V)

I was glad to see the manual for the similar thing mentioned by Steve Byan at:  
<http://bunkerofdoom.com/lit/flr9/index.html>

I have a TMC multicoupler that seems to share similar parts: See an article by Jan SKirrow, "Cooling the RCA CU-5069/FRD-10A(V) Multicoupler" at:  
<http://www.skirrow.org/Boatanchors/TechTalk6.pdf>

You likely will find the correct cord plug at WM Perry (or at hamfests if you are diligent.):

>Perry.txt  
> From K1LKY  
>  
>wmperry@covad.net  
>702 (Rear) Beechwood Rd  
>Louisville, KY, 40207  
>(502) 893-8724, FAX (502) 893-9220  
>  
>>William Perry Company  
>>92 Beechwood Rd. (Rear)  
>>Louisville, KY 40207  
>>502-893-8724  
>No web site that I know of.  
>Email reported 7/03: wmperry@covad.net (and reported now out of service:  
>2/07)  
>  
>  
>You call him or send him a note. Then you wait a few days and in your mail box will show up the right connectors. Then you send him a check.. Simple.  
>  
>"The William Perry Company is a wholesale electronic surplus company  
>located in Louisville, KY. We are a family owned and operated business  
>that has been around for over 35 years. We specialize in wholesale  
>electronic surplus, scrap metal, resistors, military connectors and  
>commercial connectors. Connector manufacturers include: Amphenol,  
>Bendix, Cannon, Burndy, Cinch and Winchester.  
>Available series types in inventory: MS3110, MS3112, MS3116,  
>MS3120, MS3122,  
>MS3126, MS3102A, MS3106A, MS3106B, MS3102E, MS3106E,  
>MS3108E, PT-BT-KPT,  
>PTSE-BTSE-KPSE, 97 A/B, CA E/R, D-SUB, STANDARD K, 17, 26, 57, 67,  
>165 and  
>48 series, dust caps, bushings, cable clamps, contacts, co-axels, strain reliefs, tools and >much more!  
>We can be reached with orders or inquiries at 502-893-8724 or fax

number-

>502-893-9220. We are located at 702 Beechwood Road, Louisville, Kentucky40207.

I'm also trying to locate a manual for the same, any help would be great. I have already checked the usual sources on the internet for the manual.

Earlier, Steve Byan posted info from Les Veenstra on the manuals: here it is:

>From: Steve Byan <stevebyan@mac.com>

>Subject: Re: [R-390] Re: Black 390A's

>Date: Thu, 21 Apr 2005 14:46:09 -0400

>To: "Veenstra, Lester" <Lester.Veenstra@intelsatgeneral.com>

>

>As an Ex NSG type (CTM1), where would I find an "operator/maintenance TM

>for the Elephant Cage"?

>

>Go to <<https://www.logsa.army.mil/etms/online.htm>>. Note carefully the >"https"; the server won't respond to http requests.

>Click on the "I accept" button.

>Click on the "Enter the Site" button.>

>Enter "FLR-9" in the text-box next to "Pub Title Text" and click on the

>"Search" button. You see a screen with the following TM's:

>

>TM 32-5985-217-15 - ANTENNA GROUP COUNTERMEASURES RECEIVING

>AN/FLR-9(V7)/(V8)

>

>TM 32-4940-201-15 - MONITOR AND TEST GROUP COUNTERMEASURES R SET, >AN/FLR-9(V7)/(V8)

>TM 32-5895-233-15 - SYSTEM CONTROL GROUP COUNTERMEASURES REC SET,

>AN/FLR-9(V7)/(V8) (S&I USAEMRA, VINT HILL FARMS STA, WARRENTON, VA 22186)

>

>TM 32-5895-234-15 - INTERCEPT GROUP COUNTERMEASURES RECEIVIN

>AN/FLR-9(V7)/(V8) F&M SYSTEMS COMPANY

>

>TM 32-5895-235-15/2 - DIRECTION FINDING GROUP COUNTERMEASURES SET, AN/FLR-9(V7)/(V8)

>

>TM 32-5895-232-PMCS - PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RADIO FREQUE SWITCH MATRIX (RFSM)

COUNTERMEASURES RECEIVING SET, AN/FLR-9

>

>Click on the PIN, TM number or title to download the PDF. Some links will  
>lead you to a "login" page; you need an official account to access these  
>documents, which I presume are restricted. Most are freely downloadable,  
however.

>

>Alternatively, call NTIS at 1-800-553-6847 or (703) 605-6000 8 a.m. - 6  
>p.m.; EST, Mon-Fri and ask them to search for TM's with "FLR-9" in the  
title. In 2003, I got the following list from them:

>

>TM 32-4940-201-15

>OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, GENERAL  
SUPPORT AND >DEPOT MAINTENANCE MANUAL FOR MONITOR AND  
TEST GROUP >COUNTERMEASURES RECEIVING SET, AN/FLR-  
9(V7)/(V8)

>Paper Copy is \$33.50

>

>TM 32-5895-232-15/4

>RESTRICTED NOT AVAILABLE PER ARMY DISTRIBUTION CENTER.

>

>TM 32-5895-233-15

>RESCINDED

>

>TM 32-5895-234-15

>OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, GENERAL  
SUPPORT AND >DEPOT MAINTENANCE MANUAL FOR INTERCEPT  
GROUP COUNTERMEASURES >RECEIVING SET AN/FLR-9(V7)/(V8) F&M  
SYSTEMS COMPANY

>Paper Copy is \$52.00

>

>TM 32-5895-235-15/2

>RESTRICTED NOT AVAILABLE PER ARMY DISTRIBUTION CENTER

>

>TM 32-5985-217-15

>RESTRICTED NOT AVAILABLE PER ARMY DISTRIBUTION CENTER

>

>I purchased the two that NTIS said were available at the time.

>

>In googling the web, I see that

>TM 32-5895-235-152 - DIRECTION FINDING GROUP  
COUNTERMEASURES SET,

>AN/FLR-9(V7)/(V8) and TM-32-5985-217-15 - ANTENNA GROUP  
COUNTERMEASURES RECEIVING AN/FLR-9(V7)/(V8) are apparently  
now available from Integrated Publishing <<http://www.tpub.com/>>. Dunno  
how much they want for them. Regards, -Steve

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Date: Mon, 20 Aug 2007 11:12:24 -0400  
From: Steve Byan <stevebyan@mac.com>  
Subject: Re: [R-390] CU-1388/FLR-9 (Was: Look for poser connector.)

None of the available AN/FLR-9 manuals include info on the CU-1388/FLR-9. It was apparently used only in certain versions of the AN/FLR-9, and the current manual set does not document those versions. I also would greatly appreciate any info on the CU-1388/FLR-9. The TM would be fantastic, but any info would be interesting.

---

Date: Mon, 20 Aug 2007 10:17:55 -0500  
From: "Les Locklear" <leslocklear@cableone.net>  
Subject: Re: [R-390] CU-1388/FLR-9 (Was: Look for poser connector.)

I had one several years ago. It was well suited for a pancake grill it ran so hot. Mine was manufactured by Sylvania if my memory is right. I gave it away to someone who seemed enamored with it. I now use a CU-2279/BRC which covers 100 kc to 100 mc (khz and mhz for young guys), has two channels with each having five outputs, four for receivers and one test output for each channel. Quiet, barely warm even after running for 24/7. Low noise and it works on the bcb! Never have found any information on this one either.

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Date: Mon, 20 Aug 2007 12:33:08 -0500  
From: "Les Locklear" <leslocklear@cableone.net>  
Subject: [R-390] Seeking info on U.S. Navy Multicoupler

I have had this particular multicoupler for a few years now, but have never been able to find a manual or documentation on it. The nomenclature tag on the front panel reads as follows:

SERIAL NO. A4  
29355 - 0135929  
MF/HF MULTICOUPLER  
CU - 2279/BRC  
DES. ACT.: NAVALEX CTR, Charleston, SC  
CONTRACT N00612 - 84 - D - 0105

It has two channels, each fed with an antenna, N connector and five BNC outputs, four for a receiver, one marked test for each channel which are marked Channel A and Channel B. 120 vac, covers 100 khz to 100 mhz. According to the analyzer that was used, it provides about 6 db gain. I am using an attenuator that negates that gain and makes it unity gain. Very quiet, runs barely lukewarm to the touch. 3.5" H X 19" W X 10.5" D (not counting connectors or rack handles). I have pics available. I know of one other in existence, and have found no other documentation on it. One

reply a couple of years ago, mentioned they believed that the BRC designation was for submarines.....??? Thanks for any help or information that may be forthcoming.

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Date: Thu, 04 Oct 2007 14:15:34 -0400  
From: n4tua@aol.com  
Subject: [R-390] antenna connector

Did not someone have an antenna connector (homebrew) which was mounted to the back on a small angle bracket? This was well documented and had a photo. Is this photo still available? Would like to see it again before making mine.

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Date: Thu, 04 Oct 2007 14:43:24 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] antenna connector

It's on Chuck Rippel's page: <http://www.r390a.com/>

Specifically at: <http://www.r390a.com/html/feedpoint.html>

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Date: Thu, 04 Oct 2007 15:43:02 -0400  
From: Barry <n4buq@knology.net>  
Subject: Re: [R-390] antenna connector

Here's how I made mine:  
<http://www.knology.net/~thelanding/R390A/Teledyne/RearFull.jpg>  
I had some close-up shots, but have removed them from the web. I can send those to you if you'd like.

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Date: Fri, 5 Oct 2007 09:26:14 -0500  
From: glwebb@gundluth.org  
Subject: Re: Re: [R-390] antenna connector

I have an adaptor that came with my Motorola R390A that preserves the balanced input. A little box made from pieces of circuit board soldered together with two pins to fit the balanced connector on one side and a BNC connector on the other. In between is a wideband transformer made with windings on a two hole ferrite bead. It works very well. Sorry I don't have any photos.

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Date: Wed, 17 Oct 2007 09:48:01 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] antennas

>I connected the coax to "Unbalanced" antenna connector.....

>.....Does that mean I miss out in the first layer of filtering?.....

Yes. And the input impedance of the unbalanced antenna connection is such that it works better on short antennas such as verticals on a jeep.

>The "Balanced" connection goes to the Primary side the "preselector".  
Would I be better off >connecting there?

Yes.

>I know some people connect an unbalanced antenna to the left  
>pin of the "balanced" connector and ground the right pin.

Do that and see what happens.

>In the good old days, how would the military connect the  
>Balanced connector to a dipole? Would they have some sort of 125 ohm  
dual conductor coax?

Balanced coax. RG-22 or some such. It can be had today but is moderately expensive.

>Perhaps instead of answering my questions, someone can tell me what I need to know...

Feed the radio with the balanced connector. Ground one side. Coax center conductor to the other side. Use a lashup or use a real twinax connector. Also, try different TV type balun transformers to see if they work better than the one you have. (There is a "field change" that rearranges the cables on the antenna relay so the balanced antenna input coil is both grounded on one side and the other side connected to the unbalanced connector. This is for convenience in connecting the antenna if you don't have the correct feedline, or the correct adapter for the balanced connector.)

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Date: Wed, 17 Oct 2007 09:59:34 -0400  
From: shoppa\_r390a@trailing-edge.com (Tim Shoppa)  
Subject: Re: [R-390] antennas

> In the good old days, how would the military connect the  
> Balanced connector to a dipole? Would they have some sort of 125 ohm  
dual conductor coax?

Twinax, especially in high-RFI environments. Sometimes the RFI was local stuff like generators etc.

> Surely not ladderline.

Conceptually this is not a problem especially when there isn't much noise. The Y2K manual is well known here but I have a Xerox of part of a paper military "installation" manual too. It shows some common antenna hookups that are kind-of geared toward the grunt who doesn't know much about radio antennas, with hints about keeping away from generators, local transmitters, etc. Does anyone recognize this manual from my description? I'm missing the first couple of pages!

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Date: Wed, 17 Oct 2007 12:41:59 -0700 (PDT)  
From: David Ribera <dribera2000@yahoo.com>  
Subject: Re: [R-390] antennas

Check out: <http://www.r390a.com/html/feedpoint.html>

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Date: Wed, 17 Oct 2007 18:58:35 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] antennas

Once upon a time the Army run an antenna coupler between the antenna and as many as eight receivers. The coax between the fan out antenna coupler and the receiver was stock 50 Ohm RG 8 coax. The receivers had a right angle adapter that grounded one side of the twin ax connector and coupled the other pin to the center conductor of a D connector. the same connector that is on the unbalanced input. It is better to feed the receiver single ended into the balanced input than to feed the receiver into the unbalanced input. The D is a 1/4 turn disconnect like the smaller BNC. These adapters are about \$23.00 these days. The Signal Corp. knew what freq to tune the receiver to and when to listen. They were not doing weak signal work. they could afford to run a whip into the unbalanced input and still get a receivable signal. The input impedance of the balanced input is over 250 ohm across most of the receiver range. The low antenna Z into the higher receiver load gets you a better voltage on the first RF grid. The vacuum tube being a grid voltage controlled device. This works well. Sort of like using a high input impedance vacuum tube volt meter to measure voltage with. The high Z gets you a better more accurate reproduction of the signal being sensed. If you pick a core material that functions in the HF range of interest, you can easily make up a good transformer that will match the unbalanced long wire to the balanced input. Think 250 Z balanced receiver input and then do a 1:1, 2:1 or 3:1 core winding to match what you expect on the antenna. Think 2000 Z on the end of a random long wire and try 9:1 for the balun. Go for about 5 to 15 turns on the receiver side of the transformer. Most core material will not cover the whole HF band. This is good as it acts as a band pass filter stage between the antenna and the receiver. You can filter out the AM broad cast band



this way. However to get a good filter you need a short length of twin ax and a twin ax connector for the receiver. You then couple the twin ax into a separate grounded metal can. Inside the can you feed the center conductors from the balun coil. After you filter the AM or other unwanted signal off the feed line you need to shield the rest of the feed line into the receiver to keep the same rejected signal from coupling back into the feed line after the filter point. Some fellows have built nice tight boxes right at the antenna relay to do this job. Some have used a separate box on a length of twin ax. Some have tried to do this decoupling and filtering, and not getting a good shield have observed poor results and just give up on the problem. See the web page from the other mail. The coupling cap works real well and keeps the static voltage from the antenna off the receiver. This single ended approach into the balanced input worked for the military for years and on most of the receivers.

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Date: Wed, 17 Oct 2007 19:27:21 -0400  
From: "John Franke" <jmfranke@cox.net>  
Subject: Re: [R-390] antennas

I thought the quarter turn connector is a C connector. It mates with my C adapters.

---

Date: Wed, 17 Oct 2007 19:52:48 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] antennas

You can go \*very\* crazy trying to match a random wire antenna. Guessing it's impedance is tough because of all the variables. Best bet is to try a couple of ideas and go with what worked best. You probably will find that what works best at some frequencies works poorly at other frequencies.

The best way to feed a 390A is with balanced coax. That's only true if you feed the coax from a balanced source. Since you want high impedance, you need both a "choke" balun and a matching transformer. I have had pretty good luck with doubled small diameter coax wound on 2" EMI cores for the chokes. Yellow or red iron cores work OK for the matching transformer if you get up above 1 1/2" diameter. Stick with teflon insulated wire / twisted for the windings of the transformer section.

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Date: Wed, 17 Oct 2007 21:19:04 -0700  
From: John Kolb <jlkolb@jlkolb.cts.com>  
Subject: Re: [R-390] antennas

On the 390's we used on the Navy ships I was on, there was a connector (right angle) which took the two pins of the balanced input, shorted one

side to gnd, and the other side to the center pin of a "C" connector, where most often, it was connected to a 35 foot vertical whip, fed either direct or through an antenna splitter. Don't know the splitter name - it divided the signal into bands, 2-4, 4-8, 8-16, 16-30, or something similiar, and had about 4 outputs for each freq range.

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Date: Thu, 18 Oct 2007 00:36:26 -0400  
From: Jon Schlegel <ews265@rochester.rr.com>  
Subject: Re: [R-390] antennas

Check this out.

[http://cgi.ebay.com/r-390-adapter-matching-ant-bal-to-50-ohm-unbal\\_WOQQitemZ140168831515QQihZ004QQcategoryZ4673QQssPageNameZWDVWQQrdZ1QQcmdZViewItem](http://cgi.ebay.com/r-390-adapter-matching-ant-bal-to-50-ohm-unbal_WOQQitemZ140168831515QQihZ004QQcategoryZ4673QQssPageNameZWDVWQQrdZ1QQcmdZViewItem)

The label seems to show an unbalanced connection to BOTH twinax pins. The termination resistor seems to suggest that the source might otherwise see an impedance that would be much greater than 50 ohms. Could this be a fixture to adjust for best balance on a receiver's input?

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Date: Wed, 17 Oct 2007 23:27:47 -0700 (PDT)  
From: Rich MC Clung <wa6knw@sbcglobal.net>  
Subject: [R-390] Re: antennas

>Don't know the splitter name - it divided the signal into bands, 2-4, 4-8, 8-16, 16-30, or >something similiar, and had about 4 outputs for each freq range.

How about the SB-404 AN/SRA-12?

---

Date: Thu, 18 Oct 2007 07:40:16 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] antennas

The band splitter sounds a lot like the SRA-12 I have sitting here. It's got some strange connectors on it. They certainly don't match anything on the back of an R-390.

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Date: Thu, 18 Oct 2007 10:10:07 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] antennas  
To: R-390@mailman.qth.net

> > The label seems to show an unbalanced connection to BOTH twinax

.....

The critter shown is a special test adapter. If it can be opened up, then it could be rewired inside to make a nice adapter. It would need rework as it is manufactured to serve to couple an antenna into a R390 receiver.

---

Date: Thu, 18 Oct 2007 16:55:40 -0400  
From: Mark Huss <mhuss1@bellatlantic.net>  
Subject: Re: [R-390] antennas

Bob, If you run over to Yahoo Groups, Shortwave-SWL-Antenna, there has been an interesting conversation on this very subject under the subject 'Antenna Tuners' and 'Not Sure Why' that has been going on now for about a week. Lot of good stuff about the value of matching impedances, or not, in receiving antennas.

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Date: Thu, 18 Oct 2007 14:12:03 -0700  
From: "Ed Zeranski" <ezeran@ezeran.cnc.net>  
Subject: RE: [R-390] antennas

>...It's got some strange connectors on it. They certainly don't match anything on the back of an >R-390.

That jogged my memory! In a previous post I said 'C'connectors but the cables had a sleeve you pulled back and ball-detents that locked on the coupler's connectors. The closest thing I can think for that lock system of is the quick-release connectors on air hoses. UG-????? Can't remember

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Date: Thu, 18 Oct 2007 14:12:01 -0700  
From: "Ed Zeranski" <ezeran@ezeran.cnc.net>  
Subject: RE: [R-390] antennas

AN/SRA-12 sounds like the one we used in the '60s, "C"connector front panel, LF thru HF. While on antenna stuff.....Does anyone have the antenna base and/or whip assembly for the AN/SRA-17? SRA-17/17A tunes LF-600 Kc. The first ones I saw were used with SRR series receivers but the antenna stayed around to/thru the R390A era. There is a built in noise generator as a tuning aid. AT 924B/SR Antenna : The whip -Need This TN418/SRA 17C Radio Frequency Tuner : Antenna base with reactors -Need this C6193/SRA 17C Antenna Control Unit : I have this. Manual: I have this too.

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Date: Thu, 18 Oct 2007 22:35:20 -0400  
From: roy.morgan@nist.gov  
Subject: RE: [R-390] antennas

Connector wonderers, TMC had a Quick Disconnect fitting on many products. It was roughly the size of an overgrown C connector but had an air-hoze type ball and spring arrangement and could be disconnected in a jiffy. GPT-750's came with one as the RF output. The TMC connector panels/ patch panels had them. They are very hard to find nowadays.

---

Date: Thu, 18 Oct 2007 22:05:27 -0700  
From: John Kolb <jlkolb@jlkolb.cts.com>  
Subject: Re: [R-390] antennas  
To: Bob Camp <ham@cq.nu>

The connectors have a groove around the outside of the outside conductor, right? The mating male connector is a bit larger than a type "N", and is held in position on the chassis mount female by three ball detents. You pull back on the outer ring of the male connector allowing the balls to pop out of the ring on the female. Patch cords with these can be switched rapidly, and handle more power than a BNC, although I never saw them used on transmitters.

---

Date: Fri, 19 Oct 2007 00:59:34 -0400  
From: "Bob Young" <youngbob53@msn.com>  
Subject: [R-390] antennas

I bought some twin Ax to SO-239 connectors which ground one side of the balanced input automatically, you get much more gain this way with an unbalanced antenna. Chuck Rippel also mentions this in his blurb you get when he does a radio over. One side works better than the other.

---

Date: Thu, 18 Oct 2007 23:49:35 -0700 (PDT)  
From: Rich MC Clung <wa6knw@sbcglobal.net>  
Subject: [R-390] Re: Antennas (AN/SRA-12)

Those are Quick Disconnect Series "QDS" connectors. They are Type "C" size. There is also a QDM connector that is Type "BNC" size. TMC made an RF Switch Panel SPP" which made use of these pop-on /pop-off connectors. <http://tinyurl.com/2622od>

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Date: Mon, 22 Oct 2007 16:52:13 -0400  
From: <jmiller1706@cfl.rr.com>  
Subject: Re: [R-390] image

There is an antenna overload lamp (I-103) inside the antenna relay that illuminates in some fashion when a strong nearby signal is present...to protect the front end presumably. This is an NE-45 (neon type?). If a neon bulb is triggered by a very strong signal, what kinds of harmonic-producing non-linearities would it inject into the front end? Open the

antenna relay and remove the bulb (if it's there) and see what happens.  
More food for thought.

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Date: Mon, 22 Oct 2007 16:57:44 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] image

DO NOT simply try and unthread THAT neon bulb! It is soldered in - at least in EVERY R-390A that I've come across!! Its purpose IS to take excess energy on the antenna to ground. A perfect example is the "sand" in the Middle East. When it blows around, the static goes sky high. That took out the front ends in the Harris rigs in the First Desert Storm.

---

Date: Mon, 22 Oct 2007 18:37:57 -0400  
From: "Jim M." <jmiller1706@cfl.rr.com>  
Subject: RE: [R-390] image

Both of my 390as have had that neon lamp removed by someone before I got them. It would be interesting to look at the lamp to see if it is glowing from the big BCST signal down the road.

---

Date: Mon, 22 Oct 2007 18:51:51 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] image

If the neon bulb is glowing you have over 70 volts on the antenna terminals. If that's the case, the radio is a bit overloaded ... The neon bulb is mostly there to protect the input capacitors against static induced voltages on a whip antenna.

---

Date: Mon, 22 Oct 2007 21:38:37 -0500  
From: "Bill Hawkins" <bill@iaxs.net>  
Subject: RE: [R-390] image

Static electricity? I thought the bulb was there for the transmitter in your, or an adjacent, comm trailer. Dunno why people would remove the bulb. It does nothing, nonlinear or otherwise, until it strikes at around 90 volts. Isn't shared ignorance wonderful?

---

Date: Tue, 23 Oct 2007 07:40:39 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] image

The neon bulb is not real effective when the transmitter fires up and you are still on the antenna .... There are a bunch of R-390's out there with black charcoal where one of the front end coils used to be. Could have been

lightning, probably was a transmitter. Here's one way to look at it: The bulb will fire at about 20 watts of RF. It's rated below a watt. It's not going to do very much protection before it vanishes. It will glow a really neat bright purple color before it goes though. Don't ask how I know that ... If you ever have had an antenna party when maybe you should have been indoors, it's amazing how fast you pick up charge on even a fairly modest antenna. One might even call the experience shocking. Again, don't ask...

Without a DC path to ground the charge on the antenna will just build up. Something has to give. There's not a lot of energy, so the neon bulb does just fine.

---

Date: Sat, 27 Oct 2007 18:57:57 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] Antenna sweep

What does your antenna look like? The only thing I can think of that would be 220 ohms at 3.75 MHz and 22 ohms at 1.65 MHz is some kind of loop ...

---

Date: Sat, 27 Oct 2007 17:11:05 -0600  
From: "Tony Casorso" <canthony15@msn.com>  
Subject: Re: [R-390] Antenna sweep

It's a 100 foot longwire sloping from the top of my chimney about 30 feet up down to the fence on the back of the property. There is a #8 ground wire running about 20 feet up the chimney to the connector block where the antenna wire and the ground tie to the coax. The coax runs about 70feet across the roof, down the other side of the house to my room in the basement. I tossed it together in about 90 minutes one Saturday. The ground wire actually goes up a couple more feet to my scanner antenna mast. The scanner antenna has been gone for years. I also have a big loop but it needs to TLC to get it going again. The tree service people cut the feedline by accident about a month ago.

---

Date: Mon, 12 Nov 2007 18:38:18 -0500  
From: shoppa\_r390a@trailing-edge.com (Tim Shoppa)  
Subject: [R-390] Ultimate Antenna (well, up till now at least!)

Roy knows about some of my antenna adventures this fall, but a brief summary for those that haven't followed my goals and ambitions: I figured out that I could hang an 80M dipole (cut for the low end as I work CW) between two trees at the corners of my property. It's a rather odd-shaped piece of property, but that's fine, because if it was more rectangular then I wouldn't have 130 feet between trees :-).

I had previously sent lead weights up about 50 feet into the trees to hang antennas, but wanted to do better this time. So I built myself a pneumatic tennis ball canon: <http://www.antennalaunchers.com/> This gizmo sends tennis balls not into trees, but just plain over trees. Towing some fishing line from a reel, I hauled my antenna up somewhere between 90 and 100 feet above the ground.

First iteration fed the antenna with coax, and I tried to cover multiple bands with a fan dipole configuration. Worked good on 80M, did not do well on the other bands at all! Took it down, and sent it up with 450 ohm ladder line. Wow, what a difference a day makes! The intermod from the local BCB is just gone if I use this antenna with a balanced tuner or a receiver with a balanced input (ala the R-390A). Today I built some proper standoffs for bringing the wire into the shack (before it was just kinda dangling across the side of the house and over the garage - OK until the ladder line lies on the gutter!). Tomorrow, a real lightning arrestor built around two spark plugs. Gotta get that M14x1.25 tap!

I am so so happy with the results. With the balanced feedline it's perfect to match into my 390A; with the coax there was awful intermod from the BCB's down the street but with the ladder line it's just clean. The same clean that I previously achieved with loops and twinax, but with a whole lot more height than I could get from my attic. And with my link-coupled tuner, the thing loads up into my vintage transmitters just fine on 80M, 40M, 20M, and 15M. Someday I'll have to get a rig that transmits on the WARC bands too, but not that modern yet

---

Date: Tue, 13 Nov 2007 06:36:07 -0800 (PST)  
From: Mark Donaldson <walqhq@yahoo.com>  
Subject: Re: [R-390] Ultimate Antenna (well, up till now at least!)

Your intermod reduction is probably due to the antenna tuner acting as a tuned bandpass filter.

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Date: Tue, 13 Nov 2007 11:51:10 -0500  
From: "Tim Shoppa" <tshoppa@wmata.com>  
Subject: Re: [R-390] Ultimate Antenna (well, up till now at least!)

I get the intermod reduction even when I just take the ladder line and run it straight into the balanced input of the 390A. The 390A is wonderful that way. Now, it is true that the antenna coupler makes worlds of difference on the rigs without a true balanced input. (What I think is happening is that the local BCB stations are inducing not differential-mode voltages on the antenna as much as common-mode voltages against ground.) I did not get such a wonderful advantage feeding the antenna with coax. Going to ladder line made all the difference in the world!

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Date: Thu, 15 Nov 2007 15:50:55 -0800 (PST)  
From: Rasputin Novgorod <priapul@yaho.com>  
Subject: [R-390] 390 collins radio adapter ant. input adapter network

I recently won a couple of "R390 collins radio adapter antenna input adapter network" eBay Item number: 140172485081, for \$10 each. They are beautifully made, silver plated; must have cost someone a lot of money.

Basically they are a cylinder with the coaxial balanced connector on one end, and an N connector on the other. The center pin of the N goes thru a capacitor to ~both~ pins of the coaxial connector. The center pin also goes thru a 50 ohm resistor to ground. It's not a connector adaptor, it's some sort of test jig.

1) Anyway, I plan to rewire one of these to be a connector adaptor; to go from my coax from a random wire, to the 390A balanced antenna input. Looking at the 390 from the back, I seem to remember that the N connector's center pin should go to the coaxial left pin, and the right coaxial pin goes to the connector shell (ground). The 50 ohm resistor will be removed. Should I remove the capacitor, or leave it in as a DC block? Have I got it right?

2) What was this part originally used to test for? Is there any reason to keep my second adaptor original so I can do this test? If so how is the test done?

---

Date: Thu, 15 Nov 2007 19:36:19 -0500  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] 390 collins radio adapter ant. input adapter network

The only use I can think of for the adapter you have is for doing a common mode rejection test. That of course assumes it's for an R-390 at all. The best way to hook things up:

Put a transformer primary between the two pins of the coax balanced conector.

Put the transformer secondary between the N connector center pin and ground via a common mode choke.

Isolate the ground on the radio from the ground on the N connector. That way the crud on the local radio ground does not show up on the antenna input.

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Date: Tue, 20 Nov 2007 13:18:26 -0500



From: Dan Osborne <wb5afy@wb5afy.net>  
Subject: [R-390] Missing "red-dot" on ant trim

Well - I am ready to do a complete alignment on my rebuilt SW RF deck - however - there is no red-dot or dimple on the ant trim shaft. Anyone have a suggestion as to how I position the shaft correctly before starting the alignment? Can I use the pin holding the gear on the upright shaft as a guide ?

---

Date: Tue, 20 Nov 2007 14:00:21 -0500  
From: "Tim Shoppa" <tshoppa@wmata.com>  
Subject: Re: [R-390] Missing "red-dot" on ant trim

If you've got the RF deck still out in the clear, I believe the intention of the red dot is to mark where the ant trimmer cap is at half-mesh. Rotate to put at half mesh and put a new dot on.

---

Date: Thu, 22 Nov 2007 08:25:47 -0500  
From: Steve Hobensack <stevehobensack@hotmail.com>  
Subject: [R-390] RE-Missing 'red-dot' on ant trim

Dan, If the signals peak at two places on the antenna trimmer control (they should), full mesh and full unmesh of the variable trimmer is at mid point between the two peaks. Half mesh is at 90 degrees from full mesh or full unmesh.

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Date: Fri, 07 Dec 2007 02:14:38 -0500  
From: n4tua@aol.com  
Subject: [R-390] Break In

I must have another problem which I am unaware of at this time. I am using the diode load pick off point and an external audio amplifier. When I switch the break in switch on with the jumper on the terminal to ground, I get about no change in received signal audio from the external amplifier. The audio from the local audio goes silent. Sounds like my antenna relay may be broken or stuck. Any ideas? Thanks, Collin

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Date: Tue, 15 Apr 2008 00:12:38 -0400  
From: "Perry W. Remaklus" <Perry@willbell.com>  
Subject: [R-390] R390A question

Have a 390A that appears to be in good overall condition. When I connect the center connector of the coax I get signals. However, as soon as the outer connector screws on the signal is attenuated. While I am digging through the manuals and web postings any insight as to what might be

going on would be appreciated. TIA

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Date: Tue, 15 Apr 2008 01:11:23 EDT  
From: JRFKE5RI@aol.com  
Subject: Re: [R-390] R390A question

What kind of antenna and transmission line are you using? It sounds like an impedance mismatch to me.

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Date: Tue, 15 Apr 2008 07:51:47 -0400  
From: "Harold Hairston" <k4hca@alltel.net>  
Subject: Re: [R-390] R390A question

I agree with John. Is the antenna connected to the other end of the COAX? That is a typical problem based on your description. Is coax open?

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Date: Mon, 21 Apr 2008 11:12:18 -0500  
From: "Phil M." <pmills7@comcast.net>  
Subject: [R-390] Need some R-390 info please

I brought a Motorola R-390 home from the Belton TX hamfest and need some info on what are apparently depot mods. First, at the top of the front panel above the ID tag are two lines...

MWO-11-5820-294-35/1  
35/2

MWO-11-5820-294-

On the back panel, a BNC jack has been added with a small wire connecting it to the diode load terminal on the barrier strip. Also, the antenna relay has been removed and replaced with a metal panel with a multi-pin military style Amphenol connector and an N-connector for the antenna. The Amphenol connector pins are wired to a terminal board mounted on the inside of the back panel and this panel contains 6 top hat style diodes. Does anyone know the purpose of this last mod?

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Date: Mon, 21 Apr 2008 12:17:26 -0400  
From: Roy Morgan <k1lky@earthlink.net>  
Subject: Re: [R-390] Need some R-390 info please

> On the back panel, a BNC jack has been added ..... <snip>

Sound simple enough.. No idea what the application would be.

> .....6 top hat style diodes. <snip>.....

Only a guess: The top hats are arranged to replace the antenna relay

function. Biasing the rectifiers in two different configurations switches the antenna in, or out with the receiver input shorted. This could be operated fast enough for full break-in, perhaps.

---

Date: Mon, 21 Apr 2008 11:49:21 -0500  
From: "Phil M." <pmills7@comcast.net>  
Subject: [R-390] More on the R-390 mod question.....

After looking further, the mod consists of the multi-pin Amphenol connector being wired to the board with the 6 top hat diodes which are connected to what looks like a position indicating switch mounted on the end of the crystal oscillator subchassis. I am guessing that the mod was to provide some kind of remote indication of the band switch position. Anyone heard of anything like this?

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Date: Mon, 21 Apr 2008 13:34:56 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] Need some R-390 info please

Download a PDF copy of TM 5820-357-35 for the R390 off the R390/A web pages. A Goggle search will find the TM for you. The two MWO's were early changes to resistors and filter caps in the RF section of the R390 to prevent some parasitic problems. These MWO's have nothing to do with the other mods you are listing in your mail.

The R390 antenna relay assembly come in several parts. The R390/A antenna relay was reduced to one assembly. A part of the R390 antenna relay was a metal chassis made of about the same gauge metal as the other sub chassis and it had two relays mounted in the chassis. It is small about the same size as the R390/A relay. The parts from the two models will not swap. You need to do a real hack job on the R390 to get a R390/A relay into it. You may need to do this as R390 antenna relays are becoming near unobtainium.

I think Roy Morgans's idea of the diodes being used as a break-in keying is valid.

I would be nice if you diagrammed the circuit and posted it where we could get a look at it. Some of the other R390 Fellows may want to try it. Likely the original relay went bad. The connector was what was on hand to get the receiver going again.

The R390 has two antenna inputs. One is single ended and by passes the first set of RF selective transformers in the first stage of the RF section. [That first can with a slug and two caps at the front of the six RF slug racks] The other input was balanced and goes through the first set of

slugs. Common practice is to ground one side of the balanced input and feed the other side with coax. On the inside the R390 antenna relay had BNC connectors. You could couple one of the balanced inputs to the single ended relay input and feed the receiver with a coax. A shorting plug was then made up to either short the other balanced BNC inside the relay or at one of the pins on the twin ax back panel connector. As these things are missing on your receiver, you need to find three coax cables going into the FR deck from the antenna input area. Depending on your antenna and listing needs you can then couple the antenna into the receiver as you need. Good luck with the receiver and welcome to the group of R390 owners. See Dave Medley's R390 page. Dave has been doing R390's since they were first let loose to the public. He has many R390 parts. He is getting old and does not read his mail daily. But if you need something, send him some mail and wait to see what he can offer you. Roger L. Ruskowski AI4NI

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Date: Mon, 21 Apr 2008 13:46:18 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] More on the R-390 mod question.....

This sounds like more of a preselect and pre amp set up. The pre amp voltage may have been pulled from the receiver or from a separate power supply. Then the multi wire was just used as control lines. With one or two used for signal between the pre amps and the receiver. It sounds like a one of a kind modification.

See which Megahertz the switch is active on. This will give you some clues as to the frequency that was of extra interest to the previous owner.

The receiver may have been used with a VHF or UHF converter that output to some frequency in the HF band and the receiver was then used as additional conversions.

The diode load to a BNC indicates that some external audio was used also. The diode may have been modified or by passed and the output on the diode load may have been 455Khz to an external FM, SSB or TTY demodulator. There is a 455KHz output but it may have not matched the add on the prior owner was using.

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Date: Mon, 21 Apr 2008 16:01:58 -0400  
From: "Tim Shoppa" <tshoppa@wmata.com>  
Subject: Re: [R-390] More on the R-390 mod question.....

- > After looking further, the mod consists of the multi-pin Amphenol
- > connector being wired to the board with the 6 top hat diodes
- > which are connected to what looks like a position indicating switch

> mounted on the end of the crystal oscillator subchassis. I am  
> guessing that the mod was to provide some kind of remote indication  
> of the band switch position. Anyone heard of anything like this?

Sounds like exactly what would be done to gang the switching of six octave-wide preselector/pre-amps to a 390A. I don't know of the part number for such a hypothetical six-octave preselector/preamp for the 390A. I do know that such gadgets exist for other brands/series of military/surveillance receivers. I honestly don't think that they'd be necessary for a 390A, in my experience with the 390A compared to those other brands/series.

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Date: Tue, 22 Apr 2008 07:35:37 -0500  
From: "Phil M." <pmills7@comcast.net>  
Subject: [R-390] More info on R-390 mod....

Several people suggested that the switch on the end of the crystal oscillator module was for switching in pre-amps based on the band. This is probably as good as explanation as any. I did attempt to see which bands were grouped together by the way the switch terminals are jumpered together and came up with the following:

0-1	2-8	9-13	14-16	17-20	21	22	23-26	27-28
	29-31							

I can send a .jpg of the switch itself should anyone be interested.

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Date: Thu, 3 Jul 2008 17:16:15 -0700 (PDT)  
From: Perry Sandeen <sandeenpa@yahoo.com>  
Subject: [R-390] PIN Diodes and counter

I want to make a loop antenna and be able to change the amount of turns electronically by using PIN diodes to short turns. The problem is that 1N5719 and the HP series cost around \$5 each. They make PIN diodes for 40 some cents each BUT they are new SMA(?) size that makes them about 1MM long. This far to small for my abilities. Does anyone have a cheap(er) source for PIN diodes with conventional leads or some leadless ones that are larger? I'm also looking for a HP 5370B TIC Also for those on a budget there are very good values on Tek scopes on Epay. Many have DVM functions on the screen. With the scope and one of the newer inexpensive DVM's a great deal of repair problems can be solved.

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Date: Sat, 5 Jul 2008 20:55:25 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] PIN Diodes and counter

Remember when you look for PIN's that you don't just want one that's the right size, you also need the right speed. A lot of what's on the market these days has a fairly small minority carrier lifetime. They are fine for VHF, but not very good at HF.

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Date: Sat, 5 Jul 2008 19:10:40 -0700 (PDT)  
From: Perry Sandeen <sandeenpa@yahoo.com>  
Subject: [R-390] PIN Diode Update

Thanks to the help of Andy Masters, Collin N4TUA, and Bob Camp I may have come up with some reasonable cost PIN diodes. Bob said that a lot of what's on the market these days has a fairly small minority carrier lifetime which is OK for VHF but not HF. I don't know how to select what would work for my VLF loop. Amplification of information appreciated. Below is a list of what I was able to find on the WWW. Someone will have to tell me what will work. I was looking for affordable prices as I wanted to use 10 for my loop. Sources for Motorola MPN3404 PIN Diode. Prices were from 25 cents to \$1 each

Circuit Specialists Inc. WWW.Web-tronics.com  
220 S Country Club Dr. #2 Mesa, AZ 85210

kitsandparts.com (Also torroids up the wazoo)

Debco electronics.com

Other low cost PIN Diode sources:  
Surplus Sales of Nebraska www.surplussales.com (Surprise-Surprise)

RF Parts Company www.rfparts.com

Down East Microwave Inc.

Tuning Diodes:

Ocean State Electronics MVAM109.....\$2.95

Dan's Small Parts (Currently closed due to his severe accident)

Mouser and all the other usual suspects all have the HP axial lead types from \$5 to \$10

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Date: Sun, 06 Jul 2008 04:54:09 -0400  
From: Mark Huss <mhuss1@bellatlantic.net>  
Subject: Re: [R-390] PIN Diode Update

I'm no expert, but frankly I would consider PIN diode switching a no-go on anything under 20 MHz unless it absolutely, positively must be a solid-

state switch. and even then I would probably look at 1N914's heavily biased in forward conduction for RF turn-on, and heavily biased in reverse for RF off condition. Frankly, I would rather go for mechanical relays. The Omron G5Y and G6Y being in the \$4-\$8 range. If I did not have the power budget, the Omron G6EK series of latching relays has good isolation below 20-30 MHz, at least as good as diodes.

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Date: Sun, 6 Jul 2008 19:57:00 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] PIN Diode Update

PIN diodes work great for RF because they are "slow" diodes. The physics in the junction keeps them from acting like a diode (turning on and off with a change in current) faster than some magic number. The common name for the number is minority carrier lifetime. Once the period of the waveform gets shorter than the carrier lifetime the diode starts to act like an open or short circuit. That's what keeps their IMD low. It's also what lets you switch a bunch of power with a very small (relative to the power) amount of current. If you run a PIN at a frequency that's "too low" you simply have a very normal diode and don't get any of the "neat stuff". You might as well use a 1N4001 as a fancy PIN. They have a nice low on resistance and only a few hundred pf of capacitance (yikes!!). Normal switching diodes that have been doped to have good on resistance may be your best bet. Gold doping used to be the standard way to do that trick. I hate to go retro on something like the 390 list, but how about miniature relays? They are cheap reliable and very low IMD .....

Date: Tue, 15 Jul 2008 21:47:29 -0700 (PDT)  
From: Perry Sandeen <sandeenpa@yahoo.com>  
Subject: [R-390] PIN Diode question resolved(?)

Thanks to all who responded about my question if it was feasible to use PIN diodes for tap selection on a loop antenna.

My original quest was based on a circuit from Ulrich Rhode's book "Communication receivers: principles & design" which had a HP PIN diode attenuator circuit for HF. (It is figure 5.21 on page 239.) I figured if it could work for him, why not me? Ah ass-u-me! The general consensus is that they will not work at low frequencies. There maybe an exception with the 1N007 (only) diode due some different doping than the other 1N400X series. At least it will be cheap to try. Several suggested relays. I had thought of that but the cost of \$3 + stated making this a very expensive project. What I finally came up to try was to buy some cheap surplus latching relays on ebay. Unfortunately at the moment I don't have the time to build my loop. Those interested in building loop antenna just need to do a google search. There are more articles than you could shake a stick

at, including at least two that will do all the calculating of frequency ranges once you enter you design parameters.

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Date: Mon, 29 Jan 2001 13:44:02 -0800  
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>  
Subject: [R-390] Working Diversity.

You just grab his R390/a and antenna and you R390/A and antenna and operate them together. You tune both receivers setting at your operating position ( move his over to your position so you can tune it with out getting out of your chair) to the same station. Because his antenna and your antenna are located some distance apart in the antenna field ( 1000 feet ) the signals will fade at different times for each antenna.

ASA not only operated diversity, but Korea use to gang two operators, two receivers at two sites with a two radio link and both guys would try to copy the signal.

Okinawa operated this split between Torri station on the beach and a site several miles away on the island's ridge.

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Date: Fri, 28 Nov 2008 03:05:04 +0000  
From: odyslim@comcast.net  
Subject: [R-390] antenna relay troubleshooting

My antenna relay suddenly stopped working. It does not make the obvious click going through the positions on the function switch. The radio itself still functions properly. I did notice the bulb inside it bad. It has a hole in it. Could that be the culprit? If so, where do I buy a bulb? Fair Radio?

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Date: Thu, 27 Nov 2008 22:53:59 -0500  
From: Roy Morgan <k1lky@earthlink.net>  
Subject: Re: [R-390] antenna relay troubleshooting

Unlikely. The bulb protects against high RF voltage at the antenna connector.  
You can do fine without it.

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Date: Thu, 27 Nov 2008 22:20:59 -0600  
From: "Ed Wirtz" <ewirtz@hbc.com>  
Subject: Re: [R-390] antenna relay troubleshooting

I would check the 12 volt rectifier diode or diodes. You need that for the relay to function. If I remember right the bulb is neon and is for RF overloads. It has nothing to do with the relay function.

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Date: Sat, 29 Nov 2008 12:00:12 EST  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] antenna relay troubleshooting (more detail)

>Thank you very much. I got this email just as I was getting ready to cry to the >group for more help. I was going to ask about the switch. I have already >replaced the rectifier bridge, CR-102. That did not work so I changed the >antenna relay with no luck. I am ready to go back and do the voltage testing >you just prescribed. It figures this would have to turn into a big science project. >The good thing is A: It is a good learning experience and B: Thank to nice >people like you, there is hope :-) Thanks again,  
Regards, Scott

-----  
Scott,

Ground the break-in on pin 9 of the TB and operate the break-in switch. This should ground the bridge on the AC side. Cause DC to flow on the output side of the bridge and operate the antenna relay.

If the break-in relay does not operate that's another problem on it's own circuit.

Maybe just exercising the break-in relay contacts a few times will restore the circuit operation. If you have not operated the break-in relay in some period of time it could just be wanting some exercise to deox a contact face.

If this break-in relay test works you then need to explore from the break-in relay contacts in the audio deck to the function switch on the front panel, where the function switch grounds the AC side of the bridge to operate the antenna relay in CAL. The relay is also operated in standby but we do not worry about that mode most of the time. We just listen for the antenna relay click as the function switch is changed from AGC to STANDBY or back.

If this test does not work, you need to check for an AC voltage at the diode and DC voltage out of the diode.

You got past an open relay coil by replacing the relay (hopefully you did check it for continuity) and the bridge.

Now you are for sure likely looking for a wire broken off at one of the solder joints around a switch.

The antenna relay circuit goes through the audio module and the power supply module. You may need to pull the back shells off the module connectors looking for a broken wire. You should also check in the

modules for a broken wire at a connector or the break-in relay connector. But check the schematic and trace the circuit.

A good schematic from any of the web manuals Y2K or TM's should be enough document to help you trace and trouble shoot the circuit.

Bad wire in the middle of nowhere in the harness are not a likely problem unless some other event has impacted the harness. Then you have a point of visible damage and reason to investing for a broken wire in an unlikely place.

Ah science projects. That's part of the disease.

Roger AI4NI

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Date: Tue, 2 Dec 2008 18:38:35 -0700  
From: "Tony Casorso" <canthony15@msn.com>  
Subject: [R-390] Antenna relay question

Has anybody opened up the antenna relay on an R-390a? The relay switches the antenna inputs to ground in break-in mode. Can the ground connection be lifted so that the relay just opens up the antenna connections without grounding them? I thout I would ask before disassembling mine.

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Date: Wed, 3 Dec 2008 17:04:11 -0700 (GMT-07:00)  
From: "Richard W. Solomon" <wlksz@earthlink.net>  
Subject: [R-390] Antenna Relay Connections ??

I am finally getting the R-390A I picked up onto the bench. It came without the Antenna Relay Assembly and has 4 coax connectors waving in the breeze. Luck was with me and one of the leads had a Panel Mount BNC to ?? Adapter. What type is that small BNC looking connector ? I need to get another adapter. There is a hole in the back labeled "Sync Xtal Osc", I expect one of those orphan cables goes to it. Is that an input or output ?? I didn't find it in my rather quick look through the manual. But first out comes the little vacuum cleaner and brushes to remove all the dirt. At least it wasn't stored in a Chicken Coop !!

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Date: Wed, 3 Dec 2008 19:10:40 -0700 (GMT-07:00)  
From: "Richard W. Solomon" <wlksz@earthlink.net>  
Subject: [R-390] R-390A Antenna Connections

I figured out which was which, but I still have an orphan left. There is a metal tag on it marked P218. I think that may be the one that goes to the Sync Xtal Osc ?? Whatever that is. I still cannot find it in the TM I have. Any thoughts ??

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Date: Wed, 3 Dec 2008 20:50:42 -0600  
From: "Barry" <n4buq@knology.net>  
Subject: Re: [R-390] R-390A Antenna Connections

P2\* cables go to the "second" deck - the IF deck. There should be two mini-BNC jacks toward the rear of the IF deck. Both cables from the RF deck (deck #1) go to those jacks. Yes, you are correct in that the wrenches are Bristol (fluted or splined wrenches). Xcellite (sp?) does sell a single insert that goes into their 3/8" round-handle (the style with two flats that fit into the handle's two slots).

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Date: Wed, 3 Dec 2008 20:53:23 -0600  
From: "Barry" <n4buq@knology.net>  
Subject: Re: [R-390] R-390A Antenna Connections

BTW, that "Sync Xtal Osc" hole is for aligning the big rotary switch inside the crystal oscillator deck. To adjust it, you loosen the gear clamp on the front of the crystal deck (or, more formally the gear in the RF deck that drives the rotary switch) and then you can rotate the switch to the proper switch location for the current band. You shouldn't have to do that unless you've taken that part of the RF or crystal deck apart.

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Date: Mon, 8 Dec 2008 10:56:47 -0700 (GMT-07:00)  
From: "Richard W. Solomon" <wlks@earthlink.net>  
Subject: [R-390] Balanced Antenna Input Question

Rather than just grounding one side of the balanced input as would happen when you use a UG-970-xxx adapter, how about using a small wide-band balun? One could mount it in a small box in place of the antenna relay. Not on keeping with the idea of restoration, but maybe the operation would be improved? Comments, thoughts, doubts??

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Date: Mon, 08 Dec 2008 13:07:41 -0500  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Balanced Antenna Input Question

This is one of those things that shows up from time to time. The REAL deal is what is the impedance of the signal generator used? \*IF\* you use an "antenna" matcher attachment that has the same impedance as the R-390A was "originally" designed for, then there IS reason for seriously working the problem through. However, as such attachments are pretty much "unobtainium", there is no REAL advantage to going through all this. Almost all the OLD signal generators had attachments for 40 and/or 50 ohm output.

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Date: Mon, 8 Dec 2008 13:42:27 -0500

From: Roy Morgan <k1lky@earthlink.net>  
Subject: Re: [R-390] Balanced Antenna Input Question

Yes. Good idea. Put a little balun in a Twinax connector, thread the cable bushing for a BNC chassis mount connector, and you have a fine adapter that will give you a bit more signal strength than just grounding one side of the input transformer. I have estimated that if you make these with commonly available parts, and sell them to folks on the list, you would make approximately 65 cents an hour for your work. But it would be the right thing to do.

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Date: Mon, 8 Dec 2008 14:21:30 -0600  
From: glwebb@gundluth.org  
Subject: [R-390] Re: Balanced Antenna Input Question

I don't know if the operation is improved, but the one I have has two pins that fit right into the balanced input connector works very well. The balun is in a little metal box with a BNC connector on one side and the pins on the other. If I was any good with computers I would post a photo.

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Date: Mon, 08 Dec 2008 17:37:30 -0500  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Balanced Antenna Input Question - WARNING

I read this again, and see that you are going to REMOVE the antenna relay. This REMOVES the break-in/Mute Function!!!! If you plan to use this with a separate transmitter, YOU must provide for this in some manner!

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Date: Mon, 08 Dec 2008 18:17:39 -0500  
From: Jon Schlegel <ews265@rochester.rr.com>  
Subject: Re: [R-390] Balanced Antenna Input Question - WARNING

Regarding use of a balun or similar arrangement. I snagged a couple of Twinax connectors (Amphenol 203/743-9272) on ePay. This connector mates to the Twinax connector on the receiver and accepts Twinax cable on the order of 0.35 inches diameter. At first glance it looks like a type N connector. A nut tightens the rubber cable clamp as you'd expect on any connector of this general style. My plan is to mount the connector to a small box with the its clamp nut and put a balun in the box and an unbalanced connector to feed it. The result is a balun with contiguous shielding all the way through to its unbalanced input that doesn't "defile" the R-390.

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Date: Mon, 8 Dec 2008 19:26:39 -0600 (CST)  
From: Jim Haynes <jhhaynes@earthlink.net>

Subject: Re: [R-390] Balanced Antenna Input Question

Some years back someone recommended an item made for use with IBM token-ring networking, consisting of a Twinax plug connecting to a little box with a transformer in it and a teletype modular type connector on the other end. I picked up a couple of these at some surplus store in Silicon Valley, and didn't do a scientific test but it didn't seem to make much difference whether I used it or not.

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Date: Mon, 8 Dec 2008 20:44:52 -0500 (EST)  
From: "Richard W. Solomon" <wlks@earthlink.net>  
Subject: Re: [R-390] Balanced Antenna Input Question

I found the answer to what I should use. It was suggested I use a Guarella Balun (4:1 is close enough). It came from someone in the QRP crowd.

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Date: Mon, 8 Dec 2008 21:02:37 -0500  
From: Roy Morgan <kllky@earthlink.net>  
Subject: Re: [R-390] Balanced Antenna Input Question

See: [www.n0ss.net/qrp\\_4-1\\_guanella-type\\_balun.pdf](http://www.n0ss.net/qrp_4-1_guanella-type_balun.pdf)

If you use a small enough toroid core, you can fit it inside the twinax connector, put the BNC chassis mount into the coax jam nut (Thread the nut, or file the BNC and force fit.) and have a very compact unit.

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Date: Mon, 8 Dec 2008 20:31:06 -0600  
From: "Richard" <theprof@texoma.net>  
Subject: Re: [R-390] Balanced Antenna Input Question

I have had good luck scavenging the balun intact from a TV 300 ohm to 75 ohm "transformer". It fits inside a twin-ax connector and seems to work just fine. I soldered a BNC connector into the nut and it makes for a nice tight little package.

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Date: Sun, 4 Jan 2009 11:52:47 -0600  
From: "Tisha Hayes" <tisha.hayes@gmail.com>  
Subject: [R-390] UnBal for R-390A

Has anyone made a un-bal for the balanced antenna connection on the R-390A to bring it down to a 50 ohm unbalanced connection? I have a hand-wound 2.5:1 balun with overlapped windings with Litz wire on a FT-75 core (125 ohm to 50 ohm). What I would like to know is if I should make another one of these things for my other receiver or I should go the easy route and use a single wire into the unbalanced connector or just use the C connector for my antenna.

My guidebook has been;  
[www.dxing.info/equipment/\\*impedance\\*\\_transformer\\*\\_bryant2.doc](http://www.dxing.info/equipment/*impedance*_transformer*_bryant2.doc)<http://www.dxing.info/equipment/impedance\_transformer\_bryant2.doc>

It seems that most folks get great results with the easy route. What have been your experiences? Any suggestions?

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Date: Sun, 4 Jan 2009 11:57:30 -0600  
From: "Cecil Acuff" <chacuff@cableone.net>  
Subject: Re: [R-390] UnBal for R-390A

The common wisdom is to avoid use of the unbalanced connector because it bypasses part of the tuned input stages and leaves some of the performance advantages of those stages on the table to do so... I would stick with matching to the balanced connector for the best performance.

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Date: Sun, 04 Jan 2009 13:10:15 -0500  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] UnBal for R-390A

Stick with your un-bal methodology. This uses the best of the input circuitry. There is ONE other aspect to consider. When performing an alignment with a sig gen, the sig gen's impedance is what you will have peaked the input for. So it "may" turn out that the 120 ohm figure is not the best. Use the balanced input, but make your un-bal to match the sig gen's impedance.

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Date: Sun, 4 Jan 2009 16:52:47 -0600 (CST)  
From: Jim Haynes <jhhaynes@earthlink.net>  
Subject: [R-390] Re: UnBal for R-390A

Is it not true that the unbalanced antenna connector is intended for use with a fairly short whip antenna, and hence may not work well with a longer wire? I wonder if you are feeding the receiver from an antenna multicoupler if one or the other connector is more appropriate.

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Date: Mon, 05 Jan 2009 10:05:52 -0500  
From: "Tim Shoppa" <tshoppa@wmata.com>  
Subject: [R-390] Re: UnBal for R-390A

I use a number of antenna configurations, including:

130 foot doublet fed with ladder line running straight into the 390A's balanced line connector

130 foot doublet fed with ladder line going to an antenna tuner to 50ohm coax, then going into the 390A in the usual way with one side grounded.

Some loops in the attic, some tuned, others untuned, fed into the balanced connector.

Other antennas without balanced line feeds fed into the balanced connector.

Far and away the best and simplest situation is the doublet fed to the balanced line connector without the tuner. I would've thought that the antenna trimmer would have to be adjusted depending on how I match (or don't match!) the antenna to the radio, but it doesn't. It peaks in the same place no matter what. Yet I know the antenna presents a wildly varying impedance from 80M to 40M to 20M etc. So maybe the calibration is not so uniquely dependent on antenna impedance like I would've thought. The worst situation for me is a vertical, because it picks up circa 25V to 30V of RF relative to ground from a local BCB (630 kc) station. The doublet or the attic loops, kept balanced all the way, is picking up only a fraction of that. Heck, a scope probe in my basement, if I touch it with my finger, picks up several volts of RF at 630 kc :-).

The lesson for me even if nobody else wants to hear it, is that a doublet fed with balanced line works great!

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Date: Wed, 7 Jan 2009 17:53:37 EST  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] UnBal for R-390A

One of the things you can do is move swap one of the balanced leads over to the unbalanced input on the inside of the antenna relay. Move P207 to J105 and then ground P206. Put J207 to J105 if you want. This just lets you use the C connector as an input. you still are routing the signals through the first stage of the RF filter sections. The input is still in the 200 ohm balanced input range.

A 4 : 1 balun will get the input down to 50 - 75 ohms. The match is close enough. The input to the receiver is not really 200 Ohms. It varies over frequency and is mostly higher. The TV 75 ohm to 300 ohm things work OK. Some do not get down to the AM band. I use a short length of twin Ax coax from the receiver into a shielded box 4x4x4. Inside the box I have run several different balun's depending on what antenna I happen to have. I use a lot of end feed long wires with real high Z. so take the balanced and go 4:1 to get up to 1600 ohm. for the long wire. I have also used a 360 PF var cap in the box to peak, trim, filter, The signal-match. The twin ax to remote box, with the shield grounded at the box and the

box grounded, has really helped me to get a bunch of neighbor hood signals out of the mix going into the receiver. I also put my receiver into a cabinet and grounded the cabinet. I was living in San Diego and LA for 20 years. You need all the edge you can get in the big cities.

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Date: Wed, 28 Jan 2009 13:12:09 -0500  
From: "Ed G" <ed.goss@comcast.net>  
Subject: [R-390] Using Break-In

From reading about the break-in feature of the 390A, I \*think\* it works like "receiver muting" does on more modern receivers, but I wanted to get some other opinions. If I leave the front panel break-in switch off, I believe the 390 just keeps receiving (with no connections to TB103 pin 9), correct? If I turn the front panel break-in switch on, what have I enabled circuit-wise? Can I then ground the rear panel TB103 pin 9 and have the receiver mute, or does the receiver then just ground the antenna inputs, but allow me to hear the transmitter? I guess the term "break-in" is slightly confusing, as I doubt this is really full QSK.

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Date: Wed, 28 Jan 2009 13:41:49 -0500  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Using Break-In

When these were built, QSK wasn't even a thought. Break In grounds the antenna input to the circuitry. You still need an antenna relay to keep the transmitter from blasting into the R-390A.

I use a Johnson TR Switch, turn on break in, and put a monitor scope on the 455 Kc IF BNC on the back of the IF section. It still gets enough RF to show precisely what my transmit signal looks like.

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Date: Wed, 28 Jan 2009 13:55:31 -0500 (EST)  
From: K1LKY <k1lky@earthlink.net>  
Subject: Re: [R-390] Using Break-In

Check my details with the schematic, but here goes: if you put the function switch in the Break In Position:

GROUNDING the rear panel connection causes the radio to mute itself. You are connecting a relay coil to ground. The relay coil works on 6.3 volts ac and draws about 40 ma of current. Your logic type connection on back of a rice box will NOT do the right thing.

What happens is:

- the antenna relay is energized (or de-energized can't remember which) to disconnect the antenna from the input coils and to ground the antenna



input connectors (Both the twinax one and the unbalanced one)  
- the input to the audio amplifiers (both local and line amplifiers) is grounded.

This system is NOT QSK. It operates in the push to talk mode and will not follow any CW keying or the like. You need a relay or switch contact external to the receiver which connects to ground. No source of power or "signal" is required.

Good luck. Roy

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Date: Wed, 28 Jan 2009 14:28:27 -0500  
From: Jim Brannigan <jbrannig@optonline.net>  
Subject: Re: [R-390] Using Break-In

As some others said, it is not even close to "Break-in", but it does the job. True break-in, defined as hearing the other station between the dots and dashes, has to be designed into the T/R combination. The only radio, IMHO, to achieve "true break-in" are the Ten-Tec radios.

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Date: Wed, 28 Jan 2009 15:09:43 -0500  
From: "Tim Shoppa" <tshoppa@wmata.com>  
Subject: Re: [R-390] Using Break-In

I don't have anything against Ten-Tecs - I own some and think they're among the finest CW rigs out there - but IMHO the HW-16 has the best break-in of all transceivers.

And for good reason: the HW-16 is actually independent receiver and transmitter in the same box.

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Date: Wed, 28 Jan 2009 17:47:43 -0500  
From: "David C. Hallam" <dhallam@rapidsys.com>  
Subject: Re: [R-390] Using Break-In

I have that: I have to open the RF gain connection on the back panel terminal strip on transmit with my DowKey relay or there is just too much signal for the R-390.

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Date: Wed, 28 Jan 2009 19:12:08 -0500 (GMT-05:00)  
From: K1LKY <k1lky@earthlink.net>  
Subject: Re: [R-390] Using Break-In

>.....back panel terminal strip .....

If you put a variable pot in that point, you can adjust the gain during transmit so you hear a side tone from the receiver. Roy

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Date: Thu, 29 Jan 2009 07:32:25 -0500  
From: "Ed G" <ed.goss@comcast.net>  
Subject: Re: [R-390] Using break-in

Thanks for all the comments on using the Break-in switch on the 390A. I may just try using one of the old Johnson or B&W T-R switches and let the receiver stay as-is (not use the Break-in switch)...unless I am risking damaging something in the front end.

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Date: Mon, 23 Feb 2009 20:10:39 -0600  
From: <wb5uom@hughes.net>  
Subject: Re: [R-390] R-390A On 160 Meters

This morning at 6am Central, I was listening on 6.676Mhz to the VOLMET Broadcasts . All receivers are fed thru a DA-4 Multicoupler.  
<snip>

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Date: Mon, 23 Feb 2009 22:35:53 -0600  
From: <wb5uom@hughes.net>  
Subject: Re: [R-390] R-390A On 160 Meters

Agreed. I just got tired of hooking and rehooking coaxes, and using two different antennas wasn't a real good test either, so I gave in to the DA4

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Date: Tue, 24 Feb 2009 12:29:41 -0500  
From: Roy Morgan <k1lky@earthlink.net>  
Subject: Re: [R-390] R-390A On 160 Meters

> Don't discount the effect the multicouplers may be having on the results. The output-to-output isolation is only on the order of 20 dB ...the ones I've measured have been significantly worse -- around 10-12 dB ... Distortion in the multicoupler amp can spread the junk all over the bands, ... Thanks for the real world numbers on the multicouplers. I have a military one sold by the surplus folks in Canada before they disappeared. It's an RCA CU-5069/FRD-10A - apparently a lot of them were made by TMC for RCA in Canada, or the other way around. This unit is a pretty early solid state unit, and I'd expect it's performance to be poorer than the ones you report on. For info, see: <http://skirrow.org/Boatanchors/TechTalk6.pdf>

I also have an older military unit that uses 12AT7's for the amplifiers. An interesting experiment would be to do an IN-OUT comparison with some weak signal, or with a busy band to see how a multicoupler was degrading the signals. Sooo many projects, sooo little time. Roy

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Date: Wed, 25 Feb 2009 11:29:14 -0600

From: "Bill Breeden" <breedenwb@cableone.net>  
Subject: Re: [R-390] R-390A On 160 Meters

I agree with Don that you have to be aware of the effect that a multicoupler may be having on the results of such a comparison. I have my multicoupler wired so that I can cut it in and out as Roy has suggested. I use the receiving antenna switch on my FT-920 transceiver to accomplish this. The FT-920 has receiving antenna input and output connectors that allow a receiving converter or other device to be inserted in the signal path to the receiver. When I select the receiving antenna function, the antenna connected to the transceiving antenna connector is routed to the receiving antenna output as long as the FT-920 is in receive mode. I have the receiving antenna output on the FT-920 connected to the input port on the MCA104 multicoupler. So that the FT-920 can still hear in this mode, I have one of the output ports on the multicoupler connected to the receiving antenna input on the FT-920, leaving 3 output ports on the multicoupler available for other receivers. Any time I think there might be an issue with the multicoupler or a spurious signal from one of the other receivers, deselecting the receiving antenna function on the FT-920 cuts the multicoupler and the other receivers out of the circuit.

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Date: Wed, 29 Jul 2009 09:32:50 -0700 (PDT)  
From: wli <wli98122@yahoo.com>  
Subject: Re: [R-390] Grounds

>As long as we're on the subject of grounding.....

So I am asking, what is the opinion for those of us on the second story in a wood house with a galvanized metal roof? I am thinking that you could use the entire roof as a counterpoise. Then run a thick braid down to a earthing rod. At the moment, I have a vertical lashed to the chimney, and a lightning arrestor attached to my steel roof with a copper braid down to a grounding rod.

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Date: Wed, 29 Jul 2009 12:07:06 -0500  
From: mikea <mikea@mikea.ath.cx>  
Subject: Re: [R-390] Grounds

I'm not in that position at the moment, thank goodness, but I'd think that the more copper straps or braids you could put down to ground rods, the better. All of them loop-and-bend-free, of course, to keep the inductance as low as possible. Do please let us know what your results are, as you continue in this investigation.

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Date: Wed, 29 Jul 2009 13:23:55 -0400  
From: "Shoppa, Tim" <tshoppa@wmata.com>

Subject: Re: [R-390] Grounds

The joints in rain gutters can generate a surprising amount of RF noise when in RF fields. Completely off topic except for us talking about rain gutters, check out about 1:40 into this video:

<http://www.youtube.com/watch?v=mvNA2kawKVE>

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Date: Wed, 29 Jul 2009 14:13:53 -0400

From: K2CBY <k2cby@optonline.net>

Subject: [R-390] Grounds

Other than for lightning protection (and that is a VITAL qualification), there is nothing magical about an earth ground. A counterpoise works just as well so long as it is large enough relative to the frequency in use. Think HF and Loran A antennas mounted on transport aircraft or bombers of the piston-engined era (a large, well-bonded, highly conductive ground plane). Think also AM radio stations operating in rocky terrain or in the desert where the earth has about as much conductivity as glass. The only remedy there is an extensive array of ground radials.

Standard broadcast practice is to use radials about a wavelength long at the operating frequency (or an odd multiple of  $\sim$  wavelength) so that the radial will present a low and almost entirely resistive impedance at the common point.

So far as the roof is concerned, I would be worried about bonding the galvanized steel panels together as enough places so that they would model an equipotential plane.

I also assume that the antenna will be somewhere above the roof -- not 100 yards away from it. While it's not going to affect the quality of the ground, the proximity of the antenna to an effective ground plane is certainly going to affect the antenna impedance and the radiation pattern.

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Date: Wed, 29 Jul 2009 14:26:13 -0400

From: rbethman <rbethman@comcast.net>

Subject: Re: [R-390] Grounds

I'd suggest that you NOT have a lightning arrestor between the roof and the ground braid. The metal roof will, at the top of the second story, tend to be a lightning attractant. Grounds for use to dissipate lightning strikes SHOULD have any necessary bends be a SMOOTH radius.

Standard electrical ground rods are indeed at LEAST 8 feet long, steel cored copper, brand named originally COPPERWELD. The steel core is to allow driving the rod into soils that aren't always easy to drive into - like

the clay and shale here in Virginia. Minimum of four ground rods, preferably ALL bonded together below the surface of the soil with at least 1/4" copper conductor. In a power plant or substation we ALWAYS used a "grid" of 500 MCM bare copper between all grounds. This will provide a Great counterpoise AND a very good ground for the home itself.

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Date: Wed, 29 Jul 2009 16:47:34 -0400  
From: Dave or Debbie Metz <dmetz@ntelos.net>  
Subject: Re: [R-390] Grounds

Following this thread, I have a further question. It is my understanding that all ground rods per the NEC need to be connected so that a danger situation does not develop.

The specific example is the ground rod (term used VERY loosely) that the cable company drives outside your house at the entry point on one side of the house and your ground rod at the opposite side of the house where the electric panel is situated is not connected but that indiscretion is a major danger in lightning protection.

As near as I can recall, the NEC requires ALL ground rods to be connected to maintain no possible potential difference. The danger as I understand is that the cable entrance has a ground, your TV is grounded to the "other" ground via the house wiring.

So,.... my question is: if we have additional grounds for our equipment, are we safer or more in danger if we do not connect them to the service entrance ground.

Perhaps this is beyond the scope of this reflector but it seems like we have some engineers lurking in the background and I would really appreciate the science of this anomaly when talking about grounds to the entire group.

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Date: Wed, 29 Jul 2009 17:13:28 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Grounds

The "codes" vary. Now that I've said that, do NOT start a flame war folks! State, County, Local Municipal codes are different in MANY instances. Dave, I'm a fair bit East of you in Virginia.

The cable TV folks, the telephone folks, and ANY one else installing a feed to the house - ALL - attach "their" grounds TO the Service entrance ground.

You are correct in the requirement that ALL grounds are bonded, (Now

THIS is a loose term!), together. This keeps the potential at the same level.

To be honest, my ground system is a WHOLE bunch better than what was installed here by the power company. My Copperweld grounds are 3/4" in diameter. Unlike that joke at the service entrance which I haven't measured, but looks to be around 1/4" to 3/8" diameter. I ran my ground grid to the service entrance ground also.

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Date: Wed, 29 Jul 2009 17:17:05 EDT  
From: ToddRoberts2001@aol.com  
Subject: Re: [R-390] Grounds

So,.... my question is: if we have additional grounds.....

As I understand it, there is more danger if the added grounds are not connected together with heavy-gauge wire to the service entrance ground, and with minimal sharp bends to the wire. This is because of the ground resistance between the separate grounds.

For example if you provide a separate ground rod for your R-390A located in a back room, say 50 feet away from the entrance ground rod. If lightning hits nearby, the extremely high current traveling along the ground can create a large voltage-drop between the two ground rods of thousands of volts, even if the lightning is not a direct hit. This can cause your isolated ground rod to be at a potential of thousands of volts in relation to your house ground and home wiring third-wire ground. If the ground rods are tied together then the potential difference may be close to zero or perhaps only a few volts depending on how much current flows along the ground from the nearby hit.

Always safest to simply unplug the radio itself and disconnect it from any external connections, antenna and ground, during a thunderstorm to avoid these problems. An isolated ground rod can be dangerous in a nearby hit. A cable company ground should be connected to your service entrance ground for best safety.

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Date: Wed, 29 Jul 2009 16:23:27 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] Grounds

I have the Polyphaser Grounding Manual if anyone would like a copy please email me off list. (pdf doc)

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Date: Wed, 29 Jul 2009 17:50:43 -0400  
From: Gord Hayward <ghayward@uoguelph.ca>  
Subject: [R-390] Grounds

I pounded in a few rods and then (in an instant of idiocy) measured the resistance between the rods and the service (water pipe) ground with an ohmmeter. Very interesting, I got a negative value. To make the long story shorter, the water pipe was corroding when connected to a copper rod. I changed to galvanized ground rods which make the ground and act as protective anodes. I know these won't last forever, but I'd rather they go than the water pipes. I also have about 250 feet of #10 insulated copper radials buried in the yard (the best the dumpster had to offer at a time when copper was cheaper).

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Date: Wed, 29 Jul 2009 17:29:50 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] Grounds

The next release of the National Electric Code will have additional details on grounding antenna installations. The existing NEC requirements for facility grounding only address the bare minimum requirement for the service entrance. You can conceivably have a ground resistance as high as 25 ohms at the service entrance.

The ground downlead you see on utility poles usually go to a "butt-wrap" or a "nailer". The butt wrap is just a few feet of bare wire wrapped around the butt end of the pole. The nailer is a copper disk the size of a small dinner plate that is nailed to the bottom of the pole. Sometimes they will drive a galvanized steel ground rod next to the pole.

As mentioned by others, in a substation there are ground mats that are buried under most of the yard. Ground resistances there are frequently less than 1 ohm and absolutely everything is bonded together. There are even special isolators that go on telephone lines that go into a substation.

With comm site design I specify less than 5 ohms to ground on non-critical unmanned locations and less than 1 ohm to ground on repeaters, access points or master stations.

When driving ground rods in an array they need to be distanced apart equal to the length of the ground rod (area of influence). Using copper strap (2" wide) is better than most conductors unless you have a bunch of 500 MCM sitting around. Lightning is much more of a skin effect and the surface area of a conductor is more important than the sheer mass or wire gauge.

In a substation where you may be trying to open a protective device on a 161KV circuit at 250 amps you want the resistance to be very low (or dangerous, lethal potentials exist) and the ground conductors need to

carry the full fault current.

The right way to test a ground is with a Megger type instrument capable of testing a "three lead Wenner Array" for an existing site or to do a four lead Wenner array test on a proposed site.

It gets really expensive to push for the 1 ohm ideal on a site with poor soil or rock. I had that problem with my home the topsoil is six inches to a foot deep, sitting on top of sandstone. When Alabama Power was setting the utility pole they had to use multiple charges of dynamite to make a hole. (they had more fun with that, it took an entire day to set one pole and didn't cost me a dime)

The poured foundation walls are sitting directly on sandstone. I am 'ufer bonded to the rebar and have 210 feet of 2" copper ground strap buried right on top of the rock layer (even a run in the crawl-space from one side of the house to the other). At the corners we core-drilled a few feet down into the sandstone (and hit limestone a few feet down), then we drove copper coated steel rods and backfilled with coke breeze to improve conductivity.

With all of this, and the ground radials at the antennas, bulkhead entrance panel, and it all bonded together I still take lightning damage. Living on a mountaintop I take 4-6 strikes a year just in my front yard. Unless I am actively listening I leave all of the coax connectors disconnected. I should own stock in Linksys for all of the Ethernet devices that have been toasted over the years. I have also lost an SP-200 due to lightning when it Chernobyl'ed the first RF stage coils and have given up on anything with a pre-amp in it.

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Date: Wed, 29 Jul 2009 19:45:30 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Grounds

The document that Tisha is offering to send out to those that want it, even gets into the inductance factoring in the lightning strike instance. The document is an excellent treatise on the topic! It says it much better than I have been attempting to. The diameter of the ground grid conductor is not as critical as is the skin effect issue of large outer area. You'd have to go for over 2" diameter copper pipe to come "close" to 500 MCM cable. If it is okay with Tisha, I'd gladly put the document on my web site, and tell everyone on the list exactly how to get it. That way folks don't have to deal with a large e-mail. I realize not everyone has that service. The file is approaching 6MB in PDF format

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Date: Wed, 29 Jul 2009 16:57:59 -0700



From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>  
Subject: Re: [R-390] Grounds

I see three threads in one so far: RF grounds, Lightning grounds, & electrical safety grounds. Your local electrical inspector should be able to answer questions as to the local/state/city NEC codes per the electrical safety grounds. My bet, and it isn't one of an expert, insurance companies will look for that little sticker from the local electrical inspector.

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Date: Wed, 29 Jul 2009 20:35:45 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Grounds

>....Your local electrical inspector.....

The inherent "flaw" would be just what you propose is \*THE\* answer. The safety grounds were installed when the house was built in 1979. I've been in it since 1988. Since I haven't done anything to the system requiring the inspector, there is NO \*newer\* sticker. Therefore this is an assumption that does bear close inspection.

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Date: Wed, 29 Jul 2009 18:17:39 -0700  
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>  
Subject: Re: [R-390] Grounds

Here near the "People's Republic of Eugene, OR", I think the owner can play with the electrical/wiring in the house and no inspection is needed. But if someone else or a contractor gets involved, then the local electrical inspector jumps into the mix.

My home I purchased now has two additional stickers, one when a heat pump was installed and the other to run a 60 amp service to the shack out back. Could of done the work myself reading a NEC at the book store, but would of missed the added local/state additions to the code because they are not in the NEC at the book store.

Some of what I've done is only so my kids will not have to jump through hoops in the event of my demise. A home inspection should not find any large electrical no-no's. If the kids are smart they will sell it, "as is" anyway.

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Date: Wed, 29 Jul 2009 22:37:25 -0400  
From: Glenn Little WB4UIV <glennmaillist@bellsouth.net>  
Subject: Re: [R-390] Grounds

Braid is not good for lightning.

It provides a high impedance to ground for lightning.  
Lightning prefers direct paths without and bends.  
The braid is made of of a number of conductors with many bends.  
This impedes the lightning which is a high frequency event.  
Always use stranded or solid conductors to connect to a ground rod.

Recommended practice is number 2 minimum outside of the building and number 6 minimum within the building. Compression fitting are not recommended for outside grounding use. Preferred is cad welding. Braid will provide a reasonable RF or safety ground.

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Date: Wed, 29 Jul 2009 21:58:53 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] Grounding

Its easy to say that lightning has been my bread and butter for 20 years. I think the more widespread that guide is read the art of grounding and surge protection is improved. I still go back and reread that guide over and over again. Share it with anyone who may benefit. Amaze and mystify your friends, walk into a comms site and point out the 20 things that can be improved in surge protection.

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Date: Wed, 29 Jul 2009 23:18:34 -0400  
From: Glenn Little WB4UIV <glennmaillist@bellsouth.net>  
Subject: Re: [R-390] Grounding

Another very good reference is MIL-HDBK-419. This addresses EMP. Lightning is an EMP event as well as a nuclear explosion. This handbook can be downloaded on the web.

It is titled "Grounding, Bonding and Shielding for Electronic Equipments ad Facilities" and is 812 pages. This can be downloaded at <http://tscm.com/MIL-HDBK-419A.PDF> It is good reading and a source of good information. At a previous job, I also made a living evaluating sites for lightning damage susceptibility.

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Date: Thu, 30 Jul 2009 08:07:05 -0500  
From: "Cecil Acuff" <chacuff@cableone.net>  
Subject: Re: [R-390] Grounds

In the area where I live there are no stickers that you speak of..  
Never seen one.

As a side note do not be fooled into believeing that just because you have a good electrical safety ground that you are properly lightning protected. The two are not the same...the practices are not the same. Proper lightning protective grounding systems are expensive and very labor

intensive...and need to be well planned in advance of installation. The book Tisha speaks of is the "Bible" of lightning protection.

I just installed a 70' guyed tower and applied all that I knew from the work I do with the company I work for as it relates to communications tower/site lightning protection. I spent probably \$1000 on ground rods, 2/0 bare stranded copper wire, ground kits for the feedlines, ground buss bars, CadWeld materials, lightning arrestors, central point ground panel and misc. two hole lugs, bolts etc.... Not to mention the countless hours spent trenching, driving the 15 10' 5/8" rods, CadWelding all the connections and tying the whole thing back into the house and shop electrical panels. I was luck because I was able to buy most of it at cost through my employer.

At least now if I get popped I can tell my wife and the insurance man that I did all could within reason. That's a whole lot more than was done the last time I had a tower up and got popped. I had a single ground rod driven at the base of the tower, clamped to the leg and a wire run in to the shack that tied all the equipment chassis together. Looking back I would have been better to have done nothing as I created a serious difference of potential between the tower ground and the electrical safety ground and blew up everything in the middle not to mention lighting up everything in the house 60' from the shop.

Ended up being over \$10,000 worth of stuff when all was said and done and that was 15 years ago.

I would have loved to run copper strap everywhere but was never able to come up with a way to cadweld it to the rods and buss bars with what I had available to me. They don't build substation ground mats out of the stuff yet...

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Date: Thu, 30 Jul 2009 08:10:50 -0500  
From: "Cecil Acuff" <chacuff@cableone.net>  
Subject: Re: [R-390] Grounds

That is correct... Also don't solder your connections and depend on that alone. The instantaneous current flow will melt them loose. Crimp and solder or use Cadweld.

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Date: Thu, 30 Jul 2009 12:31:10 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] Grounding and CAD Welding

I was first introduced to CAD welding as a means of attaching a cathodic

protection lead to a pipeline. Our corrosion techs ran around everywhere with a shovel a CADWELD kit and a half-cell. Moving more into the comms side of the oil world we were cadwelding as a cadweld is not considered a connection. It is a permanent means of attaching two pieces of metal and does not have the same potential to cause an arc due to an electrical fault. Of course the act of creating a cadweld creates plenty of fireworks and can scare the hell out of you the first time if you have never seen it done before. At least in the south, most of the electric utilities I work with (SouthernCo and TVA) prefer a cadweld connection in their facilities as it does not need to be checked for corrosion annually. If you are planning on cadwelding anything I suggest the use of the "one shot" cadweld kits. They are good for making a connection between a round conductor and the top of a ground rod. It gets E X P E N S I V E to buy all of the molds and forms to do every different type of cadweld connection. Also the molds have a lifetime limited by how many times they are used and how what environment they are stored in (it looks like a pair of graphite blocks with a set of handles and a latch). They hate getting left on a damp floor and I have had molds crack in half due to the moisture content. One of our warehouse guys decided to "clean up" one day and saw all of these nasty looking black, scorched things on a shelf. Must have asked someone who had no clue and decided to throw them out. When I found out a few weeks later I just threw my hands up in the air and turned around and walked away. I was not about to fill out a requisition for \$2000 more in molds. If you use a compression type attachment (copper to copper or even copper to aluminum) use the anti-corrosive paste. It will keep you from creating a diode connection that can make your ground system turn into a giant crystal radio receiver.

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Date: Thu, 30 Jul 2009 10:31:49 -0700 (PDT)  
From: wli <wli98122@yahoo.com>  
Subject: Re: [R-390] Grounds

All: many thanks for the many responses to my original query re the metal roof and my vertical. I was thinking of a RF ground. As noted, braid is probably preferred for that function. Living at 500' just east of Seattle, we rarely get lightning: it mostly happens in the foothills 25 miles east. If and when we are warned about a local thunderstorm (a rare occurrence here), I just disconnect all the gear from the antenna system, (and get down on my knees).

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Date: Thu, 30 Jul 2009 13:36:58 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: [R-390] Grounding reference

The reference document that Tisha Hayes has made reference to, AND offered to send to anyone whom wants it, is NOW located at:  
<<http://home.comcast.net/~rbethman/Grounding.pdf>>

It SHALL REMAIN THERE! Download and make use of it!

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Date: Thu, 30 Jul 2009 13:56:41 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Grounding and CAD Welding

It has been over two decades since I have been involved in this realm other than my own ham shack and property. I do NOT remember having access to CAD welding back then. I've learned of it since. The method we used when I \*was\* working this issue, was to use copper split bolts at every connection, AND silver braze each joint. It was a royal PIA! However, that's what we had. I hated working the South Pacific Islands with a passion! Crushed or ground coral is insane! We'd have to dig our trenches deeper than usual, lay out the grid conductor, then drive the ground rods. Then we drug the acetylene torch around to EACH connection. On one particular trip, the "Engineers" deemed that solid brass rods, 12 feet long would be used. Oh GREAT! Ever see a 3/4" dia. by 12 ft long pretzel? We raised all sorts of heck - UNTIL they finally sent us the Copperweld rods.

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Date: Thu, 30 Jul 2009 13:35:46 -0700  
From: Richard Loken <richardlo@admin.athabasca.ca>  
Subject: Re: [R-390] CAD Welding

Okay you guys. I've had enough. What on earth is CAD welding and can I do it at home with some #22 wire and a few electric bulbs?

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Date: Thu, 30 Jul 2009 15:42:55 -0400  
From: "Shoppa, Tim" <tshoppa@wmata.com>  
Subject: Re: [R-390] CAD Welding

AKA "Exothermic Welding" or "Thermite Welding". There's a graphite crucible and thermite, a lot of heat and sparks, and when you're done you've got a weld. Brand name that is getting mis-capitalized here is actually "Cadweld". Where I work, we buy them by the tens of thousands not just for copper wires but also copper-to-steel and steel rails. Yes, it is a poor idea to store all your cadwelds in the same place. Many years ago we had a bunch in a locomotive cab that caught fire; it took many hours for it to cool down enough that demolition of the remnant slag could begin.

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Date: Thu, 30 Jul 2009 13:09:18 -0700 (PDT)  
From: Bryan Stephens <bryanste@yahoo.com>  
Subject: Re: [R-390] CAD Welding

For example products, see:  
<http://www.tessco.com/products/productHierarchy.do?tabId=7>

under: Lightning & Surge Protection, Exothermic Ground Connections

Are there licensing requirements (local or otherwise) for purchasing or using this stuff?

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Date: Thu, 30 Jul 2009 15:21:15 -0500  
From: mikea <mikea@mikea.ath.cx>  
Subject: Re: [R-390] CAD Welding-RR Thermite welds

M1A1 Safe Destroyer instructions: "Twist the three red wires together; twist the three green wires together; connect one set of wires to each terminal of a 12V automotive battery. Alternatively, put your finger through the pull ring on the friction igniter, pull it firmly. Leave the area \*IMMEDIATELY\*!" A co-worker told me that he and his crew used lots of them, one or two per rack, as part of shutting down a comm center in Turkey some time before 1965, when I met him, and that smoke was still coming out of the joint around the main door two weeks later. R-390 connection: They had lots of 'em, and a Wullenweber CDAA. Before the M1A1s were used, only the tubes glowed; after they were used, lots more stuff glowed.

Date: Thu, 30 Jul 2009 15:23:31 -0500  
From: "Barry" <n4buq@knology.net>  
Subject: Re: [R-390] CAD Welding-RR Thermite welds

> M1A1 Safe Destroyer instructions:  
>  
> "Twist the three red wires together; twist the three green wires  
> together; connect one set of wires to each terminal of a 12V automotive  
> battery. Alternatively, put your finger through the pull ring on the  
> friction igniter, pull it firmly. Leave the area \*IMMEDIATELY\*!"

The military version of "pull my finger"?

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Date: Thu, 30 Jul 2009 16:29:17 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] CAD Welding-RR Thermite welds

Ah yes,, we kept one of yon thermite grenades on top of all safes, the radar vans, AND the radar consoles. Fortunately "they disassembled all the mess", and didn't let us have the pleasure! Although I have trained with the things. Once lit, I seriously doubt that you could put it out if you wanted to!

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Date: Thu, 30 Jul 2009 15:29:52 -0500  
From: "Cecil Acuff" <chacuff@cableone.net>

Subject: Re: [R-390] CAD Welding-RR Thermite welds

What a waste....

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Date: Thu, 30 Jul 2009 16:39:47 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] CAD Welding-RR Thermite welds

Yes, it IS a waste. But if you MUST abandon equipment under less than desirable circumstances, better to melt it down than let THEM have it! At least if there is NO other way. Think of the "handful of F-14s" that got left in Iran. The good news is that as they break, we do EVERYTHING possible to keep parts from getting in there.

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Date: Thu, 30 Jul 2009 17:25:38 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] Thermite welding

It is a thermite compound (one of many) that has powdered copper in the mix. Once it arcs and sparks and finally cools you open the mold or crack open the unishot ceramic shell and it looks like you melted down five or six pennies into this formed blob that has attached the wire to the ground rod.

There is no special permitting required, it is not an explosive device. Using the quantity of materials in one of the little plastic containers you would not melt through the hood of a car (had that idea once in the middle of a divorce).

How you pour the powder into the mold is important as the finer granules are at the bottom and need to be at the top of the pile. There is a thin metal disc that keeps the powder in a nice pile and it also contributes to the metal blob as the thing melts down.

We used to fire these off on steel pipelines that were 5/16" thickness with an internal pressure of up to 1170 PSI. The corrosion guys tried to attach to a flange but didn't seem to mind making this miniature volcano on a pipeline full of gasoline. I have never heard of a pipeline failing during an exothermic weld, that would be a "bad thing".

Bunches of places sell the same product. Tessco, Talley or Harger. Harger is very into the grounding world (you can say they are well grounded <pun>). They explain the ultraweld process pretty well at;

<http://www.harger.com/products/ultraw/up/up.cfm>

Their library has quite a few useful references including a more graphical presentation (death by powerpoint).

<http://www.harger.com/library/slides.cfm?maingroupnbr=183>

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Date: Thu, 30 Jul 2009 17:27:59 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] Grounding Fini

<smile> I think I have beat the subject to death now. I go back to sleep.

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Date: Thu, 30 Jul 2009 18:04:41 -0500  
From: "Cecil Acuff" <chacuff@cableone.net>  
Subject: Re: [R-390] Thermite welding

The days of the little blue shot cartridges are going away. They have a new one now that is cone shaped with a metal tab sticking out of it. You connect a yellow ignitor box to it and it uses batteries to fire off the shot. I like them...they are sealed and more impervious to moisture. Quicker and easier to handle as well. Those are the ones I used here. The Cadweld folks have a new one size fits all mold system as well that looks really neat. Probably could have used that to do the copper strap to ground rod welds but didn't have access to one of those. I borrowed all the molds for the work I did...just had to buy the shot.

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Date: Thu, 30 Jul 2009 19:34:28 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] Grounds

Better to think of your self as 1/4 wave high. Get a 1/4 wave of wire between the receiver and the real earth down stairs. Then get another 1/4 wave of wire between the receiver and what ever you think is your antenna over your head. You can need not run the wire straight. But try not to put any loops in it that would short out some length of it. Unless you are using the loop to tune the length of the wire.

Those ugly 1/4 wave really limit how far and how fast you can tune the R390 across 30 Mhz and still be somewhat resonant with the feed line. On the transmit side you would like to think ahead.

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Date: Thu, 30 Jul 2009 20:04:31 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] Grounds

You were commenting on multiple grounds.



The problem with lightning is it reaches out and touches a lot of points at once with lots of power. The electric company thinks every day 24 x 7 at 100 amps and 240 volts. What is good design for this is not good enough for lightning.

Once you put a zillion amps on a point, the voltage drop and current across a conductor to the next point become a big voltage drop at lots of current with makes for a power spike best measured joules and micro seconds or less.

This is the part of lightning strikes that cause parts of nice electrical devices to become molten metal and eject with great energy from what we consider closed containers.

Once you do the real math a few times on practical electrical systems for lightning strikes, you want to pull all the wire out of the house and hide in the sand every time it gets cloudy.

The conduct from one end of home to the other when energized by lightning exhibits a large voltage drop from end to end and large current rush. For that split second during the flash, every thing has more potential than even the Myth buster can muster and it is trying to reach a state of zero differential.

For near misses good grounds do work. You know not how many spikes go by unnoticed. Between these two extremes better grounds will save you from bigger closer strikes.

I have my antenna wire unhooked from the house and grounded outside in the yard where the antenna feed line drops down. I think I have a fair ground that is code compliant and currently just under a year old.

I have surge protectors on the computers.

I turn off the TV and radio in the flash. I have a battery weather radio, I unplug it when it comes on and tells me we have a weather watch. No dish washing, No washing machines No TV no phone calls. Let the thing ring and the answering machine deal with it. No computers. no showers when it rains.

When we hit the road I unplug every thing but the refrigerator.

I do not get an insurance discount for this but I have never had to file a claim just because it has not struck close to me again.

When I was about 4 years old my mother put me on my bed and told me to stay put. My two little sisters were on one of their beds and told to stay put. My Mom was washing dishes in the kitchen sink when the house was struck. The neighbor come over to tell my Mom the house was on fire and found my mother on the kitchen floor. (back in the days when we did not have locked doors). My Mom survived and is still doing well today. But I am a believer. I was a loud bang.

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Date: Thu, 30 Jul 2009 20:30:15 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] CAD Welding-RR Thermite welds

If you must have it destroyed overnight, U.S. Marines They have to train some where. It sure is a waste of tax payers dollars. Today waste methods do not even give you the pretense of bang, smoke and awe.

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Date: Thu, 30 Jul 2009 19:46:25 -0500  
From: "Bill Hawkins" <bill@iaxs.net>  
Subject: Re: [R-390] Grounding Fini

I haven't been able to read the whole thread ... Did anyone cover actual ground resistance? What good is a weld if the earth around the rod is bone dry?

Worked at a blasting cap factory near Kingston, NY in the early sixties. They stored explosive powders in bunkers and protected them with tall lightning rods that gave a 45 degree cone of protection.

During lightning season, the plant safety guy took an earth megger out to check the ground rods. It looked like a hand crank megger, but you put two 4' stakes in the ground and connected it to the ground rod. IIRC, the reading had to be less than one tenth of an ohm. The area was boggy, always wet. Copperhead snakes loved it.

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Date: Thu, 30 Jul 2009 21:19:39 -0500  
From: Gary Pewitt <n9zsv@magtel.com>  
Subject: Re: [R-390] Grounding Fini

Thank -you- Tisha. That was a lot of very useful information.

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Date: Fri, 31 Jul 2009 04:06:38 +0000 (UTC)  
From: odyslim@comcast.net  
Subject: Re: [R-390] Grounds

I remember living in Savannah GA. I was a military brat and we moved quite often. Georgia was one of the scariest places I have ever lived. We

constantly had terrible thunder storms and hurricanes. I will never forget the day when a lightening ball came in the house. We ran out. The house didnt burn but I thought it was going to.

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Date: Fri, 31 Jul 2009 11:51:38 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Grounding and CAD Welding

We DID use a concentric hammer! Compacted crushed coral is something short of solid rock! We drove in about two feet at a time, and watched the solid NON-HARDENED brass rods start making turns IMMEDIATELY after entering the ground. I done enough power plants to know HOW to do this.

I've also had arguments with the civil engineers regarding how soon to place a boxcar sized, 54 ton generating unit on the concrete pad. The same island, second plant, they placed them within 10 days after pour. Sure enough, the pads started to shatter within 45 days.

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Date: Fri, 31 Jul 2009 14:05:46 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Grounding Fini

Somewhere in all of this - YES - soil conductivity WAS brought in, although NOT called that specifically. The resistance of the ground grid WAS brought into the discussion. I just don't remember exactly where. Tisha brought it up, AND it IS in the document she sent out for those whom asked, WHICH I have put up on my site at:

<<http://home.comcast.net/~rbethman/Grounding.pdf>>

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Date: Fri, 31 Jul 2009 20:41:25 -0500  
From: Barry Williams <ba.williams@charter.net>  
Subject: Re: [R-390] Grounds

I was born and raised in Georgia, and I remember many close calls with lightning. I was stationed at Ft. Riley, Ks and the thunderstorms there were more scary because they were just so big and you could see them much farther off as they grew.

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Date: Sat, 01 Aug 2009 21:21:02 -0700  
From: Renée Deeter <k6fsb.1@gmail.com>  
Subject: Re: [R-390] Grounding reference

Thank you Tisha for the superb treatise on protection and Bob. Thank you for the linking.

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Date: Sun, 2 Aug 2009 15:56:25 -0400

From: "Dave Maples" <dsmaples@comcast.net>  
Subject: Re: [R-390] Grounds

>...You are correct in the requirement that ALL grounds are bonded,.....

>> ...metal roof will, at the top of the second story, tend to be a lightning attractant. Grounds for use to dissipate lightning strikes SHOULD have any necessary bends be a SMOOTH radius.

All: The NEC is correct in this case. All the grounds need to be connected together with large-gauge wire, so that any surge current (whether direct or induced) cannot set up a large potential difference between the ground systems.

In the commercial world we bond power and telco grounds together, and then bond that to a ground ring around the building. The ground ring around the building is bonded to a ground ring around the tower (if any), and the tower legs are bonded to the tower ground ring. Three ground rods at the tower, one ground rod at each corner of the building and more if the corners are more than 15' apart, and all bonded to the appropriate ring. Each coaxial cable shield conductor is bonded to the ground ring around the building at the point of entry into the building, and lightning protection is bonded to the ground ring around the building. Each telco and power entry or exit has a suitable surge protector on it. Inside the building, equipment grounds are bonded to the bonding point for the power, telco, and coax shield grounds.

This is a large condensation of guidance we received from both Polyphaser and equipment vendors. Hope this helps.

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Date: Sun, 2 Aug 2009 17:59:00 -0400  
From: "Bruce Ussery" <twc9198764412@earthlink.net>  
Subject: Re: [R-390] Grounds

For a while I got back into the RF world as my daily job, working for the NC State Highway Patrol's VIPER microwave network group. (VIPER = Voice Interoperability Plan for Emergency Responders.) This lets anyone with the proper radio reach anyone else in his group statewide, when in range of any of around 200 towers. The new sites we installed went into nice pre-fab buildings with pretty impressive grounding systems. Lots of wide copper strips where the feedlines enter the building, lots of Polyphaser devices, surge protector boxes on the AC mains and generator circuits- all done pretty much like Dave described for larger buildings. Even with all this effort lightning still causes damage routinely, mostly to the "mux shelf", a box full of circuit boards that basically sorts out all the signals going into,

or coming out of the microwave; the generator controls, and the UPS box. The Alcatel microwave and Motorola trunking radios generally survived. Experience helps I imagine.

Thanks to all for the good information.

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Date: Sun, 02 Aug 2009 18:19:19 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Grounds

This is a "rough" play for Amateur Radio installations. Tisha provided EXTREMELY GOOD reference material! Consider it a PERMANENT fixture on my site! Bruce, Dave, Dave, Cecil, myself, and others have contributed information. Roger pointed out the power dissipation being measured in Joules. Some strikes will boggle the imagination!

Bruce spoke of STILL losing some items. I don't think it IS possible to be absolutely safe from a strike no matter WHAT we do. Do YOUR \*BEST\*!

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Date: Sun, 2 Aug 2009 17:44:54 -0500  
From: <wb5uom@hughes.net>  
Subject: Re: [R-390] Grounds

This has been good reading. Thanks!

I have 23 tower installations of my own and cant cout how many more of Customers sites that we take care of . Ive got some sites grounded to the hilt and still take hits from time to time. I have others with no grounding at all that never get hit. There was(is) this large oil company, and several years ago they had a new Communications Manager take over. He had been in the Middle East for years and came in to our office one day requesting a "tour" of his sites in this area. The first words out f his mouth upon entering one of the radio Comm buildings was "Get those grounds off my equipment. I do not want any of my equipment OTHER THAN the shield of coax's grounded at the point of entry on the outside of the building."

And I have to say, it did not seem to get any worse afterwards and it is still that way today. David/WB5UOM

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Date: Sun, 2 Aug 2009 19:07:24 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] Electro and it's sister Magnetic

We cannot forget that when a lightning strike dumps a tremendous amount of energy down our tower and into our grounding system it creates a terrific magnetic field too.

Parallel conductors (like coax, equipment racks, even ground conductors from the bulkhead entrance plate down to the ground plane) all get a big kick from magnetic coupling. This can become "secondary windings" on our gigantic transformer with the antenna tower as the primary winding.

Figure that a lightning strike managed to jump a distance of thousands of feet to the tower. That aluminum rain gutter on your shack can suddenly throw an arc to ground (or you or the electrical outlet behind the wall).

If you have ever seen the "can crusher" experiments  
<http://tesladownder.com/CanCrushing.htm>  
it is a great example of the physical damages that can be done to your equipment.

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Date: Sun, 2 Aug 2009 19:14:35 -0500  
From: <wb5uom@hughes.net>  
Subject: Re: [R-390] Electro and it's sister Magnetic

Yes Yes... I think that inductive coupling is a huge part of the issue over direct hits myself. Power Lines, Telephone Lines, whether above or below ground all are little helpers (or big helpers) in causing problems. A direct hit to a Radio tower is something to see (as long as you are not on it or in the equipment building) , but it is awesome to watch. Ive seen the KTVT Tower at Cedar Hill Texas get a direct hit, I think it is 1200 foot tall. And Ive seen a 450 foot tower that I have equipment on here in Tyler get hit too from a mile or so away. David WB5UOM

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Date: Sun, 2 Aug 2009 20:28:37 -0500  
From: "Cecil Acuff" <chacuff@cableone.net>  
Subject: Re: [R-390] Electro and it's sister Magnetic

I've had PC's damaged with only CPU sitting in the floor with nothing connected to it. Only cause I can attribute it to is EMP from the current spike conducted by the tower to ground during a strike..

The magnetic wavefront induces damaging voltages into everything metallic they cut through. Try explaining that to your insurance guy...

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Date: Sun, 2 Aug 2009 20:31:02 -0500  
From: "Cecil Acuff" <chacuff@cableone.net>  
Subject: Re: [R-390] Grounds

There seem to be two camps on grounding... Ground it all as well as you can and with proven techniques and then the isolate the whole thing...grounds only attract lightning.

I can't sleep well at night knowing I did nothing because I've seen what that resulted in....

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Date: Sun, 2 Aug 2009 20:36:05 -0500  
From: "Cecil Acuff" <chacuff@cableone.net>  
Subject: Re: [R-390] Grounds

.>..... Even with all this effort lightning still causes damage routinely,.....

Bruce, that usually means someone didn't follow good technique in grounding the equipment and racks inside the building. Routing of DC power wiring and signal carrying cables etc... It doesn't take but one guy that comes in and installs something that's not up to standard and it undoes all the work (not to mention the money spent) of others. We usually call for a grounding audit after a site has been hit in that way. Especially with all the exterior grounding work that sounds like has been done at the site. It usually uncovers something that needs rerouting and grounding improvements within the building. Certainly there needs to be a central point ground system in the building for a good start.

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Date: Mon, 3 Aug 2009 09:49:29 -0400  
From: "Shoppa, Tim" <tshoppa@wmata.com>  
Subject: Re: [R-390] Grounds

I grew up in the midwest (Iowa) and when I moved to California, I really really missed summertime thunderstorms. In 8 years on the West Coast, I only once saw a storm that had any appreciable lightning activity.

Temprement wise, I think that some people like me actually find thunderstorms relaxing. The ozone in the air, the steady roar of torrential rain, the bright flashes and booms I actually find calming. Now I'm in the mid-atlantic and although the thunderstorms aren't qualitatively as good as the storms I grew up with, I am quite glad that I'm back where we get thunderstorms.

Of course, being from Iowa I'm quite used to tornado watch and alerts too. To somebody who didn't grow up in tornado alley, here is how they work: A tornado watch means that you should put a new tape in your camcorder, and be sure it's readily accessible. A tornado warning means that you should go up on your roof and try to get some footage of the tornado so that you can be on the TV news. It's very handy that most town in the Midwest have tornado sirens, just in case you aren't watching TV or listening to a radio when one comes.

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Date: Mon, 3 Aug 2009 08:56:50 -0500

From: mikea <mikea@mikea.ath.cx>  
Subject: Re: [R-390] Grounds

What He Said Above. We get some pretty intense weather here, and the National Severe Storm Center and National Weather Center were located here for good reasons. The other thing we do -- here, at least -- is switch to the indoors 2m and 70cm antennas and battery power on the V/U rigs and start listening on the local repeaters.

Eventually, if the wx is nasty enough, someone will start a SkyWarn net on one or more of the repeaters, and we start calling in big hail, high winds, and funnels. It's a lot of fun, and frequently we hear one or more of the weather guessers say exactly what we said, only they say it 10 to 15 minutes later.

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Date: Mon, 03 Aug 2009 11:03:52 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Grounds

I do NOT ground all as well as I can - THEN - isolate the whole thing! My initial comments on the \*VARYING\* codes refers to localized ordinances that SUPPLEMENT the NEC. I definitely DO tie ALL grounds together.

As you pointed out in your post regarding the magnetic effects, disconnected PCs can be destroyed. The codes here have been in a state of flux since late 2004. The county has adopted, AND made mandatory, the Internal codes for residences and commercial structures. There has been a lot of pain and financial cost to this.

Some of us that had new siding put on after a heavy hail storm, have had to have it LL removed. This is because the underlying "wrap" didn't meet the \*NEW\* code. Fortunately I went with 1/4" insulation made with Tyvek wrap. Precisely the wrap specified by the new code.

While I've done nothing electrical - antenna, ground, and the like since the new code came in, I'm having a professional come out that knew the new code, and carries it with him. Then I'll have the groundwork laid to go forward. [NO Pun Intended!] I am NOT in the county per se, BUT in a city \*IN\* the county. It simply adds to the confusion and frustration. I'm STILL looking for the BEST overall solution. If it means do MORE, then I will!

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Date: Mon, 3 Aug 2009 10:41:00 -0500  
From: "Cecil Acuff" <chacuff@cableone.net>  
Subject: Re: [R-390] Grounds



The electrical codes are a good place to start but really don't take lightning grounding into consideration because they are really two different schools of thought. Even electrical code approved grounding techniques are no help many times because they are not designed to flow the lightning impulse potentials away from protected assets towards a designed ground field.

In electrical safety grounding...just providing an electrical connection (bonding) between two points meets code but in lightning protective grounding how that connection is made can mean the difference between it providing protection or being pretty much invisible to a lightning strike. The polyphaser booklet Tisha has spoken of is really the best laymans text on the subject.....

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Date: Mon, 3 Aug 2009 10:47:18 -0500  
From: "Cecil Acuff" <chacuff@cablone.net>  
Subject: Re: [R-390] Grounds

Hopefully I didn't create confusion with my statement about the two camps.. To clarify... Some believe in doing a really thorough job of grounding everything in sight... Other believe that everything should be isolated from ground as to not attract lightning. Thus the two camps of belief. My computer was pretty much isolated but was destroyed with multiple failures the next time I tried to use it due to EMP. Had the interfaces been terminated and the cabinet grounded properly it probably would have survived.. Sorry for any confusion..

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Date: Mon, 03 Aug 2009 11:58:20 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Grounds

Not confused by your posting! Mostly confused with the status of the NEC,, City, and the International Code. Working through it. I've been in this house for almost 21 years. The antennas and the feedlines have changed a couple of times simply for the issue of aging. And one feedline loss due to squirrels! <Furry Tailed Rats!>

GOD only knows \*how\* many storms during this period. To date there has ONLY been hail damage. Trees in the area of a 1 mile radius have been struck. No houses. This area is all underground power feeds and distribution. My mast/tower cannot be so tall that it can fall with even a part of it going outside my property. I can live with that. I can hear and talk to whom I desire. Propagation permitting, of course. I "may" not \*quite\* get the results with silver brazing that the Cadweld does. However it is close enough that I can't measure it! I've got nothing that will real less than 0.01 ohms.

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Date: Mon, 3 Aug 2009 12:18:04 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] Building Standards

I built new about 10 years ago and was able to be on the job-site at 3 PM every day. I purchased a code enforcement book (somewhere on the internet, if someone was interested I could go find the darned thing and give you an author), and walked around the house each day with the construction manager, pointing out mistakes and out of compliance issues.

I was able to get the grounding put in place while they were still pouring the footings on the house. Triple coated the basement walls with black asphalt roll on coating, filled the cinderblock walls with a very potent pesticide to prevent termite problems later on, had the builders add hurricane straps on the roof, threaded rod anchors in some of the walls, a fireplace (not on the plans) and paid \$300 for a guy to come in and run fiber optic, Ethernet, coax and shielded audio cables to multiple boxes in each room. (20 different drops).

I put in fiberglass insulation on the interior walls and copper foil down on the floors upstairs (under the wood flooring) and Tyvek wrapped the entire house.

The construction manager was this crazy Cajun from somewhere in the swamps of Louisiana, he dreaded seeing me each day and tried to get his guys to leave before I showed up, so I started arriving early each morning instead. I hate retrofits after the fact but still have work to do, putting in a grey water system to a cistern for watering and replacing all the outside door for steel frames.

Question: This is an odd one. I am on a septic system, I wonder if anyone has ever thought of dropping a ground into the septic tank (bronze would probably be best). It is always wet and is 10x10x6 so the ground surface area would be 340 square feet of surface area (not counting the top) for a ground (damp concrete is a good conductor). I may try to drop an element into there and hook the Megger to it to see what happens. When I get around to that experiment I will share the data.

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Date: Mon, 3 Aug 2009 13:31:37 -0400  
From: "Al Parker" <anchor@ec.rr.com>  
Subject: Re: [R-390] Building Standards

Wow, I sure wouldn't want to be around if for some reason there were a spark from a lightning strike that ignited some methane gas in there ;-)

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Date: Mon, 03 Aug 2009 13:46:36 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Building Standards

In lieu of bronze, I'd suggest stainless steel. We don't always think of things like chlorine bleach along with ALL the rest of household items that go down the drain. I don't think copper, brass, OR bronze will have any \*real\* longevity.

Let's face it, constant replacement is NOT ideal, and the conductivity of stainless is essentially a wash since it WILL be in a very conductive fluid. Another thought. You have a drain field. This extra ground can be directly to the "tiles". (Yes, I know they don't use tiles any longer!)

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Date: Mon, 3 Aug 2009 12:58:54 -0500  
From: "William J. Neill" <wjneill@consolidated.net>  
Subject: Re: [R-390] Building Standards

A comment about the septic system and "drain field". Over here in the Great Dismal Swamp of South Texas, we do NOT have drain fields and instead have aerobic systems wherein the effluent, purified in a manner of speaking by being passed over chlorine tablets prior to entry into the holding tank, is sprayed onto the yard daily in the wee hours of the morning. Drain fields per se are now illegal given that they contaminate aquifers. We have enough problems with chemical plumes from long-plugged oil wells and waste sites. Has worked very well for us in the eleven-plus years we've been here and even in times of heavy rains and hurricanes, the system has never flooded out and malfunctioned. We have it pumped out about every three years just for maintenance purposes.

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Date: Mon, 03 Aug 2009 14:51:18 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Building Standards

I made reference to the drain field because - (here we go again with varying codes!)

- 1) Tisha built her house ten years ago. I know as late as five years ago, in Georgia, drain fields were still being used.

2) You are in Texas.

3) Tisha is in Alabama.

4) I am here in Virginia, and to my knowledge, septic systems with drain fields are still used in the county. In the City you must use the sewer

system. It is obviously of no use as it is PVC to the street. This is one of "those" issues that can vary widely based on what codes are being used and where. It is just like the entire topic of grounding. NEC does a poor treatise on it in terms of our applications, except to say "all will be tied together." We all live in different places. I know of no single solution that fits all.

---

Date: Mon, 3 Aug 2009 14:30:43 -0500  
From: "William J. Neill" <wjneill@consolidated.net>  
Subject: Re: [R-390] Building Standards

Oh, I understand too well the variances in codes. Within a ten-mile radius of my home, all sorts of red-neck contrivances exist for drainage of sewage, let alone grounding of home electrical and communication circuits. Some are quite shocking.

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Date: Mon, 3 Aug 2009 17:20:04 -0400  
From: "Dave Maples" <dsmaples@comcast.net>  
Subject: Re: [R-390] Grounds

All: Also remember that ground rings, rods, etc., do NOT last forever. If you put in a ground system years ago, there's a good chance it's no longer there, particularly if you are in acidic soil.

Cecil is also correct...it just takes one bad install to wreck the train. Fortunately, most techs that are worthy of the name don't let crazy folks install into "their" sites in a willy-nilly fashion.

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Date: Mon, 03 Aug 2009 17:27:47 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Grounds

Yes sir! I do "annual" maintenance checks. Power Supplier and I have already had a go around. Their ground had deteriorated VERY badly. They tried to tell me that I had no idea what I was talking about. I got a supervisor, and finally convinced him. They replaced it with another "puny" one. They wanted to know what I had brazed to it. Had to educate them. They took readings of my system. Made them happy.

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Date: Mon, 3 Aug 2009 18:16:21 -0400  
From: "Steve & Carol" <srosenb2@nycap.rr.com>  
Subject: Re: [R-390] Building Standards

I always find your posts very interesting but putting a ground line into a septic tank?? I wouldn't want to be around during a storm if that blew up!!

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Date: Mon, 3 Aug 2009 20:03:44 -0500

From: "Ron Kolarik" <rkolarik@neb.rr.com>  
Subject: Re: [R-390] Building Standards

Bronze would be a good choice but.....have you ever seen a steam explosion? One good strike and you could have your own UFO....no fun. There's probably a good deal of methane in there too, maybe better to just put rods down in the drain field.

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Date: Mon, 03 Aug 2009 19:12:26 -0700  
From: Renée Deeter <k6fsb.1@gmail.com>  
Subject: Re: [R-390] Building Standards

I think it would be best in the leach field.....perfect for vertical antennas above....

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Date: Mon, 3 Aug 2009 22:31:50 -0400  
From: Roy Morgan <k1lky@earthlink.net>  
Subject: Re: [R-390] Building Standards

> has ever thought of dropping a ground into the septic tank  
No, but it's a good idea!

> ... 340 square feet of surface area (not counting the top) for a  
> ground (damp concrete is a good conductor).

Here, the (new) septic tank is fiberglass or some plastic. I wonder if the capacitance through the wall would make a good RF ground if not good for AC or lightning.

> I may try to drop an element into there and hook the Megger to it to see what happens.

Do you mean megger, or ground resistance tester? Ground resistances are quite low and there are special megger-like hand cranked gadgets to measure it, right? I have here a PDF document that tells about one brand of such tester - published a LONG time ago. Also, layman level methods have been described in ARRL handbooks and presumably elsewhere.

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Date: Mon, 3 Aug 2009 19:56:34 -0700 (PDT)  
From: Joe Foley <redmenaced@yahoo.com>  
Subject: Re: [R-390] Building Standards

It is to dissipate any static buildup. The idea is to keep the resistance so low that nothing will build up to a very high level. But I have to correct some of you here, ground resistance is NOT measured with a Meggar, that is a MEG-ohm meter. Used for measuring insulation resistance, very high readings. Ground resistance is measured with a MILLI-ohm meter. Usually

a bridge-type instrument. Maybe like a ZM-11.

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Date: Tue, 4 Aug 2009 12:17:12 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: Re: [R-390] Building Standards

What I use is a James G. Biddle Co. Series 4, Earth Tester with a MEGGER trademark. It is at least 60 years old and has the C1, P1, P2, C2 connections on the side and two slide switches that can attach C1/P1 or C2/P2. It "could" be used to test insulation but it is first and foremost a earth tester.

There is a steel plate on the bottom with instructions that show the closing of switch C1/P1 and tying C1 to the ground rod. Then putting a test rod 50' away and attaching that to P2, then a second test rod 50' further away and attaching that to C2.

I have access to an insulation tester (through work) but it is really only of value for finding problems with motors that have high resistance leakage from water intrusion.

I loaned the Series 4 to work only once. It came back with two of the rubber feet torn off and a Coke spilled on the meter face. Now if work needs to borrow any of my test gear I charge them \$50/day and put it on my expenses. They had a fit until I told them to go to Testmart and look at renting the same gear.

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Date: Tue, 4 Aug 2009 12:20:15 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] Series 4 Megger

For those interested I found a Series 4 Megger up for sale on ebay (not mine). It has good pictures of what it looks like.  
[http://cgi.ebay.com/James-G.-Biddle-Series-4-1000V--DC-Megger\\_W0QQitemZ250476680480QQcmdZViewItemQQimsxZ20090803?IMSfp=TL090803218002r1288](http://cgi.ebay.com/James-G.-Biddle-Series-4-1000V--DC-Megger_W0QQitemZ250476680480QQcmdZViewItemQQimsxZ20090803?IMSfp=TL090803218002r1288)

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Date: Tue, 4 Aug 2009 11:10:48 -0700  
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>  
Subject: Re: [R-390] Building Standards

This is the device used by the company I've retired from to test the grounding grids under hydrogen plants, works real well, ain't cheap. Wishing I could borrow one today.

<http://www.aemc.com/products/html/moreinfo.asp?id=50105&dbname=p>

roducts

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Date: Tue, 4 Aug 2009 14:46:17 -0400  
From: "bill riches" <bill.riches@verizon.net>  
Subject: Re: [R-390] Building Standards

I have had the same grief when lending test equipment. I will only lend test equipment if I go with it to make the measurements and charge for my time and use of the equipment.

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Date: Thu, 6 Aug 2009 18:38:01 -0400  
From: Roy Morgan <k1lky@earthlink.net>  
Subject: [R-390] Polyphaser Documents

Lightening-aware folks, since the thread on grounding and lightening protection, I have been reading the various technical notes offered at the Polyphaser site:

[http://www.polyphaser.com/technical\\_notes.aspx](http://www.polyphaser.com/technical_notes.aspx)

I find that the bottom half of the last line of each document, and maybe the last line and a half are missing. Has anyone else found this?

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Date: Thu, 6 Aug 2009 18:54:44 -0400  
From: Roy Morgan <k1lky@earthlink.net>  
Subject: Re: [R-390] Polyphaser Documents

One of these documents, "Ufer and Tower Grounding", puzzled me: What does Ufer mean, I wondered. The Polyphaser author made no mention of what Ufer means. I found this explanation:

Ufer Ground is an electrical earth grounding method named after Herbert G. Ufer, who developed the technique during World War II in Arizona. A synonymous term is "concrete encased ground electrode". It is installed by connecting the ground wire to the steel reinforcement bars in foundation concrete, or by embedding a length of wire in the foundation near the bottom of the concrete. So, Now I have some idea. (And that document shows no cutoff of bottom lines I wondered about earlier.)

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Date: Thu, 6 Aug 2009 16:55:13 -0600  
From: w9ya <w9ya@qrparci.net>  
Subject: Re: [R-390] Polyphaser Documents

I randomly looked at a couple..and had no problems reading any of it. (I am using Firefox for browsing and it calls Adobe Acrobat Reader to render the pdf. I am using a somewhat custom linux op. system build-up to support these programs under the KDE desktop environment system.)

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Date: Thu, 6 Aug 2009 18:26:47 -0500  
From: "Bill Hawkins" <bill@iaxs.net>  
Subject: Re: [R-390] Polyphaser Documents

Looks like they are European A4 sized, about 11.5" long.  
Adobe auto- shrunk it by 94% to print on 11" paper.

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Date: Thu, 6 Aug 2009 16:33:33 -0700  
From: Dennis Wade <sacramento.cyclist@gmail.com>  
Subject: Re: [R-390] Polyphaser Documents

I can see all of the article, but there is something weird about the files. My Adobe plug-in (for Firefox) thinks I'm opening a form. It lets me highlight the fields, and I can edit them. Just can't save them though. Odd...

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Date: Thu, 6 Aug 2009 21:17:26 -0500  
From: "Bill Hawkins" <bill@iaxs.net>  
Subject: Re: [R-390] Polyphaser Documents

Same here. Ignored the notice. Programmers sometimes make mistakes.  
Even ...

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Date: Thu, 6 Aug 2009 22:53:44 -0400  
From: Roy Morgan <k1lky@earthlink.net>  
Subject: Re: [R-390] Polyphaser Documents

That clue made me realize that I'd printed the offending document (the are PDF's) with Apple Preview. When I view and print from Adobe Reader, all is well. Thanks for the hint.

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Date: Fri, 07 Aug 2009 14:10:14 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Polyphaser Documents

Actually, it was Tisha Hayes that gave us the initial info regarding Polyphaser during our discourse of grounds. One entire document is downloadable from my website. "PolyphaserLightning and Grounding Book.pdf"

Tisha brought it up, AND it IS in the document she sent out for those whom asked, WHICH I have put up on my site at:

<<http://home.comcast.net/~rbethman/Grounding.pdf>>

Enjoy all!



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Re: metal roofs  
Friday, August 7, 2009 6:51 PM  
From: "Roy Morgan" <k1lky@earthlink.net>

>My galvanized painted steel roof has the sections all secured to each other ...  
>long sheet metal screws protected by goooo, so would they not be bonded  
>from a RF sense?

Maybe but for transmitting purposes, I have been told that normal metal roofing screw will not do a good job. The problem is that RF currents will flow from one sheet to another along the edges where there are no screws and cause trouble. Also, the screws are meant to hold the sheets in place, not meant to make good electrical connection. If your roof were copper and all seams were slodered, that would be fine! (nearly no one can afford such a roof.)

>Should I also run a real thick copper wire (no acute bends) from the metal roof  
>edge down the 22 ft to the common \*ground\* of the service panel. That is a 4  
>inch pipe that disappears underground somewhere.

From reading the polyphaser advice, I suggest a 1-1/2 inch copper strap. For signal purposed, a wire might be fine, but for lightening protection, you need a flat copper strap.

> .... My vertical is actually a 15ft whip supported i... Very crude, but it works  
>swell as a receiving device where I am located.

If it works, then FINE! Some folks worry too much about how to do things and may not actually turn on the receiver to see what they can hear. Have a good time, make some improvements if you feel like it, but if it works, don't worry too much. Roy

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Date: Sun, 09 Aug 2009 13:17:24 +0300  
From: Sheldon Daitch <sdaitch@kuw.ibb.gov>  
Subject: Re: [R-390] Polyphaser Documents

When we do concrete with rebar in and around active towers, we try to do a lot of rebar bonding so the rebar is at ground potential. Some of this grounding includes tack welding every rebar crossing especially if the concrete is very close to any of the high power antenna systems. We also bring out at several points, ground ties from the rebar inside the concrete

to the regular grounding, for HF, generally ground rods driven into the ground, or in the case of MW arrays, to the 120 to 240 ground radials around the base of each tower. In general, we try to bond everything metal to ground. This is particularly important in a high power RF environment where any metal of significant size not ground tends to float, and can be hot from an RF perspective. This includes things most people never think of, such as placing flexible braid across door hinges of metal door sets, so the doors do not become RF hot and shock people when they touch an ungrounded metal door.

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Date: Mon, 17 Aug 2009 06:45:55 +0100  
From: "Lester Veenstra" <mOycm@veenstras.com>  
Subject: [R-390] Rotating LPAs

But if you truly are in love with the rotating LPAs, they are made and serviced in Frederick MD by:

United States Tower Services, LTD.  
5263 Agro Drive  
Frederick, MD 21703

<http://www.ustowerservices.com/aboutusts.html>

<<http://www.usantennaproducts.com/>> HF/VHF/UHF ANTENNA SYSTEMS:

We are the sole source for manufacturer authorized and approved parts and service on most commercial <<http://www.usantennaproducts.com/>> Telex/Hy-Gain and <<http://www.usantennaproducts.com/>> Hermes loop antenna and rotator models.

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Date: Mon, 17 Aug 2009 22:45:32 -0500  
From: "Jim Shorney" <jshorney@inebraska.com>  
Subject: Re: [R-390] Rotating LPAs

I had the pleasure several years ago of hooking an HF rig up to the demo LPA on the HyGain antenna range here the Sunday before US Tower came to dismantle it. It was fun. Even in the sorry shape that thing was in after years of neglect, it still performed well on the low bands because it was bigger than most everyone else's antenna.

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Date: Wed, 26 Aug 2009 16:38:48 +0300  
From: Sheldon Daitch <sdaitch@kuw.ibb.gov>  
Subject: Re: [R-390] Synthesizer Phase Noise

I always thought the virtue of an RLPA is they basically worked equally

bad on all frequencies. These don't rotate, but they will slew, if you buy the right options:

<http://www.tcibr.com/?PageID=202>

If you need to rotate it, try this:

[http://www.thomsongrassvalley.com/docs/DataSheets/tbm/radio\\_transmission/TRB-SWAnt-R1.0.pdf](http://www.thomsongrassvalley.com/docs/DataSheets/tbm/radio_transmission/TRB-SWAnt-R1.0.pdf)

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Date: Wed, 26 Aug 2009 18:04:49 +0100  
From: "Lester Veenstra" <m0ycm@veenstras.com>  
Subject: Re: [R-390] Synthesizer Phase Noise

Now that's a rotatable array !! But it is interesting that the commercial market with its arrays of dipoles has not picked up on the SteppIR design for variable dipole lengths.

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Date: Thu, 27 Aug 2009 09:45:34 +0300  
From: Sheldon Daitch <sdaitch@kuw.ibb.gov>  
Subject: Re: [R-390] High end antenna systems

An interesting thought. I suspect it might be a combination of several points. The 4 x 4 Thomson system has 32 dipoles, 16 on each side and the 6 x 4 TCI has 24 dipoles, I could guess the mechanical complexity adds to the operational and maintenance issues with the antenna system with little increase in antenna capabilities. I am wondering, too, if changing the electrical lengths of the dipoles without changing their spacing has an effect on the radiation pattern of the antenna systems, as well.

The TCI antenna can be supplied with both vertical and horizontal slewing, and I just don't know enough about the antenna design parameters to consider the relationship of dipole tuning with spacing, for the effects on the slewing operation. If the SteppIR design is patented, there could be an issue with paying for a license to use that technology. It would not be the first time where a manufacturer did not use another technology, simply based on a financial decision.

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Date: Thu, 27 Aug 2009 07:55:45 -0500  
From: "Cecil Acuff" <chacuff@cablone.net>  
Subject: Re: [R-390] High end antenna systems

While the stepIR is a decent antenna..its weak spot is that its element spacing is only optimum at one frequency in its range. Its performance could be enhanced if its element spacing were adjustable in a similar way as its dipole lengths.

They have a nice Vertical design. I had high hopes for it. Took one on a

IOTA (islands on the air) activation and put out a bunch of ground radials...many in the salt water with the mounting pole for the vertical in salt water in the evenings during high tide. Thing would not tune consistantly and then got to where it wouldn't tune at all...finally abandoned it. Turned out it had some type of software issues in the control box. Great design though...

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Date: Thu, 27 Aug 2009 13:47:17 -0500  
From: Robert Nickels <ranickel@comcast.net>  
Subject: Re: [R-390] High end antenna systems

That bugged me a bit before I bought mine, but the performance has been so fantastic I've never been given reason to ponder what might have been improved. My buddy in Hawaii says that only the large stacked arrays produce a more consistent signal from the mainland, 3 and 4 element SteppIRs are among the first signals heard as the band opens and last ones as it closes.

The newest "high end" alternative - the MacTenna "Simple Beam" - is promoted as a " wide spaced 50 Ohm design":  
<http://www.mactenna.net/simpleBeam.htm>

The manufacturer provides a direct link to their patent and a QST article from last year that explains the theory of operation in sufficient detail and schematics are available in the online manuals. At \$1100 (including controller) this antenna is going to get some attention, and it will be interesting to see how it performs in actual operation.

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Date: Sun, 16 Aug 2009 11:51:25 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] Synthesizer Phase Noise

I had my doubts about the capabilities of the synthesizer just by looking at the block diagram and "imagineering" how they would do it. It is not surprising to hear that phase noise was a problem. Someone could create a similarly functioning external synthesizer for the R-390A using a variety of techniques with digital IC's so why bother?

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Date: Sun, 16 Aug 2009 16:54:43 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Synthesizer Phase Noise

Tisha and others have pointed out the noise levels inherent with the external synthesizer. However, we have to remember that these were used with antenna systems that we could only dream and drool over. One particular receiver site of infamy, isn't very far from me. I do remember

when it was still up and running. When you drove up the road to get to the Guarded entrance, you drove for at least a quarter mile along a massive curtain array. That was only ONE of the VERY large number of antennas that were visible from the road. The entrance road to the actual road, even had a firing range situated between the curtain systems and the Guarded entrance.

Considering that this was a Rifle range, you "may" begin to get a feel. Just as you came to the guard, you could observe three or four RLPs, (Rotating Log Periodics), that were about 70 foot up in the air, and from the rear elements, 3MHZ was certainly within reason. When you use an antenna system(s) like this, noise becomes a non-issue. The gain of these systems had to be unreal. But, that is what they were there for. Simply to listen, record, store, and pass on to those places with initials. BTW, those curtain arrays were strung on poles the tops of which were WELL above the top of ANY power pole in the vicinity. They were obviously Class 1 poles!

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Date: Sun, 16 Aug 2009 17:44:40 -0400  
From: "John Vendely" <jvendely@cfl.rr.com>  
Subject: Re: [R-390] Synthesizer Phase Noise

You are confusing phase noise effects in receiver local oscillators with that of thermal noise in RF amplifiers and mixers. Front end thermal noise can be overcome by added antenna gain, but phase noise certainly does not become a "non-issue" with increased antenna gain. In fact, large, high gain antennas usually make the problem worse. Large antennas often deliver huge off-channel signals to the receiver front end, where reciprocal mixing with L.O. phase noise sidebands translates this noise into the receiver's IF. Weaker signals can be buried in the translated phase noise. This effect is completely independent of the receiver's front end noise figure.

Of course, if the antenna is positioned so the offending strong signal is off-axis, the effect can be reduced, but this is often not possible. Often, the whopper interferer and the weak desired signal are both in the antenna's main lobe. Consider the case of a station on the U.S. east-coast with its high gain directional antenna facing Europe, attempting to receive weak signals in proximity to an HF broadcast band. The bigger than antenna, the worse the phase noise effects. For such applications, receiver designers often trade off noise figure for improved front end dynamic range, but L.O. phase noise cannot be compromised.

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Date: Sun, 16 Aug 2009 17:49:34 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Synthesizer Phase Noise

This site, BTW, is 695 acres in size. It has since been decommissioned and turned into a housing and office park. What I would have given to have picked up ONE RLP!

These things were huge. They had a multi-Hp electric motor at the base of the tower. It turned the ENTIRE tower and antenna. During its active phase, from the '40s through the '80s, it was not a place that one really talked about. You didn't go there unless you were meant to BE there.

One did NOT drop in to use the facilities because your were simply active duty.

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Date: Sun, 16 Aug 2009 17:52:54 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Synthesizer Phase Noise

You are correct! I believe that most of the synthesized systems had very few sites involved. I do know that this site was using diversity systems, and was only for "sniffing" what was in the ether!

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Date: Sun, 16 Aug 2009 23:07:26 +0100  
From: "Lester Veenstra" <m0ycm@veenstras.com>  
Subject: Re: [R-390] Synthesizer Phase Noise

Actually, the gain of those rotating LPA's is rotten. Now a nice sterba curtain or rhombic is another matter.

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Date: Sun, 16 Aug 2009 23:11:04 +0100  
From: "Lester Veenstra" <m0ycm@veenstras.com>  
Subject: Re: [R-390] Synthesizer Phase Noise

Actually, Vint Hill Farm was hardly a secret ASA facility.

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Date: Sun, 16 Aug 2009 18:27:15 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Synthesizer Phase Noise

That is most likely very true. However, being in a peculiar outfit myself, of an entirely different nature that made use of those and others fruits, I have a very old habit of not saying too much. It is an old habit! Even now 21 years after retirement, there is much that is never spoken. Such is the way.

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Date: Mon, 17 Aug 2009 10:27:38 -0400  
From: "Shoppa, Tim" <tshoppa@wmata.com>  
Subject: Re: [R-390] Synthesizer Phase Noise

> When you use an antenna system(s) like this, noise becomes a non-issue.

Like others have remarked, you are confusing front-end noise with phase noise. The evilness of phase noise, is that it makes signals near but not at the desired frequency, appear as noise in the passband. Much ham and a lot professional equipment from the past few decades has phase noise that can be heard by tuning adjacent to a strong CW signal and hearing the noise pulsing on and off. They also transmit this phase noise too (although that becomes "somebody else's problem" in the perspective of an individual ham, in actuality it becomes everybody's problem.) The best ham equipment from the past several years, this is not so much of a problem. It is still measurable and very real and can become noticeable under the most extreme conditions (e.g. contest weekends). The synthesizer designs of the 50's and 60's military equipment that I'm aware of, is of a mix-divide mechanism, and AFAIK did not have the exactly the phase noise evilness that many of the 80's and 90's ham rigs suffered from. These military synthesizers are characterized by rotary digit selectors for each decade, mixers, and divide by ten circuits for each decade, and mixers for each decade. This technique is very hardware intensive but comparatively clean compared to most simple PLL's and DDS's.

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Date: Mon, 14 Sep 2009 18:11:58 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] R-390A s/n4214 [8719-p-55] known issues

Loose wire are not a good sign. You may or may not have problems in the antenna relay circuit, and it was just easier to clip the wires loose from the relay than to fix the real problem. The relay is de-energized when receiving signals. No need to add the relay coil field to the weak signals. In CAL. the signals should be shorted to ground. Dial up WWV and set the receiver to CAL. WWV should be lost to a cal tone. AM broad cast does sound much better at 16KC than 2KC. Fidelity is not a R390/A strong selling point. There are things you can do to one receiver if you really are into short wave reception with the receiver. You have a bit of work but that's just part of the hobby.

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Date: Tue, 15 Sep 2009 15:17:11 -0500  
From: <ka9egw@britewerkz.com>  
Subject: [R-390] [KA9EGW] s/n 4214 ANT RELAY

Yep, according to my trusty Keithley 175 bench meter, those two wires show 25VDC/14VAC in standby and cal modes, and nothing the rest of the time, readings consistent with RAW unfiltered DC. Inspection of the antenna relay shows nothing connected to it but 3 mini-BNC's. Inspection

of the schematic shows no filtering on that line. Inspection of the area around the relay shows no bridge rectifier of any sort close at hand. Are they driving the relay coil with unfiltered DC?

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Date: Tue, 15 Sep 2009 19:25:42 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] [KA9EGW] s/n 4214 ANT RELAY

Yup.....been that way since day one. Cost cutting at its best

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Date: Fri, 12 Feb 2010 02:50:51 -0500  
From: Roy Morgan <k1lky@earthlink.net>  
Subject: [R-390] Wullenweber Coupler CU-1280/FRD-10A(V)

There have been requests before for information about the receiving antenna coupler used in the "Elephant Cage" Wullenweber direction finding system: CU-1280/FRD-10A(V) . If there are any manuals out there, I'd appreciate hearing about them. For pictures of the coupler, and other info about the FRD-10, see: <http://www.virhistory.com/navy/frd10.htm>

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Date: Fri, 12 Feb 2010 06:36:21 -0600  
From: "Les Locklear" <leslocklear@cableone.net>  
Subject: Re: [R-390] Wullenweber Coupler CU-1280/FRD-10A(V)

They are probably as rare as the LF Converter for the R-1051's. I had one of those antenna couplers, ran pretty hot when in use. Got rid of it years ago. Nicely built though. Keep trying, someday somebody will find one that wasn't burned or shredded.

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Date: Wed, 10 Mar 2010 01:08:19 -0800 (PST)  
From: Joe O'Brien <jmobrien14@yahoo.com>  
Subject: [R-390] Wullenweber Coupler CU-1280/FRD-10A(V)

I have one of these CU-1280's. Got it -oh, maybe fifteen or twenty years ago after I saw an ad and an offer I could not believe (nor refuse) - in one of the SWL magazines if I recall correctly (which I don't always do). I have had as many as eight of my radios (R390A, JRC NRD-505 and '515, various Drakes and others) all hooked up at one time, and it works like a charm. Some slight hum I can not get rid of but can live with. However, I really did not get it for hooking up radios, but rather to hook up to my own elephant cage, which I am still working on. It is going to take a while, yet. Manuals/schematics are, indeed, hard to find if in fact there are any out there. Can anyone help? I've asked this list before...

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Date: Wed, 10 Mar 2010 06:23:38 -0600  
From: mikea <mikea@mikea.ath.cx>



Subject: Re: [R-390] Wullenweber Coupler CU-1280/FRD-10A(V)

I seem to recall that the Premium Receivers group's website had the manual(s) for the FLR-9.

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Date: Sun, 5 Sep 2010 20:19:13 EDT  
From: Flowertime01@wmconnect.com  
Subject: Re: [R-390] the saga cont. part 3

At the antenna relay, couple one of the balanced antenna cables over to the unbal jack. Either P207 or P206 over to P205. And then just ground the other balanced input by sticking a wire in the J104 connector on the back panel. When you use the unbal input with wire P205 you skip the whole front can of tuning coils and caps. The unbal input is thus a whole lot wider in response than the balanced input. You thus get a lot more signals and noise into the RF tube and thus a lot more intermodulation. It makes not a lot of difference when you use a signal generator except the front slug and cap will not align correctly in each of the Octaves. You have likely discovered the front cap on each of the cans still does not appear to have any tuning effect even if you do use the balanced input. This is true expected operation. There is a procedure to get that front cap properly adjusted. It will not increase the signal level. On the signal generator you can not measure the difference. It does help cull out unwanted signals when you have an antenna hooked up. <snip>

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Date: Mon, 20 Sep 2010 13:01:35 -0500  
From: <ka9egw@britewerkz.com>  
Subject: [R-390] the saga cont. pt 9

What fun...got my Amphenol 82-5628 BNC-to-Twinax adapter in the mail today...it doesn't seem to work very well; I get better results off the unbalanced input and the adapter whows some fraction of an ohm between pins and between either pin and ground. Does anyone know if it has some sort of balun or the like in it, and if so, what's the Zo and freq range?

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Date: Mon, 20 Sep 2010 14:18:38 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] the saga cont. pt 9

The "Twinax" connection was meant for something around 120 to 150 ohms for Z. It really doesn't matter unless you have a way to alter the impedance of the signal generator! These were originally aligned with the AN/URM-25(X) series of signal generators. They came with a "dummy" antenna of 500ohms Z. If you perform the alignment with a 50 Ohm Z signal output, then you are going to be in a "better" position, since today's

antenna systems are "normally" a feed impedance of 50 ohms. Tweak and peak accordingly!

Forget the "twinax", and use the "C" connector next to it. It was meant for 50 ohms Z.

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Date: Mon, 20 Sep 2010 14:58:41 -0400  
From: William A Kulze <wak9@cornell.edu>  
Subject: Re: [R-390] the saga cont. pt 9

I've got some 90° adapters, SO-239 to the twinaxe. They don't seem to have anything inside, just grounds one side of twinaxe, like recommended for feeding twinaxe input in the R390a info out there. Now, I've always heard that if you don't use the balanced input you're skipping a stage of preselection that will null any unbalanced noise that may be on the balanced line. How's all this work if you're connecting 50ohm coax to the balanced input? If you feed your Sig Gen to the junction of two 68ohm resistors at the balanced input to make the adjustment, are you still going to see any improvement if you ground one side and feed with coax?

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Date: Mon, 20 Sep 2010 14:58:30 -0500  
From: <ka9egw@britewerkz.com>  
Subject: Re: [R-390] the saga cont. pt 9

My understanding is the two 68ohm resistors thing, is to put a signal in as common-mode for adjustment of one trimmer per band, the balancing caps nearest the front panel, only.

I'm using a couple pins to feed my balanced inout, but it only works when reversed from the pin-out Chuck Rippel recommends, and it's that way on all bands. And no, P206 and P207 are not reversed. Odd. Very odd indeed. And it's that way with 2 different rf decks.

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Date: Mon, 20 Sep 2010 15:39:36 -0500  
From: <ka9egw@britewerkz.com>  
Subject: Re: [R-390] the saga cont. pt 9

Well, I bit the bullet and ordered a UG-971 twinax-to-C adapter [I already have a PL-259-to-C jumper for feeding the unbal input. We'll see how it goes.

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Date: Mon, 20 Sep 2010 13:41:13 -0700  
From: "Craig C Heaton" <wd8kdg@att.net>  
Subject: Re: [R-390] the saga cont. pt 9

Using the same method here, a couple of pins soldered to 50 ohm coax to

the balanced input, per Rippel's website. One side is grounded to the frame and his method is working well. Both of the outputs of my sig-gens are 50 ohm and I peak n' tweak the Rf cans as a 50 ohm input RX. Don't have the manual in front of me at this time, but there is an advantage using the balanced input and not crossing the jumpers between the balanced and unbalanced terminals.

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Date: Tue, 21 Sep 2010 08:02:34 -0400  
From: William A Kulze <wak9@cornell.edu>  
Subject: [R-390] FW: the saga cont. pt 9

Has anybody tried a balun of the proper ratio to couple the coax to the balanced input?

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Date: Tue, 21 Sep 2010 08:55:09 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] The Saga Pt 6 (Antenna Balun

Yes, I have, that is the way to go. I hand wound a 2.5:1 un-bal, put it in a metal box with a coax connector on one end and a twinax pigtail on the other. It works just great. If I recall correctly, using the C connector there is a mini coax flipover you need to do at the Rf deck to get the best sensitivity.

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Date: Tue, 21 Sep 2010 11:49:33 -0400  
From: "Bernie Doran" <qedconsultants@embarqmail.com>  
Subject: Re: [R-390] The Saga Pt 6 (Antenna Balun

What improvement is actually shown by the balun, vs the coax flipover or grounding one pin of the balanced input?

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Date: Tue, 21 Sep 2010 12:01:14 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] The Saga Pt 6 (Antenna Balun

Bernie - I don't know what "improvement" will be seen. It begins to get into what specific Signal Generator is used, how its impedance is effected, and other things. Roger R. will tell you that they spent their career(s) using AN/URM-25(X) sig gens. By their nature, they were issued with a 50 ohm Z "phantom/dummy" antenna. Therefore you either use it into the "balanced" input - therefore tweaking and peaking for a 50 ohm match, or you used the "C" connector, and flipped the internal cables. The net result was a VERY sensitive receiver, but it really wasn't "peaked and tweaked" for the "balanced impedance" input.

I've yet to locate or discover an AN/URM-25(X) with the adapter for the balanced input. I use an AN/URM-25(D) and the TS-585D/U for the audio output readings. I'm extremely happy with the results! I even use the same lash-up for my Northern Radio SP-600. Shake them and bake them with what you have - AND - you can make work! Nothing wrong with Tisha's method!

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Date: Tue, 21 Sep 2010 14:08:10 -0400  
From: "Judi Doran" <cooner@embarqmail.com>  
Subject: Re: [R-390] The Saga Pt 6 (Antenna Balun)

It seems that I read somewhere about measuring the input Z of receivers, and it was all over the place. Guess I could put the antenna analyzer on the input and see what it says. I strongly suspect that it also depends on how the RF was aligned/ balanced Bernie

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Date: Tue, 21 Sep 2010 15:01:18 -0400  
From: William A Kulze <wak9@cornell.edu>  
Subject: Re: [R-390] The Saga Pt 6 (Antenna Balun)

I think the idea is for performance with an antenna. However you do the alignment, the sig gen config is just to let you do the adjustment, and I guess that's handy for getting sensitivity numbers, but how's it work with an antenna? A balanced line from the antenna to the balanced antenna input, and the impression I get is that this adjustment comes into play with a balanced feed. Most of the time I'm using my radio with an antenna and not a sig gen.

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Date: Tue, 21 Sep 2010 12:05:44 -0700  
From: David Wise <David\_Wise@Phoenix.com>  
Subject: Re: [R-390] The Saga Pt 6 (Antenna Balun)

I've lost track of which tweak you're talking about. The balance adjustment is moot unless you run balanced. All other adjustments are meaningful however you run it.

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Date: Tue, 21 Sep 2010 15:55:05 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] The Saga Pt 6 (Antenna Balun)

The "reality" is that I don't know of anyone with the appropriate twinax cable for a "true" balanced input. All suggestions have been to "obtain" old IBM computer cables that were terminated with a balanced feed. There isn't a large supply of the original twinax cable that was used "once upon a time".

So we end up with our "real" antennae and feedlines. Hence the use of unbalanced coax and needing to match to the radio needs. That is why pay a ridiculous price for a coax to twinax connector and have to end up grounding one side, or having it done in the adapter.

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Date: Mon, 27 Sep 2010 08:52:12 -0400  
From: "Shoppa, Tim" <tshoppa@wmata.com>  
Subject: Re: [R-390] the saga cont. pt 10

<snip>..... The balanced input in the 390A is not "just to tune out common-mode noise". Balanced antennas and feedline systems are a joy to use, you just have to build your whole station around them :-). The whole move to coax for antennas, post-WWII, was in my opinion misguided. (Yeah I have coax in the shack... but the antenna feed line is ladder line, all the way from the link-coupled balanced tuner to the sky!) These are common themes in radios other than 390A's, too.

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Date: Sun, 26 Dec 2010 07:14:08 -0600  
From: <ka9egw@britewerkz.com>  
Subject: [R-390] C crimp connectors

OK, I'm not currently in a position [little time, no cash, lots of non-radio chaos going on in my life right now] to pursue the group buy thing any farther than gathering up the info, so if someone else wants to pick up the ball and run with it, here's all the relevant info before I misplace it: The RG-58-size crimp style "C" series plugs are Kings Electronics ["Kings by Winchester"] p/n KD-59-161. The catalog's at <http://www.winchesterelectronics.com/PDFs/resources/Catalogs/rf.pdf>

The stocking distributor who last time I checked had multiple hundreds of them in stock was Ramtronix at [www.ramtronix.com](http://www.ramtronix.com) and their minimum order is \$100. I haven't gotten as far as determining the 'each' price in quantity or where the quantity price breaks lie.

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Date: Mon, 10 Jan 2011 14:47:30 -0800 (PST)  
From: wli <wli98122@yahoo.com>  
Subject: Re: [R-390] fractal antenna

Been reading up on fractal antenna theory. The hype is all about small size and wide bandwidth. Sounds too good to be true. If I am correct, it seems to be best suited for UHF, and probably not for HF for our R390A's. I see them employed in cellphones and in HDTV amplified antenna plates. Am I in error? Has anyone built one for HF receiving? Found one article about one, but it looks like a YAGI to me. Thanks for the \*bandwidth\*

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Date: Mon, 10 Jan 2011 17:48:53 -0600

From: "Cecil Acuff" <chacuff@cableone.net>  
Subject: Re: [R-390] fractal antenna

Not too familiar with them..maybe that's the new name for a UHF/VHF  
planar  
log periodic... Just a thought...

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Date: Mon, 10 Jan 2011 18:58:20 -0500  
From: Jeff Adams <physicist@cox.net>  
Subject: Re: [R-390] fractal antenna

There are several books on them. Go search Amazon. I dont remember  
them working at HF, size is the problem.

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Date: Mon, 10 Jan 2011 18:20:04 -0600  
From: Grant Youngman <nq5t@tx.rr.com>  
Subject: Re: [R-390] fractal antenna

The whole fractal antenna thing was at one time a highly controversial  
discussion item on some reflectors/lists. See <http://www.fractenna.com> --  
where you can read about these things ad nauseum.

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Date: Tue, 11 Jan 2011 21:39:39 -0800 (PST)  
From: GARY WEBB <glwdoublewing@yahoo.com>  
Subject: Re: [R-390] Fractal Antennas

I have a 73 magazine from Sept. 1998.? There is an article ?by Chip Cohen  
1JR?. "Multibanding the Fracvert Half-wave."??He describes a wire  
vertical for 20 meters that can also be used on 40, 30,17,15,12, & 10.  
Simple antenna: Feed section (vertical) is 11.8 ft, Horizontal section 17.4  
ft. Top section (vertical) 23.6 ft. Radials were 17.5 ft wires?around the  
base of the vertical feed section. I have done many searches for HF fractal  
antennas on the internet. There are  
some articles that don't require a math degree to understand. But I get the  
feeling that any articles that gave details of the construction of one have  
been removed. I believe that Chip N1JR founded a company to develop and  
build antennas for the military and commercial interests. I remember  
seeingthe 10 meter beam article too, but good luck with googling it.

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Date: Wed, 12 Jan 2011 11:19:05 -0600  
From: "William J. Neill" <wjneill@consolidated.net>  
Subject: Re: [R-390] Fractal Antennas

Within the past 45 days, NOVA broadcast a program about fractals as a  
mathematical concept and the program concluded with perhaps ten  
minutes devoted to fractal antennae and the research devoted thereto.

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Date: Tue, 8 Mar 2011 12:11:44 -0600  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: Re: [R-390] R-390 Digest, Vol 83, Issue 19

<snip> > Re-cabling the antenna relay to use the C connector

\*Probably overlooked by many users. If you follow the schematic for the balanced and unbalanced whip antenna connections you can see where a swap of the BNC connections on the bottom of the antenna relay would be a good idea. You do not even need to heat up a soldering iron for this mod.\*

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Date: Mon, 28 Oct 2002 03:37:03 -0500  
From: rbethman@comcast.net  
Subject: Re: [R-390] R-390A's, Sandstate sets and Desert Storm static damage

Phil - Read comments made throughout. The FIRST thing to consider - Uncle is MOBILE. The Hummers, Jeeps, 2 1/2 tons, Tanks and the rest are "moving". This doesn't allow for a "ground". They are using vehicle mounted whips, not dipoles or the like. The few times they set up a command post, they are still using whips (for the most part) to maintain polarity with the masses. They may get lucky and drive a ground rod or two - IN DESERT SAND. Essentially NO GROUND. The only thing I can attest to - from spending time out "there", the static buildup is horrendous! The sand provides NO MEANS of a ground. Tactical necessity doesn't allow for digging deep trenches, heat issues preclude using water to soak grounds. The people NEED IT MORE. Sliding an R-390A out of the case and blowing compressed air through it is not a problem. Keeps them functional. What do you do with a finicky Harris - Watkins Johnson, or whatever? They can't take the static, can't take the heat!, and die faster than you can replace them. That's why Uncle keeps R-390As in a warehouse in Northern Calif, all refurbished, and ready to go. "Spares included"! Bob - NODGN U.S. Army Spec Ops Retired SFC

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Date: Mon, 28 Oct 2002 04:18:16 -0800 (PST)  
From: "Tom M." <courir26@yahoo.com>  
Subject: Re: [R-390] Gulf War 390A's?

I don't doubt that the static is a big problem. Heck it gets bad in the US with long ants. I have a note from a chap with Harris who had a devil of a time keeping thier stuff running. However I've never heard a first hand account of 390A's being used in the Gulf. Contrary to what's been metioned on this list, the Mac-Cabinets were not built for the Gulf War. They were built in the mid eighties by Laboy Industries in Camden, NJ,

years before the Gulf War. Through FOIA, I wrote to Ft Monmouth and asked for inventory, and last known requisition for 390A's from CECOM. They replied that they had none on hand, and sent me a copy of the last requisition for a handful of sets for an outfit in Germany. I'd be happy to add to my files any first hand accounts or photos of 390As used in the Gulf War.

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Date: Sun, 8 Jan 2006 11:33:14 -0500

From: roy.morgan@nist.gov

Subject: Re: [R-390] Break In Operation of R-390 & CV-591 Converter

I have not done break-in with an R-390, but I can tell you a bit about the break-in relay and how it works: the R-390A break-in relay is a 6.3 volt AC coil device and draws about 40 mA of current to operate. Grounding the rear terminal strip connection by an external relay or switch (with the radio function switch in the Break In position) makes the connection. The 6.3 volts is drawn from the internal filament supply. You cannot use a solid state switch or logic line to do the job.

The break in relay does two things:

- it causes the antenna relay to operate. (I think it is energized to pull the relay in.) This unhooks the antenna connector from the RF input coil(s) and grounds the antenna input jack.
- it grounds the audio in the radio at the output of the detector-input to the common audio preamp stage. Thus both line and local audio are supposed to go away.

The result is that the radio is still completely operating at whatever gain you had set (changed by the AVC when the antenna signal goes away partly or completely) but the audio signal is or should be muted by being grounded. Note that with the CV-591, any signals from the IF strip will be processed by the CV-591 as normal. The AGC in the 591 may operate also, increasing gain when the IF signal goes down. I can't remember if the CV-591 has any provision for external control of its audio or gain. This whole system is meant to operate with push to talk type transmitter/receiver control. It is not capable of QSK type CW break-in where you hear the receiver between the CW dots and dashes being sent. In expectation of one day setting up a station for full break-in CW operation, I have collected the experience and advice of folks on mail lists about full CW QSK operation. It takes a number of elements that the R-390A was not designed to have. Some of these elements are:

- very fast switching of the transmitter from on to off, with CW waveshape under control
- fast and very reliable switching of the antenna from transmitter to receiver:



this usually involves vacuum RF high voltage relays, or in modern radios, PIN

diode switch arrangements

- possibly a second antenna for the receiver only
- very stiff control of receiver gain - access to the receiver AGC circuits, and

modification of attack and decay times may be involved.

- possibly reduced and controllable receiver gain during transmit times to provide a monitor function.

I have seen the R-390A operated in push to talk break in operation with an AM transmitter, and it works just fine. (Presumably, it will work just as well with T/R control for RTTY) CW QSK break in is another matter, and will take a more complicated system. Roy

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From: Bob Camp <ham@cq.nu>

Subject: Re: [R-390] r390a balanced input connector

There have been numerous threads on the 125 ohm input impedance of the 390. The simple point is that if you align the radio out of a 120 ohm generator then you will have a 120 ohm radio.

If you align the radio out of a 50 ohm generator then you will have something other than a 120 ohm radio. That's not to say you will have a 50 ohm radio, just that it won't be a 120 ohm radio.

All this is even more confusing when you get into receiver design theory and they show that a low noise receiver does not general apply a matched load to the antenna. The logic goes more or less that a matched load dumps 6 db of the signal and 3 db of the thermal noise. Things get even more strange when you notice that most antennas only provide a specific matched impedance over a very narrow portion of their useful frequency range.

The bottom line seems to be that if you align the radio out of the same source impedance as the antenna you will be using then the radio works just fine. There does not seem to be any real advantage from using a 120 ohm input versus a 50 ohm input. The only exception I can see to this is a true 120 ohm balanced input. In order to run this you would need to have 120 ohm balanced coax. I'm not at all sure what kind of balanced antenna you might have running around with a 120 ohm impedance.

A full wave loop comes close but that's not a real popular antenna these days .... If you are going to do a true balanced input then there is an extra step to the alignment procedure related to properly balancing the input. Anytime you connect an antenna to a radio and the output noise level in

the receiver goes up, you have more sensitivity in the radio than you need. At that point you are going to worry more about things like front end selectivity and overload performance of your RF amplifier(s). Fortunately with the R-390 you don't have to settle for two out of three, it's got it all ..... The minor differences between 120 ohm and 50 ohm inputs aren't going to change this much at all.

None of this relates to the high impedance input to the radio. It bypasses some of the front end selectivity in the radio and is generally held to be a bad thing except when you have a short run to a small whip antenna. Even in this case I'm not sure this is a real good idea.

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Date: Fri, 25 Jun 2004 11:44:23 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] r390a balanced input connector

MIL-R-13947B, 26 October 1960 RECEIVER, RADIO (RADIO RECEIVER R-390( )/URR). states:

"3.13.3 Antenna input impedance.- The rated input impedance for the balanced input circuit shall be 125 ohms. In the range from 500 kc to 16 mc, the measured input impedance shall not be less than 50 ohms nor greater than 375 ohms; for the range from 16 mc to 32 mc the measured input impedance shall be not less than 100 ohms nor greater than 700 ohms. (See 4.9)."

( This is the Military Specification that the receiver was built to. Thanks to Al Tirevold for scanning and OCR-ing this document. Available at <http://www.r-390a.net/under Documents>:  
<http://www.r-390a.net/faq-refs.htm> )

I have not (yet) measured the input impedance of any R-390 receiver, but I would expect a wide variation within the above limits if the thing is even moderately well aligned.

All this is even more confusing when you get into receiver design theory and they show that a low noise receiver does not general apply a matched load to the antenna.

It was well known among VHF folks who were tuning and/or building converters and pre-amps that the tuning that gives the highest gain is seldom the tuning that gives the best signal to noise ratio. I would expect many things to be different between VHF/UHF and HF situations, among them input circuit Q, the related bandwidth, sources of noise and the relative impact from those sources, and losses in feedlines but even at HF,

things are not simple.

The bottom line seems to be that if you align the radio out of the same source impedance as the antenna you will be using then the radio works just fine.

I have noticed that when using an antenna tuner to get low SWR on transmit, another setting of the tuner gives me greater signal strength on receive. It might take lots of thinking of the sort that Bob presents to sort out why.

If you are going to do a true balanced input then there is an extra step to the alignment procedure related to properly balancing the input.

As I understand it, that input coil balance adjustment is important to minimize common mode noise and RFI interference and for proper functioning of direction finding systems. That would be important when the receivers are being used near operating transmitters or other noise sources. I have an odd direction finding receiver that has two separate coax inputs to a balanced input transformer, so there may well be some direction finding systems that need to have the input transformer well balanced.

Another item on the to do list here is to experiment with that balance adjustment to find out if it affects receiver performance (sensitivity or selectivity) when one side of the input is grounded in the way that most of us use it.

Sooo many projects, sooo little time.

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Date: Fri, 25 Jun 2004 10:00:15 -0600  
From: Jordan Arndt <jordana@nucleus.com>  
Subject: Re: [R-390] r390a balanced input connector

Is this not a case of using a 600 ohm antenna and a 4:1 balun..???

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Date: Sun, 27 Jun 2004 09:23:26 -0000  
From: "Bjarne Mjelde" <bjarne@mjelde.net>  
Subject: Re: [R-390] R-390 Balanced Antenna Input

Being a very new (and still unexperienced) R-390A user, I may not have much to contribute to this thread. However, some may find this of interest: Using the balanced input significantly increases sensitivity over the unbalanced input in my setting. My setting is: 550 meter beverage, coax-fed via a 1:9 transformer to a BNC connector. Monitoring the

mediumwave. When using the unbalanced input, signal recovery was noticeably lower than that of the JRC NRD-545 (which acted as a sort of "reference receiver" since the sensitivity figures of it is known, i.e.  $0.4\mu\text{v}$  -  $0.5\mu\text{v}$  in AM mediumwave, 6 kHz bw, 30% mod). I monitored stations on, or just above the noise floor. When I utilized the balanced input via the UG971/U and UG636A/U, signal recovery was noticeably better than the NRD-545. I have no idea if this means that the balanced input is significantly more sensitive than the unbalanced input; however signal recovery indicate that it is indeed the case. The short version of the above: I will never use the unbalanced antenna input for my beverages.

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Date: Sun, 27 Jun 2004 10:24:24 -0400  
From: Bob Camp <ham@cq.nu>  
Subject: Re: [R-390] R-390 Balanced Antenna Input

The performance actually is a bit harder to evaluate than simply switching between the two inputs.

To get the unbalanced input set up right you need to align the radio out of a 50 ohm generator hooked up unbalanced to the radio. In this configuration the balance tuning adjustment does not do what it is supposed to do. In addition the coils peak at a different point for a low impedance generator than they do for a high impedance generator. Given the way the circuit is set up that's exactly what you would expect them to do.

On the balanced input you need to feed the input with a proper impedance matching network. There are examples in most of the manuals. Usually they are just a bunch of resistors rather than transformer based. Once you get the radio set up from the match network there is another step that does the balancing process. Since the matching networks are usually unbalanced to ground this isn't quite as easy as it might be.

In both cases the result still won't be a 50 or 125 ohm input impedance on the radio. The result will be the best performance you can get from a 50 ohm or 125 ohm source. The difference is a bit subtle but the resulting impedance may be a half or 2X what you would expect it to be.

If you terminate a transmission line in it's characteristic impedance then it does not much mater what length you use. If you go to an impedance that is significantly different than the haracteristic impedance you want to use half wave multiples lengths of line. This works fine in a single frequency receiving setup. It gets a bit complex otherwise.

None of this came as a big surprise to the guys who designed the radio. That's why you have a nice big antenna trim control on the front panel.

Since the antenna may be both reactive and at an odd impedance you can only do so much with a single control. A full blown antenna matcher will beat a single control part of the time. What's amazing is that modern radios have forgotten about all this. We have all kinds of weird knobs on a modern radio but nothing much to make it tune up the antenna on receive. There does not seem to be any compelling argument to go to 125 ohms balanced other than to reduce the effect of noise in the shack. Matching a normal vertical or dipole to 125 ohms isn't terribly easy. Of course once you go off of the design frequency a vertical will do a bit better into a higher impedance. Getting this done with a chunk of coax between the radio and the antenna messes the whole process up to the point that the net result is hard to predict.

These days we run the 390's without upper and lower covers in place. A lot of radios have also lost the cover that goes over the RF deck. This is a great idea when it comes to cooling the radio and keeping it working for a long time. It's not as good idea in terms of shielding the radio from crud in the shack. The net result is that even though the balanced 125 ohms may help reduce the crud it's won't do as good a job as it might.

Any time you hook an antenna to a radio and the noise out of the radio goes up the antenna and not the radio is determining what is going on at the front end. As long as this is true you have more sensitivity than you need. You can still have two radios that do this and they will still hear different things. If they do it's not because one has a more sensitive front end than that other one. It's because the filters, detectors, or audio properties are different. The difference may even be a result of front end overload or distortion effects in the two radios.

One nice thing about the R-390 radios is that they give you pretty darn good sensitivity \*and\* front end selectivity. This is not always the case with more modern radios. Often they make some pretty major compromises in either the sensitivity or selectivity department. Of course many of them were designed for a very different mission than an R390. It's a bit tough to auto tune a R390 over telephone line that's a couple hundred miles long .... So how does any of this relate to 50 ohms versus 125 ohms you ask .....

The front end of the radio will have different selectivity characteristics when it is driven off of 50 ohms and 125 ohms. It's not quite as simple as larger resistance = higher Q = more selectivity. In fact the truth may be exactly the opposite. You could do some analysis to see what's going on but that's more work than I'm up to on a Sunday morning. Since you don't really know what the impedance of the antenna is I'm not sure how useful the result would be. People have constructed 50 ohm to 125 ohm transformer match networks to go from an unbalanced 50 ohm line to a

125 ohm balanced input. There have not been any reports of significantly improved on the air performance when running this kind of setup. The only observation that I have made is that the 125 ohm match seems to keep the trimmer caps on the 30 MHz end of the RF coils better in range. When you set it up with a 50 ohm input these caps often wind up at one end of their range. Both configurations are representative of how the radios were used when in military service. If there had been a significant problem with a 50 ohm shipboard setup they certainly had the skills to put a matcher between the antenna and the radio. Bottom line seems to be that they never bothered. They did do a routine impedance sweep of the antennas so it was no secret what the impedances involved were. I have no doubt that a setup of multiple big rhombics with combiner transformers and balanced line was a better setup than a 35 foot whip on the deck of a destroyer. That probably had a bit more to do with the antennas than it did with 50 ohms versus 125 ohms .... Of course if anyone would like to forward me the two setups for evaluation I'll be more than willing to post the results.

Bottom line - if you happen to have a 125 ohm balanced antenna farm then by all means run 125 ohm balanced it works just fine. For the rest of us who have 50 or 75 ohm antenna farms there is no big reason to worry about it.

Once BPL comes to all our neighborhoods this will be a moot point anyway. Maybe we can use our radios as planters ...

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Date: Wed, 16 Aug 2006 12:13:35 -0400 (EDT)  
From: John Lawson <jpl15@panix.com>  
Subject: [R-390] R-390A Break-in question

After completing some repairs to my Venerable Valiant, I also took the opportunity to finish wiring up the 'PTT' circuits - previously I'd been using the OldSkool method of switching the receiver to Standby, switching the antenna manually from RCV to XMT, and switching on the Transmitter - pretty clumsy and disaster-prone (tho I somehow managed never to actually put power into the front end of the 390A) and very difficult to carry on a rapid conversation....

Anyway, I wired in a DowKey and used the contacts on it to ground the break-in point on the 390A, as per the manual. Both relays are working, and the antenna input shows 'ground' when it's energized.... (I'm using the Unbal side). The problem is that when transmitting, I still have "leakage" into the radio - the carrier meter reads up to about 40, and enough audio gets out of the speakers to cause feedback, unless I manually rotate the Local Gain control full down. The Line Gain and meter show nothing, BTW.

The radio has the top cover in place, the chassis is grounded solidly to earth, the transmitter is likewise grounded, the antenna tuner is grounded (I'm using ladder-line from tuner to my loop antenna feedpoint) and a small 'field strength' meter that I keep on the shelf to watch such things shows no unusual amount of RF in the shack. All wiring is shielded/grounded, etc. The antenna easily and repeatably tunes up to a 1.1:1 on the AM Fone portions of 80M (generally 3870 Khtz). Power into the tuner is about 150 Watts from the Valiant.

Someone has mentioned to me that this is fairly normal R-390A behavior, but since I've just now started using the rig this way, I thought to ask the Assembled Experts here if there might actually be a problem with the radio, or at least some mitigation of the syptoms that can be done. More/better details of station and wiring upon request....

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Date: Wed, 16 Aug 2006 12:20:37 -0400  
From: Roy Morgan <roy.morgan@nist.gov>  
Subject: Re: [R-390] R-390A Break-in question

The break-in function in the R-390A does two things:

- 1) It grounds the audio at the output from the detector.
- 2) It switches the antenna relay to - disconnect the antenna input from the jack and ground the jack.

This means that the entire radio is still working except for the antenna connection and the audio. The Valiant puts out enough signal to get into the front end of your radio, and the detector puts out enough signal to get through to the audio section. I suggest you try:

- 1) clean the contacts on the breakin relay (in the audio deck).
- 2) re-establish the ground that relay uses to short the audio signal to the chassis.
- 3) Add another relay in the system to ground the antenna line going to the radio and if needed:
- 4) add some function to remove the IF stage from operation, such as applying some rather healthy (and maybe adjustable) bias to the AGC line.

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Date: Wed, 16 Aug 2006 12:49:51 -0400  
From: "David C. Hallam" <dhallam@rapidsys.com>  
Subject: RE: [R-390] R-390A Break-in question

What I have done is to add a relay contact to open the Rf gain circuit. There are terminals on the rear terminal strip to do this. At least there are on my R-390. The relay contacts need to be isolated from chassis ground.

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Date: Wed, 16 Aug 2006 15:13:32 -0400  
From: Mark Huss <mhuss1@bellatlantic.net>  
Subject: Re: [R-390] R-390 (Non A) Problems

Had a similar problem with an R-392, very similar to an R-390. Receiver works fine, then suddenly loses sensitivity. Later comes back up.

Traced it to the Break-In relay contacts being dirty. It suprised me a bit as I would think that the contacts would either make or not make as long as the contacts did not move.

Considered that the voltage on the relay coil might be 'iffy', but the relay held to 16VDC. Burnished the contacts and everything works now.

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Date: Wed, 16 Aug 2006 12:53:16 -0700  
From: "Kenneth G. Gordon" <kgordon2006@verizon.net>  
Subject: Re: [R-390] R-390 Problems - Relay

One thing we often forget concerning relays is that in order for the contacts to STAY in any sort of low-resistance condition, there MUST be some current flowing through the circuit that the contacts are switching. If that current is below a certain level, the contacts quickly oxidize and their closed resistance goes up...sometimes way up. And this has nothing to do with coil's current or applied voltage.

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Date: Wed, 16 Aug 2006 19:22:46 -0400  
From: Mark Huss <mhuss1@bellatlantic.net>  
Subject: Re: [R-390] R-390 Problems - Relay

You are right about putting current through the contacts, but the antenna relays in the R-390's are designed for no current through the contacts. So it is not that much of a problem. When i monitored the coil current, I was thinking along the lines of the contact pressure changing, thus changing the pressure on the oxidation layer on the contact. Less pressure would equal a change in resistance through the oxidation, and would account for the change in attenuation through the contacts. This can be caused by a decrease in the strength of the magnetic field, especially if a bias magnet is used in the coil core, or magnetization of the contact actuator arm. This would be evidenced by an increase in the pull-in/drop-out current of the relay. If this was the case, cleaning the contacts is only a temporary fix.



Replacement is the only option. I had run into this problem on the control system of a sixty-foot dish I had worked on once. Drove everybody nuts as you would clean the relay contacts (salt-water shore location), and everything would work for a few weeks, then the intermittent operation would reoccur. You would think that all the relays in the chain should have just been replaced in the signal chain at the first sign of trouble, but the original relays were designed to be operated off plate current (65VDC, if i remember right), and were no longer available. Ended up degaussing the bad relay with a coil of wire and a wall plug. Saved the Taxpayer several hundred thousand dollars. It lasted another twenty years before they replaced the entire dish. By then, the dish would intermittently freeze, a friend who still worked there told me. The fix was to walk out to the Dish, take a broomstick off the hook on the wall, stick it through the hole in the 'Coffin' ( a five by three by three metal box on the floor with dozens of relays in it), and rotating the end to bang everything inside until it worked! Reminds me of the 'Good Old Days', where you would walk up to an inoperable R-390A with your toolkit. Ask the operator to step aside. Run through the front-panel checklist to confirm the R-390A would not turn off. Open up your toolbox. Pull out the six-inch steel ruler and a pencil. Carefully measure the front panel and mark an X on the front panel. By now the operator is standing at your sholder, wondering just what the h \* \* you are up to (which is exactly what you have been waiting for!). Then you pull out the little rubber mallet from the toolbox, and with a show of great concentration, tap the front panel between the Mode switch and the Limiter pot. At which point, the Dial Light goes out. And with a look of great satisfaction, put away everything, turn to the operator, and confidently tell him it is fixed! Use left hand to close operator's jaw. And walk away, as off in the distance you hear 'Hey, It Really Is Fixed!!!'

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Date: Thu, 28 Apr 2011 14:53:49 -0400  
From: Nick England <navy.radio@gmail.com>  
Subject: [R-390] AN/FRR-51 dual diversity system?

Anyone ever heard of the following? Navy AN/FRR-51 dual-diversity HF receiving system with 10 channel auto-tune (0.5-32 mc) components -  
R-792/URR receiver (2 ea.)      CU-560/URR antenna coupler  
C-2087/URR receiver control      C-2086/URR remote switching control  
CV-116/URR dual diversity FSK converter  
CV-395/U Signal Data Converter  
CY-1119/U cabinet

Googling didn't show up anything except on the CV-116 and I know what that is. Above info from a September 1956 Nomenclature Card according to a Navy  
ESO publication Anyone? Anyone?

What about this theory - I read somewhere that Hoffman Labs developed a receiver but it never made it into production - could this R-792 nomenclature have been assigned for this system that never got built? Time frame seems right, CV-116 was a Hoffman design, and Hoffman supplied FRR-38 diversity systems (2 R-390 + CV-116) - would have been a logical step for them to make an R-391 competitor? (Note this FRR-51 is not a relabeled R-391 based system - R-391 had 8 channels, not 10, and also required a 28v supply for the autotune)

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Date: Fri, 29 Apr 2011 18:51:20 -0500  
From: "William J. Neill" <wjneill@consolidated.net>  
Subject: Re: [R-390] AN/FRR-51 dual diversity system?

There's good news and there's bad news. The good news is that sometime around 1955 to maybe even 1958, the Navy published a ten-volume set of books titled "Director of Communication Equipment" (NAVSHIPS 94200.1) and it described everything, including using poor quality images, that the Navy was using or could use (therefore including Army and USAF equipment) on land, sea, and air. I have all ten original volumes. The bad news is that I can find only Volumes 4 through 9. Some examples of equipment described therein:

AN/TRD-3, covered by TM 11-629/TO31R4-2TRD3-21:  
1 R-389  
1 AS-595( )?GR  
1 IP-137( )/GRD  
Shelter S-44  
1 GO-9( )/TRD-3  
1 GO-5( )/GRD

AN/MRD-15, specified but never produced  
It included 3 R-390( )s  
1 GO-5( )/GRD  
1 GO-6( )/GRD  
1 MX-1170( )/GRD  
1 AM-496( ).TRD-4  
1 T-279( )/TR

AN/URR-49( ), specified but never produced  
2 R-390( )s                      1 AN/URA-8B

AN/URR-23 or 23A  
1 Radio Receiver R-388 or R-381A (51J4)  
1 LS-175/U or LS-199/U and    1 CY-1235/URR

AN/MSQ-38, specified but never produced  
1 R-220/URR                      1 R-390( )/URR    1 AN/FRR-21  
1 R-467/ALR                      etc.

AN/FRR-49 is described in many variants based upon frequency range, using tuning heads for the FRR-502. Many other AN/FRR receiving sets ranging from the AN/FRR-3 to the AN/FRR-5 (never fielded) to the AN/FRR-60 are described but NOT the AN/FRR-51. However, an AN/FRR-51 is certainly within the realm of having been planned. Of course, there's also multitudes of AN/MRR, SRR, and URR, and WRR receiving sets listed.

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Date: Wed, 20 Jul 2011 12:21:12 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] Antenna balun

Really interesting item. Looks like it is grade A build quality  
330590619004

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Date: Wed, 20 Jul 2011 10:45:28 -0700  
From: Dan Rae <danrae@verizon.net>  
Subject: Re: [R-390] Antenna balun

More important may be what is inside :^)  
I have built a few using the MCL transformer TMO-2.5-6:  
<http://www.minicircuits.com/pdfs/TMO-2.5-6+.pdf>  
Which is small and has excellent performance converting 125 Ohms to 50, from .01 to 100 MHz, if you don't want to wind your own balun. Well worth it these days now everything is 50 Ohms.

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Date: Wed, 20 Jul 2011 13:48:48 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Antenna balun

The quality indeed looks VERY good, BUT then You'd have to buy one for the antenna AND one for alignment. It seems that the alignment for 50 Ohms, AND connect a 50 Ohm feed-line is simpler and cheaper. I certainly have NOT found ANY of this twin-ax, and don't have a balanced feed-line, nor a dipole that exhibits a 120 Ohm impedance.

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Date: Wed, 20 Jul 2011 12:52:14 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: Re: [R-390] Antenna balun

Finding the coax and connectors is pretty easy. It is the same stuff that was used on IBM ThickNet connections in the bad 'ol mainframe days. Looking for it as a radio supply will not yield any results or will show folks

who know that it can be used for the R-390/A and they charge an arm and a leg for it. Surplus IT places will beg you to take it away.

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Date: Wed, 20 Jul 2011 13:01:23 -0500  
From: "William J. Neill" <wjneill@consolidated.net>  
Subject: Re: [R-390] Antenna balun

Take a look at the other items being offered via eBay by this person.

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Date: Wed, 20 Jul 2011 13:29:02 -0500 (CDT)  
From: Jim Haynes <jhhaynes@earthlink.net>  
Subject: Re: [R-390] Antenna balun

And, one time in a surplus store, I found some things that had a twinax connector for the IBM network on one side, and a modular jack on the other side, and some kind of transformer in the middle. I never measure the characteristics, but someone said the transformer is good for the HF range, and thus the thing makes a good balun for an R-390A.

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Date: Wed, 20 Jul 2011 14:50:37 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] Baluns Caps and Ballasts

Unfortunately I did not know about Tom selling caps. About a year ago I bought one of the 3FT7 replacements and a set of caps from the same German supplier. They have been working out great.

I have seen some homebrew attempts at cap restuffing and then to use epoxy to glue the can back on. I had decided that was a route that I did not want to go. Nor did I want to spend \$60 on some 1960's vintage of an NOS capacitor from Surplus Sales of Neb.

I did buy the balun and will try to quantify it's performance on a network analyzer once it arrives. I would be interested to see just how linear it is across the .5 to 30 MHz range. Many of my low frequency baluns are wound with Litz wire but I doubt that this balun will have litz windings and I have no idea what core they are using. There does not appear to be a way to take it apart.

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I just get "so" excited when someone makes a shiny new part for the R-390A.

Of course I am not going to jump out of the canoe to buy the burnished, polished aluminum one that is up on eBay. I am not that much of a crow <j/k>

for collecting shiny tidbits in my nest.

My latest infatuation has been with Racal and WJ stuff (I know, traitor!). I am still chasing that mystical <140 dBm noise floor demon. The RF-590 "has 'spoilt me", now I just want to find a RF-1310 to pair it up with.

I have now officially run out of rack space in the console. For anything else to fit, something else has to go. The floor of the lab would not take any more "stuff" without me fearing that it collapse down into my dining room. It has since lost it's designation as a guest bedroom as well, the sofa bed has to come out.

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Date: Wed, 20 Jul 2011 16:16:05 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Baluns Caps and Ballasts

Tisha, I hope you get some decent numbers using this balun. However, it is still based upon either an SO-239 or BNC input. That puts us back to the initial point of a feed-line that is unbalanced. I have a strong belief that "Flowertime" Roger using AN/URM-25s, a TS-505 D/U and a TS-585 has served very well. I just don't see adding an "extra" item into the antenna string is going to make it work better.

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Date: Wed, 20 Jul 2011 15:34:21 -0500  
From: Robert Nickels <ranickel@comcast.net>  
Subject: Re: [R-390] Baluns Caps and Ballasts

I'll be looking forward to hearing the results of your testing Tisha, as this looks like an excellent solution.

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Date: Wed, 20 Jul 2011 17:14:07 -0400  
From: "Todd, KA1KAQ" <kalkaq@gmail.com>  
Subject: Re: [R-390] Antenna balun

I still have a couple dozen of these. Maybe 3-4 inches long, thick black cable between RG-8 and -58 size. Never checked the balun in the middle, guess I assumed it was more for keeping RF out than matching anything. Picked them up back in my mainframe days, which ended in 2008. They were used with a number of AS-400 systems we had. The sad part is, I missed getting a box of 50+ new connectors and the tool(s) required for assembly, by a week or two. They were sent to the the gov't surplus group who promptly threw them out (I checked, was too late there also). But the AS-400 guys were great, pulling tiles and locating maybe a dozen of the balun connectors they gave to me along with another dozen or so they had left in their office. The CU-286/FRR-33 uses 6-8 of them as well as the 390s and A. More projects for the future. BTW, the fellow auctioning the

new baluns and ballast replacements is or was a member of this list last I knew. Then again, that was a few years back. I lost my very first 3TF7 as few months ago. Fortunately I have spares, but the good ol 47 ohm/5-10watt resistor makes a fine replacement.

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Date: Wed, 20 Jul 2011 17:20:12 -0400  
From: "Jim" <jbrannig@verizon.net>  
Subject: Re: [R-390] Antenna balun

A really nice item, but what performance does it buy??? Will it dug a new one out of the noise? I think not, but it is really cool and neater than jamming the 50ohm coax into the connector...

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Date: Wed, 20 Jul 2011 15:38:36 -0700  
From: Dennis Wade <sacramento.cyclist@gmail.com>  
Subject: Re: [R-390] Antenna balun

I've found these twinax/modular connector things as well. I destroyed one and used the twinax pigtail to connect a homemade balun to the '390A. My connection from the pigtail to the pc board I mounted the balun on was the weak point in the assembly, as was my lack of onfidence in the characteristics of the balun I wound since I don't have the equipment to properly analyze it. I don't think it was as completely shielded as it should have been. I've also seen parts similar to the Mini Circuits device mentioned above, but in looking at the data sheet its not obvious (to me anyway) how to connect it up correctly.

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Date: Wed, 20 Jul 2011 15:53:17 -0700  
From: Dennis Wade <sacramento.cyclist@gmail.com>  
Subject: Re: [R-390] Baluns Caps and Ballasts

Isn't the whole point of the balun to convert the \*unbalanced\* 50 ohms to the \*balanced\* 125?? Doesn't that solve the problem, assuming one feeds the antenna properly, that is if feeding a balanced antenna (dipole) with coax using some sort of choke or other type of balun to keep symmetry.

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Date: Wed, 20 Jul 2011 19:02:11 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Baluns Caps and Ballasts

ONLY \*IF\* you do an alignment with a 120 Ohm signal generator. Do you see a 120 Ohm terminator/dummy antenna with the AN/URM-25 series? Sure wasn't part of the parts included. Darn sure isn't in the NAVSHIPS Manual either.  
NAVSHIPS 0967-187-5010.pdf (A 35MB file.).

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Date: Wed, 20 Jul 2011 16:50:09 -0700  
From: Dennis Wade <sacramento.cyclist@gmail.com>  
Subject: Re: [R-390] Baluns Caps and Ballasts

Why would you not feed the 50 ohm unbalanced generator through the balun for alignment, assuming you had confidence in the balun?

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Date: Wed, 20 Jul 2011 21:16:13 -0500  
From: "Cecil Acuff" <chacuff@cablone.net>  
Subject: Re: [R-390] Baluns Caps and Ballasts

You do the alignment through the Balun. It does the 50 ohm to 120 ohm impedance matching if wound properly. Sure the most ideal situation would be to have twinax all the way to the feed point on the dipole but that's not how most are equipped these days... Unless you build it yourself you will have a 50 or 75 ohm unbalanced antenna system. There is a bit to be gained by using the Balun but not as much as using a balanced antenna system.

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Date: Thu, 21 Jul 2011 07:36:13 -0500  
From: "Cecil Acuff" <chacuff@cablone.net>  
Subject: Re: [R-390] Baluns Caps and Ballasts

The fact is if you are using a balanced fed dipole you don't use a balun. In addition the military never worried about perfect height, nor perfect installation techniques nor the antenna being cut for exactly the frequency being used. They worked in a non-perfect world in most all cases when field deployed...and yet still gained the benefits of the balanced design quite nicely.

This is just hobby radio we are talking about...no ones life depends on it. It's forgiving of a multitude of technical sins and still provides a great deal of pleasure. Since it's a hobby, each one of us are free to get as intense or as lax as desired in the pursuit of the pleasure it offers. Some will optimize their antenna systems as much as is practical and certainly providing a better impedance match between our antenna systems and the radio will display a measure of improvement..whether it's done with a slick looking German engineered device or a home brewed one stuffed in a medicine bottle. That's part of the pleasure and joy of ownership.

Let each have the freedom to do it their way and let's all learn from it in an effort to better apply our thoughts and desires as to how we use our little vacuum tubed piece of history...

I'm anxious to hear Tisha's report on how it checks out.

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Date: Thu, 21 Jul 2011 12:04:02 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] Baluns Caps and Ballasts

Cecil - I actually agree with every bit that you have written here and now! My message was more tongue-in-check, and heavily leaning on sarcastic. These old radios were NOT used in ideal situations, and yet they did well! They managed to do things with them that the Amateur community can't even come close to. Yes - it is a hobby! I just get frustrated with dismissing things out of hand. Such as the test equipment that was used to service them.

If indeed the Elephant Cage antenna systems were balanced feed-line, I cannot tell from any photos I've seen. It would make a real difference. However, the multi-couplers do not appear to have had balanced input. I sincerely wish that I had the property and the trees NOW, that I had when I first started! All my dipoles were up at the 120 foot level. Now I'm stuck with: "The antenna support MUST be such that SHOULD it fall - it MUST land within your property boundaries" <snip>

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Date: Thu, 21 Jul 2011 12:23:32 -0400  
From: Nick England <navy.radio@gmail.com>  
Subject: Re: [R-390] Baluns Caps and Ballasts

FWIW - the Navy's AN/FRD-10 CDAA (Wullenweber, Elephant Cage) systems ran unbalanced co-ax from the antennas to the multicouplers -and the multicouplers and RF switches had unbalanced coax outputs to the receivers. See RF cabling diagram at <http://www.navy-radio.com/rcvrs/frd10/cdaa-flow.JPG> and more info and manuals at <http://www.navy-radio.com/frd10.htm>

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Date: Thu, 21 Jul 2011 11:30:45 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: Re: [R-390] Baluns, Caps, Ballasts

The idea of the balun is to match to a 50 ohm feedline. At the antenna there is another balun to match to whatever the characteristic impedance is of the antenna (9:1, 4:1, 2:1, etc...). A balun is just another tool (ideally a 2.25:1).

Some folks use 75 ohm feedline and a 2:1 balun would probably be a better match. it is just a matter of perspective, some folks may be perfectly fine with a wire shoved into one of the pins on the coax connector connected to a chunk of random length antenna.



Has anyone considered that the seller may also be a member of this list? It does appear to be a bit arrogant to believe that the person who has gone through the trouble of making such a device is some large corporation hiding away in anonymity. It can be a "wholesome family owned business" if it is in the US, Germany, UK or Bolivia. I will buy from whomever makes the best product at a price that I consider reasonable. Shipping charges do come into play on any purchasing decision if it is based solely upon money.

It would be nice if someone was making a balun who lived next door and I could walk over to say "Hi". We are all a community here and are connected by a common interest in a fine radio. Sometimes we may disagree with each other but at the end of the day it is about the radio. There are p-l-e-n-t-y of radio enthusiasts, amateurs, etc.. who live within 50 miles of me who I would cross to the other side of the street to avoid. I am not ready to form "Only the R-390A radio club of Etowah County" just so I could keep it local.

My apologies for diverging a bit and getting a little peeved. I have received more than enough private email flack over my choice of who to buy this from than it warrants.

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Date: Thu, 21 Jul 2011 12:17:45 -0700  
From: "Lloyd Godsey" <kk7iz@cox.net>  
Subject: Re: [R-390] Take a look at the link

I finally found it.  
A new roll of Belden 9272 78 ohm twinax.  
Will sell for \$0.25 per foot plus shipping.

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Date: Sun, 24 Jul 2011 10:42:05 -0400 (EDT)  
From: frankshughes@aim.com  
Subject: [R-390] break-in question, 390A and 390

I am seeking advice on break-in function and troubleshooting audio. I have a Collins 32S-3 transmitter, and am trying to use either a 390A or 390 to receive. I have deduced that the relay logic for the 32S-3 (Open w/ PTT) had to be reversed to work with the "break in" contact on the 390A and 390 terminal strip (N.O.) So I put a relay in the circuit between the 32S-3 and 390, works great.

The ohm meter shows that when I PTT the 32S-3, the 390A and the 390 antenna input center pin goes to ground, and the audio also squelches to full quiet.

However, I get lots of audio output from the 390A and the 390 when I

Speak into the mic!!! So even though the antenna input is grounded, both the 390A and the 390 are still getting signal input. The audio is also present from the 390 and 390A if I disconnect the antenna and activate break in while keying the 32S-3.

Is the 32S-3 bleeding RF into the shack the 390 and 390A can pick up even with the antenna disconnected? (How can these things be so sensitive to tiny RF levels...oh, wait....) If so, building a Faraday cage around my transmitting position would be ....crazy.....OK, plan "B" is to put a relay into the audio circuit to open the input to the speaker at the same time PTT is activating break-in. Or what else can I do???

---

Date: Sun, 24 Jul 2011 11:33:27 -0400  
From: "David C. Hallam" <dhallam@knology.net>  
Subject: Re: [R-390] break-in question, 390A and 390

The break in relay on the R-390 only grounds the antenna input and does not mute the receiver. What you have to do is open the RF gain connection on the back panel strip. I did it with a relay. On transmit you ground the R-390 break in relay and open the relay in the RF gain circuit.

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Date: Sun, 24 Jul 2011 11:42:58 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] break-in question, 390A and 390

Amen! It took a bit to figure that one out. What was very startling, was to have the R-390A off the antenna switch with only about a 3 ft jumper of coax attached. Someone across town lit up on the frequency and I swear the R-390A darn near jumped up! Yes - they ARE that sensitive!

I've managed to eliminate the extra relay by using a Johnson T-R Switch, and using the break-in. I monitor MY signal AND the one I am listening to by picking the 455Kc off the rear and feeding it into a Kenwood SM-220 w/BP-8.

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Date: Sun, 24 Jul 2011 12:28:17 -0400  
From: "David C. Hallam" <dhallam@knology.net>  
Subject: Re: [R-390] break-in question, 390A and 390

A T-R switch is a more elegant solution than two relays. At the time I set up the R-390, I did not have one. I do now but am a little hesitant about putting the output of my Invader 2000 into the T-R switch.

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Date: Sun, 24 Jul 2011 12:38:17 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] break-in question, 390A and 390

I put the output of the BC-610 into it. That's 400W carrier. I do get 100% modulation. I actually have to dial things down to stay with the 1500W PEP.

That T-R Switch is built like a tank!

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Date: Sun, 24 Jul 2011 13:19:44 -0400  
From: "David C. Hallam" <dhallam@knology.net>  
Subject: Re: [R-390] break-in question, 390A and 390

Mine is a B&W 381C. I don't know if it is as robust as the Johnson.

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Date: Sun, 24 Jul 2011 13:31:58 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] break-in question, 390A and 390

That's one I can't answer. I haven't had the opportunity to get my hands on one.

The Johnson T-R was hard enough to get!

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Date: Mon, 25 Jul 2011 11:33:53 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: Re: [R-390] break-in question, 390A and 390

Would it be worthwhile to dump the B+ when in break-in mode or is the decay of the B+ potential too slow to be effective?

I was sort of thinking it as the oft-cursed standby mode on the switch. I know that it opens up the B+ (causing it do do unpleasant things like really climb in voltage after solid-stating the rectifiers). Maybe there is too much capacitance on the B+ for it to decay down fast enough for break-in operations. You would almost need to open up the B+ supply at the same time you short out the B+ load so there is not that unpleasant fading effect as B+ discharges.

It would not do to just open B+ up at the audio stages, you would want the AGC to not see this tremendous signal as if it is set to slow you will get the moment of silence as the gain is decreased in the RF stages. On the other hand you do not want to cut out the B+ to things like the oscillators and PTO. It seems like there would be a few things needed; 1) dump the RF into a short to prevent really crazy high RF levels from hitting the receiver. 2) Open up B+ and short the load side to ground (through a resistor). 3) mute the audio.

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Date: Mon, 25 Jul 2011 15:28:49 -0400

From: "Don Heywood" <wc4g@knology.net>  
Subject: Re: [R-390] break-in question, 390A and 390

Hello All, I have been reading all the recommended fixes for using the R-390 family in conjunction with a transmitter, opening RF GAIN, removing B+ etc.

The BREAK-IN circuit is all you need. On transmit a ground is applied to the rear terminal board Pin 9, and with the BREAK-IN Switch ON, the break in relay not only grounds the antenna but another set of contacts grounds the audio. I used an R-390 with my KWS-1 several times on the 20M CCA net.

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Date: Mon, 25 Jul 2011 15:38:45 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] break-in question, 390A and 390

That's why I commented over the weekend about using my Johnson T-R switch and the Break-in circuit. Also, run the SM-220 Monitor w/BP-8 from the R-390A IF out. I watch what is going out, see what the signal looks like coming in, and the T-R Switch handles what the BC-610 can dish out.

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Date: Mon, 14 May 2012 19:42:23 -0400  
From: Tom Chirhart <k4ncgva@gmail.com>  
Subject: [R-390] CU1388/FLR9

Can anyone give me an idea of the value of one of these couplers? It is capable do handling 8 receivers.

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Date: Mon, 14 May 2012 20:31:22 -0400  
From: John Vendely <jvendely@cfl.rr.com>  
Subject: Re: [R-390] CU1388/FLR9

These are nice couplers, but they are loaded with oddball, tightly selected PNP RF transistors of unknown type, and custom power dividers of nonstandard impedance designed for use with these specific transistors. It's not unusual for some of the transistors to be bad, and finding replacements which will not degrade intermodulation performance is a difficult matter. Considerable reverse-engineering would be required to "do it right". In addition, they have a hermetically sealed power supply unit which is a pain to repair if defective. If at all possible, inspect it carefully, and test for gain (unity) and frequency response before buying. Caveat Emptor!

I still have a couple of these, and back in around 1990 when they were

released in large quantities, it was easy to find good working ones, and these performed well. Those up for sale today are often defective or crappily repaired. I would say \$60-\$100 tops for an unmodified, properly working unit is about right. Pricing should take into consideration the fact that you'll be hard pressed to make effective repairs if (when) it fails...

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Date: Mon, 14 May 2012 20:55:08 -0400  
From: Steve Byan <stevebyan@verizon.net>  
Subject: Re: [R-390] CU1388/FLR9

Fair Radio was selling them for \$75 in 1995. No idea what one would go for today. I'd love to have another, but I've no budget for acquisitions now :-)

The power supply seems to be unreliable. When mine went, it took out the almost-unobtainable PNP RF transistors (the NPN's survived just fine!). I did manage to lay in a stock of spare 2N5160's, which seem to work well as replacements for the original PNP in the Sziklai pairs.

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Date: Tue, 5 Feb 2013 13:52:58 -0500  
From: Robert Newberry <N1XBM@amsat.org>  
Subject: [R-390] Slightly OT

This is somewhat topical to impedance matching on a receiver antenna input.

I have a hallifcrafters receiver with a 300 ohm antenna input. I know that you get maximum energy transfer when your load matches.

I have a 50 ohm antenna and I was looking at a 6:1 balun, but I wonder if I used a tv balun which is 300 to 75 ohms.

Does anyone know how much of a compromise this is?

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Date: Tue, 5 Feb 2013 18:37:29 -0800 (PST)  
From: Steve Toth <stoth47@yahoo.com>  
Subject: [R-390] no internal noise peak

I decided to check the IF noise level adjustment on one of my R390A's per Chuck Rippel's technique in the Pearls? - no antenna connected, receiver set to 15.2 mhz, function switch to MGC, Bandwidth to 4khz, RF gain to MAX,, Line Meter switch to -10db, Line?Gain control full CCW,?then

peaking ANT TRIM for max noise on the Line Level meter prior to setting the IF gain control.

The antenna trim can get noise peak with an antenna connected, but cannot get a noise peak with no antenna connected.

Looking so far in the Pearls what I've found is either "RF misalignment" or "a failure in the RF deck".? From?looking at the schematic it would appear that T201-T206 need to be checked for alignment?

I'm sure somebody has had experience with this. Suggestions?? (I did find a 6CB6 in the RF amp tube socket and replaced it with a 6DC6).

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Date: Tue, 5 Feb 2013 20:23:43 -0800  
From: Dennis Wade <sacramento.cyclist@gmail.com>  
Subject: Re: [R-390] no internal noise peak

Before setting the IF gain you need to be certain the radio is aligned correctly, or you'll be wasting your time. If you found a non-spec'ed tube in there you probably should take a look at the electrical alignment (and mechanical... couldn't hurt) before setting gain. Setting the gain should be one of the last things you do.

Date: Thu, 8 Aug 2013 09:54:47 -0700 (PDT)  
From: Steve Toth <stoth47@yahoo.com>  
Subject: [R-390] Fw: T4XB and R390A

I'm looking at running my Drake T4XB and R390A as separates using the antenna cable and mute cable from the T4XB connected to the R390A. I'm sure somebody on the list has done this.? What needs to be done to get this to work?? a separate mute?relay for the R390A?? I believe the mute

signal my R4C requires from the T4XB?(a ground, if I am correct)?is different than what the R390A requires.

---

Date: Thu, 8 Aug 2013 13:09:53 -0700 (PDT)  
From: Steve Toth <stoth47@yahoo.com>  
Subject: Re: [R-390] T4XB and R390A

Roy: Nice try on the T4XB request! ; - )? But, if you don't ask, they can't say "yes", right?

Found the answer: The Drake T4XB has an RCA type RCVR MUTE jack on the back panel. The center conductor of this cable provides a short circuit to ground on receive and an open circuit on transmit.

I looked through the functional descriptions in the R390A technical manual the other night as well as the Y2Kr3 and was a little confused, hence the query. I just dug the tech manual back out and started to re-read the section on the antenna circuit after I read your email.

The long answer:? All that's needed to use the R390A in conjunction with the T4XB, or any transmitter for that matter, is the application of a ground to terminal 9 of TB103 on the back of the R390A during transmit with the "break-in" switch in the "on" position. The ground from the mute jack on the T4XB transmitter energizes relay K601 in the R390A which provides a ground connection for CR102 which energizes relays K101A and B.? When K101A & B are energized, all antenna input terminals are disconnected from the rf transformers and are grounded.

The short answer: Connect the center conductor of the "mute" cable from the Drake T4XB to terminal 9 of TB103.? Turn the Break-in switch to "on".? Whenever the T4XB is keyed, the R390A will mute.

The Standby switch also provides a ground to relay K601 when the mode switch is placed in the "standby" position to provide the same function without a hook up to a transmitter.

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From: Roy Morgan <kllky68@gmail.com>  
Sent: Thursday, August 8, 2013 12:34 PM  
Subject: Re: [R-390] T4XB and R390A

The mute line on the R-390A operates a 6.3 volt AC relay that does these two things:

- grounds the audio signal at the input to the first audio amp in the audio deck (before it is split to local and line amps)
- operates (or DE-operates?) the antenna relay to ground the antenna connection to the RF input coil in use,? and open the connection to

the antenna jack.

NOTES:

- the mute terminal at the back of the R-390A will only operate properly if the FUNCTION switch is in the "standby" mode as I remember.
- The rear terminal operates the 6.3 volt AC current used to run the mute relay on the AF deck, and will carry about 40 milli-amps of (AC!) current when the relay is energized.

These things will get clarified if you have and study the R-390A Y-2K Rev 3 manual.

I am not familiar with the T4XB, but if the mute or T/R connections are to a "dry" relay or switch contact, that will operate the R-390A into mute mode just fine. \*IF\*, however it is a voltage that gets switched onto the connections, with enough current to operate a small relay, then you must provide that relay in order to not damage the circuits of the TX4B.? (A very small relay would work well if this is the case.)

Sorry, I am not at all familiar with the Drake equipment.? I've heard good things about them. If someone sends me a T4XB or whatever, I'll gladly learn more (HAH!)

Roy

Roy Morgan  
k1lky@earthlink.net  
K1LKY Since 1958 - Keep 'em Glowing!

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Date: Thu, 08 Aug 2013 16:44:35 -0400  
From: "David C. Hallam" <dhallam@knology.net>  
Subject: Re: [R-390] T4XB and R390A

I don't know about the R-390A but when I operated my R-390 with a Johnson Invader in addition to grounding the relay, I had to open the RF gain line get get a fully muted receiver. The RF gain line is also accessed from the terminal board.

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Date: Wed, 25 Sep 2013 05:48:48 -0700 (PDT)  
From: Dave Sampson <challanger13041@yahoo.com>  
Subject: [R-390] another ballanced/unbalanced connector question

There is one antenna input mod where you swap two internal coax connections then short the 2 conductors on the balanced connector. This runs the unbalanced connector through all the stages.

The second mod involves grounding one balanced conductor then feeding the other.

Has anyone compared the "real world" performance of each mod?...lower average noise pickup and or increased sensitivity?

Would love to hear some opinions !!

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Date: Fri, 27 Sep 2013 15:02:51 -0400  
From: Joe G <jga747@hotmail.com>  
Subject: [R-390] Balanced Vs Unbalanced

I have a R390, which antenna lead should I use? Balanced or the unbalanced. I have a 50 ft longwire terminating in a PL-259 connection. Also any way to use one antenna on two receivers?

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Date: Sat, 28 Sep 2013 09:29:53 -0400  
From: frank hughes <fsh396ss@gmail.com>  
Subject: [R-390] R-390 antenna relays - what do I have here?

While trying to organize things, I found two different antenna relays in the spares pile for the R-390's. The relay w/ two black coils looks like what I normally find in the R-390, but the other little one I have never seen installed before. The single-coil relay mount points and antenna jacks are identical. Did Collins have two versions of antenna relays for the R-390?

[http://i180.photobucket.com/albums/x257/fish1\\_07/collins\\_mystery\\_tuner/R390\\_antenna\\_relays1\\_zps3b23d290.jpg](http://i180.photobucket.com/albums/x257/fish1_07/collins_mystery_tuner/R390_antenna_relays1_zps3b23d290.jpg)

[http://i180.photobucket.com/albums/x257/fish1\\_07/collins\\_mystery\\_tuner/R390\\_antenna\\_relays2\\_zpsd13e351d.jpg](http://i180.photobucket.com/albums/x257/fish1_07/collins_mystery_tuner/R390_antenna_relays2_zpsd13e351d.jpg)

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Date: Sat, 28 Sep 2013 09:36:40 -0400  
From: frank hughes <fsh396ss@gmail.com>  
Subject: [R-390] R-390 antenna relays edited

OK, so I am old and confused - R-390A, I should have picked up on the devices not having full-size BNC's

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Date: Sat, 28 Sep 2013 09:46:15 -0400  
From: rbethman <rbethman@comcast.net>  
Subject: Re: [R-390] R-390 antenna relays - what do I have here?

The one on the left is for an R-390A, NOT an R-390.

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Date: Sat, 28 Sep 2013 17:14:59 -0400 (EDT)

From: Roger Ruzzkowski <flowertime01@wmconnect.com>  
Subject: [R-390] Balanced Vs Unbalanced

You want to use the balanced input.

The common practice is to ground one side and feed the other side from the center of a coax. Input impedance varies across the range of the receiver but is closer to 600 ohm than 50 ohm. So a 300 ohm to 75 ohm TV balun can be a help.

If you can find a C connector for the antenna line, you can swap the cables between the antenna relay and the RF deck and use the C connector to feed the receiver. Then ground the other side by shorting the twinax antenna connector. In the R390 you have the option to use a shorted BNC connector in the second balanced RF cable.

The reason to use the balanced input is that the unbalanced input bypasses the whole first section of the tuned filters in the RF deck. That stage filters out a whole lot of out of band signal that then doe snot make it into the amplifier and mixers and thus reduces the noise floor of the receiver . Roger AI4NI

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Date: Mon, 30 Sep 2013 15:40:55 +0000 (GMT)  
From: chuck.rippel@cox.net  
Subject: [R-390] R390A Feedpoint

There are a couple ways to feed the receiver. First and best has been to use the Sigmapert balun. You can purchase one and choose it be fitted either an SO-239 or BNC connector. I posted links to the list about a week ago.

Second, on my old www site were a couple alternative approaches to feeding the receiver. Here is the link:  
<http://web.archive.org/web/20080112212454/http://www.r390a.com/html/feedpoint.html>

I need to get my www site back up and working, I suppose.....

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Date: Mon, 30 Sep 2013 11:30:05 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] R390A Feedpoint

I too have been using a Sigmapert balun, it is outstanding.

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Date: Mon, 30 Sep 2013 11:44:32 -0500 (CDT)  
From: Jim Haynes <jhhaynes@earthlink.net>



Subject: Re: [R-390] R390A Feedpoint

Some years ago in a surplus store in Silicon Valley I picked up a few devices meant for use with the IBM token-ring network scheme. Had the two-pin connector on one end, a short piece of twinax leading to a transformer and then to a modular-type telephone plug. Someone had suggested these as a good way to get into the R-390A.

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Date: Mon, 30 Sep 2013 16:48:48 +0000  
From: Bill Kulze <wak9@cornell.edu>  
Subject: Re: [R-390] R390A Feedpoint

What kind of production does Kurt have? He shows zero items right now, those links all lead to sales that have ended.

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Date: Mon, 30 Sep 2013 19:41:10 +0200  
From: sigmapert <sigmapert@gmx.de>  
Subject: Re: [R-390] R390A Feedpoint

Hi Bill and the many other members of this list, because I'm a retired professor (no, not from electronics but for neurophysiology/neuropharmacology) I'm a hobbyist, only and develop and produce items for my own fun. My prime attention is making these things in my eyes as nice as possible, regardless of the effort I've to spent. IMO, most important is a nice optical fit to the vintage gear, full reversibility, AND e.g. replacements have to be BETTER than the vintage originals.

I'm happy if others like the devices, too. From time to time I offer items for sale. As I prepare the devices by myself, I miss this time for the many future projects in mind. Besides the things of interest for the auditorium of this list I'm also heavy engaged in tube testers. Here a recent publication:

[http://schmid-mainz.de/Radio-Bygones\\_140.pdf](http://schmid-mainz.de/Radio-Bygones_140.pdf)

So, if you need any of the devices I'm preparing send me an email and I'll try to fulfill your request as fast as possible.

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Date: Mon, 30 Sep 2013 13:42:31 -0400  
From: "Todd, KAlKAQ" <kalkaq@gmail.com>  
Subject: Re: [R-390] R390A Feedpoint

That might've been me, Jim, as a source of TwinAx connectors. I came into a bunch of these at a previous site where I worked, originally used with the IBM AS-400 system. Ended up with a couple dozen for thinking of it just a tad too late. When I asked the appropriate person, he said it was too bad I

hadn't asked a week earlier as they had a full box of new connectors with the necessary tool(s) to assemble them on cables. I don't know that the cable w/phone adapter is the best route to attach an aerial, but the connectors sure work fine. Missed the mother lode but at least got enough for my receivers, CU-286 coupler, and a few spares for future needs.

It's definitely worth checking with the computer scrappers, though the AS-400s are ancient technology now for the most part. I don't know of any other system that used them. de Todd/'Boomer' KA1KAQ/4

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Date: Tue, 18 Mar 2014 12:35:22 +1100  
From: Pete Williams <jupete@internode.on.net>  
Subject: [R-390] Turn off the light !

G'day list,,,,,, It's probably not conclusive, but if I turn off the bench lamp, the Marconi TF2700 universal bridge, works fine .. Problem was that in process of checking some low value caps , the desk lamp using one of those spiral Energy Saving Lamps. seems to produce enough EMR to upset the delicate innards of the xstr bridge. The caps being tested all seemed to have inconclusive results at variance with the stamped values and even gave the impression they were open or shorted. A bit of low animal cunning ( intuition), had me switch off lamp AND... all came good . !---- not just the once. Anyone know about this, or has it just filtered down here by some yet to be determined form of intellectual osmosis !

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Date: Tue, 18 Mar 2014 2:21:03 +0000  
From: <joldenburg2@new.rr.com>  
Subject: Re: [R-390] Turn off the light !

Had a similar experience this past weekend. Was working on a Hammarlund HQ-120X receiver and had S-8 background noise. I shut off the two tubular fluorescent shop lights in the adjoining room, now S-7. On a whim I cut the shop lights ( it was day time and the bench is in front of a 9-foot window<grin>) and what do you know all the hash was gone. Ends up the compact fluorescent's contain toroid's making for a small noisy switching power supply. Tm to hoard Edison style incandescent for the shop.

interesting side note. Folks raising poultry are also getting upset as incandescent bulbs are used for heat sources in incubators and brooders for their chicks.

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Date: Tue, 18 Mar 2014 20:23:05 -0700 (PDT)  
From: "Drew P." <drewraille807@yahoo.com>  
Subject: Re: [R-390] Turn off the light !

[snipped]"background noise. I shut off the two tubular <snip>

Tubular fluorescent lamps can be run on DC to eliminate the noise. A series limiting resistor is required and does reduce the efficiency, but so run they are still more energy efficient than incandescent. A quick internet search reveals a number of schemes.

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Date: Sun, 6 Jul 2014 18:05:09 -0700  
From: Larry H <dinlarh@att.net>  
Subject: Re: [R-390] R-390A Noisy Ant. Trim and Raspy Calibrator

Hi Ken, On the trimmer - good news about the resistance. The trimmer is in a sealed area except for a .25" hole in the chassis for the wires to go through, so its probably clean inside. Getting the pin out of the gear is not easy and you must be very careful if you really need to do that. I'd first remove the trimmer and can as one unit first. Then you can inspect inside to see if the rotor is touching the sides or not. Can you see any physical damage to the can? Before that you might try exercising the trimmer a lot to see if you can make the scratchiness go away that way. <snip>

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Date: Thu, 17 Jul 2014 19:47:07 -0400  
From: Thomas Chirhart <k4ncgva@gmail.com>  
Subject: [R-390] Multicouplers

Since we are on topic does anyone have info on this Aiken coupler MC 1002?

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Date: Thu, 17 Jul 2014 20:33:59 -0400  
From: Nick England <navy.radio@gmail.com>  
Subject: Re: [R-390] CU-872A/U RX multicoupler

I have posted a block diagram and circuit description here -  
<http://www.navy-radio.com/rcvrs/coupler/cu872.htm>

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Date: Thu, 17 Jul 2014 22:00:16 -0400  
From: Bob Camp <kb8tq@nlk.org>  
Subject: Re: [R-390] CU-872A/U RX multicoupler

Not to rain on anybodies parade here, but ?.

If you drill down into the cool stuff on the navy-radio.com site, there is a pretty good bunch of data on using these gizmos. The simple answer is - don't unless you \*really\* need to. In most cases you are much better off with a simple transformer based passive splitter. Putting broad band gain in front of a nice selective R-390(A) front end does not help things out. Your cascade IMD goes up quite fast. There really is no way around it, no

matter how much money you spend.

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Date: Thu, 17 Jul 2014 21:37:27 -0700  
From: "Chris Kepus" <ckepus@comcast.net>  
Subject: Re: [R-390] CU-872A/U RX multicoupler

Dang, I knew I could count this list to bring some light onto the subject. You added not only light but put us all there with what it was like to be in the midst of all the magic of many rooms of wall to wall 390's, CU-(xxx)'s, pallet loads of 6922's.....thanks!

Also really appreciated the thorough and interesting rundown on the technical side of the CU-872. That info is "in the manual" but it doesn't compare to your description and examples. The info you provided about the various ways to configure the 872 was brand new (to me) and will likely bring some more questions your way.

Nick E also sent a pic of one of his racks in which the 872 is feeding a bevy of 390's and other receivers. I didn't realize that cascading the multicouplers was as prevalent as it apparently was (and is in Nick's Naval Communications Center) but....sure makes a lot of sense.

My 872 will be feeding a much smaller contingent of hungry receptors... coupla 390A's; SP600JX-17, 51J4, BC-348, R-1000, and a few others. As soon as I get the HV caps checked and replaced if necessary and get it on line I will let you all know how it has worked out.

Hope someone offers up a CU-872 for you to munch on.

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Date: Sun, 17 Aug 2014 20:15:05 -0400 (EDT)  
From: Roger Ruszkowski <flowertime01@wmconnect.com>  
Subject: Re: [R-390] Going to own a R390A soon.

Welcome. The cable you referenced would be the elegant deep in you wallet way. There is a C connector beside the balanced input connector.

Here are some of the following ways to get this done.

One is via the cable you posted.

Two is to just ground one of the two pins in the balanced connector and plug your antenna wire into the other pin. In twenty five feet or less of wire this is what that cable does.

Three is to just ground one of the two pins in the balanced connector and plug your antenna wire into the other pin but insert a .01 uf cap in the

antenna lead for static DC voltage isolation.

Four use the C connector with coax. This is unbalanced and skips the first set of tuning filters in the front end. OK and used by the signal corp that way.

Five use the C connector on the back. Move P206 to J105, short the input pin to J107 to ground. It is some times easier to find a C to other coax adapter or C to coax connector than some twin ax coax and connector.

Six use a length of IBM computer network cable and IBM twin ax connector ground one inner conductor to the shield and feed the other conductor with or with out an isolation cap. Patch a length of what ever cable and connector you want to the twin ax with some shrink tubing to make up the inline splice.

Seven Bring the twin ax away from your receiver into a small metal box (Faraday shield). Connect the shield of the twin ax to your small box. use a toroid core wind a unbalanced to balanced transformer. In the small metal box put the two twin ax conductors to one side of the transformer and the antenna to the other side of the transformer. As the real input impedance for the receiver is in the range of 200 to 300 ohms a better match can be achieved between the antenna and the receiver. Depending on the selection of the core you can band pass filter the antenna input. You mite use a core material that drops out above 10 megs and thus get good AM and low short wave and 160 80 40 meter operation. You may try a high pass materiel that starts around 5 - 10 megs and filter out the low ends AM band signals. You can use air core coils in the box and do all kinds of circuits in the box. I grounded my twin ax in the connector (normal assembly) And used a rubber weather electrical connector into my match box. I did not ground the twin ax shield in or to the match box. I keep the two conductors balanced and also ungrounded. The box was / is grounded outside away from the receiver where the antenna feed line comes to the earth. Not grounding the twin ax shield in or to the match box helped me filter out some local San Diego neighborhood noise.

Eight there is a right angle twin ax to C adapter that was / is used by the military. One pin of the twin ax is grounded in the adapter and the other pin is the center conductor of the C connector.

Nine wire a length of coax into a twin ax connector with the center conductor to one pin and the shield to the other pin. Ground or not ground the shield and pin to the twin ax shell and thus the receiver chassis. Include or not a bushing to reduce the twin ax shell locking nut hole down to fit the coax you use. This looks to be the solution as used in the cable sited in your post.

This Is not an exhaustive list of options.

You can have a 100 foot of twin ax with connectors on both ends for \$30.00 from the E bay place. a connector for the old IBM fat cable for 9.00. Buy a 100 for of cable. cut 6 = 8 feet off one end to use in the shop to the signal generator and such. String the other 90 feet out to the yard and hang your self the longest highest dipole you can manage and wire the balanced coax to the center. Make sure you have the breakin wired and switched on before you hit any transmit switches.

Do go find the <http://www.r-390a.net/> web site and read read read. There are also other good R390 sites.

Do down load the Y2K manual and read it. The fellows worked hard to produce that manual and it is so much more readable the original TM's TM 11 5820 - 358 - 35 for the R390A has several sections missing. It was assumed you had a copy of TM 11 5820 - 357 - 34 on hand for the R390 and could use paragraphs from that manual to service the R390/A Thus the Y2K having the good stuff in current English is a better reference source.

Roger Ruszkowski AI4NI

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Date: Mon, 18 Aug 2014 07:35:02 -0400  
From: <Jbrannig@verizon.net>  
Subject: Re: [R-390] Going to own a R390A soon.

I use a piece of coax with the center inserted into one pin and the shield to the outer shell. The shield and a jumper to the other pin are held in place with a compression clamp. The end of the coax pig-tail has a female phono plug on it. This took longer to type then build.

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Date: Mon, 18 Aug 2014 20:12:24 -0400  
From: Bob Camp <kb8tq@nlk.org>  
Subject: Re: [R-390] Going to own a R390A soon.

IBM used the same connector in one of their early LAN setups. Both sides of the connector and the cable are relatively cheap if you do some digging.

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Date: Mon, 18 Aug 2014 20:44:24 -0400  
From: "Todd, KA1KAQ" <kalkaq@gmail.com>  
Subject: Re: [R-390] Going to own a R390A soon.

That's where I got mine, AS-400 was the system. The 90 degree radio adapters are the expensive bits, and all they do is run one of the pins to

ground.

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Date: Sun, 21 Sep 2014 09:39:56 -0700  
From: JAMES GREEN <jagreen3@sbcglobal.net>  
Subject: [R-390] R-390A balanced input question

I have way too many projects to work on and just want to have a good receiver to listen to when I'm not in the shop. I have an EAC R-390A that I used to listen to quite regularly about a year ago. I put it aside for a few months and started listening more to 2 channel Hi-Fi. I had the yen to catch the BBC out of Ascension Island again so I pulled it out and ran into a small problem.

Knew exactly where the radio was stored. I can't for the life of me find the "C" to SO-239 adapter I used before to hook it to my antenna. I did find a balanced to SO-239 adapter, but I found I could not get a signal from the balanced input. Upon close inspection and some dis-assembly I found the plastic insert in the balanced connector was twisted. This twisted the relay contacts so there was no connection. I replaced the antenna relay with one from my parts radio & have verified it is now passing a signal.

Here is the problem:

I still am unable to pick up anything through the balanced input. Upon looking in the R-390A Y2K manual schematics it looks like the unbalanced connector bypasses several tuned transformers that the unbalanced input does not bypass. I suspect these tuned transformers are in need of alignment. However, the alignment procedure in the Y2K manual instructs one to connect the sig gen to the unbalanced connector. & aligning from there.

Am I missing something? Is there a separate alignment procedure that I did not find that shows how to align from the balanced input?

Cash flow at the moment prevents buying another "C" to SO-239 adapter, & I have heard some extra sensitivity can be gained by using the balanced input.

---

Date: Sun, 21 Sep 2014 10:25:40 -0700  
From: "Craig Heaton" <hamfish@efn.org>  
Subject: Re: [R-390] R-390A balanced input question

One item I believe is missing in the Y2K; the procedure to adjust the balance caps in the RF deck. This could be part of the issue. Then consider the antenna vs. the antenna input connection? Are you using a balanced antenna? How did you align/peak the RF section?

The local RFI noise level is too high here in Springtucky, OR to even see a difference. So considering the fact the antenna/tuner presents a 50 ohm unbalanced connection to the transmitter & RX; the sig-gen is cabled up straight to the balanced input of the R-390/A, center conductor to the right side, other side grounded, per Chuck Rippel's website & the RF section is peaked. All hoping for the best. YMMV

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Date: Sun, 21 Sep 2014 16:30:40 -0400  
From: Roger Ruszkowski <flowertime01@wmconnect.com>  
Subject: Re: [R-390] R-390A balanced input question

You may want to check the cables from the RF deck to the antenna relay. for correct order and seating.

Common practice is to ground one pin of the balanced connector and feed the other pin with the center conductor of a coax line with the coax shield also grounded to the receiver chassis.

When doing RF deck alignment this same set up is used. You can not adjust the first cap in the RF deck transformer using this set up.

So a lot of fellows swap two of the three cables between the RF deck and the antenna relay. This lets you drive the balanced input through the C connector with the other balanced input grounded in the balanced input pin.

See Y2K 3.2.3 Field change 5 Shipboard use.  
I see nothing in the Y2K to adjust the BAL caps in the RF deck.

You have to go back to TM 11 5820 327 35 The R390 manual for a procedure.  
As the procedure is also not in the R390A TM 11 5820 358 35 .  
Do you have CAL tones on every 100 KHz?

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Date: Sun, 21 Sep 2014 13:31:19 -0700  
From: Larry H <dinlarh@att.net>  
Subject: Re: [R-390] R-390A balanced input question

Hi Craig, Jim's right. The balanced input is for balanced or unbalanced input for low impedance input. You would hook up your antenna coax as he suggests for the signal generator (left side grounded with the coax shield grounded and coax center to the right contact). In this scenario,



the adjustment of the balancing cap is not necessary. If you need a twinax connector, I can send you one. The unbalanced input is for high impedance antennas (very short coax is ok).

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Date: Sun, 21 Sep 2014 16:33:06 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: Re: [R-390] R-390A balanced input question

If you use the balanced input you can go through and trim up the 1st RF stages. Make sure you use the same hook-up that you are going to run with.

In other words, if you are doing the "one pin shorted to ground, the other attached to a 50 ohm coax" that you calibrate with that connection.

If you use a balun (2:25:1 or 2:5:1) then you need to do the alignment through that connection. Make sure you set the ANT-TRIM knob to the center, neutral position when doing the alignment on the RF stages. Otherwise you will peak that stage with some skewed capacitance tossed on top of things.

You are peaking performance. Usually I shoot for the middle of the band that is associated with that RF stage. Since I use one of the German-made baluns I do the alignment from a 50 ohm unbalanced connection from my signal generator, through the balun, through the unbalanced connection and the 1st RF..

The reason I suggest this is that the 1st RF stage was probably pretty close to the 125-150 ohm balanced impedance. Unless someone screwed with it when they were actually using the C connection and that 1st RF stage was bypassed.

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Date: Sun, 21 Sep 2014 16:51:37 -0700  
From: "Craig Heaton" <hamfish@efn.org>  
Subject: [R-390] Balance Caps

For what it is worth, something I printed from Chuck's website years ago. Hope Chuck doesn't mind.

#### Balance Caps

Note: It is my opinion that this is an important step which is often overlooked. You're basically nulling out any signals that are not balanced. Some noise is of this type. This adjustment can make the receiver quieter in

the presence of common-mode noise.

Connect the signal generator to the junction of two 68 ohm resistors. Connect the free ends of the resistors to the balanced antenna inputs. Connect a VTVM to the diode load terminals, adjust the signal generator output to give about -7 volts diode load volt at the following frequencies.

Frequency	Transformer	Trimmer
00 +000	T201	C201A
01 +000	T202	C205A
03 +000	T203	C209A
07 +000	T204	C213A
15 +000	T205	C217A
31 +000	T206	C221A

Be sure that a true balance is obtained, and not a minimum trimmer capacitance condition. If you have two dips during the 360 degree rotation, either dip should be giving a true balance condition. If you only get one dip over the 360 degree rotation, some component value in the circuit has drifted too far away from its specified value and the dip is occurring at minimum capacitance.

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Date: Sun, 21 Sep 2014 19:10:33 -0400  
From: Charles Steinmetz <csteinmetz@yandex.com>  
Subject: Re: [R-390] R-390A balanced input question

>If you use the balanced input you can go through and trim up the 1st RF  
>stages. Make sure you use the same hook-up that you are going to run  
with.

> \* \* \*

>If you use a balun (2.25:1 or 2:5:1) then you need to do the alignment  
>through that connection. Make sure you set the ANT-TRIM knob to the  
center

> \* \* \*

>You are peaking performance. Usually I shoot for the middle of the band  
>that is associated with that RF stage. Since I use one of the German-made  
>baluns I do the alignment from a 50 ohm unbalanced connection from  
my  
>signal generator

That's all well and good, but there are only a few, very narrow frequency ranges between 500kHz and 32MHz at which the receiving antenna will be anywhere near 50 ohms. So in the end, anything you can do with a 50 ohm generator isn't going to be very helpful because using a 50 ohm generator violates the first principle above, "Make sure you use the same hook-up that you are going to run with."

Instead, people with random antennas should ignore the balanced input, feed the unbalanced input, and ignore all the whining they've seen here and elsewhere about the unbalanced input "bypassing important tuned circuits." All you're missing are the tuned primaries of T201-206 (depending on the band selected), and if you aren't matched to them (and the paragraph above explains why you won't be), you're much better off without them. As a side benefit, the front end noise of the radio will usually drop significantly (how much depends on your particular antenna).

The only exception would be if you use an antenna tuner ("matchbox") to match a resonant antenna to 50 ohms, or if you cut an antenna specifically to be 50 ohms at some important frequency -- but this can only be true for very narrow frequency bands, because antenna resonances are very narrow.

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Date: Sun, 21 Sep 2014 17:02:51 -0700  
From: Larry H <dinlarh@att.net>  
Subject: Re: [R-390] Balance Caps

Hi Craig, Yes this is true if you are using a true balanced input. If you have a normal single center conductor coax from your antenna, you would need to connect it to an isolation balun that has a 'balanced' output to connect to the 2 center connectors of the twinax connector (not grounding either 1). This can be very beneficial with some kinds of locally generated noise.

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Date: Sun, 21 Sep 2014 17:12:10 -0700  
From: "Craig Heaton" <hamfish@efn.org>  
Subject: Re: [R-390] R-390A balanced input question

Just an observation of someone that didn't have radio as an occupation. As Charles noted, an antenna tuner/matchbox is an exception to matching a resonate antenna to 50 ohms. On my two stations using a tuner, the VSWR is flat 1 to 1, and the antenna trim control is at 0 for max indication on the carrier level meter. This is an indication peaking the RF section with

regard as to antenna type/plus tuner during RF alignment has advantages.

Now, changing nothing but the KC knob, moving up or down in frequency, the antenna trim will have to be tweaked to bring the carrier level back to a peak. In my present use of a R-390/A paired with a transmitter, I'll take the advantage of using the balanced antenna input & tuned primaries of T201-T206. The antenna trim control will make up for things not quite at optimum impedance at the antenna input.

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Date: Sun, 21 Sep 2014 19:22:25 -0700  
From: "Craig Heaton" <hamfish@efn.org>  
Subject: Re: [R-390] R-390A balanced input question

Sorry Jim, we most likely took off on a tangent. So, do you have a sig-gen? If so, connect it to the balanced input and trace the signal thru the receiver with a scope. Swap the coax between the balanced & unbalanced, what happens then? The balanced signal has to pass thru a couple more switch contacts, dirty?

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Date: Sun, 21 Sep 2014 19:53:27 -0700  
From: Larry H <dinlarh@att.net>  
Subject: Re: [R-390] R-390A balanced input question

Hi Jim and Craig, Sorry, I got your names reversed on my previous post.

To all - It's important to note that the impedance on the C connector (J103) originally connected to P205, which is the hi impedance input is about 1 meg ohm. This connection was designed to connect a whip antenna to it through a very short piece of coax. The whip became part of the tuned circuit input to the rf amp and did not diminish the effectiveness of the secondary of T201-T206. This allowed the Q of the antenna circuit to reduce unwanted images, adjacent stations and noise from entering the rf amp as much as possible for a whip antenna. This also reduces IMD produced in the rf amp. However, by connecting a low impedance antenna to this connection, the Q is severely reduced and the benefits of the tuned circuit are greatly removed. If you want to take advantage of the filtering available in the antenna circuit for a low impedance antenna (ie any coax of some length (more than 20' from rx to antenna)) it's better to use the balanced input.

This can be done as explained elsewhere. The impedance on rx's is not near as critical as tx's, so the small mismatch is not an issue. The design of the R390-A's balanced input is good for impedances of 50 to 200 ohms. Using an rf xformer to match it to 50 ohm coax is not productive. I've

tried many and the insertion loss is => a direct coax connection on very weak signals.

Where the impedance matching is important is when you are measuring signal to noise ratio using the balanced input. Otherwise, it's not important to be right on.

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Date: Mon, 22 Sep 2014 07:43:15 -0400  
From: Steve Hobensack <stevehobensack@hotmail.com>  
Subject: Re: [R-390] Balance Caps

I adjusted for a dip at the junction of two 100 ohm resistors (200 ohms balanced). That way, it is balanced for my ham band 50 ohm antenna through a simple 4 to 1 balun.

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Date: Mon, 22 Sep 2014 05:24:15 -0700  
From: "Craig Heaton" <hamfish@efn.org>  
Subject: [R-390] Poor Man's J104 Balanced antenna connector

After the first R-390/A followed me home, connecting a sig-gen or antenna became an issue. Thank goodness for the web. Chuck Rippel's (sp?) website had a good solution. A homemade bracket, SO-239 connector, a little wire, etc; and a person could lash-up their favorite PL-259 and get started. I think someone here on the list has saved Chuck's site and the info is still available?

A short drive to "The People's Republic of Eugene, OR" takes me to one of the last mom & pop electronic stores left. Here I found a cheap temporary solution, twinax connectors. Mom & Pop put a price on them years ago and never raised the price per inflation, etc. Those little pins in the twinax connector fit J104 perfect.

On the cheap, solder one pin to the center conductor of RG58. With the braided shield fit as many strands as possible into the other pin & solder. The rest of the shield/braid is soldered to a small spade lug. Center conductor goes to the right hand side of J104, pin with braid to the other side of J104, lug to Phillips screw under J104. The other end of the RG58 can go to antenna, TX/RX relay, etc.

Since the price was right at the time, I made one up with just a short length of RG58 with a female BNC connector, used at the time for the lash-up to a sig-gen.

Better than nothing? On the cheap is not sturdy, bend the center conductor & pin several times, it will break. The gasoline to Mom & Pop's store was more than the twinax connectors. YMMV

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Date: Mon, 22 Sep 2014 09:52:09 -0700  
From: Larry H <dinlarh@att.net>  
Subject: Re: [R-390] Poor Man's J104 Balanced antenna connector

The male Amphenol twinax connector 82-5589-rfx that matches the balanced J104 connector on R390-A's is available on ebay for \$4.25 + \$2.25 shipping.

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Date: Mon, 22 Sep 2014 12:11:08 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: [R-390] (no subject)

.....It's important to note that the impedance on the C connector (J103)...

Very well put, that is exactly the purpose of the C connector. It is a point to attach a compromise antenna like a whip. This is shown in many of the user manuals for the radio in the first few pages. The radio is supposed to be fed from the balanced connector with balanced feedline all the way up to the antenna.

If you find yourself a bunch of IBM ThickNet coax cable with the connectors on the end it is exactly what you would want to use from the back of the radio, all the way out to the antenna. Then you either use an antenna that is impedance matched to whatever antenna design (and it's impedance) or you make a BAL-BAL out there to perform an impedance transformation. It will be the lowest loss, quietest way of feeding the radio. Those Collins guys in the 1950's knew what they were doing. Many other receivers were set-up in a similar way. The Hammarlund SP-600 was originally found with the balanced connector on the back end of the RF deck. Of course most were modded to put a UHF connector there and the first RF stage was realigned to optimize with that.

The R-390A has that oddity that you really only see if you stare at the schematic. Where the first RF stage is bypassed when using the C connector. I like to use the balanced connection because it is another stage of permeability tuned RF before we get to the first RF amplifier tube.

Along the way someone suggested swapping the connections off of the antenna relay to put the C connector through the first RF stage. This suggestion is difficult to find, it is in some of the Y2K documentation, or

the supplements or maybe in the Hollow State News. Right now I cannot remember where I saw it but it made sense at the time so I did that before I homebrewed my first Bal-Un and then later bought the German made Bal-Un (fantastic little device).

Going in at 50 ohms to the 125-150 ohm balanced connection can be done, you just need to align the first RF permeability tuned stages for a better match with that impedance. It is not beyond the means of anyone with a signal generator.. Heck, if you have your favorite antenna and balanced feedline set up, you can probably even do a better job of matching with some sort of known signal (how about a signal generator sitting in the yard with a short piece of wire as a transmitting antenna while you calibrate your radio/feedline/antenna setup? you are only going to get a few milliwatts of transmitter power from a signal generator).

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Date: Mon, 22 Sep 2014 10:46:12 -0700  
From: JAMES GREEN <jagreen3@sbcglobal.net>  
Subject: Re: [R-390] R-390A balanced input question

Thanks to all of you that responded! I have learned a lot from you. I have several sig gens in the shop and will look into this when I get a chance. This opportunity is WAAAAAY out there. I'm currently the main support advocate for my Mother-In Law who is in the local Hospice program. I am writing this from a courtesy PC at the the UW hospital. I pulled out my old R-392 and have that up and running now. I haven been able to give much quality time yet so I haven't found the BBC out of Ascention Island yet.

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Date: Mon, 22 Sep 2014 11:22:13 -0700  
From: "Craig Heaton" <hamfish@efn.org>  
Subject: [R-390] 1. Re: R-390A balanced input question (Craig Heaton)

When you have the time; look in the Y2K, manual Chapter 5, figure 5-18. The balanced input has to pass thru many more switch contact vs. the unbalanced input. So if using the unbalanced input the receiver works, then the problem will lie between those switch contacts, most likely dirty contacts. Nothing one afternoon, a six-pack of your favorite brew, Deoxit, and elbow grease can't fix.

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Date: Mon, 22 Sep 2014 17:04:21 -0700  
From: Larry H <dinlarh@att.net>  
Subject: Re: [R-390] R-390A balanced input question

Hi Jim, One of the problems we can have on R390-A's is bad connections

in the tuned circuits on the RF deck. All the rectangular cans with variable core tuning are 'plug in's held in by one phillips screw under the moving core. The contacts can get oxidized or corroded and is usually easily fixed with Deoxit. And, sometimes, unfortunately, the antenna coils get cooked by close tx power when antenna is still connected to rx. The RF cans are easy to take apart and look inside once removed. And then there's the band switch problem. I had 1 of those recently - yuk! I wish you good luck with it.

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Date: Sat, 22 Nov 2014 14:53:01 -0500  
From: Nick England <navy.radio@gmail.com>  
Subject: [R-390] Royalty and R-390A

1960 - King Olaf V of Norway is introduced to a couple of R-390As aboard USS Northampton. <http://www.navy-radio.com/ships/cc1/clc1-1960-book-03.jpg>

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Date: Sat, 22 Nov 2014 14:07:16 -0600  
From: Dave Merrill <r390a.urr@gmail.com>  
Subject: Re: [R-390] Royalty and R-390A

Appears that the cabinets can hold two CV-591s in addition to the R-390A -  
neato setup! Begs the question - why two?

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Date: Sat, 22 Nov 2014 18:00:19 -0500  
From: Roger Ruzzkowski <flowertime01@wmconnect.com>  
Subject: Re: [R-390] Royalty and R-390A

Diversity. Two different antennas to cover fade.  
Diversity. Two different frequencies maybe mega hertz apart to cover fade.  
Too listen to both ends of the conversation.  
Back when things were rock bound the exchange may have been on two different frequencies that were not even close together.  
Base control and subordinates often worked on different frequencies.  
If there were only receiver then the position was for intercept work.  
Once you found a station you went to the other receiver and went looking for his buddies.  
Maybe up the chain of command or down the chain of command on another frequency.  
We still work dual frequency on assigned nets for duplex operation.  
Lots of R'TTY with both ends sending and receiving at the same time.  
Lots of relay operation where it was received and then retransmitted on an



adjacent frequency.

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Date: Sun, 23 Nov 2014 08:46:38 -0500  
From: Nick England <navy.radio@gmail.com>  
Subject: Re: [R-390] Royalty and R-390A

Yes two receivers for diversity as shown here with AN/URA-8A RTTY converter/comparator. <http://www.navy-radio.com/commsta/r390-cv89-01.jpg>

But Dave was asking about why two CV-591 SSB converters. One R-390A plus 2 converters was a standard shipboard configuration. ISB transmitters would simultaneously transmit RTTY on LSB, Voice or RTTY on USB

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Date: Sun, 23 Nov 2014 18:05:21 -0600  
From: Cecil <chacuff@cableone.net>  
Subject: Re: [R-390] Royalty and R-390A

I'd love to have one of those cabinets....room for the CV-591 and the speaker panel looks like.

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Date: Sun, 23 Nov 2014 19:57:42 -0500  
From: Nick England <navy.radio@gmail.com>  
Subject: Re: [R-390] Royalty and R-390A

The cabinet is CY-2416/U which is a TMC model RAK-4. TMC supplied the cabinet with 2 ea. CV-591A under Navy contract. Equipment Cabinet, 21" panel space, 23-1/8" x 20-9/16" x 16-5/8" The R-390A was installed by the shipyard.

<http://www.navy-radio.com/ships/cvsl2/hornet-02.jpg>

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Date: Mon, 8 Dec 2014 21:43:16 +0000 (UTC)  
From: Perry Sandeen via R-390 <r-390@mailman.qth.net>  
Subject: [R-390] Motorola Lightning Protection Article

I have reproduced a Motorola Communications Group article on lightning protection. If anyone wants a copy of the PDF please send me an Original email off list at sandeenpaXXyatXXyahoo.com. Address translation required.

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Date: Mon, 19 Jan 2015 01:46:08 +0000  
From: "Mike McCauley" <mlmccauley@att.net>  
Subject: [R-390] multiple receiver coupler

As I recall, this topic has been addressed here before, but evidently I did not save those threads. I'm interested in buying/building a 1 in >=4 out

receiver coupler, HF only, receive only,  $\geq 0$ dB gain per port relative to the incoming antenna signal. I'd greatly prefer broadband, but I could live with tunable if that's the only practical way to go. As I recall (???), such units have existed in the mil surplus market, but they are very rare today. I'd be happy to build something, either tube or solid state, if anyone has a know-good design. Any and all advice will be welcomed. Thanks in advance for the help!

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Date: Sun, 18 Jan 2015 21:18:16 -0500  
From: "billriches" <bill.riches@verizon.net>  
Subject: Re: [R-390] multiple receiver coupler

Try <http://www.stridsberg.com/prod01.htm>  
Have used them and they work fine.

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Date: Mon, 19 Jan 2015 02:25:15 +0000  
From: "Mike McCauley" <mlmccauley@att.net>  
Subject: Re: [R-390] multiple receiver coupler

Thanks, Bill. I appreciate the info!

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Date: Sun, 18 Jan 2015 22:04:16 -0500  
From: Bob Camp <kb8tq@nlk.org>  
Subject: Re: [R-390] multiple receiver coupler

A 1 in 4 out passive splitter will only have 6 db of loss. I've seen "low noise preamps" that have 6 db noise figures at HF.

Advantages of passive:

- 1) Cheap on the auction sites (< \$40) made by Mini Circuits.
- 2) Pretty much immune to overload/lightning (Don't transmit through them ?)
- 3) No power to mess with and add a ground loop.
- 2) Pretty much no 2nd or 3rd order IM or harmonic distortion

Disadvantages of passive:

- 1) May/may not have as much isolation
- 2) Noise figure may not be as good.
- 3) Not as cool.

I'm not at all suggesting there is only one way to go here. Only that there is a choice.

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Date: Sun, 18 Jan 2015 23:06:42 -0500  
From: Charles Steinmetz <csteinmetz@yandex.com>  
Subject: Re: [R-390] multiple receiver coupler

If you decide to go passive, as some have suggested, here is some info that I posted back on 1/11/13:

>>If you go passive, you may also want to consider the passive  
>>splitters from Mini-Circuits. IME, they have better isolation and  
>>amplitude matching than the Stridsberg splitters, and can handle  
>>higher input levels with less distortion. They are also less expensive.  
>>  
>>ZFSC-2-6 (two outputs, 2 kHz to 60 MHz, \$51.95)  
>>ZMSC-4-1 (four outputs, 100 kHz to 200 MHz, \$66.95)  
>>ZFSC-8-1 (eight outputs, 500 kHz to 175 MHz, \$99.95)

>I'd be happy to build something, either tube or solid state.....

I use a Mini-Circuits ZFSC-8-1 preceded by a broadband preamp with 9dB of gain (so overall gain is 0). I have used a simple AD8010 preamp as well as several high dynamic range discrete preamps of my own design at various times. Besides bringing the gain up to 0, the preamp deals better with antennas that are not matched to 50 ohms than the naked input of a splitter does. Another good feature is that you have a nice 50 ohm point to insert filters if you want.

Are the discrete designs better than the 8010? Yes, but. Unless you have a very strong local signal that would overload the 8010 (which will accept an input of +3.9dBm when configured for 9dB of gain), or band noise 40dB lower than anyone else on the planet, you won't notice any difference. The preamp plus passive splitter scheme works significantly better than any other multicoupler I have tried, and I've used most of the usual suspects. I will send you some documentation by direct email.

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Date: Mon, 19 Jan 2015 16:44:15 -0500  
From: Roy Morgan <kllky68@gmail.com>  
Subject: Re: [R-390] multiple receiver coupler

Would-be MultiCoupler folks: I searched Fair Radio sales web site and can only find the manual for these: MM-CU-872A - CU-872A Maintenance Manual Theory, maintenance, schematics. Repro, \$21.00 each I have two files of notes on multicouplers, both include more extensive experience

and advice from Roger. There is a lot of info on the CU-872 and some on other types of military multi couplers.

In summary about the CU-872:

- It passes from 2 mc up past 30 mc
- has nearly zero gain
- does not add noticeable noise to the signals it handles
- the 2 mc high pass filter can be easily bypassed
- were normally run 24/7 for 6 months before being checked for performance/weak tubes.

Glad to mail these to anyone interested.

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Date: Mon, 19 Jan 2015 16:59:54 -0500 (EST)  
From: Gordon Hayward <ghayward@uoguelph.ca>  
Subject: [R-390] Multicouplers

I built the one designed by Phil Atchley  
([http://www.schmitzhouse.com/Johns\\_Electronics\\_24.htm](http://www.schmitzhouse.com/Johns_Electronics_24.htm)).  
It's fairly flat from 10 kHz to 1 MHz then the gain rises.  
To keep intermod down, the output transistors run hard - it gets hot!  
But, it seems to work and it isn't expensive.

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Date: Mon, 19 Jan 2015 17:05:55 -0500  
From: Lizeth Norman <normanlizeth@gmail.com>  
Subject: Re: [R-390] Multicouplers

I've got two multicouplers. One in the rack with the HF boatanchors, the other is for the UHF/VHF antennas so that I can use an SDR while I use a real radio.

The UHF/VHF unit is a Stridsberg. The HF unit is kit built using plans/boards designed by W8ZR. My vote is for the Stridsberg. Chatted with them on the phone because of a slightly non standard order. Seem to be a nice group of people. Fast shipping.

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Date: Tue, 20 Jan 2015 08:11:18 -0500  
From: Steve Hobensack <stevehobensack@hotmail.com>  
Subject: [R-390] Antenna Coupler

Back in the day, CATV systems had splitters, both active and passive . Lots of isolation between F fitting ports. Bottom frequency was 5 mHz. Perhaps today's standards require a lower bottom frequency? Has anyone tried splitters on HF receivers?

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Date: Tue, 20 Jan 2015 19:21:33 +0000  
From: "Mike McCauley" <mlmccauley@att.net>  
Subject: Re: [R-390] Antenna Coupler

As I understand, the "traditional" cable systems are now up in the low GHz range, and ADSL is fiber up to the last mile, and then VLF over single or dual twisted pair. That's what I've heard, anyway. In Dallas, I know that Time Warner uses a "traditional" RF system, and it's up in the 1-3GHz range. Everything but the house drops is 1"+ hard line. AT&T U-Verse is fiber except for the last mile. Unknown if that is uniform across the CONUS. I see the old line amps and splitters now and then at the hamfests. The chassis would be nice to use as a foundation for a multicoupler, but I don't know about "as is".

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Date: Fri, 1 May 2015 13:46:48 +0200  
From: Pierfrancesco Mengacci <pf.mengacci@outlook.it>  
Subject: [R-390] R390-A/URR antenna trimmer question

-I have completed the restoring of my R390-A/URR (a Stewart-Warner) and I succeeded in getting at least 40 db carrier meter readings on all bands, while in calibration position.

- The fact is that I still face a certain lack of sensitivity, as I notice when I check it through a signal injected via the antenna socket (impedance matching, contacts, wirings, tubes, cams and coils alignments, voltages etc. are all OK. definitely)

- The inconvenient (as may be observed in AGC position) is discontinuous, it varies slowly, while chassis temperature varies, and I can lose up to 10 db (i.e. to get a 5 volts diode load reading, in some conditions I must set the antenna signal at 5 microvolts rms, other times only 1 microvolt is needed for the same reading, and same frequency. I tested also the continuity of the cable connected from the stabilized RF generator to the receiver; it's Ok, and no shorts nor losses)

- The only "a little strange" thing I notice is that the position of the antenna trimmer for maximum reading is different when I tune it in calibrator position (marker reading) as compared to AGC position (signal through the antenna).

In the 29 McI band I must rotate the knob of 2-3 graduations to reset the max reading, when I change from calibrator to AGC (antenna signal). I do not know whether this circumstance is relevant or not. Looking at the diagram, it seems that no change or switching is involved in the RF and antenna circuit, so no change of capacity or tuning should be necessary (it's true that the antenna relay becomes disengaged in calibration position, but its internal capacity seems irrelevant (if I disconnect J105 from the relay, internal noise does not varies, nor the trimmer position

for max noise). But, may be, this also is not a relevant circumstance, if a variation of 1st RF tube internal capacity is involved with bias variation.

I'm just trying to understand where to search to remove the discontinuous sensitivity loss, while in receiving position. After all, sensitivity is the essential feature of the radio..

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Date: Fri, 1 May 2015 08:04:24 -0500  
From: Cecil <chacuff@cableone.net>  
Subject: Re: [R-390] R390-A/URR antenna trimmer question

Others can probably address the varying sensitivity issue better than I since I am at work right now and not near any of my manuals or gear.

I will comment that recently we have seen this symptom related to silver mica capacitor failures.

As for the different position of the antenna trimmer control when switching between the calibrator and the signal generator...it is probably normal due to a change in load impedance being presented to the receiver front end by the two signal sources. I will probably be corrected by one of the folks on the list but if my memory serves me correctly the design impedance of the balanced antenna input is on the order of 120 ohms and most signal generators are 50 ohms. The calibrator probably is not coupled at either of those impedance as it was not designed as test equipment but merely a reference so a different peak setting is probably normal and unrelated to your sensitivity problem.

Hope that helps a small amount.

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Date: Fri, 1 May 2015 11:00:47 -0400  
From: N4BE\_Jim--- via R-390 <r-390@mailman.qth.net>  
Subject: Re: [R-390] R-390 Ant trimmer question

Some things to consider:

I've never seen 40db carrier readings on either of my 390a's except when AGC wasn't functioning fully. If the AGC lines are being shunted somehow the radio "appears" to be more sensitive, i.e high carrier level readings.

What can impact AGC action? Any caps anywhere on the AGC circuits in IF and RF decks. If you lubricated the antenna trimmer shaft during restoration, the AGC will be affected because the phenolic shaft absorbs the lubricant. The trimmer is on the AGC line and the phenolic shaft is supposed to be an insulator. Likewise if you sprayed the band switches with cleaner such as deoxit, the chemical makes the wafers no longer be

high impedance. The impedance of the wafers could be reduced just enough to affect agc or tuning. Same for tube sockets. These may dry out eventually, or just spray them with something like Big Bath.

I agree with comments about silver mica caps in the RF stages. I recently had to recap the RF and tuned IF stage coils in a SW. Any cap that directly touches B+ will be suspect because the high voltage tends to cause failures in those caps. If failure is isolated to one band this is something to look at. Unfortunately many are across coils inside the cans so you have to remove the cans, open them up, and replace the caps. If the failure affects all bands the same way, then it's something common to all bands.

Now things get interesting when you think about the coax cables in the radio. In my old SW, I was plagued with clicks, pops, etc. Finally I discovered that the dielectric of diode load coaxes out of the IF module was breaking down internally. Had to replace them all with fresh coax. Doesn't sound like what you're experiencing. Hope this helps.

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Date: Fri, 1 May 2015 17:15:54 -0400  
From: Roger Ruzzkowski <flowertime01@wmconnect.com>  
Subject: Re: [R-390] R390-A/URR antenna trimmer question

You did not mention what books you have for reference.  
Find a copy of TM 11-5820-358-35 and the Y2K manual as PDF files at [www.r-390a.net/](http://www.r-390a.net/)

You are going to divide this problem into three parts.

Part one

Inject 455 KHz into the IF deck J518 at 150 micro volts CW.

Set the receiver to MGC bandwidth to 2KHz, BFO off.

Set the IF gain for -7 volts on the diode load.

Hang 600 ohms across the local audio out on the back panel.

You need the local output to be zero dead level flat with the generator on CW.

Turn the generator modulation on and add 30% modulation.

Now the local audio output needs to be 27 DB 1/2 watt 17.34 volts AC across the 600 ohm load. (two 1200 ohm 1/4 watt resistors in parallel)

You have to get the IF deck and Audio deck up to this spec and stable or the receiver will never pass end to end test.

You may have to do some tube swapping in the IF deck to get these numbers.

You have got to get the IF stable and quiet.

This division of the receiver lets you work on these sections and get them good then you build on this.

If you do not 1/2 watt Modulated output and a good flat zero CW response then you have to work on the IF deck.

The gain should be flat and steady not dropping in and out with time and temp.

If you see these problems then you know you need to work on the IF deck.

You did not mention your caps.

Do you have all the big black or brown plastic caps out of the IF and RF decks.

These particular caps are know to be going bad after 50 plus years and causing problems.

Part two.

With the receiver in MGC you inject 10 micro volts into one balanced antenna pin. And short the second antenna pin to ground. Use a 0.1 cap between the signal generator and the receiver just for DC isolation.

You need the same 1/2 watt output for the AM modulation but will have 7 DB of noise with the generator set to CW for a difference of 20 DB between CW and AM modulation.

If you do not have this then you need to work on the RF deck.

The receiver uses the second mixer and OSC under 8.0 Mhz.

The band switch changes the octaves as .5 1. 2. 4. 8. 16

If an octave is out work on the RF transformers.

If a single megahertz or crystal set of megahertz is out, you work on the crystal oscillator deck and the crystal.

Once you get the whole receiver working well in MGC you go to part three

Part Three

Getting the AGC to work and play well.

Open the AGC load jumper on the back terminal board.

Hang a volt meter on the AGC load and determine if the voltage is stable and constant.

If the generator input is stable and the AGC voltage is noisy then look between the detector and the AGC terminals.

If the MGC is Good and the AGC voltage is stable then you have to look



into the  
down stream AGC circuit. Likely a bad coupling cap.

Cecil pointed out the mica caps to you. In addition the receiver uses a bunch of ground lugs with small bolts and nuts. These ground points are starting to oxidize.

Just loosen the bolts and nuts and retighten the connection.

A lot of small low level noise goes away as this procedure is applied to as many of the lugs as you can find.

Good luck.

There is nothing in these receivers that can not be fixed.  
Yours just wants some love and care to get it back up to specifications.  
Did some one mention C553 in the IF deck to you?  
This blocks DC from the mechanical filters.

If it shorts you will loose at least one filter and almost always all four filters  
as you kill them one at a time trying the other band width switch positions.

Put a nice new quality 600 volt .01 cap in the place of C553 if it still has the old plastic cap in the IF deck. Roger Ruzzkowski AI4NI 33C4H 68-75

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Date: Fri, 1 May 2015 17:28:36 -0400  
From: Roger Ruzzkowski <flowertime01@wmconnect.com>  
Subject: Re: [R-390] R-390 Ant trimmer question

Thank you for this post.  
I did not know the coax would give us problems.  
The coax is getting old. We can think to check it if the noise floor is coming up of we have the noise pops and can not find a bad tube or other cause.

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Date: Sat, 2 May 2015 00:09:25 +0000 (UTC)  
From: Larry H <dinlarh@att.net>  
Subject: Re: [R-390] R390-A/URR antenna trimmer question

Hi Franco, good work on your rx. It sounds like you're using the J103 (big C (whip) connector) as input. This way you will see some difference in ant trim setting when switching from cal to agc (the whip ant is switched in). If you are using a very high impedance and very low capacitance input, that is ok. If you are using a low impedance input (50 - 200 ohms), then

you should use the balanced twinax input as Roger referred to.

Anyhow, on your changing sensitivity on warm up, if you are not experiencing this variation in calibrate, it could be the ant relay contacts. Try measuring their resistance. If you are, it could be many, many things. As Roger suggests, start with the IF deck.

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Date: Sat, 2 May 2015 12:02:35 +0200  
From: Pierfrancesco Mengacci <pf.mengacci@outlook.it>  
Subject: [R-390] R: R-390 Ant trimmer question

Roger, ... Thanks to all! I just quote a part of my feed backs to the various kind answers. As I said, it takes time to me to comprehend the relevance and pertinence of the suggestions. I'm working on them...

Quote:

"Hi, Cecil!

Thanks for your infomations. By the way, I have connected the RF generator to the unbalanced antenna input (50 ohm) via an attenuator/impedance matcher, which has a 50 ohms resistive output, almost exact.

But, your suggestion about mica caps failure may be right. Indeed, in a first restoring stage, I had problems of relevant variation of sensitivity in the 16-32 Mhz range (both via calibrator and via antenna). I finally solved this former problem by substituting both the mica capacitors (5 and 18 pf) of the first RF coil with current ceramic NPO capacitors. After that, at least in calibrator position, I could reach a CARRIER METER reading of 40-45 db also in the 16-32 bands, and that in a rather stable manner. The residual problem, as said in former mail, is "only" an unpredictable, slow variation of sensitivity via antenna, in the range of 5-10 db (i.e a sensitivity variation/reduction in the range of 1: 2 to 1:3 , at least)"

"Hi, Jim! Thanks for kind interest

About the calibrator readings (from 39 to 50 db, from band to band) , I can say that:

- the Carrier meter indicates exactly 0, when on AGC position and the RF gain knob is completely counterclockwise
- the gain adj. of the IF module has been set to give an output of -7,0 Volt at diode load, when a 100 microvolt Rms un-modulated signal is injected in the module via the IF output socket (50 ohm impedance)

- with no signal and "0" RF gain, in AGC, the AGC output varies from -0,05 to - 0,1 volt (it is more negative with a new tube in the AGC circuit, about -0,25 volt, and becomes less negative after ca 10 hours "aging")  
- with a 43 Db reading in calibrator position, the AGC output is about -5,2 Volt

- Ok, oil may reduce the insulation of the antenna trimmer shaft (I have also dismantled the trimmer itself!). But, in my case, the overall resistance toward ground, measured on pin 1 of V201 (control grid of 1st RF tube), is about 1 MegaOhm, almost exact: this should be an indirect test of the AGC circuit insulation (or, at least, of no extra losses toward the chassis).

- Anyway, your message is correct and helpful, i.e.: I have to take into consideration the possibility of some influence of ineffective AGC and bias related to my problem, in addition

I'll let you know"

Unquote

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Date: Wed, 1 Jun 2016 10:05:20 -0500  
From: Phil <pmills7@comcast.net>  
Subject: [R-390] OT -- need help with CU-872A antenna multicoupler

First, I need a manual or a schematic. It appears that a board mounted below the chassis has been removed. I suspect it is some kind of rectifier or power supply board. And finally, I need a source for the 3-pin mil style power connector.

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Date: Wed, 1 Jun 2016 11:12:52 -0400  
From: Nick England <navy.radio@gmail.com>  
Subject: Re: [R-390] OT -- need help with CU-872A antenna multicoupler

Bill Perry is the best source for all kinds of military connectors  
William Perry Company - Louisville KY  
work 502-893-8724  
home fax 502-893-9220

Check with WA5CAB to see if he has the manual available -  
wa5cab@cs.com -  
he sells excellent copies.  
Fair Radio also has copies of the manual for sale.

FWIW, I have put a block diagram and circuit description here -

<http://www.navy-radio/rcvrs/coupler/cu872.htm>

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Date: Wed, 1 Jun 2016 11:32:58 -0400  
From: Nick England <navy.radio@gmail.com>  
Subject: Re: [R-390] OT -- need help with CU-872A antenna multicoupler

I found my CU-872/U manual and scanned it  
<http://www.navy-radio.com/manuals/cu872-man-93803A.pdf>

I don't know what differences there are between CU-872 and CU-872A

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Date: Tue, 23 Aug 2016 21:31:15 -0500  
From: Tom Frobase <tfrobase@gmail.com>  
Subject: [R-390] Updated Loop antenna

I have been working on a band magnetic loop antenna project. My goal is to build a simple surface mount phantom powered amplified loop. Power would be 12 volts provided through the coax. It will fit inside a small pelican case which makes it suitable for outside use. Small enough for a backpacker but capable enough to be used in the ham shack. My question for this group is whether I should provide a differential for R-390's or just a single ended output? Please comment ... tom, N3LLL

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Date: Tue, 23 Aug 2016 20:30:39 -0700  
From: Francesco Ledda <frledda@att.net>  
Subject: Re: [R-390] Updated Loop antenna

Differential gives common mode rejection!

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Date: Sun, 28 Aug 2016 03:29:52 +0000 (UTC)  
From: Larry H <dinlarh@att.net>  
Subject: Re: [R-390] Updated Loop antenna

Hi Tom, Great project. Noise rejection is always a good thing. I believe that in order for it to work at its best on a 390, it needs to be very close to balanced to suppress the most noise. And of course the 390 input must be aligned correctly, too. But, what I'm wondering is can you accomplish that feeding the power through the coax?

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Date: Tue, 30 Aug 2016 23:39:13 +0000 (UTC)  
From: Larry H <dinlarh@att.net>  
Subject: R-390A Antennas, Wellbrook ALA1530 HF receive 1 M loop

Oh how I miss my horizontal dipoles, but when you move, some things just

are. I've been at this location (a small city lot) for 4 years. I don't have room for them here, but did get a 38' vertical put up. I've been quite happy with it, but it certainly is not what I'm used to. There's a little more noise, but not near as bad as I was anticipating. The S/N is not as good as before, either. So, after a couple years I went on the hunt for something that would work better in my situation.

After a lot of research, I decided I wanted to try a Wellbrook ALA1530 receive 1 meter loop. I got one a little more than a year ago, and the results are good - most signals come in a little better on the loop than the vertical, some come in even a little better than that, and very few are not quite as good, but still close. One of the major benefits is reduced interfering noise. This does make a difference.

They are not cheap, but they are worth it. And right now the British Pound is at an all time low of \$1.31. If anyone was thinking about trying one, now is the time. They just came out with a new version, ALA1530LN, the Low Noise version, and I wish I could get one to try.

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Date: Tue, 30 Aug 2016 21:05:45 -0400  
From: "Bill Riches" <bill.riches@verizon.net>  
Subject: Re: R-390A Antennas, Wellbrook ALA1530 HF receive 1 M loop

Replaced my old 1530 with the 1530ln+. More gain, less noise. What more can you ask for!

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Date: Sun, 5 Feb 2017 16:40:32 -0600  
From: "Thomas Frobase" <tfrobase@gmail.com>  
Subject: [R-390] Broadband RX Loop amplifier for experimentors

About 5 years ago I distributed some kits, the kit consisted of two units one at the radio the second in an attic or other sheltered place. The second unit contains a phantom powered broadband (HF) differential amplifier feed by a single 50 ohm coax cable. The inside unit by the radio connects to a nominal 12 volt supply for power injection to the loop amplifier, provides an antenna connection to the radio receiver and a third connection to the loop amplifier. The loop amplifier has an internal relay that is engaged while 12 volts is available, when power is removed the loop is shunted by a neon bulb. So in essence, when transmitting nearby simply remove the 12 to the power injector and the unit is protected. The power injector is also fused.

I have used the unit pictured in the attached link for over 5 years, it is permanently connected to my AFEDRE software defines radio, and sometimes my R-390A, due to high noise here it provides access to 80 and 160 meters as well as Standard Broadcast. Rather than resurrecting the kit I have decided

to provide the loop package as a completed and tested package. I have a limited amount of completed units available for shipment. The link to the paper and kit instruction files are <http://www.kitparts.com/loop> Please contact me off the list for pricing and delivery options,

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Date: Sun, 5 Feb 2017 19:47:10 -0500  
From: Robert Newberry <N1XBM@amsat.org>  
Subject: Re: [R-390] Broadband RX Loop amplifier for experimentors

I have one of these in service at my work bench. I use it for testing receivers after I've completed working on them. I like it!

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Date: Sun, 5 Feb 2017 19:13:26 -0600  
From: "Thomas Frobase" <tfrobase@gmail.com>  
Subject: Re: [R-390] Broadband RX Loop amplifier for experimentors

Thank you Bob, mine works well too ... tom

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Date: Wed, 11 Jul 2018 17:59:15 -0700  
From: Larry H <larry41gm@gmail.com>  
Subject: [R-390] My R390A Antenna Relay Repair Document updated

Hi, I added a section to My R390A Antenna Relay Repair Document on the R-390A disk, tutorials section. It describes a problem with the twinax connector where it becomes twisted out of alignment. Here's a direct link: [http://www.r-390a.net/R390A\\_Antenna\\_Relay\\_Repair.pdf](http://www.r-390a.net/R390A_Antenna_Relay_Repair.pdf)

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Date: Mon, 23 Jul 2018 19:05:23 -0400  
From: Bob Weiss <bobweiss1967@gmail.com>  
Subject: [R-390] Single coil antenna relay--anyone seen one of these

Have been working through the 1968 EAC "Rocketship" unit, and had to dig into the antenna relay to clean a dirty set of contacts, and straighten a mangled twinax connector. This unit has an unusual style of antenna relay with a single magnetic coil, and the neon overload lamp mounted externally. Contact access is through a threaded access plug that was a real bear to loosen. Posted some pics at my Flickr page:

<https://www.flickr.com/photos/140826987@N07/>

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Date: Mon, 23 Jul 2018 17:26:56 -0700  
From: Larry H <larry41gm@gmail.com>  
Subject: Re: [R-390] Single coil antenna relay--anyone seen one of these

Thanks for the nice pics, Bob. That's an interesting relay. At first, I

thought it might be from 1 of the companion rx's, but does not seem to be there. Have not seen one like it, before. I like the meters.

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Date: Mon, 26 Nov 2018 21:29:38 -0800  
From: Larry H <larry41gm@gmail.com>  
Subject: Re: [R-390] R-390/URR sensitivity issue

Hi Don, Nice to hear from you. Glad all is well in Charleston. All is good here, now. We had really bad smoke from the fires up north and NE. Those poor people. My wife has bad asthma, so the smoke really bothered her. It's been clear for a few days now.

Interesting problem. Sounds like it should work. I assume that the adapter you built is the DA-121. That is the right one for the bal input. You said that all is well using the unbal input. I assume that the secondary on the input trans tuned correctly using the unbal. If the correct adapter is not used for the unbal input, the readings will be misleading. If the unbal is fed with a low impedance source (eg: da-121), the same level of signal may get through on all bands, even though the circuit is not working correctly. For the unbal, the correct adapter is the da-124, or the 50 ohm 'impedance adapter' and a 56 pf cap in series. IE, the unbal needs to be fed with a high impedance input so the secondary tuning will work.

Because the primary resistance usually reads about 1 ohm, some measurements are hard to do. With the can in, the input should measure infinity to ground (with no adapter plugged in to the bal) and you should measure 1 ohm at the ant bal input between the 2 pins.

Sometimes the tuning can contacts are ok at DC, but not at RF. Make sure that the pins on the bottom of the cans are good and the jacks in the RF deck for them are also good. I've had lots of problems with both of these.

Good luck. Have fun and let me know.

Regards, Larry

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Date: Wed, 20 Feb 2019 18:24:28 +0000 (UTC)  
From: John Flood <kblfqg@yahoo.com>  
Subject: [R-390] CU-872A/U antenna coupler FS near Boston

This is working, some "test" readings are a bit on the low side so perhaps some of the 6922 tubes are getting tired.? There is some glue residue below the normal data tag most likely from some other data tag that was mounted there.? Looking for a local sale in the Metrowest or North Shore

Boston (This of course means that the first reply will come from Alaska!).? I'm not really interested in shipping this or dealing with Paypal any more in MA.? Any interest?? I could bring it to the Lewiston ME, Nashua, NH, or Framingham, MA fleas.? Nearfest as well but I hope it finds a home sooner than May!

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Date: Wed, 20 Feb 2019 17:00:45 -0500  
From: Nick England <navy.radio@gmail.com>  
Subject: Re: [R-390] [Milsurplus] [Boatanchors] CU-872A/U antenna coupler FS near Boston

The parts list says it has UG-58A/U connectors. Everything I can find says that is a 50 ohm connector. I think all the military type N listings are 50 ohm.

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Date: Wed, 20 Feb 2019 18:08:48 -0600  
From: Francesco Ledda <frledda@att.net>  
Subject: Re: [R-390] [Milsurplus] [Boatanchors] CU-872A/U antenna coupler FS near Boston

Also, the CU-1099/FRR is 70 ohm. It was used with receivers with Z 50 ohm. Wonder why....

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Date: Wed, 20 Feb 2019 23:29:38 -0500  
From: Roy Morgan <kllky68@gmail.com>  
Subject: Re: [R-390] [Milsurplus] [Boatanchors] CU-872A/U antenna coupler FS near Boston

I am guessing: a system of 70 ohm coax connections might have lower loss than the more common 50 ohm coax. The TMC transmitters like the GPT-750 operated with 70 ohm outputs, and I remember right, interconnections among RF portions of transmitting systems were also 70 ohms. (Many of their transmitters operated with inputs from oscillators or multimode RF generators at the level of 200 milliwatts.)

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Date: Thu, 21 Feb 2019 07:06:28 +0000 (UTC)  
From: Roger Ruzkowski <flowertime01@wmconnect.com>  
Subject: Re: [R-390] CU-872A/U antenna coupler FS near Boston

Fellows, the CU 872A/U was the ASA popular version of the antenna coupler. The screw on N (50 ohm small pin) connector was preferred over the 1/4 twist lock C series connector in other early models. The amplifier circuits are the same in all models. Parts is tube stages changed values to meet the bias requirements for different tube sets in different models. The CU 872 uses the skinny pin going for higher frequency. The CU 872 also had a low end 2 Mhz band pass filter (sub chassis box) on the input. Part



of the modifications to address problems in previous production models. A barrel connector will bypass the low end filter for AM band use. Class room speculation in 1968 was all the way down with a R389 receiver. Other transformer changes were made to round off the high end way over 30 Mhz signals. Circuit layout supports the high frequency operation. CU872's, R390's and Harley's are alike in that they all meet the minimum specifications. All outputs are close but you can detect differences in performance between outputs. Nice units for the multi receiver shack on HF. The units are left bank and right bank of four outputs. You can put the best of the tubes down one side and from front to back and have the best four outputs and keep the other side lite up in balance and not used with the weaker tubes. You can cherry pick the tubes and where you install them into the unit. Signal levels will not come up. However you are keeping the CU872 noise floor down and preserving the head room between signal and noise what ever its source. Pick up a full set of NOS Russian made tubes and enjoy the next 17,000 hours of power on time. The idea that you can hang an R390 direct on the rhombic antenna line or any coupler output and measure the same signal strength is good. Hang 8 receivers and all are equal to the receiver numbers when feed direct from the antenna. Once we cascaded the couplers three deep 8 x 8 x 8 to 512 receivers (a lot of 47 ohm resistors were used as dummy loads. small losses were measurable to the test equipment. Operators in performance test could not discern differences in signals routed through various cascades of antenna couplers. Direct, one coupler, two or three couplers fanned out it all sounded the same in the headsets. The N series connectors exhibit less loss at higher frequencies that the C connectors. My CU 872's only had to work up to 32 Mhz because that was the top end of the R390 receivers in the station. CU 872's will keep right on working right up across the FM band. Some thing to keep in mind as ones choice of spectrum shifts. Our operators listened to different setups looking for a hot amp or dud outputs split phones and best two receivers in the station and a check list that would make NASA proud. It has a 70 ohm antenna matching input impedance. Ever work any armored antenna cable that ignored 80 MM HE mortar rounds? Had more steel standing in the field than the air field had in the runway? Had more copper hanging in the air than the station generators had in their windings Had more antenna lights than the airfield had runway lights Every child needs a field station is sight just for the night lights and sense of security it brings. The armored cable from the Rhombic antennas terminated in a steel plate bulk head the size of a doorway (shrapnel proof). Between the bulk head connector and the CU 872 input connector mounted in a rack, was a specific length of a specific cable type. Read the manuals on mid trick once in a while. The cable characteristics at the cut length was the best antenna impedance match to antenna coupler impedance match achievable across the 30 Mhz I was interest in and some more spectrum we had no equipment to access. It was common to go three deep and then

receivers. One in the head to the bays. One in the bay to seven receivers and another third coupler to 8 more receivers. Eight operators with 16 receivers all wanting to listen different stations in the same far away city. Implications are that if all these CU872's want 70 ohms in and are happy with the output from another CU872 then CU872's must output 70 ohms. R390's are advertised at 70 ohms and we use 50 ohm sources frequently. Elegant military robust solution in a world wide production and application environment between real receiving antennas and receivers. A length of transmission line with offset impedance to match a source and load of different impedances thus tuning the entire antenna system to the optimum transfer of power with out respect to an exact Z at any point in the system in either time or space. Use 70 for the CU872 end of the matching segment when doing calculations. Seconds, thirds, and receivers were all three cables and six connectors in the patches. CU 872 back side to rack bulk head connector. Bulk head jumper cable. Bulk head connector to receiver or another CU872 input. Mill spec and good enough near loss less. Rack to rack jumps between rooms added another cable and connector set in the set up. To do the cable calculations backwards into what works best, it was found that the number 70 worked well for Z. When the head room starts with 48 CU872's six high in the rack and 8 racks wide plus maintenance rack you can believe this was an engineered installation that worked very well. Two operators could monitor every connector on the bulkheads in the bay room racks in under a minute at trick change. And reported any thing that fell down in the last 8 hours even if we were not using it. Three times a day it was ready if we wanted to use it. Or it was found and fixed real time. As a maintenance man I copied a lot of AM voice back side from Australia and keep it in my headphones. Every one else in the bay was working. The ditty bays were cooler than the maintenance shop so we would set idle time in the bays. When a Rhombic is catching an inch of rain per hour even it gets washed out. Wire noise goes way up with the falling rain and signals strength is lost through the rain. The eye wall of a hurricane either side is not the antenna reflector it is hypothesized up to be. Practical science experience being assimilated faster than beer. A transformer output can be rewired to offer a phase flip at its output connector. An external match between the balanced CU872 output connector pair would be a two to one match into the balanced input of the R390. All mote science as most of us fellows do not operate in faraday rooms and the noise floor of CU872's and R390's are well below antenna atmospheric limits. The hardware is not the limit in the system. If you live in a metro area and get blasted by overload a vacuum tube CU872 offers significant protection for virtual HF receivers.

Roger AI4NI

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Date: Thu, 21 Feb 2019 13:03:22 +0000 (UTC)

From: John Flood <kblfqg@yahoo.com>

Subject: Re: [R-390] CU-872A/U antenna coupler FS near Boston

To say this was interesting would be an understatement. I should state that I did not offer any financial compensation for this post. But if it sells because of his post, I will owe a pint of Guinness... no make that two, to Roger!

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Date: Thu, 21 Feb 2019 08:21:15 -0500  
From: Thomas Chirhart <k4ncgva@gmail.com>  
Subject: Re: [R-390] CU-872A/U antenna coupler FS near Boston

The technical response is worthy of printing and saving. I'm betting the NavSecGru's had these too behind a Wellenwebber (sp?) dinosaur cage. Somewhere up in the garage attic I have one.. I need to conduct a search and rescue mission to find it.

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Date: Thu, 21 Feb 2019 09:35:32 -0500  
From: Nick England <navy.radio@gmail.com>  
Subject: Re: [R-390] CU-872A/U antenna coupler FS near Boston

This has indeed been an interesting conversation! Roger's message is definitely in the "Save It!" file. We hams just aren't accustomed to that scale of HF receiving effort. FWIW, here are a few items regarding the USN AN/FRD-10 Wullenweber system - an FRD-10 component list that I have shows quantity 196 ea. CU-872/U multicouplers

CU-872/U block diagram and description  
<http://www.navy-radio.com/rcvrs/coupler/cu872.htm>

A figure showing impedance for cables and equipment in the FRD-10A system I think this is for a later version FRD-10 that used the CU-1382 multicoupler with 50 ohm in/out  
<http://www.navy-radio.com/rcvrs/frd10/cdaa-flow.JPG>

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Date: Thu, 21 Feb 2019 10:30:11 -0500  
From: Richard Davis <rdavis7@comcast.net>  
Subject: Re: [R-390] R-390 Digest, Vol 178, Issue 1

Ok, so you jogged my old memory of buying a NOS 872 C/U from Fair Radio eons ago and storing it away. I'm never going to use it at my age. Everything original, clean ,from heated storage. All factory tubes and shields. Nice panel. Understand the audiophools like these tubes. Taking (reasonable )offers. I can be reached at rdavis7@comcast.net. K8PJQ since 1959.

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Date: Thu, 21 Feb 2019 16:40:45 +0000  
From: Doug Hensley <w5jv@hotmail.com>

Subject: [R-390] How does CU-168/FRR compare to the CU-872/U

How does the CU-168/FRR compare to the CU-872/U outside the former having 4 outputs and the latter has 8 ? Favorably, unfavorably? Not-comparable? I've used the CU-168 (in fact I have two) but never the other.

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Date: Thu, 21 Feb 2019 12:37:32 -0500

From: Nick England <navy.radio@gmail.com>

Subject: Re: [R-390] How does CU-168/FRR compare to the CU-872/U

IIRC, the CU-872/U has very closely controlled transmission delays through each path. This was necessary for summing multiple antennas for beamforming in DF arrays such as the Wullenwebers. FWIW, here's a typical signal distribution using CU-168 multicouplers <http://www.navy-radio.com/commsta/rcv-site-01.JPG> Does anyone know what happened to Jan Skirrow's site? He had a nice "Tech Talk" on the CU-168.

I am using a CU-168 with an original tag that says "Multicoupler No. 25" - fun to imagine there are 24 more in my back room serving the other 120 receivers..... Also FWIW to the discussion, the shipboard receiver multicouplers dealt with the big problem of close proximity between receiving and transmitting antennas and included protection circuitry. <http://www.navy-radio.com/rcvr-coupler.htm>

The most common post-war shipboard receive multicouplers, AN/SRA-9 and AN/SRA-12, were just passive bandpass filters. Later active units like SRA-49 had tunable front ends with quick overload shunting.

<http://www.navy-radio.com/rcvr-nrl.htm>

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Date: Wed, 10 Apr 2019 14:47:58 -0700

From: Alan Victor <amvictor@ncsu.edu>

Subject: Re: [R-390] IF Transformer, alignment and performance

So Tisha, as a bench level data point for the receiver system you describe, what is your ON BENCH 50 ohm signal level sensitivity measure? I assume for the same S/N ratio you address hooked up to your receive antenna (nice), that it is in excess of -112 dBm?

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Date: Thu, 11 Apr 2019 08:02:40 +0200

From: fdigiol <fdigiol@gmail.com>

Subject: [R-390] Antenna trimmer

Hi guys, the restoration of my R-390A goes on. All the missing screws, lock and flat washer are on their position. All of wrong type are been replaced with the correct one, even the missing green screws. Every RF deck gear is cleaned and lubed. I have some issues with the antenna

trimmer.

1. 1) the red dot has vanished. Which is the right alignment? Full, minimum, half capacitance?
2. 2) I suspect it is contaminated by oil or grease. I tried to remove its cover from the bottom, but the 3 wires are too short to let me expose the dual section variable capacitor and their solders to the rotary switch are difficult to reach. I could remove the worm gear on top, but I am unsure in which direction to push the pin. Any ideas? Best regards, Francesco

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Date: Fri, 12 Apr 2019 02:09:32 -0700  
From: Larry H <larry41gm@gmail.com>  
Subject: Re: [R-390] Antenna trimmer

Hi Francesco, Glad you are making progress on your A. When the Ant Trim knob is straight up, the cap should be at it's 1/2 way point. There was a discussion about the pin on Wed, Jun 20, 2018, 4:20 AM. Take a look.

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Date: Mon, 29 Apr 2019 17:39:36 +0100  
From: jm <josemic@gmail.com>  
Subject: Re: [R-390] antenna conection

Re. Antenna connection: I have done some experiments with the antenna connectors in the r390A. First of all, I have followed the extended and "official line" of instructions about the use of the balanced connector, grounding one of the terminals being the antenna connected to the other through a capacitor. My antenna is a long wire one fed with coax and pl259 connector. My questions:

1. Sometimes I plug the antenna to the unbalanced connexion and I think that it is a slightly stronger signal. Has it any sense? If so, why the common belief is the connection to the balanced terminals? The military manuals state that the unbalanced connector is intended for whip and long wire specifically.

2. I have found on ebay one R390A for sale. The seller mentions one mod in which the antenna is connected through a toroidal 4:1 balun instead of a capacitor (photo attached). He claims that ?matches and balances the 100+ohm receiver input to 50 ohm coax, grounding out household RF noise picked up by the coax shield. Popular adapters which directly connect the coax shield to one side of the balanced input let this noise in, and also cause signal loss due to impedance mismatch?.

Has anyone tried this way? Many thanks and regards  
Jose Isasa EA8DCP

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Date: Mon, 29 Apr 2019 21:03:57 +0200  
From: sigmapert <sigmapert@gmx.de>  
Subject: Re: [R-390] antenna connection

The balun transforms 50 Ohms unbalanced to about 130 Ohms balanced. But most important is RF noise cancellation (CMR). The balun shown in your photo is much too large and thus has high (stray) losses (insertion loss). Baluns at the receiver front-end should be as tiny as possible. The enclosed photo shows an adapter containing a tiny balun with low loss (MiniCircuits). The second photo depicts, charts a) insertion loss, b) CMR versus input frequency (0.5 - 30 Mc), c) both as table.

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Date: Sun, 16 Jun 2019 05:15:19 -0700  
From: Larry H <larry41gm@gmail.com>  
Subject: [R-390] R-390A Antenna Trimmer Repair

Well, I was hoping to never have to work on the antenna trim variable capacitor, but here it is, staring me down, daring me to open this can of worms. It has the 'rotor' grounded, which is not good for the AGC, and some static when rotating it to tune for best signal. I thought I'd look around the Pearls and the Y2KR3 tech manual for some help, but found only a little bit there. So, I thought I'd document what I found on my journey. It's attached for your reading pleasure.

Let me know what you think.                      Regards, Larry

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Date: Sun, 16 Jun 2019 10:46:49 -0400  
From: "Jacques Fortin" <jacques.f@videotron.ca>  
Subject: Re: [R-390] R-390A Antenna Trimmer Repair

Hello Larry, Thank you for this one. Very well done.

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Date: Sun, 16 Jun 2019 19:32:46 +0200  
From: fdigiol <fdigiol@gmail.com>  
Subject: Re: [R-390] R-390A Antenna Trimmer Repair

Thank you Larry for the excellent documentation. I always looked for a procedure to work on the antenna trimmer, but never found it, nor in the manuals, nor in the Pearls.

Thank you again 73's, Francesco Di Giovanni - IN3XZP

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Date: Thu, 27 Jun 2019 17:39:43 -0700  
From: Larry H <larry41gm@gmail.com>  
Subject: [R-390] Fwd: R-390A Antenna Trimmer Repair

Al has graciously put this document out on the R390 disk for our viewing

pleasure. Here's a link to the Tutorials section that has the link to it: <http://r-390a.net/faq-refs.htm#Tutorials> or here's a direct link to it:  
<http://r390a.net/R390A%20Antenna%20Trimmer%20Cap%20Repair.pdf>

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Date: Fri, 28 Jun 2019 18:16:23 +0200  
From: <fdigiol@gmail.com>  
Subject: [R-390] R: Fwd: R-390A Antenna Trimmer Repair

Excellent job, but why don't you have published some pictures of the bakelite insulators? How the rotor must be oriented regarding the red dot on the gear? The dot on mine is faded away and there is no dimple on it.

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Date: Fri, 28 Jun 2019 18:35:09 -0700  
From: Larry H <larry41gm@gmail.com>  
Subject: Re: [R-390] Fwd: R-390A Antenna Trimmer Repair

Thank you Francesco, for the very good ideas. After I was assembling the doc, I realized I forgot to take a pic of the insulating ring installed on the cap. The red dot goes on the gear at a 90 degree angle to the pin in the shaft. Orientation of the shaft is not important as the cap is the same at 180 degrees.

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Date: Sun, 14 Jul 2019 13:21:45 -0700  
From: Larry H <larry41gm@gmail.com>  
Subject: [R-390] My R-390A Antenna Trimmer Repair document

Hi Folks, I received a couple of good suggestions for improvement, so have updated this document to version 2. Al has graciously replaced it for me on our R390 disc.

Here's a link to it:  
<http://www.r-390a.net/R390A%20Antenna%20Trimmer%20Cap%20Repair.pdf>

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Date: Sun, 11 Aug 2019 18:00:57 -0700  
From: Larry H <larry41gm@gmail.com>  
Subject: Re: [R-390] R-390A Antenna matching, 26Z5W, 3TF7, OA2 replacements available? Recommendations?

<clip> And, as for the antenna balun, if you are not experiencing common mode interference, the balun signal loss is something to consider on weak signal reception. The 125 ohm balanced antenna connection on these receivers is designed to work with impedances of 50 to 200 ohms without much of a mismatch. The loss is extremely small, so using a balun to overcome the

imbalance would introduce more loss than without a balun. The least insertion loss available today in this type of balun would be about .5 db on the low frequency side, and up to 2.5 db on the high side. The maximum loss without a balun due to a mismatch on an R390A is about .3 db. Impedance matching in this range on a receiver is not very important.

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Date: Sun, 20 Oct 2019 08:10:39 -0400  
From: "John Gedde" <jgedde@optonline.net>  
Subject: [R-390] Sigmapert Balun Review

Out of curiosity, I bought a Sigmapert twinax to BNC balun from eBay. Sigmapert sells them on there from time to time and also offers them in twinax to UHF. I had been using a Twinax to UHF connector adapter from Fair Radio to interface my 50 ohm coax to my R390 and R390A. All that adapter does is tie one balanced terminal to the shield and feeds the signal into the other one. I wouldn't have expected much improvement with the Sigmapert, but I was very surprised at the huge reduction of noise I get using it! A slight bit of signal strength reduction but the betterment of signal to noise is profound. I'm quite sure it has nothing to do with 50 ohms versus 125 ohms but rather the ability for the R390/A to reject common mode noise with a bona fide balanced input. I haven't yet played around with adjusting the RF input stage balance adjustments, but it seems the whole common mode noise rejection thing is very real.

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Date: Tue, 22 Oct 2019 08:02:23 -0400  
From: comcast <kg2bz@comcast.net>  
Subject: Re: [R-390] Sigmapert Balun Review

I see many twinax baluns to RJ series outputs. some of those even have two terminal screws on the body above the RJ connector. Those are cheap too on eBay. I wonder if those can be used soldering a BNC or UHF connector to the output with shielding

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Date: Tue, 22 Oct 2019 09:54:25 -0400  
From: Straw Conklin <ligature@burlingtontelecom.net>  
Subject: Re: [R-390] Sigmapert Balun Review

Roll your own: <https://www.minicircuits.com/pdfs/TMO-3-1T+.pdf> -----

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Date: Tue, 22 Oct 2019 16:51:04 +0100  
From: "Andy G8JAC" <g8jac@btinternet.com>  
Subject: Re: [R-390] Sigmapert Balun Review

Would these be any good?

<https://www.electronic surplus.com/mini-circuit-labs-tmo-2-5-6-transformer-rf-50-ohm-0-01-to-100mhz>



If they are, I would be interested in one if someone buys a bunch and is willing to mail one across the pond.

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Date: Sun, 27 Oct 2019 16:40:24 +0000  
From: Doug Hensley <w5jv@hotmail.com>  
Subject: [R-390] Navy CU-168/FRR Antenna Multi-Coupler Available

I have a pair of new condition CU-168/FRR Antenna Multi-couplers for sale. These are US Navy contracted antenna couplers designed to input one antenna's signals and output to five receivers. These were a staple ship's communications item during the R390 through R1051 hey-day of radio. They provide, at least for that class of gear, brick-wall isolation between channels and protected receivers very well from high adjacent RF fields. The antenna connectors are low-loss 50 ohm Type-N females. If all your coax is PL-259 fitted, you can use the SO-239 to Type-N adapters without issue. I'm asking \$250 each plus shipping from 70806. You can estimate your shipping cost on the FedEx rate finder page entering my zip, your zip and box size 21L x 14W x 12H with a weight of 40 lbs. These are packed in custom double wall cartons using sufficient styrofoam & packing to prevent damage if dropped. Pictures on request.

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Date: Sun, 27 Oct 2019 15:27:53 -0400  
From: Nick England <navy.radio@gmail.com>  
Subject: Re: [R-390] [Boatanchors] Navy CU-168/FRR Antenna  
Multi-Coupler Available

A great source for military connectors is Bill Perry - I usually ask him for dirty or cutoff ones as they may be cheaper - phone is the best way to contact him.

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Date: Mon, 20 Jul 2020 16:15:33 -0400  
From: Roy Morgan <k1lky68@gmail.com>  
Subject: [R-390] TV Balun for R-390A

I can't easily locate discussions of the past about using a TV coax to twinned balun on the (balanced) RF input to my R-390A. I'd like to order some from Mouser (or other place) for use on HF radios and on FM receivers. Can anyone suggest some part numbers or descriptions I can search with?

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Date: Mon, 20 Jul 2020 23:02:31 +0000 (UTC)  
From: B Riches <bill.riches@verizon.net>  
Subject: Re: [R-390] TV Balun for R-390A

2\* UHF/VHF/FM/TV F cable 75-300 Ohm balun \*antenna matching

transformer adapter | eBay

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Date: Mon, 20 Jul 2020 19:20:45 -0400  
From: Charles Steinmetz <csteinmetz@yandex.com>  
Subject: Re: [R-390] TV Balun for R-390A

The lower boundary of the traditional (US) TV broadcast band was 44MHz, so most TV baluns are specified only for VHF and UHF and do not do well at HF. (Actually, most commercial TV baluns are not really "specified" at all, at least as far as published data is concerned, or they are "specified" so sparingly as not to be useful. Even a quality manufacturer like ChannelMaster does not give \*any\* frequency response data for its CM9444 and CM3203 baluns.) listings of some commercial baluns:

<<https://www.amazon.com/s?k=baluns&ei=electronics&x=13&y=21>>

It is probably best to stick to Mini-Circuits and similar manufacturers who provide real technical data.

<<https://www.minicircuits.com/WebStore/Transformers.html>> (Enter

Frequency Low = 0.01MHz, Frequency High = 50MHz, and check "Single-Ended to Balanced" to get a manageable list of HF balun candidates.)  
Or, wind your own -- it's easy.

tutorial: <<http://vk5ajl.com/projects/baluns.php>>

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Date: Wed, 22 Jul 2020 21:35:55 -0500  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: Re: [R-390] TV Balun for R-390A

If I recall correctly the balanced coax connector on the back of the R-390A is for connection to a doublet style antenna with a characteristic impedance around 125 ohms (working from memory here). The connector and the coax is still available; it used to be used on very early networking for IBM AS-400 systems. In fact, if you look for it in vintage computer surplus it is way cheaper than buying it as a radio (RF) component. The cable was commonly referred to as "twinax" and is a fairly thick, double-center conductor, shielded coax cable.

There is another advantage to using the balanced 125 ohm twinax connection: in the RF deck it routes the incoming signal through an additional set of RF transformers and that may improve selectivity in some bands. The "C type" (unbalanced) connector did not really appear to be the preferred way of antenna-ing (antennaing? now I am making up new words), the radio. If you have access to some of the installation

manuals for the R-390A it shows the doublet antenna as the preferred installation.

Of course we know that the R-390A ended up installed in all sorts of situations; from expedient installations with a whip antenna or a chunk of wire for an antenna, up to installations with rhombic or elephant cage arrays. So, depending upon your band of interest (500 KHz up to 30 MHz) there are some ferrites that work pretty good for making baluns. (technically a bal-bal, not a bal-un or an un-un, but I digress). You could match that 125 ohm balanced connection up to a 50 ohm unbalanced (for the traditional ham radio type of antenna) or a variety of balanced, wire antennas (my favorites).

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Date: Sun, 26 Jul 2020 20:31:26 +0000  
From: Doug Hensley <w5jv@hotmail.com>  
Subject: [R-390] Fw: Balanced Twinax Connector Usage

George was a senior ETN, along with 2 others, that kept our ships radio signals "on the air". His input is below:

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From: George Frederick <gefred08@gmail.com>  
Sent: Sunday, July 26, 2020 3:06 PM

That same exact plug & jack ended up on every UHF satellite multi-channel RTTY receiver installed throughout the fleet back in the '70's. The AN/SSR-1A had up to four outlying 'front-end' units called 'amplifier/downconverters' that look like little beer kegs, always very close by an all-aluminum 'turnstile' antenna. The twinax runs could be up to 400 feet away from the main receiver unit in Radio Central. I measured the first model noise floor at -134 dbm, 4 db noise figure, at a 1200 baud datarate @ zero bit errors. Incredible RF performance numbers in 1973 when compared against anything we all worked with on CAMP.... But in all fairness, at HF the R-390 even today is still considered a benchmark unit. If I remember correctly, it was something like 0.16 microvolt, not too shabby!

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Date: Sat, 1 Aug 2020 10:41:48 -0500  
From: Phil <pmills7@comcast.net>  
Subject: [R-390] need info CU-286/FRR-33 antenna coupler

Does anyone have any info or manual on this? It is a tuned coupler with two cathode follower amps relay switched between two pairs of antennas and used for diversity reception. Also, if anyone has a manual on the CV-157 ssb converter for sale, please let me know

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Date: Sat, 1 Aug 2020 11:10:32 -0500

From: Don Reaves <donreaves@gmail.com>  
Subject: Re: [R-390] need info CU-286/FRR-33 antenna coupler

I have a pdf of TM 11-266 Field Maintenance for the CV-156/URR I can email you. Its 3.4MB.

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Date: Sat, 1 Aug 2020 12:16:49 -0400  
From: Nick England <navy.radio@gmail.com>  
Subject: Re: [R-390] need info CU-286/FRR-33 antenna coupler

This is what I sent Phil. Should have copied the list FYI.  
> You can download the CV-157 manual here  
> <http://www.militaryradio.com/manuals/CV-157/cv-157-tm11-266.pdf>  
> Fair Radio has both CV-157 and CU-268 printed manuals for sale. The CU-268 is covered in the FRR-33 manual as I recall.

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Date: Sat, 1 Aug 2020 11:28:00 -0500  
From: Don Reaves <donreaves@gmail.com>  
Subject: Re: [R-390] need info CU-286/FRR-33 antenna coupler

Heh. I can't even remember what's on my own website for download. Thanks, Nick, for pointing that out. TM 11-871 is for the FRR-33. Saw one (the TM, not the equipment) for sale on Amazon but currently unavailable. Hey, there's an idea, Amazon should start selling heavy metal military radio gear. Free Prime shipping. Returns. User reviews. The CV-157 is made out of lead.

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Date: Sat, 1 Aug 2020 12:44:35 -0400  
From: Glenn Little WB4UIV <glennmaillist@bellsouth.net>  
Subject: Re: [R-390] need info CU-286/FRR-33 antenna coupler

Check out:  
<http://navy-radio.com/manuals-aux.htm>  
Nick has the CV-157 manual for download.<http://navy-radio.com/manuals/hsn/hsn-issue%2039.pdf>  
Has some info on the coupler.

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Date: Sat, 8 Aug 2020 10:26:44 -0500  
From: Phil <pmills7@comcast.net>  
Subject: [R-390] Need C-974/FRR-33 selection console

I know this is a long shot for sure but I am looking for the C-974 selection console. It is part of the FRR-33 diversity receiver setup. This setup consists of a CU-286 antenna coupler (preselector), two R-391 receivers, the selection console, a remote selection console, a power supply for the autotune motors, and a afsk device to keep things in sync.

I recently got the CU-286 coupler and the remote console when I bought an R-391 locally. I have fond hopes of getting the auto selection part of it working...that is selecting the channel of the R-391 and tuning the antenna coupler. Unfortunately, the remote coupler I have only attaches to the C-974 so that is the missing piece I need as I believe I can fabricate cables. In case anyone wants to see this in action, there is a 20 second video on YouTube than can be found by searching for FRR-33. Any help or leads greatly appreciated.

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Date: Thu, 25 Feb 2021 14:07:13 +0000 (UTC)  
From: Thomas Hoyer <thoyer1@verizon.net>  
Subject: [R-390] R390 Antenna Connector Module - Wiring

Continued evidence that someone had their hands in this radio. Someone changed the unbalanced antenna connector to an SO-239. Fits well, but when they wired it in, they wired the suppressor in SERIES with the input, not in shunt. The 220k resistor was not connected either. Probably scratching their heads why their connector mod didn't work very well..... I fixed it, tested the relay and reinstalled it. Glad I looked!!!!

-----  
Date: Thu, 25 Feb 2021 10:24:21 -0500  
From: "Jacques Fortin" <jacques.f@videotron.ca>  
Subject: Re: [R-390] R390 Antenna Connector Module - Wiring

Interesting: the Collins part list specifies a UG-568/U, a C connector for J107. It was changed to a Teflon SO-239 also in my R-390... I never asked myself if that was a modification, despite I had the information available all those years.... Was it a Field Change applied to all units ? For the wiring error in your set, well, some techs are more dyslexic than others, I believe. But you are right: as those BAs had another life before they went in our hands, you have to CHECK EVERYTHING.

-----  
Date: Sat, 17 Jul 2021 14:42:42 +0300  
From: Edward <navydudel962@yahoo.com>  
Subject: [R-390] Sigmapert

Looking for the Sigmapert baluns for the R390 balanced antenna input. Let me know if you have any spares.

-----  
Date: Sat, 17 Jul 2021 09:52:00 -0400  
From: Roy Morgan <k1lky68@gmail.com>  
Subject: Re: [R-390] Sigmapert

Once a long time list member reported good results with common television coax-to-twinlead Baluns. (At least with some of them. )

No doubt the R-390 Pearls of Wisdom has details.

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Date: Sat, 17 Jul 2021 09:26:30 -0500  
From: Tom Frobase <tfrobase@gmail.com>  
Subject: Re: [R-390] Sigmapert

here is an alternative, tom, N3LLL  
<https://www.ebay.com/itm/265016480357>

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Date: Sun, 18 Jul 2021 02:55:10 -0700  
From: Larry H <larry41gm@gmail.com>  
Subject: Re: [R-390] Sigmapert and balun's

Hi Ed, They have not had their baluns listed for quite a while. If you search the R390 archives about Sigmapert, you will get a few hits.

About baluns: See this post by \*Charles Steinmetz\*  
<http://mailman.qth.net/pipermail/r-390/2020-July/059059.html>

As Charles points out,TV baluns are probably not the best solution, if you really want to use one.

The situation with balun's is that they all have insertion losses. The Sigmapert's are designed for HF, but their specs say the least insertion loss available today in this type of balun would be about .5 db on the low frequency side, and up to 2.5 db on the high side. The maximum loss without a balun due to a mismatch on an R390A is about .3 db. Impedance matching in this range on a receiver is not very important. So, on any antenna, you will always have weak signals that you'd like to receive better. Any good balun will improve the signal strength for the stronger signals, but you don't need that. You need improvement on the weak ones, which is just the opposite of what a balun will do because the impedance mismatch is not that much on an R-390.

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Date: Sun, 5 Sep 2021 18:14:15 -0600  
From: <gary.biasini@shaw.ca>  
Subject: Re: [R-390] Audio Sub-chassis Break-in relay mod

Thank you for your insightful response and my apologies for the delay in responding. I am attaching links to the photos as they appear to be too large to be attached directly to the message.

<https://1drv.ms/u/s!AhXaYQRsUlJ0gvAlzPkC5fr0UP5u-g?e=Kocv1x>

<https://1drv.ms/u/s!AhXaYQRsUlJ0gvAk82FuOezJdQdwEA?e=d98UMB>

[https://1drv.ms/b/s!AhXaYQRsUlJ0gvAjY-YgPeZfXgHX\\_w?e=kzhzoV](https://1drv.ms/b/s!AhXaYQRsUlJ0gvAjY-YgPeZfXgHX_w?e=kzhzoV)

I hope that you can better understand the circuit with these pictures.

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Date: Sun, 5 Sep 2021 22:03:05 -0400  
From: Charles Steinmetz <[csteinmetz@yandex.com](mailto:csteinmetz@yandex.com)>  
Subject: Re: [R-390] Audio Sub-chassis Break-in relay mod

The pictures don't do anything for my understanding. I stand by what I said in my original reply:

> That is just a gain stage to allow the relay to be driven by a low-voltage,  
> low-current source (perhaps even a logic gate). The input  
> (150 ohm resistor) feeds the transistor base, the emitter is grounded,  
and the collector goes to the relay. There should be some protection (at  
the very least, a clamp diode across the relay coil) to prevent the inductive  
> flyback from the coil from destroying the transistor when the relay is  
> de-energized.

>  
> As you have it drawn, either the diode or the capacitors are polarized the  
> wrong way. The diode would be fighting to develop a negative voltage on  
the positive terminals of the capacitors. Which of these (the diode or the  
> caps) is drawn correctly will determine whether the transistor is an  
NPN or PNP, and also whether the control voltage needs to be positive or  
negative with respect to ground.

I see that the transistor is a TO-3 (relatively high-power) part. It should be a Darlington so it has both high gain (only requiring low input current) and high-ish output current capability.

To be useful, it really needs several kinds of protection added so it doesn't blow itself up under use conditions. And, of course, the diode or capacitor polarities need to be fixed. (If it really is drawn to match what's in the radio, it has no hope of working.)

If you're getting the impression that I do not think it is well designed, you may be on to something...

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Date: Sun, 5 Sep 2021 20:24:11 -0600  
From: <[gary.biasini@shaw.ca](mailto:gary.biasini@shaw.ca)>  
Subject: Re: [R-390] Audio Sub-chassis Break-in relay mod

Again, thanks.

I think I have the diode backwards. It looks like a band on the diode pointing to pin 1 of the relay.

The good news is, good design or bad, I have no use for the break-in relay, so I think I will leave in place and move on to the rest of the radio. You may have noted that I have replaced at least 2 of the paper caps that are visible in the picture and the rest of them and the tantalum cap have also been replaced so, for now at least, I am done with the audio module on this receiver.

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Date: Sun, 5 Sep 2021 23:41:27 -0400  
From: Charles Steinmetz <[csteinmetz@yandex.com](mailto:csteinmetz@yandex.com)>  
Subject: Re: [R-390] Audio Sub-chassis Break-in relay mod

I would advise ripping all of the foreign parts out to avoid sabotaging anyone who might try to make something of it in the future, and also any potential problems from failures of these parts. Whether you re-wire it to factory stock is up to you, but I wouldn't bother. Very few owners use the break-in circuit, and anyone who wants to can restore its function easily in the future.

This is just good radio hygiene -- remove extraneous crap.

Just pull out Dnew1, Cnew1, Cnew2, Cnew3, Rnew1, and Tnew1. You can just clip the wires and leads, except for Tnew1 which you can either unscrew and remove (preferable) or just leave in place after clipping or removing the wires to the two pins. This will leave K601 with no connections to its coil.

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Date: Sun, 28 Nov 2021 07:40:37 -0600  
From: Paul Staube <[staube@gmail.com](mailto:staube@gmail.com)>  
Subject: [R-390] R-390A deaf below 600 KC?

I picked up an otherwise beautiful Amelco from a local yesterday but noticed three things that were strange. First was that it didn't like my Beverages on the twinax input but performed normally with a 160m vertical. Can the impedance difference be that much of an issue? My EAC doesn't care between either antenna. <clip>

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Date: Sun, 28 Nov 2021 09:29:24 -0700  
From: "Jordan Arndt" <[Outposter30@shaw.ca](mailto:Outposter30@shaw.ca)>  
Subject: Re: [R-390] R-390A deaf below 600 KC?

In my experience, the unresponsive meter is likely to be due to a non-standard meter which doesn't have a 17-18ohm internal resistance. If that is not the case, then there are components in the meter circuit which need assessment.



As far as the antenna input is concerned, all 3 of my 390A's exhibit mis-match effects from ~15 to 24MC with the 90ft wire antenna I use, when fed into the balanced input with the J207 side of the connection grounded. In fact, ungrounding that side eliminates that problem, so yes, impedance mis-matching can and does occur. <clip>

-----  
Date: Thu, 23 Dec 2021 11:38:55 -0700  
From: "Jordan Arndt" <Outposter30@shaw.ca>  
Subject: [R-390] Balanced input on higher bands correction

Hi group and Happy Holidays... Sometime back I responded to a post stating that my 390A's all had an issue above 15-16Mhz when connected to my ~90 foot wire via the balanced antenna input... The problem was not the antenna or the balanced input. The real problem was that I was temporarily using an 18" jumper to ground one side of the balanced input connector to the chassis.

Once I replaced the 18" jumper with a **2 inch wire grounded to the mounting screw just below the balanced input connector**, the sensitivity was restored from 15 to 32 Mhz. In fact, I'm surprised at how much of a difference the length of that connection made... Live and learn...!

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Date: Fri, 24 Dec 2021 05:11:13 +0000 (UTC)  
From: Jim Whartenby <old\_radio@aol.com>  
Subject: Re: [R-390] Balanced input on higher bands correction

Jordan: there are Twinax to coaxial adaptors available so you don't really need to jury-rig the connection.? I believe that you have a choice of Twinax to N, BNC or UHF. There is one on eBay, Item #?401412862478 which adapts Twinax to BNC. Another is Item #132072997494 which is Twinax to UHF. If you are patient, the perfect adapter for you application will eventually show up, at a decent price. Not my auctions, don't know the sellers, etc <grin>

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Date: Fri, 24 Dec 2021 10:07:05 -0600  
From: Dave Merrill <r390a.urr@gmail.com>  
Subject: Re: [R-390] Balanced input on higher bands correction

IBM used twinax on their System 34 token ring network and at least some of the twinax to BNC adapters you'll find are from those networks. They contain a balun which may or may not be responsive at HF frequencies. A safer bet is a UG-971/U and a UG-636A/U C to BNC adapter. Both of these are found in the MK-288 Maintenance Kit. NOS UG-971/U adapters are available very reasonably here: eBay item 312574496229.

The UG-636A/U can be found on eBay for about \$20.

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Date: Fri, 24 Dec 2021 18:15:08 +0000 (UTC)  
From: Jim Whartenby <old\_radio@aol.com>  
Subject: Re: [R-390] Balanced input on higher bands correction

Thanks Dave, I didn't know about the balun, I wonder it covers the MF and HF bands? I have the UG-971/U here which was what I was thinking about.

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Date: Fri, 24 Dec 2021 15:46:16 -0700  
From: "Jordan Arndt" <Outposter30@shaw.ca>  
Subject: Re: [R-390] Balanced input on higher bands correction

Hi again Jim, Dave and the group... I have both right angle C and straight Twin-ax connectors, so antenna connection isn't an issue. Over the years, I've tried a number of different baluns, from Hygain BN86 and W2AU types to 75 Ohm TV type baluns and never found a "one size fits all" solution for feeding the balanced input, so more recently I've been feeding one side of the Twin-ax balanced connector with the wire antenna lead and shorting the other side to ground as described in several online texts.

Recently, while going through the RF deck of this S-W 390A, I happened to use temporary Twin-ax connections with long "jumpers" that have alligator clips at each end for convenience, which lead me to suspect problems in the RF deck above 14.5Mhz which aren't really there. It was the 18" long jumper to ground that was causing the problem.

Since feeding the antenna to the radio this way works so well, I'm seriously considering applying the Shipboard cable-swap mod and connecting signals via the C connector.

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Date: Fri, 24 Dec 2021 19:59:29 -0800  
From: Larry H <larry41gm@gmail.com>  
Subject: Re: [R-390] Balanced input on higher bands correction -  
connector sale

Hi All, I have about 6-8 twinax connectors I'll sell to you for \$3.35 each + shipping (about \$4.00). These Twin-Ax Plug connectors are Amphenol 82-5589-RFX or an AIM 27-9080 (they are the same as UG-421 as specified in the R-390A tech refs) and are designed for RG-8 coax, but with a small length of the correct tubing, will fit RG-58 coax perfectly. I will include a 1" piece of the tubing for \$0.15, if you like. And/or I'll make you a 1 foot cable of RG-58 coax with a twinax on one end and a male or female BNC connector on the other end for \$14.00 + shipping (about \$4.50). The wiring in the twinax will be the coax center conductor

to one side of the twinax and the shield to the other twinax pin \*and\* to connector frame (ground). The connector on the other end could also be a male or female UHF connector for a \$1 more. Longer coax can be had for \$0.50 per foot. Please send me an email directly if you'd like any of these.

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Date: Sun, 26 Dec 2021 15:50:25 -0300  
From: "Studiumtelecom S.Rocha" <battcharger@gmail.com>  
Subject: Re: [R-390]

<clip> Another question: should I replace the antenna connector for a SO-239 UHF type?

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Date: Sun, 26 Dec 2021 20:26:12 +0000 (UTC)  
From: Jim Whartenby <old\_radio@aol.com>  
Subject: Re: [R-390] Amelco R390A help, RT301 current regulator tube

<clip> In my 4 1/2 years in the Air Force back in the early 1970's, the only equipment I ever saw that used the UHF type RF connector was the WW2 designed AN/ARC-3. It was used as the VHF comm gear in the MPN-13 RAPCON van when I was stationed in the Philippines. Mactan AB was also used by both the Philippine Air Force and commercial aviation so VHF was needed.? There are adaptors available to convert from UHF to N or BNC so no surgery is needed. I am not sure but I think that American Hams are the only group still using the UHF style of connector. New equipment sold everywhere else has either N or BNC connectors. True?

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Date: Sun, 26 Dec 2021 21:19:59 +0000 (UTC)  
From: robert meadows <rpmeadow@bellsouth.net>  
Subject: Re: [R-390] Amelco R390A help, RT301 current regulator tube

Do Not change the connector!  
SO-239 was UHF in 1930

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Date: Sun, 26 Dec 2021 19:10:39 -0500  
From: "Dave and Sharon Maples" <dsmaples@comcast.net>  
Subject: Re: [R-390] Amelco R390A help, RT301 current regulator tube

Jim: The Harris land-mobile radio gear generally uses TNC connectors now. † Their MIL gear uses either N or BNC. † I don't think anyone is still using UHF connectors besides the amateur and CB communities, but I could be wrong.

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Date: Sun, 26 Dec 2021 18:32:44 -0800  
From: Larry H <larry41gm@gmail.com>  
Subject: Re: [R-390] Amelco R390A help, RT301 current regulator tube

Sam, Replacing the RF connectors is not a good idea.† They are built into the antenna relay in such a way that it would be very difficult to maintain the relay operation.† See my antenna relay doc in the tutorials section on our website, r-390a.net.† There are twinax and C connectors available, but I don't know about in Rio.† I can help you with a twinax connector, if necessary.

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Date: Mon, 27 Dec 2021 13:13:51 +0000 (UTC)  
From: B Riches <bill.riches@verizon.net>  
Subject: Re: [R-390] Amelco R390A help, RT301 current regulator tube

There are? Twinax to C and BNC adapters on Ebay and from other connector suppliers - Try Pasternak.

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Date: Thu, 30 Dec 2021 14:42:27 -0600  
From: Tisha Hayes <tisha.hayes@gmail.com>  
Subject: Re: [R-390] Balanced input on higher bands correction

I used the Twinax connection so I could have a (shielded) balanced pair coming in to the lab; I even made a gas tube surge arrestor using GDT's that had a triggering threshold of 65V (line/ground, line/ground, line/line) with Twinax connections on each side and a brass bolt to pin it to the copper bulkhead entrance panel.

If you shop wisely you can find the cable (and connectors) at junk-prices (do not use R390 as part of the search term, that causes people to charge an outrageous premium).

The baluns that come with the IBM cable IS HORRIBLE for anything to do with radio. I tried it, just write off that idea, the impedances and frequency range were just wrong-wrong-wrong. It has been so long ago that I do not remember exactly what my testing had shown, because once I saw how bad it was I just lopped off the baluns, tossed them out and wound my own on a binocular core for a frequency range and impedance that was useful to me. If you look closely at the schematics for the RF deck you can see that one of the other differences between the unbalanced (50 ohm) and balanced (~100-150 ohm) connection are the antenna relay and an additional stage of slugs in the RF deck. I had found one deck that had a zapped 1st RF inductor (probably lightning) that affected only a range of 1 MHz frequency selections (the RF transformers are selected in gangs through the rotary switch). I was able to scavenge a new inductor off of a parts deck and bring it back to life.

Actually, the biggest hassle I have ever had with the RF deck is on intermittent connections on that long rotary switch that runs along the bottom. It is sensitive to mechanical misalignment and can result in some

bands where you have to jiggle the 1 MHz bandswitch to get a good connection. You can tell when that problem exists when you get a 1 MHz band that is somewhat deaf. I would suggest that you use a crystal oscillator to throw up a marker every 1 MHz at the midpoint of each band (1.5, 2.5, 3.5, 4.5...MHz) so you can just get the oscillator on frequency using a master reference or by zero beating it against something that is known good (I used to use WWV on 2.5 MHz) and then just turn the MHz switch and you could tweak the trimmer caps on the crystal deck.

(BTW, spending a great deal of time to constantly zero each 1 MHz crystal is a fool's errand. The on-off action of the crystal heater will cause the beat frequency to swing up and down, sometimes as much as a hundred Hz or so. I can see why RTTY operators would spend their entire military careers sitting in some shelter, tweaking that adjustment for a couple of years. (insanity may be the end result).

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Date: Thu, 30 Dec 2021 16:40:42 -0500  
From: "Jacques Fortin" <jacques.f@videotron.ca>  
Subject: Re: [R-390] Balanced input on higher bands correction

When you wrote: The on-off action of the crystal heater will cause the beat frequency to swing up and down, sometimes as much as a hundred Hz or so. I can see why RTTY operators would spend their entire military careers sitting in some shelter, tweaking that adjustment for a couple of years. (insanity may be the end result).

Well, I agree with that, (already experienced it, btw) but I believe that the easiest solution is to turn OFF the heaters, unless the radio is operated in sub-zero temperatures...

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Date: Fri, 7 Oct 2022 15:08:16 -0400 (EDT)  
From: Barry <n4buq@knology.net>  
Subject: Re: [R-390] R-390 Antenna Relay Chatter

That advice appears to pertain to an R390A. This is an R390. Do you think that would make any difference? BTW, I was using STANDBY primarily for warmup.

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Date: Fri, 7 Oct 2022 13:39:55 -0600  
From: "Jordan Arndt" <Outposter30@shaw.ca>  
Subject: Re: [R-390] R-390 Antenna Relay Chatter

I stopped using "Stand By" on all my tube gear because the manner in which it is usually implemented allows the B+ voltages to soar, often beyond the rated voltages of caps and any other components exposed to the unloaded B+ voltage.

I also add a CL-90 thermistor in the AC line on all the tube gear I'd like to keep running. It drops the input AC by a few volts and provides an automatic soft-start. Just make sure there is some air circulation around the thermistor and that it's not too close to wiring and other heat sensitive parts, because they do give quite a bit of heat.

The 390 and 390A antenna relay circuit is pretty much the same, aside from the voltage IIRC, so the rectifier issues are also pretty much the same. It sounds to me like your rectifier is in the process of failing. What happens when you use the Break In circuit...? Does it chatter when operating in Break In mode also..?

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Date: Fri, 7 Oct 2022 15:13:04 -0500  
From: "Les Locklear" <leslocklear@hotmail.com>  
Subject: Re: [R-390] R-390 Antenna Relay Chatter

Like Jordan said...the voltages are pretty much the same. I would just replace it. The few pieces of tube gear I own all have a thermistor and am using a bucking transformer to provide 115 Volts AC.

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Date: Fri, 7 Oct 2022 16:20:22 -0400 (EDT)  
From: Barry <n4buq@knology.net>  
Subject: Re: [R-390] R-390 Antenna Relay Chatter

Thanks, Les. I'm currently "soft-starting" it with an autotransformer and setting it to 115VAC for final run voltage. I plan to add the thermistor and possibly a bucking circuit as well.

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Date: Fri, 7 Oct 2022 16:20:13 -0400  
From: "wc4g@knology.net" <donwc4g@gmail.com>  
Subject: Re: [R-390] R-390 Antenna Relay Chatter

I don't think the B+ will soar in an R-390 because the B+ is regulated. Not so in the "A" model. That is where I think this issue originated. The antenna relay is only energized in STBY, BRK IN or CAL. As soon as the FUNCTION switch is turned to STBY, the B+ comes up. The B+ will increase only if the regulator circuit develops a problem and regulation is lost. (R-390) All of my equipment "sees" ~117VAC due to my BIG bucking transformer.

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Date: Sun, 18 Dec 2022 22:36:58 -0800  
From: Larry H <larry41gm@gmail.com>  
Subject: [R-390] Error in article in HSN 45 (Summer-Fall 1998)

While researching a different project, I came across an article in the HSN

# 45 (Summer-Fall 1998) that is an error. I know it's been a very long time since it was published, but since they are now online for everyone to easily see, I thought it was necessary to alert you. I looked through the HSNs after it and the forum archives and did not find any correction, so I'm letting you know now. The article is titled:

'SUPPLEMENTARY GROUNDING OF THE R-390A ANTENNA TRIMMER'.

and starts on the bottom of page 3. It says you should ground the gear on the top of the antenna trimmer cap that mates to the gear on the antenna trimmer shaft. That is absolutely wrong.

The antenna trimmer gear is at AGC voltage level. Same for the mating gear on the AGC trimmer adjust shaft. But, the shaft itself is at ground potential. Nice design, huh. Well in order for this to work, the gear on the AGC trimmer adjust shaft is electrically insulated from the AGC trimmer adjust shaft, which is grounded.

Grounding the gears at this point totally disables the AGC on the RF amp and adds a 270 K ohm load to the AGC line. This seriously disables the AGC function.

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Date: Sun, 2 Jun 2024 13:31:26 -0600  
From: "Jordan Arndt" <Outposter30@shaw.ca>  
Subject: [R-390] Antenna Trim trouble

I've removed the Ant Trim assembly and I'm looking into removing the roll pin, however I can't find the pin diameter. It also appears from the different generations of service docs that some were made with set screws rather than roll pins.

>From the service docs, the RF deck several #6/0 taper pins (.077 in avg. dia.) which appear to be about the same size or perhaps slightly larger.

Does anyone know the Ant Trim roll pin diameter so I can find the correct size punch... 73...Jordan VE6ZT

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Date: Sat, 8 Jun 2024 12:05:43 -0600  
From: "Jordan Arndt" <Outposter30@shaw.ca>  
Subject: Re: [R-390] Antenna Trim trouble

Well, my first attempt to remove the roll pin was not a success...The pin didn't budge and the roll pin punch bent. I'll try the freeze/torch process and I hope that works. The punch I used was 1/16" which appeared to center and fit properly, but it was/is a fairly cheap tool. I may look for a tougher type of punch.

My problem did not appear to be grounding of the AGC line, only slight scratching as I turned the Ant Trim control, so using my Sprague TO-6, I tried to see if I could provoke "leakage" using the insulation resistance test of the TO-6, but to no avail.. That's all for now...

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Date: Fri, 21 Jun 2024 15:39:22 -0600  
From: "Jordan Arndt" <Outposter30@shaw.ca>  
Subject: Re: [R-390] Antenna Trim trouble/Capacitor Q question

I'm still unable to remove the roll pin, and the punch I was using actually broke off near the business end, so I'm stuck there for now.

Q: What happens when you use 2 x 18pF SM caps in // to replace a single 36pF..? Specifically, I want to replace C-211, a 36pF cap, but I only have 18pF and 39pF SM caps on hand. Aside from ordering more caps, which is the "better" solution, using 2 x 18 or a 39pF cap to replace C-211...? Your thoughts are much appreciated....73...Jordan VE6ZT

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Date: Fri, 21 Jun 2024 15:42:45 -0700  
From: Manfred Antar {KN6KBS} <manfredantar@gmail.com>  
Subject: Re: [R-390] Antenna Trim trouble/Capacitor Q question

Get some Kroil - penetrating oil for the roll pin.  
Let it soak overnight or longer then try again.  
Works much better than liquid wrench.

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