

R-390x Newbie Support Information

- Revision 1, changes A - D, 7-25-2020, Larry Haney
- Revision 2, changes E - H, 7-9-2021, Larry Haney
- Revision 3, changes I - J, 11-19-2021, Larry Haney
- Revision 4, changes k - L, 05-21-2022, Larry Haney
- Revision 5, change m, 11-11-2022, Larry Haney
- Revision 6, change n-o, 3-11-2023, Larry Haney
- Revision 7, change p, 6-19-2023, Larry Haney
- Revision 8, change q, 9-1-2023, Larry Haney
- Revision 9, change r, 4-25-2024, Larry Haney

Revision 4K Start:

Contents

	<u>page</u>
1. a. Getting information from the R-390 Email Reflector Forum ARCHIVES	2
b. Using the R-390 Email Reflector List Forum	2
2. Types of information available on our website (R-390A.NET)	3
Revision 60 Start:	
3. Technical References and other R-390 family documents	3
Revision 60 End.	
4. Isolation Transformers	4
5. Lubrication	5
6. Mechanical Filters	6
7. R-390A internal coax size	6
8. R-390A mini BNC connector, MB	6
9. Limiter Filament Dropping Resistor	7
10. Repair of broken pin on connector	8
11. Spline wrench and Phillips screwdriver mounted on back	8
12. Using the unbalanced C or the balanced Twinax connector	10
13. Spare tubes organization software	11
14. Temperature compensating capacitors	12
15. Signal to Noise Ratio Test and Navy Field Change 5	12
Revision 4K End, Revision 6N Start:	
16. The MK-288 Adapter Kit for the URM-25 and R-390	13
Revision 6N End, Revision 9R Start:	
17. Replace the R-390A Mechanical Filter 'killer' cap C553	13
Revision 9R End.	

Although I've been working on R-390As since 1963, I've only been monitoring the R-390 List Forum since November of 2013 and contributing since June of 2014. There is a huge amount of information stored out in the R-390 list archives that is important, but not well known. This is especially true for folks that joined recently and missed the helpful posts that so many folks made, before the newer folks joined (like me). Revision 1A start: There's also a lot of information on our 'R-390a.net' website and other places. So, this document is my attempt to fill that gap and let you know what's where. What I plan to include in this document is that

information that is not diagnostic or repair in nature, but none the less, important. (Wei-i Li did a great job of capturing the technical posts and saving them in the 'Pearls'). I'm including stuff that is not currently on the R-390A website (like in the Pearls, etc), just in the list forum archives or nowhere. Here's a link to the Pearls contents page: <http://www.r-390a.net/Pearls/index.htm> .

Revision 1A end.

For instance, Tisha Hayes did a nice piece of research and a very nice post about the mini bayonet (MB) connectors used on the mini-coax inside the R-390A. David Wise posted about the Noise Limiter filament dropping resistor. Spare tubes organization software: Hank (Dan) Arney. R-390A internal coax size: Scott, Barry (Clyde B). More information on those and other subjects later in this document. For GFI and GFCI issues, see post by Roy Morgan, Date: Wed, 19 Jan 2000 11:59:32 -0500 in the Pearls Power Supply section. There is also a lot of GFI info in the 'AC and Other Line Topics' section of the Pearls. Cleaning and Lubrication - see the Restoration section in the Pearls on the R-390A website.

Revision 5M start:

Using the R-390 Email Reflector List Forum

The R-39x users have a forum on QTH.net called R-390. To use it, all one needs do is sign up (subscribe) at [R-390 Info Page \(qth.net\)](http://R-390%20Info%20Page%20(qth.net)). Once subscribed, you can post to the forum by sending an email to: "R-390 'at' mailman 'dot' qth 'dot' net". The List etiquette is quite simple: Stay on topic. Be civil. No religious or political comments. Make the title line meaningful, so it can be found through a search. It is preferred that it start with the type of unit you are asking or commenting about, EG: R-390A or R-392. You can list items for sale , if you like. Please start the title (subject) line with 'FS:' If you want to buy something, please start the title line with 'WB:' You can include pictures by attaching them to the email. Our list administrator has set the allowable filetypes to: .pdf, .jpg, .bmp, and .gif. The attachments will be distributed to subscribed users, but will not be in the Archive with the email posts. However, they will be in 1 directory ordered by date with no name and can be found here:

[Index of /pipermail/r-390/attachments \(qth.net\)](http://Index%20of%20/pipermail/r-390/attachments%20(qth.net))

Revision 5M. Revision 1B start:

Getting information from the R-390 Email Reflector Forum archives

Larry Haney, 7/25/2020 - I obtained most of the information in here from the R-390 Email Reflector Forum archives. I used 2 methods to do so:

1. The HHI Email Reflector Search Tool accessed with the internet link:
<http://www.w9wze.net/ReflectorSearch/SearchReflectorForm.php> . Because it searches all of the archive, it takes a couple minutes to provide the list. To see the item of interest from the list, just click on the highlighted link.
2. The built-in method in the 'Mailman' tool that provides the function for our Email Reflector Forum. Here's how I access the R-390 list of the archived entries from an internet window:
<http://mailman.qth.net/pipermail/r-390/> . If you want to display information for a different product group, just replace the 'r-390' with it's name, such as: Collins, Hammarlund, National, Hallicrafters, Heathkit, Eico, QRP, etc. It displays a table entry for each month. You can display the months forum entries in a list sorted by: thread, subject, author or date (by clicking on those keywords). From that 2nd list you can display a

desired post entry.

For both of the above, I created an 'Internet Shortcut' on my desktop with the link as the target location. This is easy to do by 'right clicking' in an empty space on your Windows desk top and selecting 'create a new shortcut'.

Revision 1B end.

Types of information available on our website

There is a lot of information available on our website (R-390A.NET), a lot of which is in the Pearls, the Y2KR3 R390A and other Tech Refs, miscellaneous contributors documents, original Collins, Army, Navy, and Air Force documentation, and much more. One of them we are usually very interested in is the 'Tech Ref'. So, where are they? Do they have indices? Are the schematics included and do they print out OK? Are they searchable online?

Revision 8Q start:

Technical References and other R-390 documents:

Our website:

So here's some things you might want to know about the tech ref manuals: the Y2KR3 R390A Tech Ref is searchable, but does not contain an index (so you may not want to print the whole thing). The schematics are in section 5 and are good for printing. But, there are many typos in them and the schematic for the IF deck is all on one page, resulting in way too much information on one page. To fix them, I created a separate file with just the schematics in it. You can see them here: [R390A Y2K R3 schematics corrected \(r-390a.net\)](http://www.r-390a.net/Y2K_R3_schematics_corrected(r-390a.net).pdf). It's 9 pages.

There are 3 military tech refs listed in the 'References' section (<http://www.r-390a.net/faq-refs.htm>) on our website. One is in the U.S. Army section at the top, TM 11-856A from 1/1956. It contains 8.5 x 11 printable schematics and an index, but it is not searchable online. All the pages should look ok when printed. Another one is TM 11-5820-358-35 from 8 December 1961 (it's about in the middle of the U.S. Army section). It contains schematics (not printable on 8.5 x 11), an index and is searchable. It also has a lot of wide pages that will not look right when printed on 8.5 x 11. What's important to remember about this file is that it is searchable.

Revision 6O Start:

The third one is at the bottom of the 'Navy' document list that is covered a little later on page 4. It is 'NAVSHIPS 0967-063-2010-7004, R-390A/URR Navy Tech Ref, 1970-Apr' on Navy-Radio by Nick England.

BAMA:

For new users, reading chapter two of the Operators Manual is of great benefit. I like to use the ones on BAMA (described next). Here's the link to the R-390A manuals on BAMA: [Bama Manual Archive \(edebris.com\)](http://www.edebris.com/Bama_Manual_Archive.html)

Revision 6O End.

There's a lot of information on the BAMA (Boat Anchor Manual Archive) web site, including the R390, R391, R392 and R390A. You can find them by Googling 'R390 bama', 'R391 bama', 'R390a bama', etc. The tech ref for the R390 is TM 11-5820-357-35. It has schematics and an index, but it is not searchable online. All the pages are 8.5 x 11, so should be easily printed. This version is from 9 March 1962. The tech ref for the R390A is TM

11-5820-358-35 (21 MB). It has schematics and an index, but it is not searchable online. All the pages are 8.5 x 11, so should be easily printed. This version is from 8 Dec 1961. The tech ref for the R392 is TM11-5820-334-35 (17 MB). It has schematics and an index, but it is not searchable online. All the pages are 8.5 x 11, so should be easily printed. This version is from 21 August 1961. The tech ref for the R391 is TM 11-863 (32 MB). It has schematics and an index, but it is not searchable online. All the pages are 8.5 x 11, so should be easily printed. This version is from 23 October 1953. All of these files on Bama have indices, but are not searchable.

Jammin' Power:

There is also a lot of info on Andy Moorer's Jammin' Power website for both the R390 and the R390A. Take a look here:

Revision 3J start:

[r390 page \(jamminpower.org\)](#). Some time shortly before 10-7-2021, Andy tells me that he needed to add some function to his website and therefore needed to change its structure. So, the previous address to the R390 page is now different. This is the new one.

Revision 3J end.

Navy-Radio:

Revision 1C start:

Larry Haney, 7/25/2020 - There is also a lot of information about Navy radios on Nick England's <http://navy-radio.com/> web site. There's a lot of manuals, pointers to them, history and pictures. Take a look in the <http://navy-radio.com/rctr-div.htm> diversity receiving section for uses of the R-390x's in the AN/FRR-38, AN/URR-41 and AN/URR-49 and half way down in the Receivers section <http://navy-radio.com/rctrs.htm>.

Revision 3I start:

Nick recently added 2 files that might be of interest to you: 1. the 1970 Navy tech ref at [R-390A/URR Receiver Technical Manual NAVSHIPS 0967-063-2010 April 1970 \(navy-radio.com\)](#) and 2. the high resolution schematics in wide fold out page format here (created by me from his scans) [R-390A schematics - US Navy 1970 manual \(navy-radio.com\)](#). The 1970 Navy tech ref does not have an index, but the 'contents' pages are very good. It is searchable, but has a lot of wide pages in it, so be careful if you print it.

Revision 3I end.

Those Tech Refs without indices are probably not the best for printing. If you print it you will want an index.

There is also a lot of info in 'Dave Medley's R-390 Compendium of Knowledge' on Lester Veenstra's disk for the R-390. Take a look here: <http://www.r-390.com/>. The 'Link to Chuck's Page' (Chuck Rippel, that is) does not work, but you can however, see it here in the archives:

<https://web.archive.org/web/20090204020515/http://www.r390a.com/>

Revision 8Q end.

There is also a lot of information about antique radios (including many boat anchors) at Henry Rogers Western Historic Radio Museum (Radio Boulevard) here: <http://www.radioblvd.com>. One of the sections of interest to us is the 'COMMERCIAL & MILITARY COMMUNICATIONS EQUIPMENT (Airport, Shipboard, General Purpose & Military Gear, Part 1) 1932 - 1942 & 1946 - 1950' at:

<http://www.radioblvd.com/MilitaryCommunicationsGear.htm> (notice this section covers 1932 to 1950,

so no R-390 info there).

Revision 7P Start:

But, there is a lot of information about the R-390s and many of its variants in a Part 2, 1949 to 1969:

Military-Commercial Communications Gear Part 2 (radioblvd.com). Also, one of the items covered is the 'real' story of the R-725 (thanks to Les Lochlear for the pointer) at the link:

http://www.radioblvd.com/R390A_Rebuild_Part3.htm and then search for R-725.

Revision 1C end.

The link to some more R-390 related information on Radio Boulevard is here: http://www.radioblvd.com/R-390A_Rebuild.

Revision 7P end.

The following are excerpts from the R-390 List Archives that I thought would be of interest and fit in the category I described at the beginning:

Cheap isolation transformers:

Drew Papanek, drewmaster813 at hotmail.com, Tue, 05 Aug 2003 13:10:15 -0400

On the subject of isolation transformers Gary E Kaufman wrote:

"You can grab most any 2 large filament transformer with the appropriate wattage ratings and put them back-to-back. I used a pair of 56v/3A transformers for many years set up as 115:56<-->56:115 with good success while repairing AC/DC tube radios. There was about a 5% voltage drop over line voltage. Admittedly this may be tough if you really need a 750-1000 watt unit."

Transformers from junk microwave ovens can also be used in this manner by connecting the HV windings together. One end has a terminal, the other is usually internally connected to the transformer's frame.

Connect frame to frame, HV terminal to HV terminal. HV runs a couple or few KV; make sure that connection is well insulated and done with appropriate wire (salvage that from the junk microwave also). These transformers will handle quite a bit of power and you can use 2 differing units to get a slight increase or reduction in net voltage.

Drew

Larry Haney, 7-5-2020: Old microwaves end up at the 'recycling centers' by the hundreds. I suspect that transformers could be found there in abundance at a good price. I haven't had a chance to check into it, yet.

Lubrication - Marvel Mystery Oil gums up:

Todd Roberts, ToddRoberts2001 at aol.com, Sun, 27 Apr 2003 14:53:10 EDT

I think some people in the past have recommended using Marvel Mystery Oil or mixing it with another lubricant as a good way to lubricate an R-390A RF deck? I thought I would relate an experience I had with Marvel Mystery Oil. I had a can of the stuff sitting in a cupboard for about 15 years. Some of the oil leaked around the top of the can and after being exposed to the air for 15 years it did indeed turn into some kind of sticky red gummy substance. It would seem this is not a good indicator of the oil for use as a lubricant exposed to air over a long

time = 15 years or more? It looks like Synthetic oil or grease would be the best bet for a long-term lubricant exposed to air?

73 Todd Roberts WD4NGG.

Robert Meyer, meyer_rm at yahoo.com, Sun, 27 Apr 2003 21:31:16 -0700 (PDT)

I had something similar happen. I have model aircraft that have glow-fuel engines on them. Someone recommended that I use Marvel Mystery oil to lube the engines prior to storage. I had one engine that sat for about three years. When I went to turn it, it was so gummed up that it took significant force to get it to move. Poured some solvent into it and it freed up. I only use synth oil, now.

Robert

Drew Papanek, drewmaster813 at hotmail.com, Mon, 28 Apr 2003 13:46:59 -0400

Marvel Mystery Oil is described as a solvent/penetrant and all penetrating oils with which I have had experience have gummed up, some after only 1 week. Penetrants are good for freeing up stuck mechanisms but ultimately should be cleaned out and replaced with a non-gumming lubricant such as Mobil 1 or other synthetics.

I have not used the Nolan Lee-recommended mixture of 50:50 MMO and Mobil 1 for R-390 series RF geartrains but have wondered if the Mobil 1 inhibits gumming tendencies of the MMO.

My approach has been to completely tear down gummed up geartrains and soak in lacquer thinner (any brand except that in the red white and blue can from A** Hardware). On assembly I apply Mobil 1 and re-apply semi yearly or yearly as needed.

I have heard that Mobil 1 was recently reformulated and may possibly not be as good as previously. Maybe time to switch to Amsoil?

Kerosene or fuel oil will gum up after a year or two.

Drew

Dittmore-Freimuth mechanical filters are superior:

Les Locklear, Llgt at aol.com, Tue, 7 May 2002 17:08:10 EDT

Fabio, The Dittmore-Freimuth mechanical filters are superior to the Collins mechanical filters. They were installed in the 1968 run of R-390A's. Manufacturing techniques were much improved over the Collins type filters and they exhibit much less loss.

Les Locklear

R-390A internal coax size:

Scott, Barry (Clyde B), cbscott at ingr.com, Wed, 6 Mar 2002 15:00:54 -0600

Is RG-178 the proper coax? I remember a thread about this a couple of years ago and according to the emails I saved, it was RG-179. I also have a quote from SkyCraft for RG-179. Which cable is correct?

Thanks, Barry(III) - N4BUQ

Larry Haney, 7/4/2020 - RG-179 is the specified coax used, but RG-187 is very close. It really does not matter

except that it fit the MB connectors correctly. Impedance is not a factor to consider. However, the coax for the high impedance antenna connection (C connector) is larger and lower in capacitance.

R-390A mini BNC connector real type, MB (Mini Bayonet):

Tisha Hayes, tisha.hayes at gmail.com, Mon Dec 8 12:53:31 EST 2008

I finally found out what the mini BNC connectors on the R-390A are designated as. This has been a question asked by many on the R-390A reflectors and on the Hollow State News, no answer was readily apparent. Since I have a large amount of coaxial inter-series adapters as part of my professional work, I decided to pursue an answer to this question through the Amphenol tech-rep. Here is what I found out;

The series connector is designated as MB. It is not rated for a specific impedance like 50 or 75 ohms. The specification has a wide variety of impedance's that the connector will work with, ranging from 50 to 150 ohms. I also found that the connector, chassis plug, Tee's and terminators are still available through a variety of sources. Since this is a little-known specification without any widespread knowledge of it's applications the parts are available cheaply from some surplus sites. At the higher end, there are still suppliers who can make custom cables with the MB connector.

One surplus site that has the connectors is Surplus Sales of Nebraska. Of course, their prices are on the high end of what is considered surplus but they have a decent array of connectors. This can be found at <http://www.surplussales.com/Connectors/MB.html>

These are a direct fit and I have purchased connectors and tested them on my R-390A. This may be a great tip on rebuilding the R-390A when the coax cables are seriously deteriorated or when connectors are badly corroded.

Tisha

Larry Haney, 7-6-2020 - Surplus Sales of Nebraska still does carry an Amphenol straight MB connector for RG-179 coax. Their part number is 44950 and their price is \$23.

Chris Farley, Thu Jul 24 12:25:11 EDT 2014

Before somebody buys the wrong thing, I just want to clarify a detail- These are NOT "mini-BNC" connectors, which do exist and are readily available. The connectors used are simply called "miniature bayonette", or "MB" connectors. They are NOT the same, nor compatible with each other.

I spent quite a bit of time digging for these things a while back, and basically you're not going to find new ones from any dealer unless you want to spend A) more than the whole receiver is worth, or B) buy NOS from a surplus dealer. Even then the prices were insane for the most part. I found ONE surplus dealer who was willing to work with me on their tarnished NOS stock, but didn't feel the rather large investment required was worthwhile.

IMHO just rebuild your original ones, it will save you time and be less aggravating in the long run. If you have a missing or broken one, I do have just a few 90° spares.

Regards, Chris kc9ieq

Larry Haney, 7/6/2020 - There are a couple MB connectors manufactured and available in small quantities today, BUT they are NOT for the small coax used in the R390A. They are for 7/32 inch (5mm) (RG-58) coax and will not accept the small 1/10 inch coax used in the R390A. As mentioned above, Surplus Sales does sell the correct straight one, but not the 90 degree one.

Revision 2E start:

Larry Haney, 7-9-2021 - Fair Radio Sales still does carry some of the USED straight and 90 degree MB connectors used in the R-390A. Unfortunately, they are hard to find in their online catalog unless you know the trick. You will not get a hit if you search on 'R-390A', 'R-390', 'mb' or 'connector'. The best search argument that I know of is: 'mbnc'. They will also be listed with the search: '390A', along with a ton of other 390A stuff. The price for them is \$4 each.

Revision 2E end:

Limiter Heater Filament Dropping Resistor R536:

David Wise, David_Wise at Phoenix.com, Wed Apr 29 13:19:46 EDT 2009

The limiter is running dim to reduce noise and hum.

Those cathodes are at the input of the audio chain, and they're floating around at high impedance; the slightest H-K leakage would cause hum. In some positions in old tube-type Tektronix oscilloscopes, a tube might be selected for low leakage. The other day I noticed hum in my R-390A when the limiter was on. I replaced the limiter tube and the hum stopped. The original tube did not register any leakage on my Hickok 600A.

Tube audio preamps run dim to reduce noise. If the cathode emits enough electrons to satisfy the maximum requirement of the circuit, then it's bright enough. The requirement here is very small.

Dave Wise

Larry Haney, 7-6-2020. I have been investigating this subject for a couple months now, and put together a small document about it (which I have not published, yet). Here's a little bit of it:

John (W3JN) found the information on reducing hum documented in the Hallicrafters R-274 manual TM 11-897 on page 49 under power supply. A Hallicrafters R-274 is similar to a Hallicrafters sx-73. Here's the relevant information that it says: "Tubes V12 and V16 are important from the standpoint of hum in the audio amplifier. Hum can be reduced by reducing the heater voltage of a tube. Therefore, the voltage on heaters of V12 and V16 is reduced by resistor R105 to approximately 5.5 volts." V12 is a 6AL5 and is the audio detector and noise limiter, V16 is a 6AT6 and is the 1st audio amp.

I thought I'd check and see how many receivers use triodes today or what else they use. I knew that the R-390A uses 5814/12au7s dual triodes connected in a diode configuration (the grid tied directly to the plate). Well, to my surprise, I find that the 51J-3 (R388) and 51J-4 use a 12AX7 (dual triode) for the audio and avc detectors and 1/2 of a 12AX7 for the noise limiter. These are of course connected in the diode configuration as just described. And, guess what, only the half of the 12AX7 used for the noise limiter has the filament dropping resistor. The Hallicrafters SX-111A uses a 6BJ7 (triple diode) for audio and avc detectors and the ANL, and uses a filament

dropping resistor in it's line. The 75A4 uses four 6AL5s for a few functions and one is for the noise limiter (V12), and it is the only tube that has a filament dropping resistor. The other three 6AL5s (V10, V16, and V19) do NOT.

What I have found is that there are many, many receivers that use the dropping resistor in the filament line of noise limiters (both diodes and triodes) in order to reduce hum in the audio.

Revision 2F start:

Repair of broken pin on large bakelite connectors:

Larry Haney, 7-9-2021 – There are three ways to repair a broken pin on one of the large bakelite chassis mount connectors used by three of the sub-chassis in the R-390x.

1. Find a good complete replacement connector and replace it on the chassis. Unsoldering and resoldering in the replacement will be a daunting task on the IF deck.
2. Drill the broken pin out and replace it with suitable pin stock. Unfortunately, I don't know where you can obtain it. Drilling it out would require a good drill press.
3. Fashion a very thin metal splint about 1/8" long and the diameter of the pin. Center it on the broken point. It can be any very thin solderable metal that you can form into a circle. Sometimes the break is very close to the bakelite, but it can be dug out enough to allow for the 1/16" fit. My splint I did 15 years ago is still going strong after all that time.

Revision 2F end.

Revision 2G start:

Spline wrench and Phillips screwdriver mounted on back:

Larry Haney, 7-9-2021 - The Phillips head screwdriver is a #1 and has a 8" long shaft. Very importantly, the maximum shaft diameter that will work for all screws is 3/16". Don't settle for a cheaply made one. You need one with a hardened tip. This helps prevent damage to the screw heads. I use one that has a 6" long shaft and it works well for all those places that the standard 4" shaft length will not work.

The spline (Bristol) wrench is a .094 inch diameter (close to 3/32"), 6 spline with an overall length of 7 3/4 inches, L shaped. The spline wrench is 2 3/8" long with an L shaped aluminum stock handle. I use a standard 3 1/4" long L shaped wrench with no problem, although a longer one would be easier to use in some cases. Kits are easy to find with the one I use in there, but you can also find them individually. I see online that a .096" spline wrench is also available and may very well work as it's only .002" larger, but I think it will be too tight in some cases. I use a .094" wrench and it fits firmly and works well.

Thanks to Gary Biasini for finding and providing the original drawings for both of the above. They are included here:

EQUIP-TYPE P-38044 UCR EXP-NR.		COL. OCT 01 1960																															
<small>NOTICE: THESE DRAWINGS DESCRIBE, SPECIFY, OR OTHER DATA ARE UNCLASSIFIED. THEY ARE THE PROPERTY OF THE UNITED STATES GOVERNMENT AND MAY NOT BE SOLD, COPIED, OR OTHERWISE DISSEMINATED EXCEPT AS AUTHORIZED BY THE CONTRACTOR. APPROVALS, OR OTHER DATA IS NOT TO BE RECORDED BY ANY PERSON OR COMMUNICATED, OR INVESTIGATED, OR MADE PUBLIC, EXCEPT AS NECESSARY FOR THE CONDUCT OF THE CONTRACT. THIS DRAWING IS SUBJECT TO SELECTION, APPROVAL, AND CONTROL BY THE CONTRACTOR.</small>		<small>*FOR INFORMATION ONLY. CONTRACTOR MAY AT HIS OPTION DEVIATE FROM THESE PROCESS DETAILS.</small>																															
		REVISIONS <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">SYM</th> <th style="text-align: center;">DESCRIPTION</th> <th style="text-align: center;">DATE</th> <th style="text-align: center;">APPROVAL</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A₁</td> <td style="text-align: center;">A, SAE 6150C WAS SAE 6150 A₁ ADDED APPL SM-D-34362Z</td> <td style="text-align: center;">B OCT 59</td> <td style="text-align: center;">4242B-PC 59-AI-SI REV-F</td> </tr> </tbody> </table>		SYM	DESCRIPTION	DATE	APPROVAL	A ₁	A, SAE 6150C WAS SAE 6150 A ₁ ADDED APPL SM-D-34362Z	B OCT 59	4242B-PC 59-AI-SI REV-F																						
SYM	DESCRIPTION	DATE	APPROVAL																														
A ₁	A, SAE 6150C WAS SAE 6150 A ₁ ADDED APPL SM-D-34362Z	B OCT 59	4242B-PC 59-AI-SI REV-F																														
<p>NOTES:</p> <p>1. PART MAY BE NO. 18 AS SUPPLIED BY VACO PRODUCTS CO., CHICAGO, ILL., OR EQUAL, PROVIDING IT MEETS THE FOLLOWING REQUIREMENTS & DIMENSIONS SHOWN.</p> <p>DESCRIPTION: #1 5/16" PHILLIPS SCREWDRIVER. MATERIAL: HANDLE; DURABLE HIGH DIELECTRIC HEAT RESISTANT PLASTIC. BLADE; SAE 6150C CHROME VANADIUM STEEL. FINISH: BLADE; M262 PER SPEC. MIL-F-14072.</p> <p>(A)</p>		<p>COLLINS PART-NR ITEM ITEM-NR PART-NR DESCRIPTION W.H. W.H.SPEC</p> <p>LIST OF MATERIAL</p> <p>COLLINS PART-NR 559-0140-002</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">DRAWN</th> <th style="text-align: center;">CHECKED</th> <th style="text-align: center;">APPROVED</th> <th style="text-align: center;">COLLINS-RADIO CO. MANUFACTURING CO. 1621A PTA 51-93</th> <th style="text-align: center;">SIGNAL CORPS</th> <th style="text-align: center;">DEPARTMENT OF THE ARMY SIGNAL CORPS LABORATORIES</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">JENNETH</td> <td style="text-align: center;"><i>[Signature]</i></td> <td style="text-align: center;"></td> <td style="text-align: center;"></td> <td style="text-align: center;">REVIEWED PME</td> <td style="text-align: center;">FORT MONMOUTH NEW JERSEY</td> </tr> <tr> <td style="text-align: center;">SM-D-34362Z</td> <td style="text-align: center;">1</td> <td style="text-align: center;">SM-D-248775</td> <td style="text-align: center;">APPROVED HLY PME</td> <td style="text-align: center;">Screwdriver</td> <td style="text-align: center;">SM-B-249/98</td> </tr> <tr> <td style="text-align: center;">559-0001-004</td> <td style="text-align: center;">1</td> <td style="text-align: center;">559-0140-002</td> <td style="text-align: center;">ALL MATERIALS ARE TO BE PURCHASED IN QUANTITIES INCLUDING APPLIED FINISH AND ARE GIVEN IN INCHES.</td> <td style="text-align: center;">DATE 11 JAN 55</td> <td style="text-align: center;">SCALE 1/2</td> </tr> <tr> <td colspan="3" style="text-align: center;">APPLICATION</td> <td colspan="3"></td> </tr> </tbody> </table>		DRAWN	CHECKED	APPROVED	COLLINS-RADIO CO. MANUFACTURING CO. 1621A PTA 51-93	SIGNAL CORPS	DEPARTMENT OF THE ARMY SIGNAL CORPS LABORATORIES	JENNETH	<i>[Signature]</i>			REVIEWED PME	FORT MONMOUTH NEW JERSEY	SM-D-34362Z	1	SM-D-248775	APPROVED HLY PME	Screwdriver	SM-B-249/98	559-0001-004	1	559-0140-002	ALL MATERIALS ARE TO BE PURCHASED IN QUANTITIES INCLUDING APPLIED FINISH AND ARE GIVEN IN INCHES.	DATE 11 JAN 55	SCALE 1/2	APPLICATION					
DRAWN	CHECKED	APPROVED	COLLINS-RADIO CO. MANUFACTURING CO. 1621A PTA 51-93	SIGNAL CORPS	DEPARTMENT OF THE ARMY SIGNAL CORPS LABORATORIES																												
JENNETH	<i>[Signature]</i>			REVIEWED PME	FORT MONMOUTH NEW JERSEY																												
SM-D-34362Z	1	SM-D-248775	APPROVED HLY PME	Screwdriver	SM-B-249/98																												
559-0001-004	1	559-0140-002	ALL MATERIALS ARE TO BE PURCHASED IN QUANTITIES INCLUDING APPLIED FINISH AND ARE GIVEN IN INCHES.	DATE 11 JAN 55	SCALE 1/2																												
APPLICATION																																	

DRAWING NO. EXP. NO.			Rev. 000-0000-00																			
NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR MANUFACTURE, PROCESSING, OR RELATED PURPOSES, THEY ARE DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION. THE UNITED STATES GOVERNMENT IS THE OWNER OF ANY INVENTION, DESIGN, DRAWING, OR OTHER DATA. IT IS THE POLICY THAT THE GOVERNMENT MAY FORMULATE, FURNISHES, OR IN ANY WAY SUPPORTS THE CONTRACTOR IN THE DEVELOPMENT OF INNOVATIONS. THE CONTRACTOR MAY NOT DISCLOSE THE INVENTION OR INNOVATION OR IN ANY MANNER LICENSE THE HOLDER OR ANY OTHER PERSON TO USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.			REVISIONS																			
			*FOR INFORMATION ONLY. CONTRACTOR MAY AT HIS OPTION DEVIATE FROM THESE PROCESS DETAILS. <table border="1"> <thead> <tr> <th>SYM</th> <th>DESCRIPTION</th> <th>DATE</th> <th>APPROVAL</th> </tr> </thead> </table>						SYM	DESCRIPTION	DATE	APPROVAL										
SYM	DESCRIPTION	DATE	APPROVAL																			
NOTES: 1. PART MUST BE #64660 AS SUPPLIED BY BRISTOL CO, WATERBURY, CONN., OR EQUAL, PROVIDING IT MEETS THE FOLLOWING REQUIREMENTS & DIMENSION SHOWN. DESCRIPTION: STRAIGHT, MULTIPLE SPLINE SOCKET SCREW WRENCH FOR #8 BRISTOL SET SCREW. FINISH: M262 PER SPEC MIL-F-14072.																						
			<table border="1"> <thead> <tr> <th>GENERAL PAGE NO.</th> <th>ITEM</th> <th>NUMBER</th> <th>PART NO.</th> <th>DESCRIPTION</th> <th>DATE</th> <th>MANU-SPEC</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>						GENERAL PAGE NO.	ITEM	NUMBER	PART NO.	DESCRIPTION	DATE	MANU-SPEC							
GENERAL PAGE NO.	ITEM	NUMBER	PART NO.	DESCRIPTION	DATE	MANU-SPEC																
			LIST OF MATERIAL COLLINS PART NO. 550-0100-002																			
<table border="1"> <thead> <tr> <th>DRAWN</th> <th>CHECKED</th> <th>APPROVED</th> </tr> </thead> <tbody> <tr> <td>RDG</td> <td><i>Am</i></td> <td></td> </tr> </tbody> </table>			DRAWN	CHECKED	APPROVED	RDG	<i>Am</i>		UNLESS OTHERWISE SPECIFIED: DECIMAL DIMENSIONS INCLUDING HOLE SIZES MAY VARY ±.005 FRACTIONAL DIMENSIONS INCLUDING HOLE SIZES MAY VARY 1/164 MACHINED ANGLES MAY VARY ±1° INSCRIBED ANGLES MAY VARY ±1° BROKEN ANGLES MAY VARY ±1° ECCENTRICITY BETWEEN ANY DIAMETERS ON THE SAME CENTERLINE SHOULD NOT EXCEED .005 INCHES. ALL DIMENSIONS ARE FINISH DIMENSIONS INCLUDING APPLIED FINISH AND ARE GIVEN IN INCHES.													
DRAWN	CHECKED	APPROVED																				
RDG	<i>Am</i>																					
550-0100-002-1 SM-B-2491975-1 -COLLINS NO. 550-0100-002 NEXT ASSY USED ON			WRENCH DEPARTMENT OF THE ARMY SIGNAL CORPS ENGINEERING LABORATORIES FORT MONMOUTH NEW JERSEY SM-B-2491975																			
APPLICATION			DATE 25 JAN 1955 SCALE 1/1																			
WHEN REFERRING TO THIS DRAWING STATE DRAWING NO., APPPLICABLE ISSUE SYMBOL, IF ANY, AND DATE																						

SHEET-TYPE C3000MUR EXP. NO... NOTICE: UNDER GOVERNMENT CONTRACT, INFORMATION CONTAINED HEREIN MAY NOT BE REPRODUCED OR DISSEMINATED, IN WHOLE OR IN PART, EXCEPT AS AUTHORIZED BY THE GOVERNMENT CONTRACTOR. THE UNITED STATES GOVERNMENT PROPERTY NUMBER AND CONTRACT NUMBER ARE IDENTIFIED ON THE DRAWING. THIS DRAWING IS THE PROPERTY OF THE UNITED STATES GOVERNMENT AND IS PROVIDED FOR GOVERNMENT USE ONLY. THIS DRAWING IS NOT TO BE USED FOR COMMERCIAL PURPOSES. ANY COMMERCIAL USE THEREOF MAY PROVE FELONIOUS, PUNISHABLE, OR IN ANY WAY INVOLVING THE GOVERNMENT CONTRACTOR. THIS DRAWING IS NOT TO BE COPIED OR REPRODUCED, IN WHOLE OR IN PART, EXCEPT AS AUTHORIZED BY THE GOVERNMENT CONTRACTOR. THIS DRAWING IS NOT TO BE USED FOR COMMERCIAL PURPOSES. ANY COMMERCIAL USE THEREOF MAY PROVE FELONIOUS, PUNISHABLE, OR IN ANY WAY INVOLVING THE GOVERNMENT CONTRACTOR.		* FOR INFORMATION ONLY. CONTRACTOR MAY AT HIS OPTION DEVIATE FROM THESE PROCESS DETAILS.																																									
REVISED BY DATE APPROVAL																																											
EOL 540-7882006																																											
		REVISIONS <table border="1"> <thead> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>DATE</th> <th>APPROVAL</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		REV	DESCRIPTION	DATE	APPROVAL																																				
REV	DESCRIPTION	DATE	APPROVAL																																								
<p><i>GANG OR FILE TO ACCURACY TO PRODUCE PERFECT SMOOTH</i></p> <p><i>STAKE WRENCH(2) INTO HANDLE(1.)</i></p>																																											
<p>NOTES:</p> <p>1. PRESS WRENCH (2) INTO HANDLE (1) AS SHOWN. 2. WRENCH ASSY MUST WITHSTAND TORQUE OF 10 INCH LBS WITHOUT SLIPPING.</p>																																											
<table border="1"> <thead> <tr> <th>COLLATING-PART-NR.</th> <th>ITEM</th> <th>RESD</th> <th>PART NO.</th> <th>DESCRIPTION</th> <th>MATL</th> <th>MATL SPEC</th> <th>NOTES</th> </tr> </thead> <tbody> <tr> <td>559-0102-002</td> <td>2</td> <td>1</td> <td>SM-B-249197</td> <td>WRENCH</td> <td></td> <td></td> <td></td> </tr> <tr> <td>559-0407-002</td> <td>1</td> <td>1</td> <td>SM-B-249109</td> <td>HANDLE</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="8">LIST OF MATERIAL</td> </tr> <tr> <td colspan="8">COLLATING-PART-NR. 559-0102-002</td> </tr> </tbody> </table>				COLLATING-PART-NR.	ITEM	RESD	PART NO.	DESCRIPTION	MATL	MATL SPEC	NOTES	559-0102-002	2	1	SM-B-249197	WRENCH				559-0407-002	1	1	SM-B-249109	HANDLE				LIST OF MATERIAL								COLLATING-PART-NR. 559-0102-002							
COLLATING-PART-NR.	ITEM	RESD	PART NO.	DESCRIPTION	MATL	MATL SPEC	NOTES																																				
559-0102-002	2	1	SM-B-249197	WRENCH																																							
559-0407-002	1	1	SM-B-249109	HANDLE																																							
LIST OF MATERIAL																																											
COLLATING-PART-NR. 559-0102-002																																											
<table border="1"> <thead> <tr> <th>DRAWN</th> <th>CHECKED</th> <th>APPROVED</th> </tr> </thead> <tbody> <tr> <td>Hamer</td> <td>Rho</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>		DRAWN	CHECKED	APPROVED	Hamer	Rho											<p>UNLESS OTHERWISE SPECIFIED: DECIMAL DIMENSIONS INCLUDING HOLE SIZES MAY VARY $\pm .005$ FRACTIONAL DIMENSIONS INCLUDING HOLE SIZES MAY VARY $\pm 1/64$ ANGLES AND RADII MAY VARY $\pm .1^\circ$ BEARING ANGLES MAY VARY $\pm .25^\circ$ BROKEN ANGLES MAY VARY $\pm .1^\circ$ ECCENTRICITY BETWEEN ANY DIMENSION ON THE SAME CENTERLINE AND THE CENTERLINE OF ANOTHER DIMENSION IS $\pm .005$ ALL DIMENSIONS ARE PRIMIUM DIMENSIONS INCLUDING APPLIED FINISH AND ARE GIVEN IN INCHES</p> <p>COLLING-RADIO-00: C-100-AUTOMATIC 14214-PH- 51-93</p> <p>SIGNAL CORPS</p> <p>REVIEWED PME</p> <p>APPROVED HLY PME</p> <p>DATE 15 DEC 55</p> <p>SCALE 1/1</p> <p><i>WRENCH ASSY</i></p>																										
DRAWN	CHECKED	APPROVED																																									
Hamer	Rho																																										
<table border="1"> <thead> <tr> <th>COLLATING-PART-NR.</th> <th>ITEM</th> <th>RESD</th> <th>PART NO.</th> <th>DESCRIPTION</th> <th>MATL</th> <th>MATL SPEC</th> <th>NOTES</th> </tr> </thead> <tbody> <tr> <td>559-0001-001</td> <td>1</td> <td>SM-D-248176</td> <td>SC-DL248175</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COLLATING-NR.</td> <td>QTY</td> <td>NEXT ASSY</td> <td>USED ON</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		COLLATING-PART-NR.	ITEM	RESD	PART NO.	DESCRIPTION	MATL	MATL SPEC	NOTES	559-0001-001	1	SM-D-248176	SC-DL248175					COLLATING-NR.	QTY	NEXT ASSY	USED ON					<p>DEPARTMENT OF THE ARMY SIGNAL CORPS ENGINEERING LABORATORIES</p> <p>FORT MONMOUTH NEW JERSEY</p> <p>SM-B-249114</p>																	
COLLATING-PART-NR.	ITEM	RESD	PART NO.	DESCRIPTION	MATL	MATL SPEC	NOTES																																				
559-0001-001	1	SM-D-248176	SC-DL248175																																								
COLLATING-NR.	QTY	NEXT ASSY	USED ON																																								

Revision 2G end.

Revision 2H start:

Using the unbalanced C or the balanced Twinax connector

This subject has had and still does get a lot of attention (as recently as this week):

Scott, Barry (Clyde B)

Thu, 18 Jul 2002 08:20:26 -0500

- Next message: [R-390] Antenna question

Gang,

What is/was the recommended "standard" antenna and feed line for the R390A? Is there 150-ohm feed line (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" feed line.

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.

Thanks,
Barry(III) – N4BUQ

Larry Haney, 7/9/2021 – I remember numerous discussions on this subject over the years. Thomas got it right with his reply:

Thomas W Leiper

Thu, 18 Jul 2002 12:39:17 -0400

Next message: [\[R-390\] Antenna question](#)

On Thu, 18 Jul 2002 08:20:26 -0500 "Scott, Barry (Clyde B)" <[\[email protected\]](mailto:)> writes:
> What is/was the recommended "standard" antenna and feedline for the
> R390A?

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 feed line 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 feed point of a resonant half wave dipole.

Larry Haney, 7-9-2021 – If you are using coax longer than 15' long to connect your antenna to your R-390x, you are using a low impedance feed line and should be connecting it to the 'balanced' low impedance antenna input (Twinax). The R-390x balanced input is designed for 50 to 200 ohm input with very minimal mismatch loss. If you connect a low impedance antenna feed line to the unbalanced C input (high impedance), you are bypassing a very important impedance matching tuned transformer on the input. This also allows the unwanted signals from the low impedance feed line to enter the RF amp because the C input is very high impedance and the high impedance tuned circuit on the front end can not block or reduce them due to the low impedance input.

Revision 2H end.

Spare tubes organization software:

Hank (Dan) Arney, hankarn at pacbell.net, Sun, 30 Dec 2001 03:52:49 -0800

Ken, Someone on the list had an EXCEL spreadsheet for tube inventory that was good and you could change it to suit your needs. I lost it due to having to reformat to kill a worm. Would sure love to find it again.

Hank

Larry Haney, 7/4/2020 - There is a free spread sheet program available for Windows. It is part of the 'Open Office' org software at OpenOffice.org. I have not set up my tube inventory in a spread sheet, yet.

Revision 1D start:

Temperature compensating capacitors:

millerke6f at aol.com, *Thu Dec 10 23:40:31 EST 2015*

[R-390] Negative temperature coefficient capacitors

Check Surplus sales of Nebraska. They list a pretty wide selection of N type and NPO types see: <https://www.surplussales.com/Capacitors/RF-TempDogbone.html>

Cheers

Bob, KE6F

Larry Haney, 7/25/2020 - NTC (Negative Temperature Compensating) capacitors are not very easy to find, but Surplus Sales of Nebraska does carry a fairly large supply of them, the **last two entries** in their 'capacitor' listing are NTCs: '[Uncased Silver Micas](#)' and '[Temperature Compensating: Dogbone Ceramic](#)'. The first being the type usually found in Collins VFOs and BFOs (BEWARE – these are very fragile). Here's the link to their cap page: <https://www.surplussales.com/homenew.html#Capacitors>

Revision 1D end.

Revision 4L Start:

The reason I included this next post is that it is important to know why the R-390A Navy Tech Refs and the Y2K R3 Tech Ref specify the input to the R-390A, in the Signal to Noise Ratio Test procedure, to use the 'Unbalanced' input.

Signal to Noise Ratio Test and Navy Field Change 5

Larry H [larry41gm %20%40gmail.com](mailto:larry41gm%20%40gmail.com)

Tue Mar 22 00:20:50 EDT 2022

I just finished writing a small doc that explains why the R-390A Navy Tech Refs and the Y2K R3 Tech Ref specify the input to the R-390A in the Signal to Noise Ratio Test procedure to use the 'Unbalanced' input. I also explain why Navy Field Change 5 was necessary. And, I documented my recommended Signal to Noise Ratio Test procedure. It's at the end of the References section. Here's a direct link to it: R390A Measuring Sig to Noise Ratio.pdf (r-390a.net) <<https://www.r-390a.net/R390A%20Measuring%20Sig%20to%20Noise%20Ratio.pdf>>.

Revision 4L end.

Revision 6N Start:

The MK-288 Adapter Kit for the URM-25

The MK-288/URM Impedance Adapter Kit was made to be used with the AN/URM-25 signal generator for use when testing the R-390 family of receivers. This was necessary in order to correctly match the antenna input impedances on these receivers to the signal generator. The impedance adapters in this kit can be used on any signal generator that has a 50 ohm output impedance. The importance of matching the impedance is so that the AN/URM-25 Signal generator will read the correct signal level output on its meter.

It is important to know the actual signal level being fed into the R-390s when doing S/N ratio and Sensitivity measurements. In most other cases, it is not important to know the actual signal level when doing circuit diagnosis or debugging.

The documentation for this kit was done in the Army Technical Bulletin TB SIG 319. A link to it on the Radio Nerds website is here: [nfe82b2.tmp \(radionerds.com\)](#). Another link to it is in the bottom of the 'Army' section of the 'References' page on our website.

This kit contains the DA-121 adapter and others for the R390x connection to an AN/URM-25. It shows the schematics of the four adapters DA-121 through DA-124 and when they are to be used.

Revision 6N end.

Revision 9R Start:

The R-390A Mechanical Filter 'killer' cap C553:

There's one **important thing to do BEFORE** you power it on the first time. Replace C553. See the following post on our 390 forum:

Date: Tue, 28 Oct 1997 09:42:17 +0000
From: cripel@... (Chuck Rippel)
Subject: [R-390] Re: Why filters go bad - viz. bad caps

It's C-553, the 0.01 plate blocking capacitor for V-501. It's too low a voltage to begin with; a condition aggravated by the multiplicity error caused by the high voltage transformer. That Vitamin-Q cap (that is there from the factory) shorts and the B+ then has full run of any mechanical filter selected and opens the fine wire inside. Since the frequency involved is 455kc at that point, change C-553 to a 600V 0.01 Orange Drop.

Even if C553 is not bad now, it will go bad and take out whichever mechanical filter the bandwidth is set to. The following information was given to me by Charles Steinmetz: a good cap is an SBE series 225P, 418P or 715P (the 715P are a little larger as they are made of Polypropylene). These are Orange Drops and the construction is 'film and foil'. Do not use 'metalized film' caps. They are designed to be 'self healing'. Unfortunately, the process of 'self healing' can draw enough current to permanently damage a Mechanical Filter.

Revision 9R End.