Real Audio for the R-390A Revisited

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It's certainly been gratifying over the last few years to note how many people have seized tools and soldering iron and made a great receiver even better by upgrading the audio section according to my original ER article in issue number 42 October, '92. As I noted previously, the RF design of the R-390A is second to none and will never be duplicated, but the audio sections were deliberately designed to deliver only a restricted-bandwidth signal at a level of perhaps a half watt. Not only that, but a close examination of the original Collins designed audio chain reveals that feedback has been added to the amplifiers in a deliberate attempt to further restrict dynamic range. I can only make educated guesses as to why the receiver was designed in this manner, but it suffices to say that while the original audio section was adequate for CW, RTTY and local monitoring purposes through a typical military "tinbox" speaker or communications headphones, it certainly isn't up to the task where quality, wide-range audio is desired with the use of today's limited efficiency high fidelity mini-speakers. And if anyone's noticed, today's speakers are usually 4 to 8 ohms- not 600!

Having modified a number of audio chassis for individuals over the last couple of years, I've gone up the learning curve regarding my original design. With a number of my originally modified chassis having been used for several years, sometimes on 365 x 24 duty, it can be said the circuit is as bulletproof as the rest of the receiver - the tubes and components are run so conservatively that no failures have been reported to me. The tubes in my own receiver still check at 100% in my tester. About two years ago I made some minor revisions to the design in response to a minor annoyance and in an effort to achieve an even better sound.

The annoyance I'm referring to is that the sound quality of the original design was to some extent dependent on the brand of 6BA8 tube used. While the sound with any tube used was always pretty good, nevertheless I felt the circuit should perform in a more consistent manner from unit to unit. I ran a number of 6BA8 tubes through exten-

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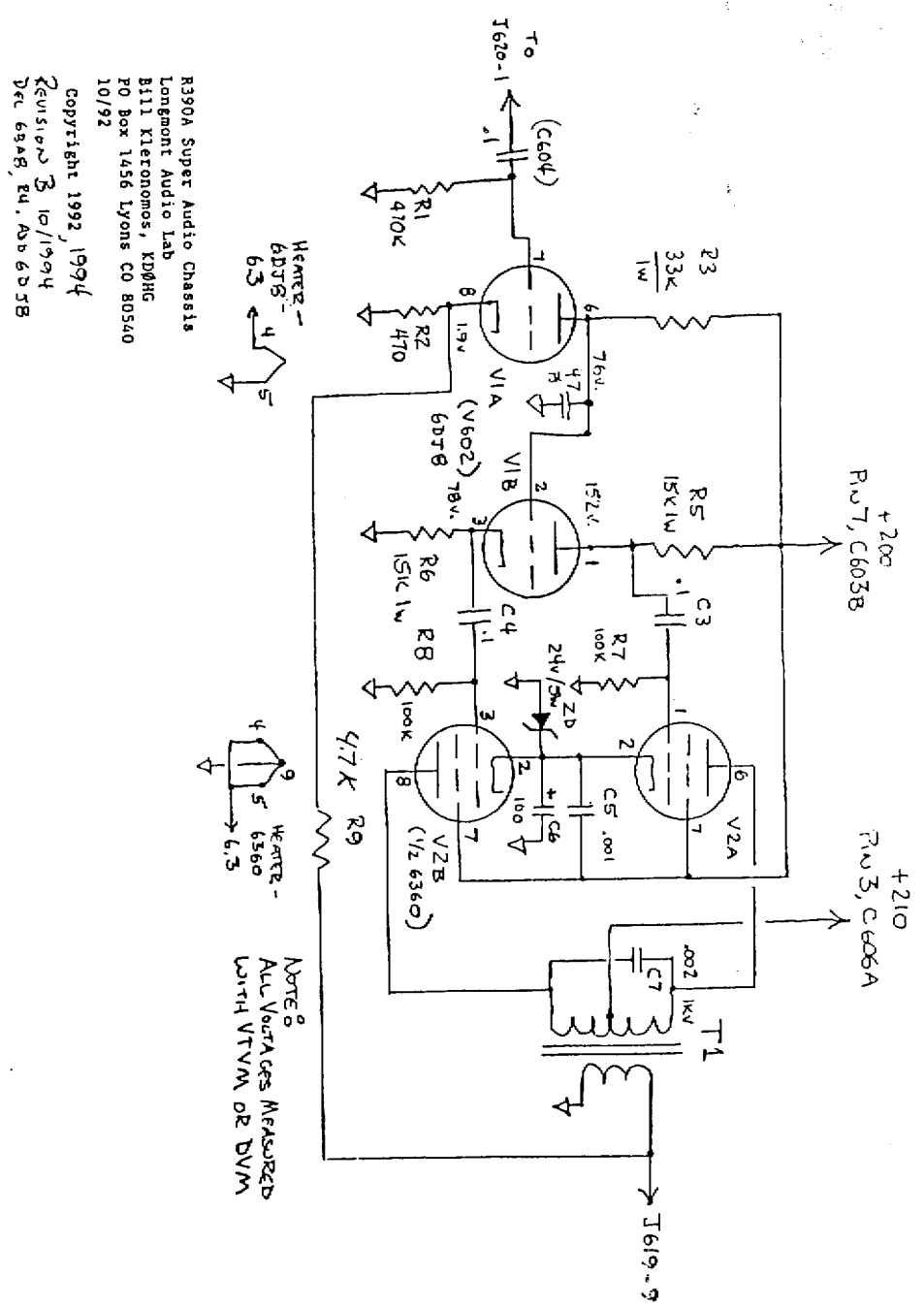
Parts List

R1 470K, 1/2W
R2 470,1/2W
R3 33K, 1W
R5, R6 15K, 1W
R7, R8 100K, 1/2W
R9 4.7K, 1/2W
C1 (C604) .1 uF metal film, 100V
C2 33 to 47 pF, 300 volt
C3, C4 .1 uF 250 volt
C5 .001 uF 1 KV ceramic
C6 100 uF, 25 to 30 volt electrolytic
C7 .002 uF, 500 volt metal film
T1 8000 ohm to 8 ohm PP output transformer, @ 8 watts. Antique Electronic Supply #PT-291 suggested.
V1 6DJ8 or 6922
V2 6360
ZD 24 volt, 5 watt zener diode



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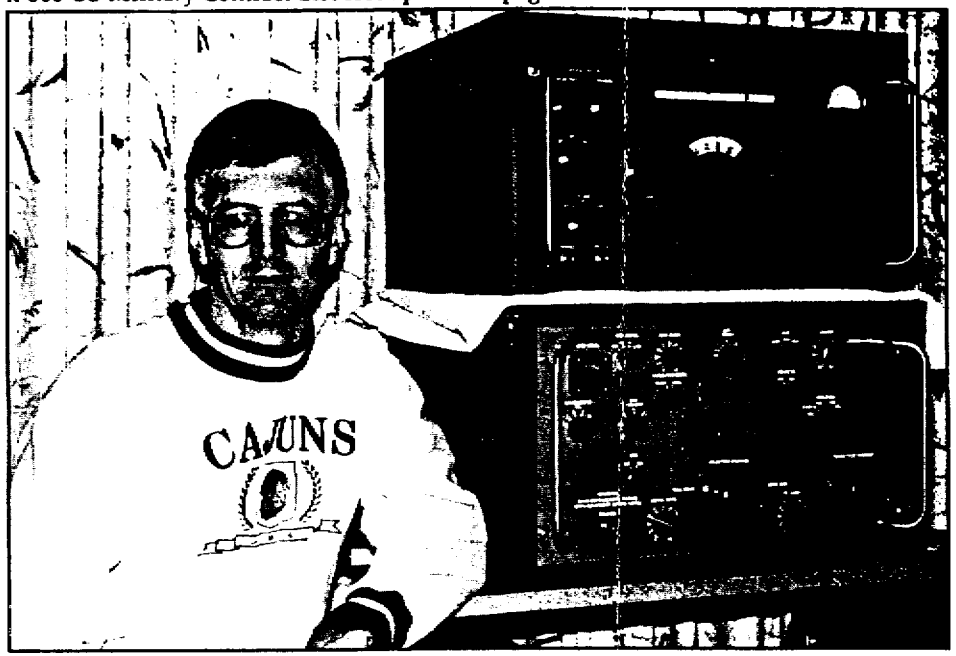

The author with his two of his favorite receivers: R-388, top; R-390A, bottom.

me by an owner, so it can be inferred that at least that many were made under each contract. A high s.n. of "0" means that from various pieces of documentation this is a known contract, but no examples surfaced in my survey.

Compiling an R-388 contract list is like counting stars; there is a finite number out there, but each time you count, the number gets higher. It would appear that Uncle Sam placed many orders of small numbers. Interestingly enough, the R-388 orders go out well beyond the dates of availability of the new R-390 and R-390A. Perhaps this was for reasons of economy or ease of use.

According to the information available, all R-388's were made by Collins.

Not shown in the list below is a contract for R-388A's (same radio, but with mechanical filters, equivalent to the Collins 51J-4), NObsr-69046. I don't have any serial number data for this contract, however civilian serial numbers as high as 7000 have been contributed. There were likely some radios made for government agencies other than the military.

Future installments will cover the R-389, R-390, R-391, R-392, and R-725.

Any info on these rigs contributed now would make the future installments all the more complete. ER

R-388 US Military Contract List

NObsr-49132 (AN/URR-23A) 91
NObsr-52527 (AN/URR-23A) 180
19624-PHILA-50 976
1908-PHILA-51 355
3096-PHILA-51 8
3131-PHILA-51 919
3155-PH-51 1379
3164-PH-51 153
3167-PHILA-51 491
3357-PHILA-52 1672
3362-PHILA-52 109
3469-PHILA-52 20
3470-PHILA-52 1449
25635-PHILA-53-36 2193
25067-PH-54-55 363
21318-PH-56 88
30951-PH-56 0
30951-PHILA-57 0
37003-PC-62 171
Total of high serial numbers 10617

supply before the 866A mercury vapor rectifiers had time to warm up. I tried a scheme of connecting the filament of a 12H6 twin diode in series with the bleeder of the bias supply and operating a relay from current passed by the diodes. The 5R4GY bias rectifier had to warm up before the 12H6 started to warm up which gave a 22 second delay. It would also provide protection from bias supply failure. The use of the 12H6 for extra delay was discarded to save cost, most of which was due to the need for a 300 mA bias supply instead of 75 mA. This deletion reduced the delay to approximately 5 seconds which meant that the operator had to be the "30 sec. timer".

The Boonton Q-Meter was a very important RF test instrument. We could use it to measure coil inductance and Q, capacitance, and coefficient of coupling between coils. A neon bulb on the end of an insulating rod was also very helpful. We used it to search out parasitic circuits. HF caused a pink glow, a LF parasite caused a yellow glow and a violet glow indicated a VHF parasitic oscillation. We could follow the resonant circuit path by moving the bulb along the circuit path where the color was strongest.

Models 30K-2, 3, 4, and 5

These were all intended for commercial service. There were some users who wanted to be able to communicate between different locations independently of the telephone system. One example was the Corps of Engineers who controlled the water flow through dams. All they needed was a day and a night frequency. These transmitters were crystal controlled with two sets of tuned circuits. Relays were used to switch the tuned circuits from one frequency to the other. They used single-ended pi-networks for the RF output networks. As I remember, most of the differences between models were related to methods of remote operation.

Concluding Remarks

It was fun working on the development of this transmitter. The Company allowed us quite a bit of freedom to use ingenuity in our designs. Most of the engineers at Collins were hams and they frequently stopped by to see how it was coming. I had lots of free advice. My office mate was Lou Couillard who was developing the 75A receiver at the same time. A color photograph of the 30K in the laboratory appeared on the cover of the November issue of *RADIO NEWS*. Clyde Hendrix, WØHBG, came to Cedar Rapids to personally take delivery of serials No. 1 of the 75A and the 30K with the 310A exciter. Years earlier he had purchased a Collins 30FXB when the company was just getting started. ER

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tude of RTTY signals. My final score showed 30 valid exchanges and two QSO's with fellows who were simply curious. I think the chirpy, raspy TNT signal was a success. Several people commented on it - N2EZ said it was the lousiest signal on the band! Hooray! Halfway through the contest, I loosened the antenna coupling slightly, dropping the output to 2.5 watts. This seemed to steady the signal a bit. I feel that the project was a complete success except for one thing - I didn't receive a single OO (official observer) notice! Maybe next year I'll short out the filter choke! ER

References

1. ER #82, Feb. 1996
2. ER #83, March 1996
3. Old-Timer's Bulletin, Antique Wireless Ass'n, Dec. 1987

To join AMI send $2 to:
AMI
Box 1500
Merrimack, NH 03054

From: bowes@ibm.net
Received: from x6.boston.juno.com (x6.boston.juno.com [205.231.101.23])
by x15.boston.juno.com (8.6.13/8.7.Alpha.4/1.34.kim) with ESMTP id VAA05445
for <philw7bw@juno.com>; Tue, 24 Dec 1996 21:28:57 -0500
Received: from uro.theporch.com (uro.theporch.com [192.150.244.11])
by x6.boston.juno.com (8.6.13/8.7.Alpha.4/1.34.kim) with ESMTP id VAA08898;
Tue, 24 Dec 1996 21:28:50 -0500
Received: from uro (localhost.theporch.com [127.0.0.1])
by uro.theporch.com (8.8.4/AUX-3.1.1)
with SMTP id UAA04955;
Tue, 24 Dec 1996 20:24:56 -0600 (CST)
Return-path: boatanchors@theporch.com
Reply-To: bowes@ibm.net
Sender: boatanchors@theporch.com
To: Multiple recipients of list <boatanchors@theporch.com>
Date: Tue, 24 Dec 1996 20:24:56 -0600 (CST)
Subject: R390a Audio Mod Info Offer
Message-ID: <9612250547.AA0110@localhost>
X-Status: Read
X-Mailer: Ultimedia Mail/2 Lite, IBM T. J. Watson Research Center

R390A Audio Mods

Given the number of responses that I have had in the past three hours regarding the R390a audio mods, I, at my own peril, will make the following offer to all list members and any other solder-smoke sniffing hams who might desire such information in order to raise the levels of deposited lead in their bloodstreams.

As I mentioned in an earlier post, I have gone through the information in the original ER article by Bill Kleronomos and done some revisions and refinements. The revisions are relatively minor and mostly involve the fattening up of a couple of the caps in the audio stream which were left at their original size in the ER article. The refinements are that I have gone through and documented part placement for each of the components involved in the modification, and I have redrawn the schematic on the computer in order to make it more readable. The schematic indicates the placement of the parts i.e., on TB601 or on the audio chassis proper.

Included with the schematic is the full parts list for the modification, and a few hints and kinks as to how to best reutilize the existing terminal board and wiring harness. The information also includes what changes must be made to the wiring harness in order to facilitate the mod. All told, the information that I have compiled should allow nearly any industrious ham possessing above "tech-lite" skills to go ahead and do the 6360 "Kleronomos" mod with a minimum amount of head scratching and aggravation.

Now for the offer:

If you will send me $3.00 "AND" an SASE, I will send you a copy of the information that I have put together regarding this mod. This info will not include a copy of the original article as it is probably copyrighted by ER and I don't need to get into that hassle. I believe that you will find

From: "Lon W. Cottingham" <k5jv@swweb.net>
Received: from x11.boston.juno.com (x11.boston.juno.com [205.231.100.26])
by x15.boston.juno.com (8.6.13/8.7.Alpha.4/1.34.kim) with ESMTP id XAA26893
for <philw7bw@juno.com>; Tue, 24 Dec 1996 23:51:49 -0500
Received: from uro.theporch.com (uro.theporch.com [192.150.244.11])
by x11.boston.juno.com (8.6.13/8.7.Alpha.4/1.34.kim) with ESMTP id XAA19698;
Tue, 24 Dec 1996 23:51:42 -0500
Received: from uro (localhost.theporch.com [127.0.0.1])
by uro.theporch.com (8.8.4/AUX-3.1.1)
with SMTP id WAA06742;
Tue, 24 Dec 1996 22:50:27 -0600 (CST)
Return-path: boatanchors@theporch.com
Reply-To: k5jv@swweb.net
Sender: boatanchors@theporch.com
To: Multiple recipients of list <boatanchors@theporch.com>
Date: Tue, 24 Dec 1996 22:50:27 -0600 (CST)
Subject: Fw: R-390A Audio
Message-ID: <199612250450.WAA06706@uro.theporch.com>
X-Status: Read
X-Mailer: Microsoft Internet Mail 4.70.1155

R390A Audio

Greetings All:

Since I'm not a current BA subscriber, I don't know if this message will be posted--but this is in response to the earlier posting by Lon, K5JV re: my audio chassis mod that I was just sent a copy of via e-mail.

First, let me thank Lon for his kind words!
Let me make some corrections to his posting....

The article I wrote in ER, October 1992, Vol # 42, "REAL AUDIO FOR THE R-390A" that Lon refers to contains some typographical errors. If you choose to "roll your own", make sure to obtain the following issue for the corrections! I have since revised the circuit published in the article and the current design has more consistent and better performance than the published one both overall and with respect to normal component variations.

I still am doing the modification, but I will be moving sometime in the next couple of months and during the move I won't be able to accept any orders. Please reply by e-mail (wkleros@csn.net) or call (303) 823-6438 if interested.

Best to all-

-Bill
KD0HG

USED FOR 6HQ5 AUDIO MOD
→ 2900 = 4W 2901 = 8W 2904 = 18W

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(For Single or Push-Pull Pri.)

PRI.: PLATE START BROWN, B+ RED, PLATE FINISH BLUE

FOR SINGLE PRI. USE BROWN FOR B+ BLUE FOR PLATE

SINGLE	43-45-50-2B6 6L6-6P6 25A7G-25A6	31-33-42-47 59-89-2A5 6B5-6F6-6N6G	89-1G5G-6K6G 6A4	41-49-6G6G 6K6G	10-38-950 12A7-1J5G
PUSH-PULL	48-2A3-6A3 6A5G-6B4G 6L6-25L6	45-46-59-79 6L6-6Y7G	30-43-50-53-2B6 6V6-6N7-12A5	19-42-49-52-89 6A6-6B5-6F6 6N6G-1J6G	41-47-79 1G5G-6A4-6K6 6Y7G-31-33

SEC. TAP	VOICE COIL IMPEDANCE — OHMS				
2-3	.17	.30	.34	.42	.59
3-4	.19	.34	.38	.48	.68
4-5	.30	.53	.61	.76	1.06
1-2	.51	.89	1.02	1.27	1.78
2-4	.73	1.28	1.46	1.82	2.54
5-6	.83	1.44	1.65	2.06	2.89
3-5	.96	1.67	1.92	2.39	3.35
1-3	1.27	2.23	2.54	3.18	4.46
2-5	1.97	3.45	3.94	4.92	6.90
4-6	2.12	3.70	4.22	5.30	7.40
1-4	2.48	4.32	4.92	6.18	8.65
3-6	3.60	6.30	7.24	9.00	12.6
1-5	4.45	7.80	8.90	11.1	15.6
2-6	5.32	9.35	10.70	13.3	18.7
1-6	9.15	16.0	18.3	22.8	32.0
PRI. LOAD IMPEDANCE	4000	7000	8000	10000	14000