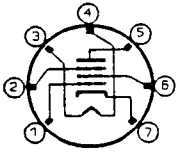


HOLLOW STATE NEWSLETTER

"For lovers of vacuum tube radios"



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EDITOR'S AND PUBLISHER'S CORNER

As your new editor, this is my first 'stab' at putting together a complete newsletter (or any other wide-spread publication) and I hope it lives up to your expectations. Comments and suggestions, as well as **contributions**, are requested.... By now you should have had a chance to examine the new index sent recently to all current subscribers. In addition to adding material from this and future issues, are there any other important items or references that might be added? Admittedly, it's heavy on the R-390 stuff, but that's been the heavy emphasis in *HSN* from day one.... Please look this issue over closely ... it's really **your** newsletter and it must reflect **your** interests.

From our publisher, Ralph Sanserino --- Ralph has asked me to add a couple of things: It's important that **all** checks or money orders for subscriptions, back issues, etc. be made out to him. *HSN* is not the publication of some formal 'club' which has officers, bank accounts, etc. Everyone, especially those who provide the materials for publication and not just the editor and publisher, are volunteers. To keep our costs down, Ralph handles the money personally rather than incur the extra expense of a commercial account. In addition: The new *HSN Index* was mailed in mid-December to all current subscribers. If you didn't receive yours, drop Ralph a line and one will be sent post-haste.

Happy Holiday's
Reid

Paul Tice from Coopersburg, PA sends us his suggestions for ...

CLEANING AND LUBRICATING THE R-390A GEAR TRAIN

A detailed stripping to clean and lubricate the R-390A gear train is a task that I would not want to do, but when 25+ years of dust and hardened lubricants started to get into the works, I had to do something.

I have had great success with a product called **CRC Lectra-Motive Cleaner**. It is available in both spray cans and gallon containers, and is available at NAPA auto parts stores. I bought a gallon of the stuff, put it into a refillable sprayer, and washed off all of the moving parts. It is NOT like tuner cleaner, and leaves no residue and should not be sprayed into the PTO or other controls.

Once the gear train is cleaned, it needs to be lubricated and I used a product called **COMPU-LUBE**. It is Teflon-based and does not appear to harden in use. It also penetrated like crazy so be very sparing in its application. It is available from Flouramics, Inc. (103 Pleasant Ave., Upper Saddle River, NJ 07458; 1-800-922-0075 or in NJ 201-825-8110). They also produce several other interesting products, but since they are NASA suppliers, they are not cheap. It is about \$10 for a one-ounce bottle, but it really works.

I cannot stress enough that these products are *different* from many conventional materials and you should read the label instructions carefully before you use them.

Alan is a new subscriber to *HSN* but not to tube technology. He has been published in *The Audio Amateur* and *Radio Age*. Excited enough to buy a set of back issues, he offers us...

PROFESSIONAL TEST GEAR ON A BUDGET

Alan Douglas, Box 225, Pocasset, MA 02559

Good test equipment, like good radios, used to be very expensive. If you grew up with a Hallicrafters or Knight-kit receiver, you probably also made do with Heathkit or Eico test gear. But times have changed. Now you can buy the finest radios ever made for peanuts. Likewise, you can own real test equipment. I won't claim that vacuum-tube test gear is better than the modern stuff, but it can be just as good, if you don't mind the size and weight, and the fact that it uses (horrors!) tubes.

Commercial users must recalibrate their equipment every six months to a year. This considerable expense quickly exceeds the original price of the instruments, especially if factory repairs or replacement parts are needed, so it's not surprising that large companies dump perfectly good equipment. Also, government contracts come and go, as do the companies themselves. When they do, their loss can be your gain.

RF GENERATORS

RF generators can be pretty simple. Ham shacks, cellar workshops, even TV service benches are full of them. Sure, a Heath will put out a signal for aligning your radio, and is perhaps all you need. But it is a real pleasure to own a generator that puts out a clean signal, stays where you set it, and has a calibrated output with no leakage. It's the difference between tuning a Hallicrafters S38 and a Hammarlund SP600. Yes, a Hewlett-Packard 606A does handle as smoothly as an SP600. Jeez, if H-P ever made receivers ... well, they did, actually, but called them wave analyzers or selective voltmeters. But most of them were not hollow-state, so that's another story. Back to business.

My first signal generator was a Lafayette ("you pays your money, and they're laughing yet") made in Japan. It worked all right, in conjunction with an LM frequency meter to tell where you were. But when Bill Slep advertised TS413/U generators for about \$100, I bought one. It arrived in its original shipping trunk, and has worked more or less flawlessly for 20 years. Its weak points: the dial could be more accurate (it does have a crystal calibrator though), it will only modulate to 50%, and it is calibrated into an open circuit. On the plus side, being able to read output and modulation simultaneously on two meters is really convenient.

I had no immediate plans to replace the TS413/U, but a friend asked me to find him an RF generator at the Deerfield flea market on my semi-annual pilgrimage. I came across a scrap-metal dealer with a pallet full of URM-25Ds that had seen better days. Since I was his first customer I picked out the three best ones in matching brands (Trad Television, whoever they were) and with the most lid accessories, figuring I could make one good one from the three, and paid him \$50. He'd probably have sold me the whole two dozen for \$100 but I didn't know I wanted them. In any event, I did assemble one complete generator when I got home, for my friend, and another one which I kept for myself, and the third one needed some noisy pots cleaned but it worked, too. The URM-25 is well-made, compact, and nice to use. Its defects include its compactness, which makes it hard to service, and the single meter for both RF output and audio modulation that requires constant switching back and forth. But the calibrated output make up for everything. As previously noted in HSN, it uses odd dial lamps (but I already had some from old aircraft instruments) and the meters may stick (mine didn't, but a bit of masking tape or a toothpick should remove the offending rust particle or whatever, if you can borrow the use of a stereo microscope). There is a URM-26 series of generators that looks superficially like the URM-25, but covers 4 to 400 MHz.

The ultimate vacuum-tube RF generator is the Hewlett-Packard 606B. It's big, no question, but the panel space is necessary for the large dial and the two meters. It's beautifully made and a joy to use, has better specs than the receivers you'll be calibrating, and needs no exotic tubes. 606As turn up everywhere now, for \$100 or so. The B model has an auxiliary RF output for a frequency counter, and a little tweaker control for setting the output to the last .0000 (you know how it is, when you're watching a digital display). 1968 prices were \$1350 and \$1550 for the 606A and B models.

Incidentally, a frequency counter can be used with the TS-413/U or URM-25D, both of which have high-level BNC output jacks on the front panel. The only thing to watch is that leakage from the coax cable doesn't

interfere with low level measurements.

FREQUENCY COUNTERS

If I might sneak in a word about counters: the only sensible course nowadays is to buy a modern instrument, but if you just like the older ones, I suggest the H-P 5245 counter. It has all the "advantages" of vacuum-tube equipment -- size, weight, and a noisy fan -- but is completely transistorized. Seriously, its big advantage is the Nixie readout, visible from across the room. The 5245 is easy to use, accurate, and cheap. I bought mine from a test-equipment dealer at Deerfield for \$20 (its marked price!) because it had a bent switch shaft and broken knob. I took it home, bent the shaft straight again, swapped the knob with one on the back panel, and presto. A resistor in series with the fan quiets it considerably. If you're paying very much for a 5245, you should plug it in and verify that it reads 10000.000 in self-check mode. If it does not, the mischievous digit module can be moved over to the extreme left where you'll never use it, but be warned. The 5246 is a budget version with fewer operating modes (and, if they weren't installed as options, fewer digits and a less-accurate crystal standard). Both models will work fine without plug-ins and are complete in themselves. The plug-ins improve sensitivity (to 1 mV, 5261 video amp) or extend the frequency range beyond 50 Mhz (5253 converter, but don't buy one with a sluggish tuning dial).

AUDIO GENERATORS

An audio oscillator is perhaps less useful than an RF generator (unless you do audio design or servicing) and the RF models do have uncalibrated audio outputs at 400 and 1000 Hz. But if you want something better, you can hardly go wrong with a Hewlett-Packard 200CD, 5Hz - 600 KHz. I don't know how many millions of these things they made, but it's right up there. They work well, last forever, and are cheap at flea markets, typically \$30. There are other models that look the same, with different frequency coverage, and there are rack-mounted versions, but the 200CD is most common. It has no output attenuator; that's a separate box, an H-P 350D, 0-100 dB in 1 dB steps, 600 ohms.

OSCILLOSCOPES

If you're in the market for a scope, the new ones are really bargains, and getting cheaper all the time. But if ya gotta have a tube model, then buy Stan Griffiths' book on Tektronix scopes and study up (available from Antique Electronics Supply). He's hot on 535s and 545s, which I find a bit bulky (the first word that came to mind was humongous). I use a 506, with a 561A (essentially identical) for backup and because it came with a plug-in I wanted. I also have a T912 congealed-state model that I don't like very much but it was cheap. Hewlett-Packard and others also made scopes but Tek parts and plug-ins are much easier to find.

CAPACITANCE BRIDGES

Yeah, you can buy hand-held digital capacitance meters now that run rings around the old ones, and if all your capacitors were perfect and you only needed to know their value, great. But capacitors aren't perfect. Definitely not the ones in old radios, the kind you want to replace if bad, but leave alone if they're good. You'd also like to check your replacement stock, especially if they came from a flea market or have been around for a long time. That means leakage as well as capacitance value. An ohmmeter will give a vague indication of leakage, at a low voltage. There were at least a couple dozen hobbyist or servicemen's capacitance bridges made by Sprague, Heath, Eico, etc. that incorporated a leakage test at

high voltage, usually a magic eye tube (by the way, they're called bridges because they use a circuit similar to a Wheatstone bridge). At least one military model, the ZM-3A/U made by Shallcross, also had a leakage test. This ZM-3 is easy to spot across a parking lot, with its red, yellow, and green panel and the entire operating manual printed on it. A friend of mine swears by his.

Laboratory bridges measure capacitance and dissipation and will catch leaky capacitors even though they don't measure leakage directly. They also measure inductance (and Q) and resistance. The granddaddy of RLC bridges is the General Radio 650A from the 1930s. It works but is a real clunker to use. Its replacement, the 1650A or B, was much smaller and more convenient, and very popular. It's self-contained and battery-powered. Trouble is, no one gets rid of them, so they're not cheap. Except the one I bought for \$40 and I found out why, soon enough, though it works fine now. The very best RLC bridge, in my opinion, is the Hewlett-Packard 4260A (designed, if not made, in Japan) which cost \$1780 in 1982. While it's tethered to the AC power line, it takes less bench space and is much faster to use. The first one I bought, at an Antique Wireless Association flea market, looked as if it had been in the middle of a food fight, though the seller assured me it worked (they all do, but it actually did). The second, for a friend who fell in love with mine, looked much better, and was also guaranteed to work (it didn't even come close, but eventually I won the battle). I'm still looking for a third (gotta do something about all those friends!).

To make accurate leakage measurements, and to re-form electrolytics before using them, I built my own tester. Essentially it's a variable power supply, 0 to 700 V at 10 mA, with a 100 μ A meter shunted to 1 mA and 10 mA. The design was published in Radio Age in August 1993, and I'll be glad to send a copy of the article for an SASE.

QUESTIONS AND ANSWERS FROM OUR READERS

This section will present questions from subscribers for which responses are solicited. If you can help in providing answers, suggestions or just plain good advice - please send them to the editor for inclusion in the next issue of HSN.

Ans. R-390A antenna relay voltage

In HSN #24/25, a question was raised as to the voltage applied to the coils of K101, the antenna relay. In MY R-390A that was manufactured by EAC sometime in 1968, the relay is marked 20 VDC and measures 19.5 VDC on my meter. The simplified schematic diagram on page 7 of TM 11-5820-358-35 also indicates that 20 VDC is what the relay needs. [Paul Tice]

??? SSB converters / R-390A

I have been wondering for some time about the various SSB converters that are designed for use with the R-390A. Since I can tune SSB by using the BFO, what are they good for? [Paul Tice]

??? GENESIS OF MANUFACTURERS & ORDER NUMBERS / R-390A

Is there anyone who could provide exact definitions of each R-390A order number-related differences and modifications? I think it is a known fact that there are certain differences in R-390A's made by different companies, and considering that even not all of these order numbers have been listed so far, a lot of detailed information is lacking when someone is offered a 'brand new' R-390A ... it is almost impossible to find out what hybrid monster you may be purchasing ... [Gordon von Campe]

??? FSK converter / R-390A

Fair Radio Sales sometimes advertises a FSK converter for RTTY. Has anyone ever used one of these? Is there an interface to allow the R-390A to supply RTTY to a computer? [Paul Tice]

??? 12AT7 for 5814 / tube substitution / R-390A

While testing some spare tubes by substitution, I noted that a few of the locations that were marked for 5814's had 12AT7's in them. When I replaced all the 12AT7's with 5814's I noted a great loss of gain. Apparently the 12AT7 gives an improvement over the 5814, but only in some locations; in others the 5814 appears the best choice. All the tubes that I used were known to be new. [Paul Tice]

Ans. First, let's review where the 5814A is used in the R-390A: looking at my NAVSHIPS technical manual, it is used as V205 (Calibration Oscillator and 100-KHz Cathode Follower); V506 (Detector and AGC Time Constant); V507 (Limiter); V509 (AGC Rectifier and IF Cathode Follower); V601 (1st AF Amp and AF Cathode Follower) and as V602 (Local AF Amp and Line AF Amp). Referencing my 1963 General Electric **Essential Characteristics** manual, let's compare some important specs (also my GE manual states that the 'A' suffix indicates a later version than the 5814. An 'A' version can be substituted for the plain 5814, but not vice-versa. The R-390A calls for the 5814A, so let's compare on that basis):

	<u>5814A</u>	<u>12AT7</u>
<u>Basic parameters:</u>		
Classification by construction	Medium-Mu Twin Triode	High Frequency Twin Triode
Maximum plate volts	330	300
Capacitance (picofarads)		
Input	1.6	2.2
Output	0.5/0.4	1.2/1.5
Grid-Plate	1.5	1.5
(5814A values w/o shield)		

In Class A amplifier operation, the 12AT7 has 1-1/2 more plate resistance, twice the mutual conductance, and 3 times the amplification factor.

I'm certainly no tube engineer, but it appears that where not used as an amplifier, there probably isn't a lot of difference (but the 12AT7 may result in increased distortion where used as an impedance transformer, but I don't know enough theory to tell you if or where). For amplification, the 12AT7 is certainly 'hotter'. So ... depending on which locations were using the 12AT7, what comes through the headphones could be quite different from 'specifications'.

In *HSN #7*, the 12AT7, -7A and -7AW are suggested as (non-standard) substitutes. Likewise in *HSN #12*, a reader has (apparently) used 12AT7's in the audio output (V602) for increased audio gain. Personally, I'm pretty much a purist on this and normally use only what's specified. I do, however, keep some of the substitutes on hand for an emergency. Incidentally, my GE manual indicates the 5814A is a "5 Star" special 12AU7 (what GE calls "special-quality tubes for critical applications". My 1971 Allied **Tube Substitution Handbook** doesn't call out the 12AU7 or -7A version as a 5814A substitute but I have tried them and they appear to work OK - the specs are pretty close across the board. I am also quite willing to 'stand corrected' by more expert knowledge on this ... any takers?? [the Editor]

??? 5749 for 6DC6 / tube substitution / R-390A

I substituted a 5749 tube for the 6DC6 RF amp [in an R-390A], and promptly pinned the carrier meter. Strong local stations now come in without an antenna. Does the 5749 actually work this much better, or is it just having a strange effect on the meter? Why was this tube not used in the original circuit? [Paul Tice]

Ans. Gleaning the back issues of *HSN*, some of the substitutes used for the 6DC6 are the 6BA6 (definite RF gain noted over the 6DC6), 6HQ6, 6HJ6, 6BJ6, 6BJ6A, 6GM6, 6662, and the 6BZ6 (Dallas Lankford has reviewed the Collins engineering report on the R-390A; sez the 6BZ6 may be used for the RF amp). My 1971 Allied substitution book also calls out the 6AW6, 6CB6, 6CF6, 6DE6, and the 6DK6 in addition to those already mentioned. Of course, the 6BA6W (the "W" indicates rougher duty) and the 5749 are interchangeable (again, my GE manual notes the 5749 is the "5 star" special 6BA6). Others' experience with the 5749/6BA6 matches yours - more gain and pinning the carrier meter. I have no idea why it wasn't used in the original circuit ... can anyone add some insight? [the Editor]

SHORT SUBJECTS

BOOKS & CATALOGS - The November 93 issue of *Electronics Now* contains an ad for the PROMPT Publications **Tube Substitution Handbook** (First edition, 1992) carried by one of our old favorite data sources, Howard W. Sams & Company. It's a little 'pricey' at \$16.95 (plus your state's sales tax and shipping costs) but it does claim to list "all known vacuum tubes" and its 149 pages of small print (a quick scan to the 3TF7 shows what we have been hearing for years - they're ain't none. Its the only one I've seen that even lists the 3TF7!). If you're interested, call Sams at 1-800-428-7267 and ask for item #61036. There is a cheaper one available through another good parts source, **Antique Electronic Supply** (6221 S. Maple Ave., Tempe, AZ 85283). Their 1994 catalog offers one for a mere \$7.95 plus sales tax (AZ only), \$2 handling and UPS shipping. Minimum order is \$10.00 but once you see what's offered, this shouldn't be a problem! Having ordered from them several years ago, I still get their annual catalog without additional charge - I believe there still is an initial cost of \$2. There is no '800' number for them but if you can't wait, call (602) 820-5411. Of particular interest is the availability of new 3TF7's (\$30.00), 6Z5W's (\$7.50), and A.P. Jacobi's **Ballast Tube Handbook** including his substitution guide for \$10.95 (last mentioned in HSN #19. Apparently he has made a deal with AES.) [the editor]

R-390A / MORE ON ANTENNA CONNECTIONS - Having finally tired of using small finish nails and alligator clips (I must admit a feeling of shame in stooping to such desperate measures), I was able to get an appropriate adapter for the balanced input jack (J104) from our esteemed publisher, Ralph (and I just realized that I still owe you for it!). This is the UG-970/U which mates to a PL-259 UHF connector suitable for an unbalanced antenna feed. This connector (a handy, right-angle one) seems to be the most common one used and is called out in the NAVSHIPS Technical Manual (Chapter 8). There are also UG-type adapters for connection to type C adapters/connectors as well as balanced antennas. Further discussion on this is contained in HSN #4 and an excellent source of various RF connectors, **The R.F. Connection**, in HSN #19. I have stumbled onto another source but the purchaser must be willing to do a little shop work. **Mendelson Electronics Co., Inc** (MECI), 340 East First Street, Dayton, OH 45402 is offering Twin-Ax Chassis Mount Male (with wire leads) connectors (No. 240-1219F) for the ridiculous sum of 89 cents each. I purchased a bag-full of 'em on pure speculation and they fit the J-104 perfectly. Their periodic flyer also contains much other weird and unusual stuff... and its a good thing 'cause the minimum order is \$20.00 plus tax (Ohio only) and UPS + \$2 shipping. Check it out and get a free flyer by calling

1-800-344-4465. I've been successful in making an adapter for BNC cables using a 35mm film canister appropriately drilled at each end, solder lugs and a little hookup wire. [the editor]

FED SOURCES - MANUALS Some government institutions from which equipment manual photocopies can be purchased include:

National Technical Information Service (NTIS); 5285 Port Royal Rd., Springfield, VA 22161, Attention: Defense Publications or 1-800-555-NTIS.

*Center for Legislative Archives
National Archives
Washington, DC 20408 or 202-501-5350*

*US Army Military History Institute
Carlisle Barracks, PA 17013-5008 or 717-245-3611*

Call or write for details of ordering, copy costs and mailing.

BRISTOL SCREWS - While 'rooting' through the HSN correspondence files, found some interesting info concerning the fluted, multiple spline Bristol wrenches and screws: Apparently the term "Bristol" is not a generic name but the name of a company no longer in business. They, and one other company, manufactured multiple spline products for a short time, mostly for the military and some electronic applications, but they weren't popular and never caught on. [Joe Bunyard] And as all of you with an R-390A must deal with the Bristol set screws, occasionally it might be a good idea to check for loose set screws on all couplers and gears. If your receiver is not tracking correctly through the bands, a loose screw may have allowed slippage of the gear train-cam alignment system. Check and correct using the Fifth Echelon procedures of the Technical Manual [Wayne Heinen] *(It would certainly appear that preventing this problem would be a lot easier than fixing it - the editor)*

WANTED TO BUY / SELL / TRADE / WHATEVER

This section is reserved for HSN subscribers in good standing (i.e., you're paid up according to Ralph) looking to connect with HSN readers for mutual benefit. All deals are between individuals; HSN does not evaluate the accuracy of any statements or claims herein. No 'business' ads, please. Items printed will be on the basis of available space.

FOR SALE Subscriber Joe Barry in Bend, OR has a Stewart-Warner R-390A for sale. \$250 negotiable. Sez good condition with meters (no extra parts; no case). Joe travels a lot on the West coast and a personal delivery might be possible; otherwise shipping (and costs) will be between Joe and the purchaser. If interested call him at (503) 385-3152.

WANTED Your editor is looking for a Heath GD-125 'Q' Multiplier w/ or w/o manual. Also schematic, specifications, alignment info (photocopy OK) for Hallicrafters SX-107 receiver. Write (or call (206) 786-1375) if you can help.

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