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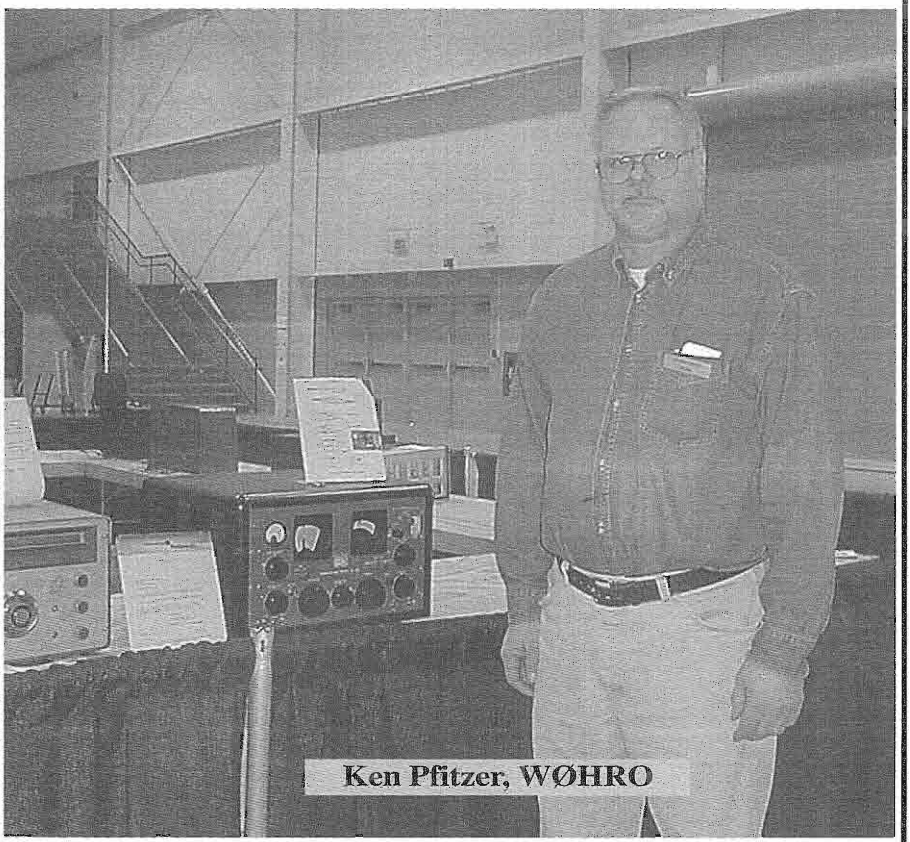
ELECTRIC RADIO

celebrating a bygone era

Number 173 October 2003



Ken Pfitzer, WØHRO

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Electric Radio is dedicated to the generations of radio amateurs, experimenters, and engineers who have preceeded us, without whom many features of life, now taken for granted, would not be possible. Founded in May of 1989 by Barry Wiseman (N6CSW) the magazine continues publication primarily for those who appreciate the intrinsic value of operating vintage equipment, and the rich history of radio. It is hoped that the magazine will also provide inspiration and encouragement to collectors, restorers and builders.

We depend on our readers to supply material for ER. Our primary interest is in articles that pertain to vintage equipment and operating with a primary emphasis on AM, but articles on CW, SSB, and shortwave listening are also needed. Photos of Hams in their radio shacks are always appreciated. We invite those interested in writing for ER to write, email, or call.

Regular contributors include:
Bob Dennison (W2HBE); Dale Gagnon (KWIl); Chuck Teeters (W4MEW); Bruce Vaughan (NR5Q); Bob Grinder (K7AK); Jim Hanlon (W8KGI); Brian Harris (WA5UEK); Tom Marcellino (W3BYM); John Hruza (KBØOKU)

Editor's Comments

RCA to Sponsor CW QSO Party

The Radio Club of America, established in 1909, is the world's first radio communications society. The mission of the organization is to provide a forum for the exchange of knowledge, recognize outstanding achievement, provide financial assistance to deserving students, and preserve the history of wireless communications.

November 8, 2003 has been set for the first annual Radio Club of America CW QSO Party. It will be an on-air gathering for members and guests (non-members) alike. They will be using the 80-meter band, specifically 3650 to 3700 kHz. Transmitter power to be limited to 100 watts output, more than adequate for even coast-to-coast work during the later hours.

Commence operating at 6pm untill 2am Eastern time on Saturday evening, and exchange RST, QTH, name, equipment in use, etc. Any transmitter, receiver, or transceiver, antique, vintage, or modern are welcome. RCA members should sign their calls with "slant bar" RCA. For example: W2ER/RCA.

This event will be a gathering of chat and fellowship, not a contest. Five words per minute or twenty-five, the purpose is to have a good time and increase awareness of the RCA and it's missions.

"Radio Club of America" QSL cards will be available to all stations worked by member stations. Please submit logs so that QSL cards can be distributed for those members to non-member contacts. Mike Raide (W2ZE) will be the QSL Manager. Please email or send postal mail logs to him at:

Mike Raide, W2ZE
21 Canandaiqua Street
Shortsville, NY 14548
E-mail: mraide@rochester.rr.com

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Military Radio Nets at the Dayton Hamvention June 2003

by Joe Munson, WA4VAG
12873 Pennington Road
Walton, KY 41094
photos by Mark Francis, KIØPF

Old Military Radio Net at 2003 Dayton Hamvention, 12:00 Noon, Local Time, 3885 kc, AM

Rain didn't keep important and serious radio communications from taking place during WWII. It sure didn't keep the Old Military Radio Net from taking place at the 2003 Dayton Hamvention this year, using the same equipment some 60 years later--but for pleasure this time around. The 5th annual event was as popular as ever, and still managed to draw a sizable crowd around space 3415, where the SCR-284 was set up, even in the rain. Comments were heard such as "those guys don't give a %$#&* if it rains, they just use their equipment anyway," and "I can't believe they are letting those antique radios get wet," etc.

Joe (WA4VAG) ran the net using a BC-654 powered by the GN-45. Kim (W4OSS) spun the generator, with relief provided by KIØPF, Mark. Kim stated the BC-654 took a lot more energy to crank than the GRC-9 that was used to run the net in preceding years. Over 14 checkins were logged. Before the net, and during tune up, the BC-654 was netted to Dale Gagnon's (KW1I) Squad Cal, as he was crystal controlled, and only received AM as one sideband,

Here is the author operating his authentic BC-654 in the rain. The installation includes a T-17 hand mic and LS-8 loudspeaker.

and transmitted AME. The BC-611B belonging to Chuck (WD8AXA) was voted the best audio.

Some of the checkins are as follows: (Some info may be wrong, as the paper got wet and was smeared by about a ¼ inch of water in the BC-654 lid.)

Net Control: WA4VAG, Joe, BC-654/GN-45
WA4MRR, Tony, MAB
KW1I, Dale, Squad Cal
KK1K, Dean, ...
WD9GHK, Bruce, BC-611
K4CHE, Breck, BC-611
WW6N, Lee, BC-611
W8AUP, Perry, BC-611D
W4XE, Ralph, BC-611D
K9WT, John, PRC-70
KB9PZC, Paul, BC-611F,
AA4BM, Marty, BC-611B
WD8AXB, Charlie, Yaesu 817,
KM6AB, Mike, PRC-138
WD8AXA, BC-611B Chuck

Cold War Net, 51 MCS, 02:30 Local Time
Dayton Hamvention, 2003

The 2nd annual cold war net took place in the rain at 02:00 local time on Saturday. This net is for FM equipment used near the end of WWII, Korea, Vietnam, Desert Storm, and including current equipment. The net was run by K9WT, John, using a PRC-70. Again, the rain did not stop the net, and as in the old Military Radio Net for the WWII AM equipment, people were walking around with the equipment out in the rain. As with the Old Military Radio Net, the log sheet got damp and smeared somewhat. Some 23 checkin's were logged.

Net Control: K9WT, John, PRC-70
KA3EKH, Ray, PRC-68
WA4VAG, Joe, PRC-6
W4OSS, Kim, SEM 35
W4XE, Ralph, PRC-68
K4CHE, Breck, PRC-6
NK8X, Art, Yaesu VX-7,
KQ6XA, Bonnie, Yaesu VX-7
KM6AB, Mike, PRC-138
KD5TET, Stephanie, PRT4A/PRR9
WD8MGO, Fred, PRC-68A
KC8JZO, John, SEM-52A
KB8ELT, Don, SEM-35
KB8KBK, Scott, PRC-25
WD8IGL, Gabe, PRC-126
N8WOM, Martin, PRT4/PRR9
KB9VBO, Vic, PRC-25
KB9NNL, Debbie, PRC-68B
KB9VRV, Jim, RACAL PRM-4090B
KB9PZC, Paul, PRC-10
WD9GHK, Bruce, PRC-68
KC9CGR, Jesse, PRC-6
KI0PF, Mark, PRT4/PRR9
WD8AXB, Charlie, Yaesu FT-817

ER

In the afternoon, this group checked into the Cold War Net as described in this article.

Block Performance Tables- A Valuable Receiver Fault Isolation Tool

by Bill Feldmann, N6PY
n6py@qnet.com

Have you ever turned on your favorite receiver to find it acting strange or dead while having a limited amount of time to get it working? You would most likely try preliminary tests like checking all the receiver's tubes and tube socket voltages. But, if you found nothing wrong, then the question is where do you start looking for the problem?

A little while ago I stumbled onto a handy aid to troubleshooting receivers while trying to find out why my 75A-1 was loosing sensitivity after warming up. I found the problem in my 75A-1 by making a table of injected signal strength at each stage in the receiver from the last IF stage forward to the antenna terminal that resulted in a voltage across the receiver's detector diode load of ten volts. This was done when the receiver was cold and seemed to have adequate sensitivity. I then repeated the procedure when the receiver lost sensitivity. At the first mixer's grid, I found it took ten times the injected signal strength to obtain the same ten volts across the receiver's diode load when the receiver's sensitivity decreased. However, the strength required at the stage after this one—the second mixer's grid—remained the same. This led to a rapid assessment of mica capacitor failures in the first IF stage. The repair was described in my article on my 75A-1 in the January 2003 issue of this publication. This led me to devise a technique that would help in finding future receiver failures. Now, after I have a receiver working satisfactorily, I document a block performance table similar to those shown in Tables 1 and 2. Then, if I have a problem with that receiver at a later date, I can go to my block performance table and repeat the signal injections to see which stage in that receiver has a change in its gain. However, this technique is like an insurance policy. You have to take the time to make the performance table when the receiver is working and before you have a problem. A good time to generate one of these block performance tables is when you are doing an alignment of your receiver's IF and RF stages.

To generate a block performance table you'll need the proper tools. These are a method of injecting signals of known frequency and strength into the receiver's IF and RF stages and a good voltmeter. With the low price of high impedance digital voltmeters today, obtaining one should not be a problem. The signal generator can be more of a problem to obtain, but I feel every Ham working on and restoring old radios should have one. Older tube generators, like my HP 606B, can be obtained for a low cost on the used market. I also use a low cost digital Radio Shack frequency counter with my HP 606B to make it easer to set its frequency. With these instruments, you now have the necessary tools to generate a block performance table for your receiver.

I'm going to go into a fair amount of detail for those of you that are maybe a little new to working on receivers. For

those of you with more experience, you can probably scan this article, take a good look at both of my tables, and get a good idea how to make and use one of these performance tables. Table 1 is for the modified 75A-1 that was featured in my January and February 2003 Electric Radio articles. The 75A-1 is a dual conversion receiver with a fixed and tunable first IF. The second table is for my simpler single conversion military BC-348Q receiver.

First you need to design your table. A good example is the one shown in Table 1 for my 75A-1. In designing the table, first label across the top the five column names of the table. This starts from left to right with the stages the signals are injected into, the locations where the signal will be injected (like the tube and its pin number), the frequency to be injected, the frequency the receiver is set to, and the level of the signal injected that is required to get a DC voltage across the receiver detector's diode load. I usually use a level of ten volts for tube radios.

To start planning your table you should take a look at the schematic, and if you have one, the block diagram showing the RF and IF stages in your receiver. These are usually found in the receiver's manual. Now determine the best places to inject test signals into the receiver using the schematic and block diagram, starting from the AM detector working forwards to the antenna input. For my 75A-1, I found the grid of each tube in the receiver's IF, mixer, and RF stages to be excellent locations that are easy to get to. These are listed in the left hand columns of each table. Next determine the frequencies that you will inject. For last IF or non-tunable IF stages, I usually use the center IF frequency of that stage's filter if it has one. I used 500.87 kc, which is the center frequency of my 75A-1's crystal filter. For my BC-348, I used 914.6 kc because that is the crystal filter's center frequency. For the first IF in my 75A-1, which is tunable, I selected a frequency near the center of its tunable range. For mixers, I inject the frequency expected out of the mixer stage along with each frequency that its grid will see. This allows me to look for failures of IF components just after the mixer along with injection oscillator failures. Also, if the IF frequency range changes when switching bands, like when receiving ten meters on my 75A-1, be sure to inject those other IF frequencies. You should be able to determine IF frequencies or ranges using the circuit description in the receiver's manual. For my 75A-1, I used the center frequencies of each tunable IF range: 2.00 mc and 4.50 mc. For RF stages, you will need to get data for each band the receiver will operate on, as shown in my tables. This is necessary because different coils and capacitors are used for each band.

Be sure to list in the notes for your table how your receiver is set up when gathering data, and the diode load voltage you will use. I usually use 10 volts for tube type receivers and a lower level for solid-state designs. This level is not critical as long as it remains constant while gathering performance data, is well above the detector's noise floor, and doesn't saturate the receiver's detector. I always set my receiver controls as follows: AVC off, BFO off, and RF gain fully on. For the RF stages, I test near the center of each band, or with a general coverage receiver like my BC-348, near frequencies where I will mostly be using it and note these frequencies in the table.

Now, using the schematic for your receiver, connect your voltmeter across its detector diode load. This was R41 for my 75A-1 and the AF gain pot for

(TABLE 1)
IF/RF BLOCK PERFORMANCE
COLLINS 75A1, S/N 630

STAGE	INJECTION LOCATION	INJECTED FREQUENCY (mc)	RECEIVER FREQUENCY (mc)	INJECTED SIGNAL LEVEL *
2nd IF 6SG7	V7 PIN 4	.50087	NA	97mv
2nd IF 6SG7	V6 PIN 4	.50087	NA	6.5mv
2nd MIXER 6SL7	V4 PIN 5	.50087	NA	1.9mv
		2.00	3.70	3.9mv
		4.50	29.00	2.47mv
1st IF 6SK7	V3 PIN 4	1.90	3.80	380uv
		4.50	29.00	720uv
1st MIXER 6SB7	V2 PIN 5	2.00	3.70	152uv
		4.50	29.00	240uv
		3.70	3.70	350uv
		7.30	7.30	250uv
		14.50	14.50	222uv
		21.30	21.30	207uv
		27.00	27.00	294uv
		29.00	29.00	252uv
RF AMP 6CB6	V1 PIN 1	3.70	3.70	23uv
		7.30	7.30	12uv
		14.50	14.50	15uv
		21.30	21.30	14uv
		27.00	27.00	28uv
		29.00	29.00	40uv
ANTENNA INPUT	ANTENNA TERMINAL 2, TERMINAL 1 GROUNDED	3.70	3.70	2.1uv
		7.30	7.30	1.6uv
		14.50	14.50	1.2uv
		21.30	21.30	2.6uv
		27.00	27.00	2.9uv
		29.00	29.00	2.0uv

TEST CONDITIONS:
LINE VOLTAGE, 115VAC
MANUAL GAIN CONTROL MODE
RF GAIN FULL CW
SELECTIVITY AT 0
HP 606B SIGNAL GENERATOR MODULATED 400 CYCLES AT 40%
*VOLTAGE ACROSS DETECTOR DIODE LOAD, R41, SET AT 10.00 VDC

Table 1: Block performance data for my Collins 75A-1 receiver

my BC-348. Those of you with 75A-4s are lucky because there's a pin jack on the receiver's chassis that connects to its diode load resistor. For injecting the signal, I start by setting my signal generator to the center frequency of the last IF, and I use a .01 capacitor and an alligator clip for connecting to circuit components. This is in series with the cable going to the 50-ohm output of the generator. There may be an impedance mismatch using this type of injection probe, but it protects any DC voltages from shorting a receiver circuit, and is fine for the way we will use this table for future fault finding, assuming we always run future tests using the same generator and probe. I also run the generator about 40% modulation at 400 cycles to be able to hear a tone in the

(TABLE 2)
IF/RF BLOCK PERFORMANCE
WELLS GARDNER BC348Q
ORDER NO. 11415-WF-43, S/N 36

STAGE	INJECTION LOCATION	INJECTED FREQUENCY (mc)	RECEIVER FREQUENCY (mc)	INJECTED SIGNAL LEVEL *
IF, 3rd TUBE	VT116 PIN 4	.9146	NA	82mv
IF, 2nd TUBE	VT117 PIN 4	.9146	NA	2.6mv
IF, 1st TUBE	VT117 PIN 4	.9146	NA	1.2mv
CONVERTER	VT150 PIN 8	.9146	NA	144uv
		.300	.30	195uv
		1.90	1.90	153uv
		4.00	4.00	204uv
		7.30	7.30	165uv
		10.00	10.00	159uv
		14.50	14.50	153uv
RF, 2nd TUBE	VT117 PIN 4	.300	.30	91uv
		1.90	1.90	98uv
		4.00	4.00	71uv
		7.30	7.30	57uv
		10.00	10.00	65uv
		14.50	14.50	59uv
RF, 1st TUBE	VT117 PIN 4	.300	.30	45uv
		1.90	1.90	44uv
		4.00	4.00	25uv
		7.30	7.30	20uv
		10.00	10.00	14uv
		14.50	14.50	17uv
ANTENNA INPUT	ANTENNA TERMINAL	.300	.30	4.1uv
		1.90	1.90	5.1uv
		4.00	4.00	5.5uv
		7.30	7.30	4.4uv
		10.00	10.00	5.8uv
		14.50	14.50	6.7uv

TEST CONDITIONS:
LINE VOLTAGE 115VAC
MVC MODE
VOLUME CONTROL FULL CW, FULL RF GAIN
BFO OFF
CRYSTAL OUT
HP 606B SIGNAL GENERATOR MODULATED 400 CYCLES AT 40%
*VOLTAGE ACROSS DETECTOR DIODE LOAD, AF GAIN POT R110 AT -10VDC

Table 2: Block performance data for my BC-348Q

receiver's speaker for ease of tuning the receiver to the generator frequency. If you use a modulated signal, it's important not to change the modulation during the gathering of data since its level does affect the detector diode load voltage.

Now the fun starts, you can start getting data on your receiver's performance. First, connect the signal generator test probe to the first signal injection location in your table, which in my 75A-1 table was pin 4 of V7, the grid of the last tube in its second IF. Adjust the output of the signal

generator while watching the voltmeter connected across the receiver's diode load until you reach the test voltage level specified in the notes of your table, which was 10 volts for my 75A-1. Now record the level of the injected signal in the last column of your table opposite its injection location. For higher levels, I record them in millivolts and for lower levels in microvolts. For my receivers, this was 97 mv and 82 mv since signals will be very high at the end of the IF chain. Next, move your input probe to the next location going down the table, which was pin 4 of V6 that is the first tube of the second IF in my 75A-1. Again, adjust the output level of your signal generator to obtain the required voltage level across the detector's diode load, and enter the generator's injection voltage in the last column of your table—6.5 mv for my 75A-1. Now repeat this procedure for any other stages in your receiver using the last IF injection frequency. For mixers or converters, be sure to inject all signal frequencies that stage will see at it's input, along with all IF frequencies it will generate, as shown in both of my tables.

After you complete gathering data for the last IF and the mixer feeding it, adjust your signal generator for the next stage in your receiver. With my 75A-1, this was 1.90 mc for the first IF. I had planned to use 2.00 mc, which is closer to the center of its dial range, but I encountered some oscillation and feedback at this frequency. This was probably caused by stray inductance or capacitance so I slightly moved the frequency to 1.90 mc. Connect the signal generator probe to the location of this stage in your table. If this is a tunable IF, I adjust the receiver's dial and the signal generator's output level to where I hear the modulation in the receiver's speaker and see an increase of voltage across the diode load. If your receiver is single conversion having only one IF stage—like the BC-348 in Table 2—skip the rest of this paragraph. Again adjust the signal generator's output for the specified diode load voltage and enter the signal generator's output level into your table. Obtain signal generator injection level data for all stages in this IF down to where you have to change the generator's frequency. If your IF uses a higher frequency range, like my 75A-1 does for the eleven and ten meter bands, repeat the above procedure for that IF frequency as I did in my 75A-1 table using the 4.5 mc input. If your receiver is triple conversion, repeat the measurements for all remaining IF stages.

After obtaining level data for the entire IF stages of the receiver you are now ready to gather data for the RF stages. My tables usually start at the lowest frequency band and progress to the highest. Connect the signal generator probe to the first RF test location in your table (pin 5 of V2 for my 75A-1) and adjust the signal generator to a frequency near the center of the lowest band, or 3.70 mc for my 75A-1. Adjust the receiver's frequency to tune in the signal generator's modulation in the speaker and for a voltage indication across the diode load. Again, adjust the generator's output for the specified diode load voltage and enter the generator's output level in the table. Repeat this procedure for each band on the receiver. Now repeat this injection procedure for each band, and for all RF stage injection locations as shown in Tables 1 and 2.

After completing your IF/RF block performance table you will have a valuable record of your receiver's performance from its detector to the antenna input, for every frequency used by your receiver. If your receiver's performance changes you can go back

and repeat the table's procedure to rapidly see what stage, or stages, have caused the change. When you find a large increase in required signal injection level, but the next injection location toward the detector signal level hasn't changed, you know the problem is in the circuit between these two locations. In the case of a converter or mixer, a failure in the oscillator circuit feeding it will also be known. This allows you to narrow the problem to just a few components.

Also, this table is very educational in seeing how signal levels change in strength throughout the receiver. However, since we made no attempt to match the generator input impedance to the input impedance of the location we injected our signals into, the table should only be used for troubleshooting, and not as an accurate indication of actual signal levels.

These tables should only be used for comparison purposes to troubleshoot a receiver using the same instruments and test conditions. Also, taking data for a receiver and then using the data in troubleshooting a second identical receiver could lead to some errors, since components in the second receiver could have aged differently. In addition, modifications to one of the receivers can lead to large differences in voltage readings. However, I did successfully use a table for my modified 75A-4 receiver to troubleshoot a friend's unmodified 75A-4 that had very low sensitivity. Going through the first IF, I saw differences of as much as 50% between the two receivers, which were expected due to the modifications in my receiver. When I noticed it took nearly thirty times the signal voltage at the first detector's grid to produce 10 volts across it's diode load as mine did, I had a good indication of where the problem was. I then rapidly found an open first IF coil. I was able to isolate the problem in only 30 minutes, where it would have taken much more time without my table even though it was not absolutely accurate for his receiver. As a caution, Table 1 is for my 75A-1, which is modified, and the injection signal level data may not be the same as your 75A-1 unless it has identical modifications per the January and February issues of ER. Table 2 is for my BC-348Q, which has no modifications to its RF and IF stages so it is closer to a stock BC-348Q except for aging of its components.

I have only made my tables for stages ahead of the detector—the IF and RF stages—and not for the audio stages. Audio stages are usually much simpler to troubleshoot, but you could expand your table, or make a second table of performance using signal levels to obtain a given AC output level at 1 kc across the receiver's speaker terminals. 1 kc signals could then be injected into each audio stage from the audio output amp to the detector and recorded using the same technique as my table for IF and RF stage performance.

I hope this article is of some help to you, but remember it's like an insurance policy. You have to generate the table before you have a receiver failure. A good time to do this is when you are doing routine maintenance like aligning you receiver. I now consider these tables a valuable part of the documentation for each of my receivers.

ER

Hallicrafters S38-Size Radios

by John Hruza, KBØOKU
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Denver CO 80222
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Hallicrafters' big selling point was more bang for the buck. Their equipment was well designed, well built, and had plenty of features for their price range. They could keep prices down by making maximum use of standard off-the-shelf parts, common circuits, and mass-production methods.

Among the parts they standardized were their cabinets. This article will take a look at the various pieces of equipment that used cabinets similar to the one that first came out with the S-38 receiver and SP-44 panadapter in 1946. All these cabinets were about 13-1/2" wide, 7-1/4" high and between 7" and 9" deep. (I have examples of all these unless marked with an asterisk.)

Original cabinet, black unless noted:

S-38 shortwave receiver, 1946, 2 half-round dials
SP-44 Skyrider Panoramic panadapter, 1946
S-38A shortwave receiver, 1946-47, 2 half-round dials
HT-17 HF CW transmitter, 1947, slide-rule dial
HT-18 HF NBFM exciter, 1947-49, slide-rule dial
S-38B shortwave receiver, 1947-53, 2 half-round dials
S-53 communications receiver, 1948-53, slide-rule dial & hinged cover
SR-75 HF transceiver, 1950-51, 2 half-round dials (*)
S-53A communications receiver, 1950-58, slide-rule dial & hinged cover
S-81 Civic Patrol VHF-HI FM receiver, 1951-53, round dial
S-82 Civic Patrol VHF-LO FM receiver, 1951-53, round dial (*)
5R-10 shortwave receiver, 1951-53, slide-rule dial
5R-100 shortwave receiver, 1951-53, slide-rule dial, gray (*)
5R-10A shortwave receiver, slide-rule dial
5R-100A shortwave receiver, slide-rule dial, gray (*)
S-38C shortwave receiver, 1953-55, 2 half-round dials, gray
S-38D shortwave receiver, 1955-57, slide-rule dial, gray
S-94 Civic Patrol VHF-LO FM receiver, 1955-62, round dial, gray
S-95 Civic Patrol VHF-HI FM receiver, 1955-62, round dial, gray
S-102 2m am receiver, 1956-57, round dial
S-106 6m am receiver, 1956-57, round dial
SX-104 VHF-LO AM receiver, 1957-58, slide-rule dial
SX-105 VHF-HI AM receiver, 1957-58, slide-rule dial (*)
S-38E shortwave receiver, 1957-61, slide-rule dial, sloping panel, gray

The S-38 was the first Hallicrafters receiver to break with the idea that bigger is better. It was the smallest receiver made by the company up to that time, and it covered .54-32 Mc in 4 bands using 6 tubes. The last few S-38s used the 5-tube .54-31Mc S-38A chassis, as did the S-38B, S-38C and S-38D. The S-38E was of a similar electrical design but used miniature tubes. There were 2 different color cabinets available in addition to the standard gray. The S-38EB is beige and the S-38EM is mahogany. The 5R10, 5R10A, 5R100 and 5R100A are similar to the S-38D

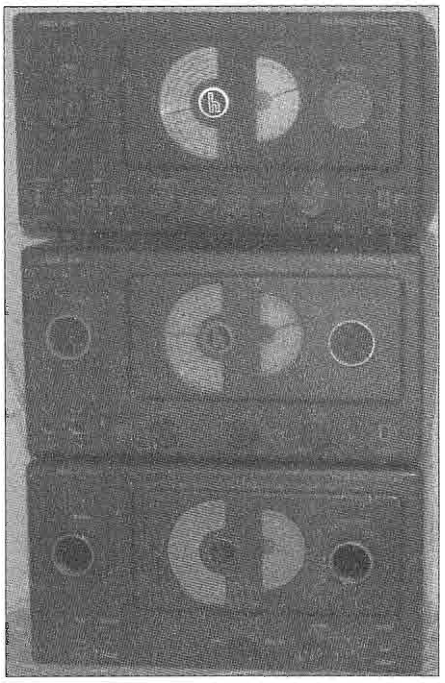


Figure 1: Top to bottom are an early crackle-finish S-38, and late production smooth-finish S-38 and S38A.

except for their black color and lack of the Speaker/Phones and BFO/AM switches.

The SR-75 is considered by some to be the first true amateur transceiver. It is basically an S-38B with an 80-10 meter (including 11 meters) CW transmitter added. In addition to the receiver's 5 tubes, the unit used a 12BA6 crystal oscillator. The receiver's 50L6 audio output tube acted as the 10 watt final using plug-in coils. Two D cells were needed for the keying relay.

The SP-44 was a panoramic adapter using 10 tubes including a 2AP1 2-inch CRT. It could be used with any receiver with a 455 Kc IF and could display signals up to 100Kc on either side of the center frequency. It could also be used to monitor modulation, distortion, carrier shift and other characteristics of a transmitter signal. The Panoramic Radio PCA-2 T-200 was a unit identical to the SP-44, except for knobs, paint, and panel markings.

The first transmitter to use this cabinet was the HT-17, covering the 80-10

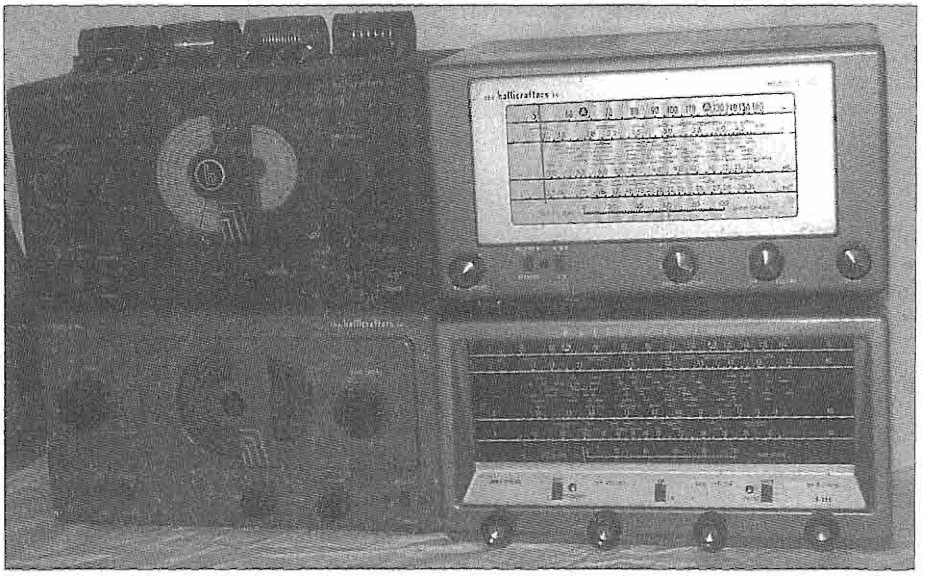


Figure 2: On the left side is an S-38B with SR-75, a transceiver based on the S-38B.Its coils are on top of the cabinet. Below is an S-38C. On the right side are the S-38D and S-38E.

Figure 3: Here are several monitor receivers based on the S-38 cabinet design. The top row has the S-81, 152-173 mc "Civic Patrol" model. The middle row shows the S-94 30-50 mc and S-95 152-173 mc examples. In the bottom row an S-102 2-meter receiver is on the left, and an S-106 6-meter version is on the right.

meter amateur bands with 5 plug-in final coils. It produced 12-25 watts CW depending on the band, using a 6V6 crystal oscillator and an 807 final. It came with a tuning indicator pilot light, which could be replaced with the optional SM-17 S-meter. The second transmitter was the 4-watt HT-18 that used 7 tubes, including a 6BA6 VFO/crystal oscillator and a 6L6 final. It covered the amateur frequencies from 3.5 to 29.7 Mc in 7 bands in CW, AM or NBFM modes.

The S-53 and S-53A were a significant improvement over the S-38 series of receivers. They used a mix of 8 miniature and GT tubes to cover .55-32 and 48-55 Mc (.54-31 and 48-54.5 Mc in the A model) in 5 bands. Based on their sensitivity and selectivity, I consider the S-38s to be shortwave receivers with BFOs, but the S-53 and S-53A are true communications receivers.

The S-81 and S-82, 152-173 and 30-50 Mc respectively, were the company's first single-band FM monitor receivers, and used 6 tubes. They were replaced by the S-95 and S-94 respectively, which added 2 tubes and changed some of the GT tubes to miniature types. The final series of monitor receivers in this cabinet are the 8-tube AM mode SX-104 and SX-105, which added the option of crystal-controlled

Figure 4: Here are some more familiar Hallicrafters monitor receivers. The top row holds an S-104 30-50 mc receiver, and the middle row has an S-94 30-50 mc receiver, and an S-95 152-173 mc receiver. In the bottom row from the left is the 2-meter S-102 and the 6-meter S-106.

single frequency operation. The other 2 AM radios in this series are the S-102 and S-106, 143-149 and 50-54 Mc respectively, each using 7 tubes. All these receivers used ratio detectors and had selenium rectifiers.

In 1958 Hallicrafters introduced a new cabinet, of similar size and shape, with the S-107. The main difference was a front panel set inside the front edges of the cabinet shell, replacing the older style panel that wrapped around the edges.

Restyled cabinet, gray:

S-107 communications receiver, 1958-62, slide-rule dial

CB-1 Littlefone 1-channel CB transceiver, 1959 (*)

CB-2 Littlefone 4-channel CB transceiver, 1960 (*)

HT-40 HF CW transmitter, 1961-63

SX-140 amateur band receiver, 1961-64, slide-rule dial

CRX-4 Civic Patrol VHF-LO FM receiver, round dial, 1964 (*)

CRX-5 Civic Patrol VHF-HI FM receiver, round dial, 1964 (*)

R-48 5"x7" PM speaker, 1965-69

R-48A 5"x7" PM speaker, 1970-72

The 8-tube S-107 covers .54-1.63, 2.5-31 and 48-54.5 Mc in 5 bands and is basically an upgraded S-53A. The SX-140 is the only multiple amateur band receiver in this size cabinet, covering the 80-6 meter bands. It is also unique among the receivers discussed here in

Figure 5: Here is an HT-17 I found with the original box and 4 box sets of additional band coils. This little rig was produced from 1947 to 1950 and was CW only. It used a 6V6 tritet oscillator and an 807 PA and could produce about 10 watts of carrier. It had an internal power supply using a type 5U4 rectifier.

that it has a crystal filter, S-meter, crystal calibrator and front panel antenna trimmer and requires an external speaker such as the R-48. This is a lot of features for an inexpensive 5-tube receiver. It was available as a kit as well as assembled.

The 11-tube CB-1 could transmit and receive on any 1 of the 23 original CB channels depending on the installed crystal. It featured a magic eye modulation monitor. It was rapidly replaced by the 7-tube, 4-channel CB-2, the receiver portion of which could operate crystal controlled or tunable. The CB-2 also included a 3 way power supply: 6 or 12 VDC or 120 VAC.

The HT-40 transmitter was designed to be used with the S-107 or, preferably, with the SX-140. This is a novice unit like the HT-17, but its output was 75 watts on CW, and somewhat less on AM. It covers the 80-6 meter amateur bands under crystal control but has provision for an external VFO. It has only 5 tubes including a 6DQ5 sweep tube final and has a silicon diode rectifier and voltage doubler. Like the SX-140, it was available in kit form or assembled.

The 7-tube CRX-4 and 8-tube CRX-5 Civic Patrol, covering 30-50 Mc and 152-173 Mc respectively, are the last tube type single band FM monitor receivers to be built by the company. They are similar in performance to their S-94 and S-95 predecessors.

Most of the equipment described here can be bought for reasonable prices at Hamfests, estate sales or other such venues. They are easier to work on than their more complex cousins. A beginning Hallicrafters collector might start with some of these radios. A good Novice station dating from 1947 could be assembled consisting of an S-38A or B with an HT-17. A 1948-49 station would need an S-53 with an HT-18. Or an SX-140 with an R-48, an HT-40 and perhaps an S-107 for general coverage would make a good 1961-64 station. Any of these would do a fine job in the role they were designed for.

Figure 6: On the left is an HT-18 VFO/exciter. These were produced from 1947 to 1949 and covered 80 to 10 meters. They produced CW and NBFM emissions from a 6BA6 crystal or VFO oscillator, and a 6L6 multiplier and PA. They could generate about 5 watts of carrier. Two other 6BA6's served as the speech amplifier and FM reactance modulator. It had an internal regulated power supply, and a link-coupled output network. On the right is the SP-44 Skyrider Panadaptor. Note the slightly different case, originally produced by Panoramic Radio.

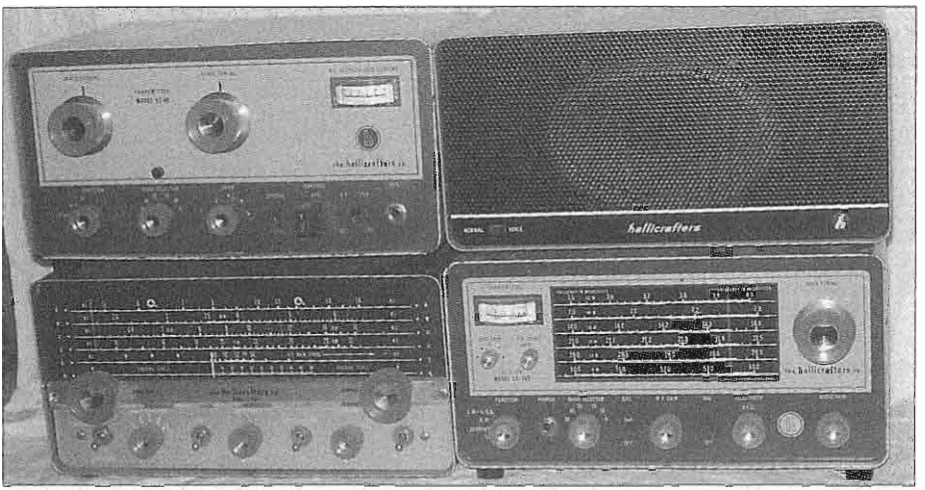


Figure 7: If we were still in 1961, this could be your Ham station. On the top right is the HT-40, which was produced from 1960 to 1964. It used a 6DQ5 television horizontal sweep tube to produce about 75W CW carrier, and about 30W peak for AM. It used a controlled carrier AM screen modulator and had a 50 ohm pi-network output. Next to the HT-40 is an R48A speaker for the SX-140. On the bottom row is an S-107 on the left, and on the right is an SX-140. The SX-140 included 6-meter coverage, and had an unusual regenerative IF for developing IF selectivity. The S-107 could be purchased for less than a hundred dollars and also covered 6 meters, but it had no IF filter.

ER

The Radio Builder's Photo Gallery

Photographs and text for this new column have been sent to Electric Radio by:
Dave Ishmael, WA6VVL
Jim Stoneback, K4AXF
Jerry Fuller, W6JRY

Dave Ishmael, WA6VVL

When I was in 6th grade, I checked out "The Boys' First Book of Radio and Electronics" by Alfred Morgan of the school library. I dreamed about building the 1-tube 1G4GT regen in that book all year long. I never built it. About ten years ago, I mentioned it in the article that I wrote for ER called "Regeneration Fever". I built a Plexiglas 2-tube regen that used two type 30 tubes. For some reason, I was STILL not satisfied, so I went looking for that book on ebay this year and I (finally) just finished that 1G4GT 1-tube regen (Figure 1). The front panel is 8-1/2" x 3-3/4" and the baseboard is 8-1/2" x 5". I used ceramic sockets for the 1G4GT and Ocean Hopper broadcast band coil. The little regen works like a charm. I bought two 1G4GT's and the NOS Sylvania works the best. The book also suggests using a 1H4G, but when I plugged one in, it worked the worst of all, with almost no regen action. I didn't want to build another battery supply, so I used the 3 Vdc portion of my supply that I used for my 19 Twinplex and I used a 33 ohm resistor in the 1G4GT's filament lead to drop it down to the required 1.4 Vdc filament voltage. Lots of headphone volume even with my mediocre Trimm headphones - my Baldwin's are even louder! With the 100uuf antenna tuning, peaking works well with a surprising degree of selectivity and plenty of stations heard, and the main tuning cap covers the entire broadcast band using a single (Ocean Hopper) coil. Short Wave also works pretty well, at least for the 1.65-4.1 MHz coil, but for SW, the front panel could use a metal sub-panel to minimize hand capacity effects. This radio was built strictly for the AM broadcast band. Built with many junkbox or donated parts, the total cost was $35.76. The most expensive items are all the brass hardware used in the construction and two 1G4GT's.

Here are the photos (Figure 2) of my 1G4GT 1-tube regen packaged into a jewelry box. The "inspiration" for this project started when I saw this box at a Sav-On Drugs. It is built to the same basic schematic as the last 1G4GT 1-tube regen that I built using Alfred Morgan's "The Boys' First Book of Radio and Electronics". The radio is self-contained with the D-cell for the filament and the 27V B+ supply using three 9V batteries attached piggy-back-style. It uses a J.W. Miller P/N 2002 Vari-loopstick antenna coil in the place of the more traditional plug-in coil. With the addition of 9 turns of insulated wire for the tickler/feedback winding, the performance is indistinguishable between the loopstick and the coil.

Jim Stoneback, K4AXF

I recently finished building The Ultimate Regen from the articles by Bruce Vaughn in Electric Radio (Vols. 151-153). Bruce's plans were so well laid-out that I felt enough confidence to spend a few extra bucks here and there. This was not my first homebrew project but I've have never been so pleased with the results before. The receiver works every bit as good as Bruce promised.

It is a wonderful receiver for short-wave broadcasts - sufficient selectivity and really nice-sounding audio. The audio is loud enough to annoy the XYL in the front room. Surprisingly, it's a

Figure 1: This is Dave Ishmael's 1-tube regen that he dreamed about building many years ago, but which was not finished until recently. The design came out of Morgan's book, which is shown in the illustration. Notice the beautifully finished wooden panels, and polished old-stock hardware.

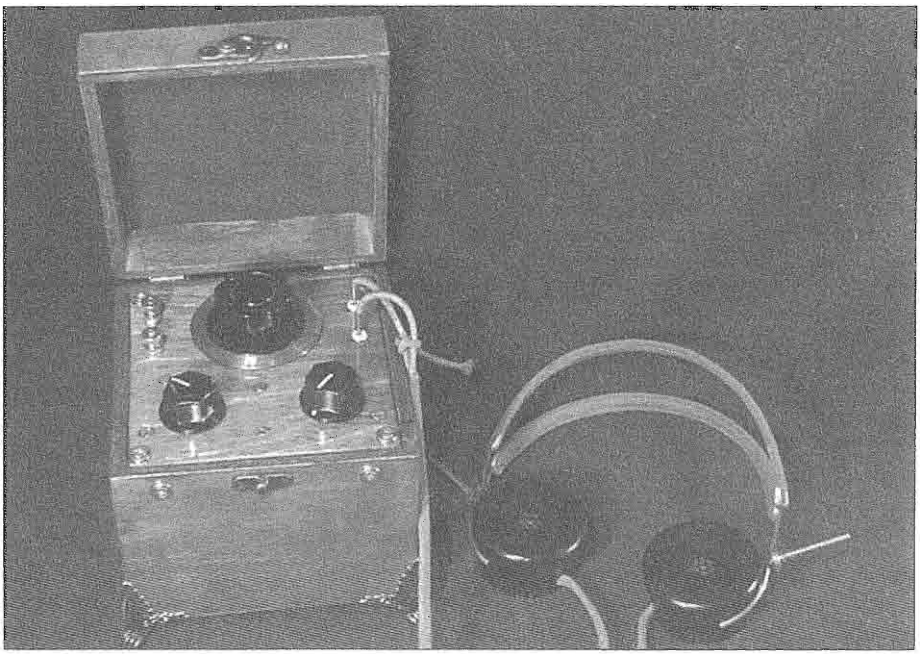
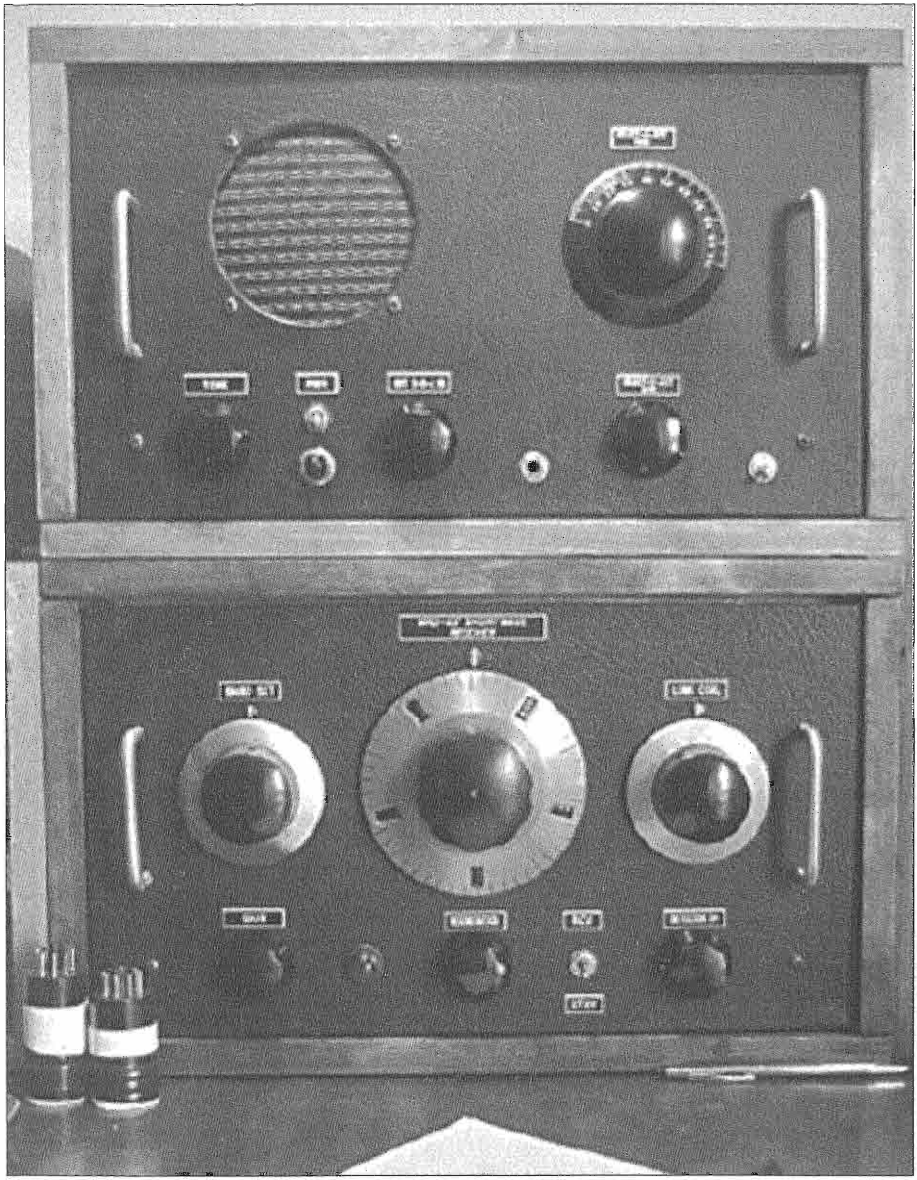


Figure 2: Reminiscent of circa-1920 crystal sets and classic regen receivers, Dave Ishmael's Jewelry Box 1G4GT set shows the thought and craftsmanship that has been invested in its construction. There are benefits to projects such as these that are not available with the purchase of expensive and complicated modern equipment.



This is Jim Stoneback's Ultimate Regen listening post which is based on Bruce Vaughan's design from Electric Radio issues 151 to 153. The receiver is on the bottom, set off by the great looking National PW dial in the center of the panel. A set of band coils are to the left. Above the receiver is the audio amplifier and speaker, which was frequently built seperately during the 1920's and 1930's. Notice also the hand-finished wooden cabinets and the engraved control labels. Projects such as these encourage a rebirth of interest in the roots of Ham radio, and in the rediscovery of the pride of accomplishment.

very sensitive and stable receiver - more than adequate for tuning in CW and SSB QSO's on 20, 30 and 40 meters. I haven't heard much activity on 17 or 15 meters, which it also covers. I built my Ultimate Regen with a National PW dial also; so, the bandspread is excellent for hamband use. By the way, the sound of the CW band through this regen is hauntingly beautiful.

I built the 6C4 detector and the two-stage audio preamp stages on one chassis using the shock-absorbing subchassis for the detector tube just as Bruce suggested in his plans. And continuing to follow his suggestion, I built the power supply and audio output stage on a separate chassis. I also added a two-tube audio select-o-ject (ala' National) to that chassis. I used National Velvet Verniers for the Bandset capacitor and for the antenna link coil.

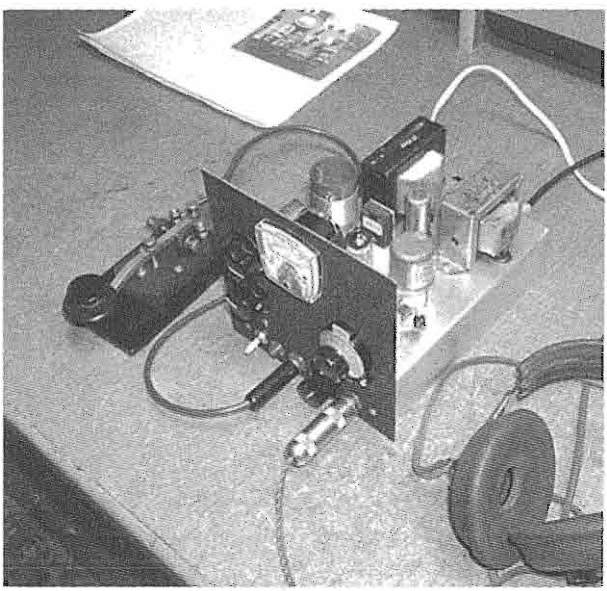
As I write this note, I'm listening to Radio Canada International's 'As It Happens' on 31 meters. It's understandable that the superheterodyne was so readily adopted by both communicators and the general public alike. You really have to operate a regenerative receiver; but once you've got everything adjusted you can sit back and enjoy!

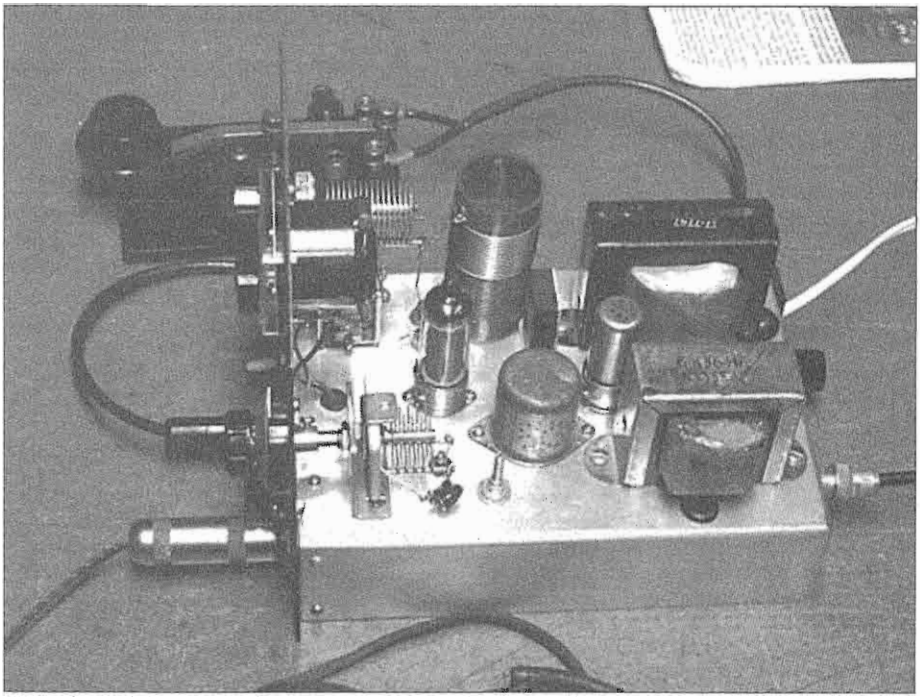
I spent a morning last week on 20 meters working CW with my Johnson Adventurer (XTAL-controlled, 20 watts out) and my regen receiver. In a two-hour period I worked stations in Albuquerque, Sioux City, Memphis, and Newport Richey. Two days later, I worked upstate New York and Greensboro, NC with the same setup but on 40 meters. Everyone I worked was mind-blown that I was using a regenerative receiver! Not bad for a mix of 20's, 30's, and 40's technology.

You can believe that I'm proud of it. It's a keeper!

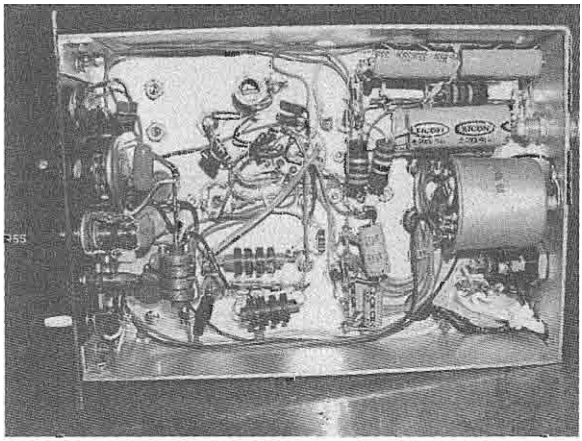
Jerry Fuller, W6JRY

Jerry Fuller has been working on his version of the 1-tube K6DPZ transceiver that was described by Hal Guretzky in Electric Radio 169, June 2003. He recently completed the rig, and the photo on this page, and the two on the next page show Jerry's work. The photo to the left show the completed rig and the vintage military key and headset that Jerry is using with it. He is now QRV on 40 CW and has worked many stations along the West coast from his home QTH in Forest Ranch, California. The photos don't do the rig justice, as it is a beautiful piece of work complete with a polished chassis and a black wrinkle front panel paint job. Along the rear of the chassis are the back-to-back filament transformers that supply B+ to the rig's circuitry. The 6AQ5 is just ahead of them, and the receive coil and transmit crystal are to the left. The round can just in front of the right transformer is the 6PDT high-impedance 10K relay. The front panel is laid out so that all of the controls are easy to use.





Here is a side view of W6JRY's rig. Nothing used in its construction is hard to find, except possibly the high-impedance relay. If there is enough interest, Hal Guretzky is considering making a kit of parts available for his 1-tube transceiver. Anyone interested in this kit should contact Electric Radio or Hal directly and express their opinion. At this point, we are wondering who will be operating the first station to make a coast-to-coast QSO with a one-tube transceiver? It is hoped that any such results will be sent in to Electric Radio.



A peek under the chassis of Jerry's rig shows the careful construction style that would make anyone proud. Notice the surplus ARC capacitor mounted on the right end wall! ER

Installment 4

W. J. Halligan
Newspaper Reporter and the State of Radio 1923-1924, Part 2
Epilogue

by Robert E. Grinder, K7AK
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Full outline of Part 2

A. Vignettes inspired by the 1923-1924 era
   1. Contemporary happenings
   2. Pertinent statistics
   3. Radio manufacturing in the United States
   4. Radio in other countries
   5. Musings—Bill Halligan
   6. Emerging need for an international language
B. Listener vignettes inspired by the advent of radio
C. Vignettes inspired by radio associated witticisms
D. Epilogue
   1. The Pallophotophone
   2. The patent mess
   3. Radio in other countries
   4. Wavelength or frequency?
   5. Reginald A. Fessenden
   6. Emerging need for an international language
   7. References

D. Epilogue

The Pallophotophone

Vaudeville dominated show business in the hoopla turn-of-the-century years. Not a single nickelodeon existed in the United States in 1904, but only three years later, in 1907, over two million people a day, one-third of them children, were attending movie shows in converted stores and barns. By 1920, 35 million persons were attending a movie show, on the average, once a week. Then, the entertainment attraction of silent films suddenly plummeted. It was threatened by a sky-rocketing, brand-new form of entertainment that "promised 'something for nothing'—radio." The industry recovered its bloom on October 6, 1927, when "The Jazz Singer," starring Al Jolson opened not only with a synchronized musical score but also with spoken dialogue. Movie goers were immediately entranced; talking pictures had arrived (Green and Laurie, 1951).

The Pallophotophone was a major precursor in the development of the "talking" motion picture. This pretentiously named device was the first to photograph voices on a moving picture film so that they could be reproduced simultaneously with the projection of the picture, and thus, present them as they would be heard in a real drama. Charles A. Hoxie, an engineer working for General Electric, developed in 1922-23 the Pallophotophone. WGY Schenectady was the first broadcast station to use it to record the voices of its announcers. Listeners claimed that they could not ascertain whether an announcer was live in studio (Morecroft, 1923a).

The Patent Mess

Major patent controversies raged out of control in the radio domain while Bill Halligan was a reporter [see "Radio Manufacturing in the United States," 5/5/23 and 3/18/24.] The saga began shortly after WWI when U.S. government officials intensely opposed British domination of American wireless stations. Franklin Roosevelt, Assistant Secretary of the Navy, and prominent Admirals thus persuaded General Electric to purchase a control-

ling interest in American Marconi and to form the Radio Corporation of America.

The new corporation was created ostensibly to advance American interests in international wireless communications. Major manufacturing companies, including General Electric, Westinghouse, American Telegraph and Telephone Co., Western Electric, Wireless Specialty Apparatus, etc. agreed mutually to exchange information and to pool patents under the RCA umbrella. The coalition enabled RCA to tightly control about 2,000 radio patents. None objected particularly to the monopolistic implications, since at the time the domestic radio manufacturing industry had hardly any commercial significance. Indeed, as Morecroft (1922a, p. 1) described the circumstances: "two years ago the only interpretation of the word 'receiver' would have been a man appointed by the courts to take over a bankrupt firm." After KDKA began broadcasting, November 2, 1920, from East Pittsburgh, the public for the first time had good reason to purchase receiving sets. They purchased 5 million dollars worth of them in 1922; they purchased 15 million dollars worth in 1923, and in 1924, an astonishing 100 million dollars worth (MacLaurin, 1949, p. 139).

The big conglomerates that via pooling had sole access to the patents were swamped by the unprecedented demand for radio equipment. Patent infringements thus escaped their attention while they struggled to keep up ("Editor," 1922). As regards crystal sets, the purchase of which predominated among BCLs during the early years of broadcasting, manufacturers assumed that they were free of patent constraints. However, the Wireless Specialty Apparatus Co., an affiliate of RCA, controlled patents for both crystal detectors and receiving circuits employing them. The company, therefore, sent an open letter to the public, manufacturers, and trade organizations in which it insisted that all manufacturers of crystal sets must obtain from it a license and pay royalties. The letter also asserted that any retailer handling crystal sets not made by a licensed manufacturer would be liable for damages ("Editor," 1922, p. 450). Fortunately for the industry, the Courts, December 1922, ruled that the stipulations were unfair and over-reaching and ruled against Wireless Specialty Apparatus and enjoined it from continuing its campaign of harassment (Morecroft, 1922b, p. 92).

Entrepreneurs and eleemosynaries who rushed to establish broadcast stations found themselves ensnared by patent infringement, too. The executives of AT&T contended that the cross-licensing agreements with RCA reserved for AT&T exclusive rights to the manufacture of broadcast transmitting equipment, given that the Company possessed patents that covered many aspects of radiotelephony. Therefore, AT&T maintained that all broadcast stations must take out licenses in keeping with its patents. A royalty rate was fixed at $4.00 per watt of input power, with a minimum fee of $500 and a maximum of $3,000. Beginning in 1923, AT&T campaigned aggressively to bring into compliance every broadcast station in the country. Opponents, including Secretary of Commerce Hoover, saw in the efforts of AT&T an attempt to monopolize the entire domain of entertainment broadcasting. Political agitation against the Telephone Company grew intense. Fearing public censure, the executives of AT&T abandoned voluntarily its battle to license broadcast stations (MacLaurin, 1949, pp. 113-114).

RCA ruled the receiver manufacturing industry with a proverbial iron fist. Hundreds of small, generally poorly capitalized manufacturers arose only to be beaten into submission by its army of attorneys. Many of them infringed unknowingly upon RCA patents as they manufactured components and sets. Claiming ignorance was a good defensive tactic, since damages could not be collected unless the infringer actually knew of the patent (Hoar, 1923). However, as Morecroft (1923a, p. 356) put it, "a monopoly of the most grinding sort is the object of this firm," for RCA pursued it aims relentlessly. For example, RCA sought an injunction against the A. H. Grebe Company, a rising manufacturer of both broadcast and amateur short-wave receivers (Grinder, 1996), for infringement of five different patents. Grebe claimed that it had purchased components like tubes, transformers, coils,

wood cabinets, and molded Bakelite parts, and then, had assembled them into a complete unit. RCA claimed in court that "the A. H. Grebe Co . . . did unlawfully and wrongfully make wireless receiving sets adapted, designed, and intended for use in combination with vacuum tube detector and amplifier tubes" (Morecroft, 1923a, p.356). The Courts upheld the sweeping rights of RCA, and Grebe was forced to pay RCA royalties of about five percent of its net sales.

General Harbord, president of RCA, wrote a letter in 1923 to the editor of Radio Broadcast in which he set forth a rationale for the harsh treatment RCA meted out to infringers. In brief, his letter reiterated what the hapless manufacturers already knew: "An infringer of patents has the advantage that he has no patent investment, no research to finance, no responsibility to the art. He can make a thing and sell it; if he makes a dollar profit it belongs to him until the Courts take it away from him, which can only happen after a long litigation." The Radio Corporation, he said, "had the absolute right to enforce every patent which it owned against every user. However, "in keeping with the high ideals which have characterized it since its inception, decided that if an amateur wanted to build his own set for his own amateur use he could do so, and that it would not, until further notice, treat such procedure an infringement of its patent rights." RCA, therefore, "is not attempting to create a monopoly; it is attempting to enforce the lawful rights limited in scope and in time which it has been necessary for it to acquire in order that the radio art might go forward" (Morecroft, 1923c, p. 4).

Amateurs of 1923 surely were indebted to RCA for its largess, but no expressions of gratitude were ever forthcoming, since the ARRL never acknowledged it and few amateurs were aware of it. The likelihood that a BCL or amateur might purchase a piece of manufactured equipment seems to have been a remote possibility to Bill Halligan; he mentions in his columns a manufacturer by name only once or twice. He focused exclusively on BCLs and amateurs who built their own equipment, and thereby, both he and they were affected only obliquely by the patent controversies swirling around them.

Radio in Other Countries

Bill Halligan's discussion of government policies toward both broadcasting and receiving in industrialized countries shows that early in the broadcast era "free enterprise" practices were solely the province of the United States. For example, England and Germany neither permitted private broadcast stations, because they feared the intrusion of commercial advertising, nor allowed citizens free rein in constructing receivers.

In the instance of England, the General Post Office announced in 1922 that it would initiate radiophone broadcasting for patrons who would be required to pay a nominal sum for a permit to purchase or build an "approved" receiver. It would have to be capable of only receiving above 300 meters and below 500 meters, use an antenna between 30 and 100 feet in length, and be British-made. The latter criterion was invoked to ensure that receiving sets from other countries did not flood the market to the detriment of national industries. Fortunately, experimental licenses were granted to amateurs so that they might copy any wavelength and transmit on 175 and 275 meters (Morecroft, 1923b; Sleeper, 1922).

Wavelength or Frequency?

Bill Halligan observed cryptically [Musings, 4/3/23] that "It isn't stylish to talk in wavelengths any more, we're informed." He was right, for he was probably aware that one of the recommendations at the forthcoming second radio conference (May, 1923) would be to assign to broadcast stations frequencies in "kilocycles" rather than wavelengths in "meters."

The two measures possess a reciprocal relationship. The lower the frequency the longer the wavelength; the higher the frequency the shorter the wavelength. The correlation stems from the characteristics of the alternating current that a transmitter emits. On the one hand, the current changes constantly in respect to potential and polarity. A cycle occurs when the current rises from zero potential to a peak of positive polarity, swings to zero, rises in the opposite direction to a peak of negative polarity, and returns again to zero. The number of complete cycles

that occur during one second is described as the frequency of the alternating current. On the other hand, the physical distance between two successive peaks of the same polarity is identified as the "wavelength" of the current. A wave that travels a distance of 500 meters between peaks is transmitted on a wavelength of 500 meters.

Radio waves travel away from a transmitter at the speed of light, or at about 300 million meters a second. Therefore, to convert wavelength in meters into frequency in kilocycles, 300,000 is divided by the number of meters; to change frequency in kilocycles to wavelength, 300,000 is divided by the number of kilocycles. For example, 200 meters is equivalent to 1,500 kilocycles and 600 kilocycles is equivalent to 500 meters.

From the earliest days of radio it was customary to designate transmitters as operating on certain wavelengths and to describe receivers as tuned to certain wavelengths; however, radio engineers in 1923 made the recommendation in favor of the frequency nomenclature because (1) the notion of "kilocycle," which had long been a common reference term in the wider electrical sciences, was now gaining credence in the radio sciences, and (2) relationships associated with signal widths of broadcast stations and the width of the broadcast band are interpretable more readily in the context of frequencies than in that of wavelengths. Consider:

First, a high proportion of pre-broadcast, ship-to-shore radio communications initially took place around 750 meters or 400,000 cycles. In the interest of brevity, members of the radio community preferred to converse with one another in terms of meters than frequency because it was easier to talk about a few hundred meters than about hundreds of thousands of cycles. However, when long distance, transatlantic radio transmissions utilizing high-power spark transmitters became a reality, longer wavelengths proved to be more useful than shorter ones. A 15,000-meter wavelength represented an alternating current frequency of only 20,000 cycles per second. The frequency nomenclature gradually entered the technical vernacular, and as the expression of cycles in terms of kilocycles came into vogue, "wavelength" fell into disuse except as a broad reference term, e.g., 80-meter band, 40-meter band, etc. (Morecroft, 1923d).

Second, the radio engineers of 1923 assumed ideally that each broadcast station requires a band of frequencies ten kilocycles wide on each side of the carrier frequency in order to operate without interfering with an adjacent station. Thus, approximately 26 stations can be accommodated if the range of the broadcast band is from 550 to 1350 kilocycles and station assignments begin sequentially at 560 kilocycles and their carriers are distributed evenly every 20 kilocycles. The bandwidth separation for stations is a function of their modulated carriers and is constant (carrier frequency plus and minus ten kilocycles), whatever their wavelength.

The above calculations would be both difficult to compute and to comprehend if expressed in wavelength nomenclature. The problem is that measures of separation by frequency and by wavelength are asymmetrical. For example, a separation of 10 kilocycles at 500 and 550 kilocycles represents a separation of 15 wavelengths at the equivalent 600 and 545 meters. However, a separation of 10 kilocycles at 1340 and 1350 kilocycles indicates a separation of only 2 wavelengths at the equivalent 224 and 223 meters. Consequently, it is difficult to discuss and compare the bandwidth of modulated carriers in terms of wavelength. No wonder, then, that Morecroft (1923d, p. 186) asserted "the decision of radio engineers to use kilo-cycles instead of wavelength is seen to be reasonable and justifiable."

Reginald Fessenden.

Bill Halligan notes [Musings, 4/7/24] that recently he "had the pleasure of listening to a lecture by Professor Reginald A. Fessenden." He declared that Fessenden, in the opinion of most American scientists, was more influential than Marconi in advancing the science of radio. Professor Fessenden was living in semi-retirement in 1924 in Chestnut Hill, one of the more affluent suburbs of Boston. He was 68 years of age, and one can easily appreciate why the 25 year-old Halligan admired and respected the distinguished electronic scientist. Fessenden was essentially a "pure" scientist. He liked to pioneer by

exploring novel, indeed revolutionary, principles with little regard to practical consequences. His contributions to both radiotelephony and reception were often several years ahead of application.

Whether Bill Halligan ever met or talked with Professor Fessenden is not known. Fessenden could be polite and solicitous, when it suited him. "But he was hot tempered and intolerant, seldom suffered fools and was distressingly vain" (MacLaurin, 1949, p. 62). Consequently, there is no evidence that he paid any attention to the ongoing columns of the young man. Nonetheless, Bill Halligan did report extensively on the efforts of BCLs and amateurs to advance the art of radio. Fessenden once had a significant role in that advancement. Yet in 1923 he was apparently disinterested in relatively mundane aspects of its application.

Emerging Need for an International Language.

Bill Halligan endorsed enthusiastically efforts to establish a universal, "international auxiliary language" (I.A.L.) The project gained impetus in late 1923 and early 1924 following the first amateur two-way contact between the United States and France, and subsequently, as transatlantic two-way contacts became commonplace. Persons like O. C. Roos, of AMRAD, excitedly promoted one version or another. During this initial phase of interest, the ARRL was apathetic toward the matter. However, in September 1924, shortly after Bill Halligan ceased writing columns, the ARRL announced that it had investigated the I.A.L. question and that it had elected to endorse Esperanto and to commend it to the membership (Warner, 1924).

Kenneth B. Warner, Secretary of the League, argued that Esperanto had the greatest number of followers, was a practical, living language, had a strong literature base, and was used actively by thousands of persons all over the world. Esperanto, he believed, was simple and easy to learn. It was conceptualized in 1887; all nouns ended in "o," all adjectives in "a", and all verbs followed the same rules of conjugation. On behalf of the ARRL viewpoint, Warner proclaimed that "We have communicated with all the national amateur radio societies of the world, and all who had an opinion recommend Esperanto."

Although Warner urged amateurs to become acquainted with Esperanto at their earliest convenience, he recognized that "most of us will fail to make the necessary slight effort until the whole world takes up the idea." He recognized that whether amateurs succeeded would depend on "general progress in society at large." He hoped, accordingly, that the leading nations of the earth would cause Esperanto to be adopted and "put to work all over the civilized globe."

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[Editor's note: Next month, Bob continues with Part 3 of this series]

ER

Reducing Selective Fading Distortion

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Figure 1 shows two audio waveforms, each eleven seconds long. This is a voice signal from an AM broadcast station in the 25-meter shortwave band. One waveform was received using fast AVC and the other with slow; other receiver settings were identical. Figure 2 shows a similar comparison for a signal received on the 31-meter band; these waveforms are six seconds long. Can you tell which AVC rate applies to which waveform?

Automatic volume control is a receiver feedback system intended to minimize variation in demodulated audio level. AVC controls the gain of the RF and IF stages (and sometimes the converter stage). An RC filter extracts a signal proportional to the AM carrier level from the detector output. AVC applies this signal to the tube control grids. The RC time constant determines how quickly the AVC system responds to changes in signal level. Receivers with a fixed time constant invariably use fast AVC (generally 100 to 200 ms) for AM reception. This lets the receiver track rapid variation in signal strength with little variation in audio level. Knowing this much, it's easy to guess that the top waveform in both figures, which shows much less level variation, must correspond to fast AVC.

Selective Fading

What I haven't told you is that the shortwave signals exhibited selective fading. Selective fading is nonuniform signal-strength variation across the receive passband. Figure 3 shows some examples of selective fading. These are spectrum analyzer traces of a digital shortwave broadcast signal on 17.62 MHz in the late afternoon. The signal spectrum is 10 kHz wide, apparently and presumably flat. This montage shows the variety of ways selective fading can alter a spectrum.

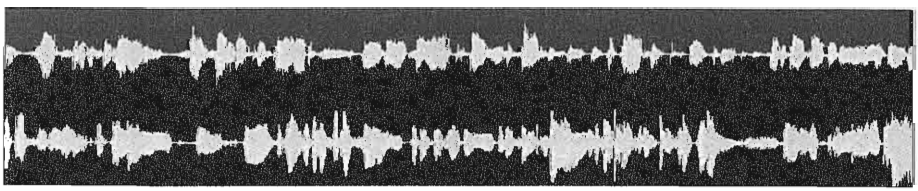

Figure 1: Shortwave voice signal in the 25-meter band, two AVC settings.

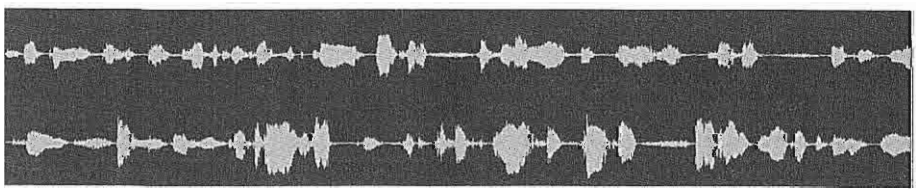

Figure 2: Shortwave voice signal in the 31-meter band, two AVC settings.

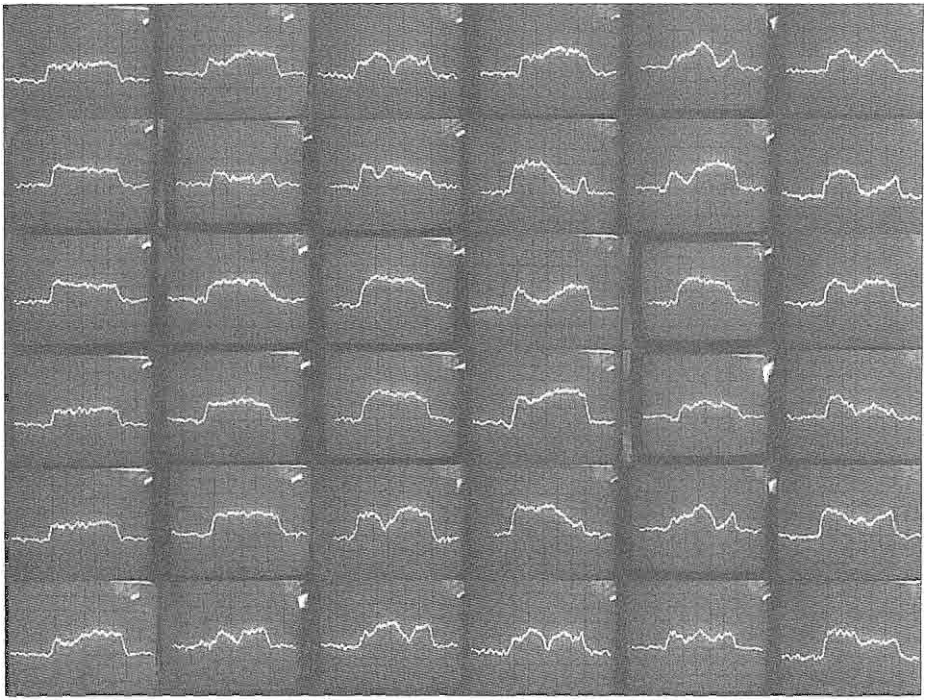

Figure 3: Digital shortwave broadcast signal at 17.62 MHz. 20 kHz span, 10 dB/div.

Figure 4 shows the cause of selective fading: multipath propagation. The signal is a uniform pulse train emitted by an HF radar at 17.45 MHz. The radar tracks meteor ionization trails for scientific study. I recorded these traces from a spectrum analyzer in nonscan mode with 30 kHz bandwidth. In these images the horizontal axis is time, not frequency. The first column shows the pulse train early in the day when a slightly delayed pulse was just starting to appear. This extra pulse may be due to the extraordinary ray, a second ionospheric path caused by earth's magnetic field. The remaining images are closeups taken later in the day when each pulse had become an ever-changing ensemble of many. Mentally superimpose an AM carrier for each pulse you see, recall that time delay is phase shift, and you'll get some idea of the self-interference multipath propagation can cause.

Selective fading can change an AM signal's tonal character by altering the shape of the sidebands, and it can change the audio level by altering the sideband or carrier amplitudes. When it attenuates the carrier, selective fading can cause distortion by raising the effective modulation index beyond 100%. When it changes the relative carrier and sideband phase, it can cause distortion by altering the signal envelope. Distortion from these two mechaisms can be severe.

Now return to Figures 1 and 2. In fact, the upper waveform in each figure was received using very slow AVC (a time constant of about 5 seconds), while the lower trace used fast AVC

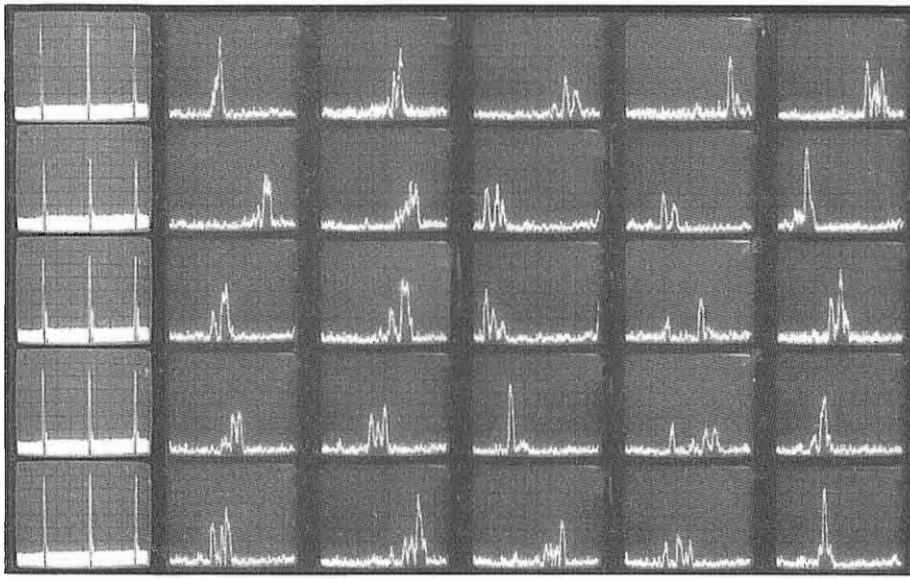

Figure 4: HF radar signal. First column, 0.5 ms/div; others, 0.2 ms/div. 30 kHz bandwidth, linear detector.

(about 300 ms). It's clear from the traces that slow AVC was much more effective at stabilizing audio level. What the traces don't show is that slow AVC greatly reduced audio distortion.

Selective fading fakes out an AVC system by giving a false indication that the audio level has changed. When the carrier level decreases but the sideband level remains the same, AVC applies less negative bias to the control grids to increase receiver gain. This causes the audio level to rise when it doesn't need to. Similarly, the audio level will drop when the carrier level alone rises. The AVC does the opposite of what it's designed to do. The problem occurs because carrier and sideband levels are not well correlated during selective fading.

Distortion

Unwarranted volume variation during selective fading isn't the worst of it, though. A misbehaving AVC increases audio level just when it is most likely to be distorted. When a selective fade greatly reduces the level of the carrier with respect to the sidebands, it's as though the transmitter were severely overmodulated. A diode detector can cope well with upward modulation exceeding 100%, but downward modulation so large causes the demodulated waveform to clip and fold. With little or no carrier, which is common during severe selective fades, the audio sounds raucous, irritating, and sometimes unintelligible. Most of the high-amplitude sections in the lower traces of Figures 1 and 2 sound highly distorted.

What's interesting is that when the carrier fades and the audio distorts, the audio level generally drops a few dB if the receiver gain is held constant. This may happen because the selective fade is not so selective and attenuates nearby sidebands along with the carrier. It may also be due to the carrier phase rotating

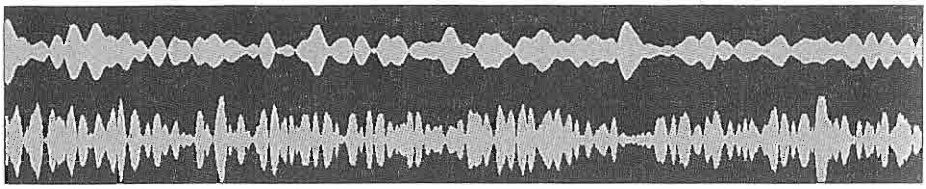

Figure 5: Sixty seconds of carrier from two shortwave broadcast stations.

with respect to the sidebands. Theoretically, if the carrier phase rotates 90 degrees, the output of an envelope detector will drop 14 dB (and consist of purely second harmonic, which may account for some of the audible distortion). It's unlikely that the phase of the carrier and all of the sidebands will align this unfavorably. Still, audio level generally does drop during a selective fade if the AVC system is prevented from raising it. You can take advantage of this natural distortion-suppression mechanism by not undoing it with fast AVC.

Carrier loss during a selective fade is often quite brief. If the AVC time constant is very long, the AVC voltage can ride through brief periods of carrier loss with little change. Such an AVC system measures the long-term carrier level and ignores short-term variations. The receiver gain that results is much more appropriate.

Figure 5 shows sixty seconds of carrier from two shortwave broadcast signals. The upper trace was recorded in the 25-meter band in the daytime, while the lower trace is from the 31-meter band at night. I obtained these plots by tuning my Kenwood TS-930S to the carrier in CW mode with the 500-Hz IF and audio-peaking filters engaged to reject modulation sidebands. AVC was disabled. You can see that carrier loss is usually sharp and brief, often rebounding to the prior level. An AVC system with a very long time constant would have no trouble smoothing the short-term variation in either of these signals.

Do Your Own Experiment

It's easy to see how badly fast AVC behaves using your own receiver. Find an AM signal with pronounced selective fading. Listen to it for a while with fast AVC enabled to get a feeling for the character of the fades and the audio distortion. Then turn AVC off. Adjust the RF gain so that the audio level is about the same as before. Then listen to the audio. If you're like me, you may be surprised not to hear any distortion the first time you try this. I assumed that propagation conditions had changed and selective fading had gone away. Switching AVC back on made clear that it was still there. With AVC off, listen carefully when the audio level drops a bit. You should hear some distortion, though it won't sound nearly as raucous as with AVC enabled. What's unexpected is that if you listen casually, the residual distortion with AVC off may drop below your awareness threshold.

Using manual gain control is a very good way to reduce selective-fading distortion. If you're willing to track long-term variations in signal strength by riding the RF-gain control, you'll be rewarded with much cleaner audio. But most of the time you won't want to pay such close attention while receiving. This is when the use of a very long AVC time constant makes sense.

Implementing Very Slow AVC

In my receivers I use time constants of about 300 ms for fast AVC and 5 seconds for slow. It's impractical to have only slow AVC available, at least AVC this slow. When you tune away from a strong signal, it may take several seconds for the receiver gain to rise enough to hear weak signals. I use fast AVC for tuning and slow AVC for listening.

Don't make the fast AVC too fast. If your receiver's audio system has good bass response, an AVC time constant of less than 200 ms may cause audible distortion on low-frequency tones. Residual audio on the AVC capacitor changes the receiver gain at an audio rate, distorting the signal envelope.

Even with your receiver parked on one frequency, there will be times when signal strength increases rapidly. This may happen when propagation suddenly changes or when a stronger signal appears. It's helpful if the slow AVC has fast attack. Otherwise you may hear a loud burst of audio as the AVC slowly comes to the right level. The automatic noise limiter described last month provides fast-attack AVC as a bonus. This ANL uses the AVC capacitor to clamp audio impulses. When a strong signal appears, the clamp diode quickly charges the AVC capacitor and reduces receiver gain. The ANL and AVC systems work synergistically to limit audio impulses and bursts, and to properly set receiver gain.

I use a 4.7-megohm resistor feeding a 1-uF low-leakage capacitor for slow AVC. The charging current available from the ANL circuit depends on the IF output impedance, diode conductivity, and series resistance. Using a very large AVC capacitor may cause some audible distortion if the ANL can't charge it quickly when a large signal appears. I found it easy to arrive at suitable component values by experiment. Be sure to evaluate your circuit under a wide variety of signal and propagation conditions.

Some receivers connect the main AVC capacitor to the controlled grid circuits through RC filters for RF decoupling. The capacitance of these filters often makes only a minor contribution to the overall AVC time constant. It's best not to modify the AVC time constant by altering the value of a decoupling capacitor. These capacitors often exhibit a small reactance, and altering a value may degrade RF tracking or the IF response.

If no decoupling networks are used and the AVC capacitor functions as an RF or IF grid-circuit bypass, replace the original capacitor instead of paralleling another. The series-resonant frequencies of capacitors of unequal value differ. A parallel combination will exhibit a high impedance at some intermediate frequency where the capacitive reactance of one capacitor equals the inductive reactance of the other, effectively disabling the bypass. Replace the original capacitor using the same attachment points and lead lengths since RF tracking may depend on stray circuit inductances. It's a good idea to check RF tracking and IF alignment after capacitor replacement.

ER

A Shortwave Primer, or Shortwave 101 Part 2

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Now, if you don't want to travel to Dayton or hit the malls or ham stores, may I suggest an alternative approach?

Radio Purchases on the Internet

The world on ebay has opened up new vistas on the horizon of shortwave radio. If you've not ventured there may I suggest a visit to www.ebay.com? Under the category selection click on the main heading of Electronics & Computers, then under the heading of Radio Equipment, choose "Ham Radio" or "Shortwave". You can then either cruise the myriad pages of equipment or cut to the chase and enter the specific brand or model you're looking for, such as Hallicrafters, into the search box.

Sellers on ebay are very honest in their picture presentations and descriptions of the equipment they're offering for sale. After all, their credibility and rating as an acceptable seller are at risk if they receive an unacceptable rating from a buyer. They can even have their ebay selling privileges suspended. Once you locate a suitable radio, you'll find that you can usually send the seller questions by email to gain additional information. I highly suggest that you get a reliable history regarding any radio you're considering for purchase. Many sellers find radios at garage sales and will usually state such information in their description of the unit. Find out if the seller has taken good care of the set. Many are addicted radio nuts like myself and have several radios in their collection. They can also usually tell you about any problems with the unit and tell you if the radio needs to be repaired. Also ask if the owner's manual is available. One question that I failed to ask was if the radio lived in a smoke free environment, or if the current or past owner was a smoker. Damage from cigarette smoke can be very annoying for the non-smoker but can be easily rectified with a little elbow grease and the right cleaners.

I'd like to offer a few additional words of advise about Internet purchases. If you spot that boatanchor you've always dreamed of having, you have the option to buy it immediately if a 'Buy-It-Now' choice is shown next to the item. Use this method and you've got your radio without any competition. The other sometimes-successful trick is to place a high maximum bid. Make your initial bid just above the current price but put a higher bid in reserve. Secondly, bidding is just that, bidding. It's exactly like being at an auction and you can be out bid in a heartbeat, and usually at the last minute. The stories about the one-that-got-away are not just for the fishermen in the crowd. It also relates to those of us who choose the ebay route. All bidding has a cut off time that usually hits around midnight, West coast time. And believe it or not, there are some very dedicated West coast insomniacs that will beat you out. You may think you are high bidder and are riding high, and then all of a sudden you get that email saying you were out bid, and whammy, your dream machine is gone.

I learned my lesson the hard way and lost out on the bidding on some receivers from Knight and Hammarlund.

Luckily, when I spotted a Hallicrafters SX-122 in decent working order, the seller had listed a Buy-It-Now price and I decided to grab it. The SX-122 was Hallicrafters' premier shortwave receiver manufactured in 1966, offering dual conversion and a full-scale tunable band spread. This was the receiver that I dreamed about when I was a kid. I was also able to purchase the matching speaker and an owner's manual on e-bay. So, happy hunting!

Shortwave Radio Kits

Everyone remembers Heathkit. ER classified are filled with requests for un-assembled kits. There is one manufacturer that still offers a passable shortwave radio kit. Ten-Tec, Inc., makes a little shortwave receiver kit, No. 1254, which can be assembled in a few weekends or evenings. Their address is 1185 Dolly Parton Parkway, Sevierville TN. 37862-3710. Or, catch their web site at www.tentec.com. The kit contains all the necessary parts to build a modern, solid-state receiver that covers 0-30 MHz and has a decent BFO circuit for SSB reception. I assembled one of these kits last winter and am very pleased with the results. I have also seen various articles in ER on building you own radio. In ER #167 Bob Dennison wrote a great article about building your own shortwave set. So give it a try.

Antennas for Shortwave

The interesting trick here is that you should probably use an antenna reserved exclusively for receiving. You're not broadcasting in the shortwave bands. Ideally, your antenna should be a horizontal dipole that's tuned to match the band frequency or a multiband model. There are three main considerations that will define your criteria for the proper antenna: The type and size of the radio you're using, how much space is available for the antenna, and the frequencies you're trying to tune in. Sound familiar? Radio owner's manuals also usually include a section on recommended antennas, so there's another valuable resource.

Location, Location, Location.

Those favored words by real estate agents certainly apply to the radio crowd. Have you been boxed in by a condo or a new neighborhood that has restrictive covenants? Well, welcome to the modern age. But trust me when I say there are ways around this problem. Temporary, random length long wire antennas can be strung from a balcony to a tree, secured to the side of the balcony wall or rail, or just tossed out a window. When I was in college I achieved reasonable results by running aluminum foil held up by thumbtacks around the walls of my dorm room. I then clipped a wire that ran from my whip antenna to the foil. Sometimes, you just have to be creative, I guess. I have also seen ads in *Monitoring Times* and evaluations in *Passport* for active antennas that can be mounted on a porch or deck rail or around a windowsill. There are even antennas that slide over the top of a plumbing vent stack and are disguised to look like the stack. These restrictions don't affect all locations but are certainly worth mentioning.

With a small portable set you may be limited to the extendable whip that came with the radio or a reel type, portable long wire indoor antenna that simply clips over the whip. Some manufacturers also include a jack for an external antenna, so that the portable reel type of antenna, or fashion your own long wire antenna with the appropriate plug. You can also use either an indoor or outdoor 'active' antenna. This type of antenna uses an external power source to amplify the received signal and is a great accessory for putting your portable radio on steroids.

Remember the 'Tropical' bands? For best listening in the 60 - 120 meter bands, I suggest using a tunable loop antenna that is designed for the frequency band and that is directional in

reception pattern. Many of the books available covering antenna design and construction usually offer designs for antennas covering these bands. Commercial antennas are also available.

For either modern or vintage receivers, the type and size of antenna you can run are nearly limitless. I have seen entire books published on the subject. Owner's manuals are again a good source of information. Many older receivers will simply have screw type terminals on the back of the receiver for the antenna and ground connections. Here you may be limited to a long wire antenna unless you want to rig a flanged coax adapter into the antenna circuit and mount it on the back of the receiver. Newer receivers and the better vintage radios already have these fittings in place. Both *Monitoring Times* and *Passport* give excellent descriptions on commercially available antennas. I've had very good success with the Grove Skywire; catalog number ANT02, from Grove Enterprises. This dipole is already tuned to match the majority of the shortwave bands.

Want to make your own? Run a half wave tuned dipole and you're in reception heaven. I must stress the need for heeding numerous safety considerations. *Do not* string or attempt to string any wire antennas within any proximity, falling distance, or within several hundred feet (Am I making myself clear?) of any other antennas or electrical wires. We want to have you around with us for a long while. I must admit that I now cringe when I look back on some of my first escapades with stringing antennas. The simple long wire antenna that I ran along the roof ridge of my house could have easily come loose and made contact with the main electrical service. And please make sure that out door antennas are protected from static and lightening charges with the proper gas or ion filled arrestors. My suggestions for homebrewed antennas include the longwire and the tuned dipole. I suggest using SO-239 and PL- 239 fittings wherever possible and RG-58/U coax for the lines to run to your receiver. Sink a copper rod for the outside grounding point.

Now, let's talk antenna types. A longwire type of antenna is just that, a longwire. String a wire out the window to a tree or trees. I have had good results with longwire antennas about 250 feet long. For wire size I suggest using about size 16 for your antenna. Go with a much heavier gauge wire and it will sag. Go much thinner, like coil wire, and it will break on a windy day. I've found that insulated wire will perform just about as well as uninsulated wire. In fact, I would strongly suggest starting out with a simple longwire if you have no other suitable antennas. You may be surprised at the results.

Now for the half wave tuned dipole. I'm going to assume that my audience already knows how construct a dipole antenna. This is a horizontally stung antenna with an insulator or T-fitting in the center that allows one leg to be connected to the center or active element of the coax line with the other leg being connected to the grounded side of the coax shell. Insulators are then attached to each end for connecting lines to your supporting structures. Each side is of equal length and is strung high and broad side to direction of the transmitting station. If you have unlimited space you can build a dipole for each band and employ an antenna switch to change bands. You can calculate the total length for a half wave tuned dipole for any of the popular shortwave bands by using the following formula: Divide 468 by the middle frequency of the band in megahertz, to get the overall length of the antenna in feet. Since dipoles will cancel out weaker signals received at each end, you can experiment by running two identical dipoles mounted at right angles to each other and then switch

between the two for the best reception. I wasn't kidding when I suggested having 'unlimited' space. Perhaps the ultimate DX listening post would include a five-acre antenna array.

I also remember reading an article either in *MT, Popular Electronics,* or *Popular Communications;* about a fellow that put a set of old coil bed springs on the roof for an antenna, and buried a bathtub for the ground and apparently got good results. I would not recommend this approach.

You don't have to go to major extremes for decent reception. As I mentioned earlier I have experienced good performance using a Grove Skywire. And, several companies offer commercially available antennas with traps or tuned sections to save you the trouble of running several antennas. These may be run horizontally or in the inverted V position. I again suggest that you consult either *Monitoring Times* or *Passport* for additional information regarding antenna possibilities. Your local radio store may also carry antennas designed for shortwave reception.

Setting Up Your Listening Station

Now you're all set with a decent shortwave receiver and antenna combination. Hopefully, you've selected a comfortable area for your listening activities. And, maintaining a station log will allow you to record vital information on each station you've heard and will provide information when you're trying to locate certain stations in the future. A student sized spiral notebook or hardbound 'composition' book will work just fine, or you can use the ARRL Station Log and make your own modifications to suite SW. If you're starting from scratch, I suggest setting up columns for the date, time in UTC, station heard plus location, frequency, and some type of station rating, such as the SINPO code, which I'll discuss further in the QSL section of this article. Hang on to old logbooks because they provide a record of 'where you've been' in the shortwave world. Personally, I get a kick out of looking back at the stations I received in the past.

You'll also need some method for copying the running program information needed for obtaining a successful QSL from the station. I know that some folks will use tape recorders to record programs and then replay them to create their reception reports. Some receivers even come with a tape delay-recording feature. This may be an interesting feature for catching stations that only broadcast in the middle of the night, but for normal operations, copying station broadcast information in a spiral note book should prove sufficient.

A few listeners may also want to use headphones either for privacy or to better capture weak stations. Whatever the case, consult your owners manual for recommendations and find a pair that's comfortable.

QSL Preparation

Ah, the colorful QSL's from foreign lands. Airmail envelopes arrive stamped with exotic stamps. And, folded station schedules contain frequencies and station information in seven languages. QSL's certainly take on a new persona in the world of shortwave listening.

I guess I could have titled this section of the article by paraphrasing Shakespeare... To QSL or not to QSL, that is the question! I'll readily admit that while part of the fun with shortwave listening is finding, identifying and listening to the programs, a lot of fun is derived from receiving the interesting QSL's and station information from the shortwave broadcasters. As in other aspects of the radio hobby, the purpose of the QSL is to tell the broadcast station about the quality of their transmitted signal. Stations also like to hear about how the listeners enjoyed their programs. In order to achieve QSL 'success,' a few simple rules-of-the-game will help that guarantee that

International broadcasters frequently provide colorful material along with traditional QSL cards. This illustration shows a sticker from Radio Beijing that lends an interesting flavor to the QSL process.

success.

First off, you need to make a decision about which stations you'll want to QSL send in reception reports and receive information in return. All Stations? Confirm one station from each continent? It's essentially your decision but keep in mind the associated cost and the possibility of not receiving information from a station even though you've done everything according to Hoyle. Stuff happens. Some stations don't honor QSL requests for the same reason, cost, and your carefully prepared reception report ends up in their proverbial round file. Cruising *MT* and *Passport* will allow you to keep tabs on what's happening with the broadcasters. The experts will tell us who's not playing the QSL game. Put these comments in your station log to prevent disappointments later on. But, don't let a non-QSL policy prevent you from seeking out a station on the SW bands. It's these stations that sometimes have the most interesting programs and news broadcasts.

Good note taking skills are another valuable asset. Now, I readily admit to not having the best handwriting or being able to read what I've just written down. So, I had to create a handy form to copy data for my reception reports. I keep these completed forms along with my station logs at my listening post. The information on this form includes excerpts from the station log with additional space for program notes. I also have space for the type of radio and antenna, where I'm located since I move around a lot, and the local weather. I'd like to think that the person at Radio Whatever would like to know if I heard their station on a cheap portable with a whip antenna or if I had trouble receiving them on a pricey Drake with a dipole.

OK. It's two minutes to the hour and you've locked onto a strong signal with an identifier lead in musical tune. Once the station starts making their announcements, start writing. Frequency, time, and station ID. Your notes should capture the highlights of the broadcast. If the station starts with a news broadcast, just don't record "news," but capture the main part of each main story in your notes. Keep a running time log down the left hand side of the page to track time intervals about every five or ten minutes. In order to have a satisfactory report, try and gather notes on at least thirty minutes of the broadcast. You could also find a station at fifteen minutes past the hour and start your report at that time. Getting a good block of time that is traceable to the station format is what's essential for a good reception report.

For reporting on signal quality, shortwave utilizes a SINPO code. Throughout your listening period, keep these

factors in mind. How is the overall signal strength? Is there much propagation disturbance? Is there another station that's interfering with the broadcast, and who is it? Is there much background noise associated with the broadcast?

The form you use for notes and reception reports should have a space for a reception code, such as 'SINPO'. The reception code is reported numerically, 1-5, with 5 having the best rating. So, if you hear a booming station on a great reception night, the rating would be 5 5 5 5 5, while the losers in the mud being drowned out by the BBC would be rated 1 1 1 1 1. Call 'em as you see ' em. Stations want to receive honest information. Officially, SINPO is defined as:

S = Signal Strength
I = Interference
N = Noise
P = Propagation Disturbance
0 = Overall Merit

There are some additional rules-of-the-road to follow if you've decided to request a QSL and frequency guide from the station. Stations will tell you if you've not sent the right stuff. A simple one-page form letter can be used for reception reports, provided that they include the pertinent information from your notes. Include your running notes about the program and tell the station what you liked or didn't like about their program. I suggest that you specifically request a QSL card, a station broadcast schedule, and some general station information. So don't be surprised if you receive that, and more, in return. If you're interested in DX, ask if the station sponsors a DX club. Or, if you have a particular question for the station such as recommended antenna designs, ask if they have a mailbag department to answer listener's questions. I believe Radio Netherlands (RN) offers both of these services. It's always interesting to listen to a foreign station and catch the comments of other listeners from other parts of the globe. Several years ago, I tuned in to RN every Friday night and heard a running dialog on DX techniques from various listeners around the globe.

Sending Your Reception Reports

By all means, it's imperative that your reception reports get sent via airmail and that you always include funds for return postage. So, trot off to your local post office and purchase two items with the intent of laying in a supply for those cold winter nights when you can't venture out: You will need First Class Air Mail Stamps and International Reply Coupons (IRC's). No doubt, you will wake up your postal clerk with this request. The IRC is a small coupon measuring about two by three inches, and is the approved, common document for paying for postal services in many countries. And, sending cash along with your reception report will not only line someone's pockets on the other end, but will most likely terminate your request. IRC's currently run about $2.00 per copy, and I believe the First Class Air Mail rate is $0.60. When buying your IRC's, make sure that the postal clerk applies the date stamp to the left hand side of the coupon showing the country of origin. The right hand side will be stamped at the receiving end and funds will be transferred in the station rep in the local currency. The alternative is to include First Class stamps from the country you're requesting where you're requesting the QSL. You'll find a source for foreign stamps in *Passport* if you want to go that route. I've used IRC's for thirty years with no problems. I usually include two or three with each reception report.

The address for sending in your reports is usually given near the end of each thirty-minute broadcast. All is not lost if you didn't catch the address. Your trusty, dog-eared, copy of *Passport* includes a section on station ad-

dresses. Always make sure that your request is addressed to the English Language Section or External Service of the station. And, you can always mark near your return address "QSL Requested." I suggest that you keep a record of what you've sent. Your report, how many IRC's were included, date sent, etc. I usually have four or five QSL requests cooking at one time so it's a good idea to keep track of the process.

It's not uncommon for some QSL's to take over one hundred days to get back to you. It's a fact of life that many stations have experienced cutbacks in staff and operating funds. This means fewer personnel to open envelopes and transfer your request on to the correct department. I don't want to discourage anyone from sending in a reception report. Some of my most interesting QSL's have been those reports where I expected a late return and included some extra postage or IRC's.

Want to share the good news about your logged contacts or QSL's? Well, look no further than the *Monitoring Times*. Two unique columns in the magazine are *The* QSL *Report* and *Broadcast Logs*. Both columns are maintained by Gayle Van Horne and provide not only an opportunity to share your experiences, but provide another source of information about what's out there and who's hearing it.

The Internet: A Source for Addresses and QSL Forms

Many stations that originated during the early days of shortwave have graduated to the new age and allow reception reports to be sent by email. This method of reception also provides an email QSL in return. There's no postage and no waiting. But, gone is the romance of receiving a reply postmarked from foreign lands, and the intrigue of foreign stamps. The choice is yours to ponder and practice. *Passport* and *MT* botht list web addresses for several shortwave stations. The Addresses Plus section in *Passport* is a veritable gold mine of information on each station with addresses, web sites, the personal responsible for various functions and general station information.

Some stations, Radio Japan for example, require that you use of their own special form for reception reports to their station. A few years back I sent a reception report to this station and about three months later I received a letter from the station that contained a blank reception report. I filled out this form using information from my original notes on the reception, mailed it back, and had the QSL in another three months.

Station's Internet-based home pages will also offer printable versions of their broadcast schedules and information about the various programs they offer. I would suggest book marking your favorite stations for ready reference. You can even elect to have stations send you news and broadcast schedules by e-mail on a regular basis.

QSL Preservation

I must tip my hat to Gayle Van Horne of *Monitoring Times* for first publishing her ideas and recommendations in the February 2002 issue of *MT*. I have captured several of her ideas and put them into use. I must say that I'm extremely pleased with the results. I've been in the SW/QSL game for a long time. During my high school days, I kept my QSL's in used cigar boxes or just had them in a stack behind my shortwave set. Later on, I taped them to the wall in a display with stings showing links to the various countries shown on a world map. While this was a 'pretty neat display', I now cringe as I try to remove thirty-year-old tape.

I have now learned the error of my ways. Gayle's article stresses many valuable points. QSL's should be preserved in an acid free environment that's also free from the vapor releasing plastics found in several types of

U.S. Department of Commerce
NATIONAL BUREAU OF STANDARDS
RADIO STATION WWV
FORT COLLINS, COLORADO

E. Power
5437 Tenley St.,
Alexandria, VA. 22306

2.5 MHz-40°40'55"N, 105°02'31"W
5 MHz-40°40'42"N, 105°02'25"W
10 MHz-40°40'48"N, 105°02'25"W
15 MHz-40°40'45"N, 105°02'25"W
20 MHz-40°40'53"N, 105°02'29"W

This is to confirm your reception report of WWV

on 10.0 & 15.0 MHz. 0301 & 0900 UTC 29 & 30 June 1992
Frequencies Time Date

Serial № 28113

John B. Milton
Engineer-in-Charge

Leap Second

☆ GPO679-168

This unusual QSL was received from WWV in 1992 and confirms a reception report for the addition of a "Leap Second" to Universal Coordinated Time.

photo albums. Whether you choose to store your QSL's and other station information in files or binders, there are several manufactures that offer archival storage systems that can be found in local office supply stores.

The method that I have chosen to use was specified by Gayle in her article and is a very convenient system. If you can't locate a copy of the February 2002 issue of MT, you can link up to their web site that I previously mentioned and purchase a copy of the article from that issue.

I use three ring binders with 'D' shaped rings rather than 'C' shaped. D shaped rings allow the pages to sit flat along one edge of the binder and prevent damage to the contents. I also use archival safe plastic sheets that have the entry slots located along the top edge of each sheet. You can easily add cards or schedules from the top and items are prevented from falling out during storage or viewing. My collection is filed alphabetically so is easy to add extra pages and still keep things organized.

Interesting and Oddball QSL's

I guess all QSL's are interesting, but some are certainly more interesting than others. Some stations will issue what's known as a 'Special QSL' or a 'QSL Series', much like when the post office issues a series of postage stamps, such as baseball players. If the station installs a new transmitter they may issue a special QSL. Station HCJB in Ecuador did just that back in 1968. Radio New Zealand issued a QSL series on wild birds native to their country. Other stations may issue special QSL's to celebrate a special event, such as the Olympic games on the country's centennial. By listening to a favorite station on a regular basis you could capture any requirements needed to receive the special QSL or the whole series. *MT* will sometimes report on stations that are planning new QSL releases.

There are some oddball QSL's out there. Did you know that you could request station information and a QSL from WWV, the nation's time station?

What would state on your reception report for a QSL? "WWV reported the time, on time, from 0100 UTC to 0130 UTC?" Believe it not, but about every five years the official time for the planet has to be adjusted. This is because the tilt of the Earth is not exact and does in fact vary just a little from year to year. WWV actually has to adjust the time by adding in a 'Leap Second' to the official time, usually during the middle of the night. Maybe that's why I suddenly felt older. I've seen brief announcements in *MT*, articles in major newspapers, and have heard local news broadcasts about this minor leap in time. A few years back, I was able to QSL WWV by recording the station broadcast on tape for a couple of hours around 0000 UTC and managed to captured the station announcements about the time adjustment. I sent WWV the tape along with a letter and a brief reception report and received a 'Leap Second' QSL in return. That's oddball! There are others out there and all you gotta do is look for 'em.

The Death of Shortwave?

This rumor has been spread around as long as shortwave stations have been broadcasting. TV will kill shortwave. Cable news will kill shortwave. Satellite broadcasting will kill shortwave. The latest rumor is that the Internet will kill shortwave. Economics may have caused some stations to disappear or run at lower power, but this only makes more room on the bands for new stations to open up shop. Check out the frequency sections in either *Passport* or *MT* and you'll see stations running cheek to jowl on the frequency listings. Both publications also feature updates and news articles on the various stations to keep readers informed of station happenings and who's leading the charge in the shortwave bands.

It's still an exciting challenge to pull a weak signal out of the mud or off the shoulders of a more powerful station, and getting QSL's from remote corners or the world is still a blast. When I get a letter from a foreign country with a frequency guide or QSL, I get a kick out of asking my kids to find these places on the map! In fact, I get a kick out of finding these places on the map. OK, guys, where in the world is Carmen Santiago?

Conclusion

Shortwave is certainly one of the more fascinating aspects of the radio hobby. I don't have to worry about buzzing the neighbors. On an evening with good conditions you can cruise the 49 and 31 Meter bands and easily hear stations from the other side of the globe. If you're an early riser, you can catch the news and happenings from Radio Australia or Radio New Zealand. Stay up past Letterman and catch the African Asian broadcasters. BBC runs English news programming on a twenty-four hour schedule and usually beats the cable networks on the latest news happenings. With very little effort you can begin to acquire a colorful and varied collection of QSL's and station memorabilia. Want to brush on your foreign language skills? You don't need a passport, just a pack along a frequency guide, tune your trusty shortwave radio to a foreign broadcast and you're in business. And, the Internet certainly opens up a new world for the shortwave listener.

Whether you chose large or small, old or new, a radio off the rack or a restorable vintage receiver, or want to homebrew your own rig for shortwave, the options and fun are up to you. I have tried them all and have never been disappointed by learning more and more about the always exciting and surprising world of shortwave radio.

(Author's note: The Radio Restorations column in Monitoring Times is authored by Marc Ellis.)

ER

Radio's Golden Age-
Episode 26
Ham Radio's Future

by Bruce Vaughan, NR5Q
504 Maple Drive
Springdale, AR 72764
NR5Q@AOL.COM

We should all be concerned about the future because *we will have to spend the rest of our lives there.*

--C. F. Kettering (1876-1958), American Engineer

While not every reader of this magazine is a licensed Amateur Radio Operator, I believe those who read Electric Radio embody all the traits and feelings of the true Radio Amateur. Some readers are engineers, others are involved with radio in everything from design to sales, and some just like to experiment—perhaps enjoying the thrills of listening to far off stations on a simple homebuilt radio. Whatever our interest, the future of Amateur Radio, both here and abroad, should be of concern to us all, and I believe it is.

I have been writing this column for well over two years, and until now have never presented my true feelings about our hobby. Please bear with me this month while I share with you some thoughts to ponder. You may violently disagree with me as some of my friends in the local radio club do. I feel that some few among us might even agree with me. The important thing is that you feel strongly enough about my ideas, pro or con, to give this subject some thought. Ham radio is at a cross roads today. The existence of Ham Radio is in your hands. Its future is up to the entire ham radio fraternity.

I have had several hobbies during my lifetime—sports cars, radio, photography, motorcycles, and flying. The latter two hobbies were more of the armchair variety—I only owned two motorcycles and my flying days ended about 1950. The first three mentioned I once pursued with a passion. As I look back upon these hobbies one, motorcycling, seems to be purring, or should I say roaring, along much as it has for many, many years. Aviation as a hobby is probably healthier than ever, I would rate its future as bright indeed.

The hobbies of photography, radio, and sports cars, all seem to be in decline. Why should three out of five hobbies be in decline, one relatively unchanged, and one still gaining in popularity?

As we try and analyze this phenomena lets take a quick look at what the five hobbies share in common. All five were born at approximately the same time—the end of the nineteenth century. OK, about here someone is sure to remind me that Daguerre actually invented the photographic process in the 1830's—a true statement. I contend that the early photographic processes were far too costly, dangerous, and technically challenging to become popular with the masses. It was not until George Eastman developed roll film in the 1890's that it became a practical means of amateur photography.

To be perfectly fair then, all five hobbies mentioned were born within the same decade. All shared other common traits. All five are technically based, and appeal to those interested in mechanics and science. All five are

within the financial reach of most of the population. All five require skill, and some scientific knowledge, yet are within the grasp of anyone who applies himself. All three provide a means of increasing self-esteem.

Aviators, motorcycle riders, Ham Radio Operators, sports car drivers, and serious amateur photographers, take pride in their achievements, and feel as though they belong to an exclusive group. To encourage this feeling of belonging all five hobbies have both local and national organizations. All have competitions of some sort, and all require some sort of sanctions by local and federal governments.

In retrospect it seems to me that the single biggest threat to all five hobbies can be summed up in one word—progress. How well they adapted to progress has been the determining factor in their survival.

Because of limited space we cannot go into all the aspects affecting each hobby, but we can take a brief look at them. First, lets talk about sports cars. My interest in small, high performance cars began during my sojourn in Great Britain during WW-2. Those were the days of the MG-TC and Morgan Plus-Four variety of sporting machine. Those small four cylinder British cars, each displacing from 1200cc to 1.5 liters, had a top speed of perhaps 80 MPH if conditions were right. My MG-TD could do zero to sixty in about 14 seconds if you were capable of using the four speed gearbox properly. Would it go 100 MPH? The only way I could have reached speeds in excess of 100 MPH in the TD was by driving it off a very high cliff. Yet, they were capable of outrunning larger, more powerful American automobiles on a nice crooked road. They cornered very well, and the four on the floor helped a lot. A MG-TC could be had brand new in 1946 for around $1500.00 dollars. Morgan Plus-four roadsters were slightly higher. Fifteen years later I bought a Triumph TR-3 for less than three thousand dollars. By 1960 the Triumph had grown to a full 2 liters displacement and was capable of respectable zero to sixty times—though by no means equal to lower priced American sedans built today.

The little cars delivered a bone-jarring ride, were difficult to enter and exit, and the top and side curtains fit nice and loose providing more ventilation than needed. You would likely arrive at your destination both cold and wet in bad weather. Transmissions, though far ahead of the early stick-shift automobiles, still required a certain amount of skill to operate smoothly.

The national sports car organization, The Sports Car Club of America, (SCCA) was active in motor sports throughout the US. They divided up the US into regions, much as the ARRL has done with radio. I belonged to the NEOKLA region. (Northeast Oklahoma Region)

We had monthly meetings, and regularly scheduled events such as hill climbs, rallies, races, gymkhanas, and car shows. It was a time when many sports car owners drove their cars to work during the week, drove it to the track on Saturday, participated in one or more races, and then drove the same car home. While delivered as a fun to drive car, there was much the individual owner could do to enhance performance. The top performance was limited only by the owner's mechanical ability, and how much money he had to spend at the local speed shop.

So what happened? A few of the fellows with deep pockets imported such exotic cars as Maseratti, Ferrari, Mercedes, D type Jaguar, and the famous Porsche Spyder. This pretty well eliminated the chances of cars costing less than $5,000.00 ever winning a race.

But the most important factor contributing to the loss of interest in Sports cars was that GMC, Ford, Chrysler, and a lot of Japanese auto makers got very smart, very fast. They started out

by stiffening up the suspension, improving gearboxes, improving brakes, and increasing horsepower. Now, owners of an American built 'broom peddlers special' sedan, complete with air conditioning, AM/FM radio, eight-track tape player, and automatic transmission could humiliate owners of cars like my '54 MG-TD. After many years of waiting, buyers now had a choice of family automobiles with firm suspension, good road handling qualities, rapid acceleration, and reasonable price tags. The glory days were over.

Now, let's look at photography. If you are going to make pretty pictures, certainly you want someone to see them. If not, there would be little reason to put film in your camera. How do you get work that you feel is above average before the public? The answer came in the form of 'Photographic Salons' or exhibitions. The next step of course was to make such exhibitions international in character. In such exhibitions a photographer's work would be judged against the best in the world—at least this was the assumption of those who chose to spend the time and effort to enter such activity. Naturally such a prestigious showing of photography developed a set of rules those who competed must follow—much as the DXCC does in the ARRL. All work, including exposing, developing, printing, and even mounting on standard 16 by 20 mounts had to be the done by the exhibitor. No commercially processed prints were accepted.

Darkroom equipment business flourished. Home darkrooms became as awesome as some DX stations are today—and just about as expensive. Many darkrooms had temperature controlled wet tables for film and print developing. A good enlarger was a must as was a wide assortment of lenses. Some print driers cost as much as a KW linear does today. Enlargers, like ham transmitters, were things of beauty, and literally dozens of attachments were available to satisfy the gadget-loving streak in every serious photographer. However, the major factor involved in making prints for exhibition was the time and skill involved.

The hobby flourished. Photographic magazines, and there were many, featured hundreds of items for the home darkroom worker—enlargers, lenses, developing equipment, etc. Some photographers preferred mixing their own chemicals. Many home darkrooms looked like a chemical laboratory—which indeed it was.

Cameras were things of beauty—cherry wood, brass, red leather bellows, fancy and sturdy tripods—the choices were unlimited. Photographer had such a wide choice of cameras to choose from that they often owned, and carried into the field, several cameras of different formats. Of course everyone had an ideal film size, but most photographers shot everything from 35mm size cameras up to sheet film cameras.

What happened to this wonderful hobby to start its downhill slide? In my opinion, the downturn started with the invention of Kodachrome film. Kodachrome was a beautiful film when it was introduced in the 1930's and continues to be one of the best color film ever produced. Look at any old movie on TV. If the colors look as though the film were shot yesterday chances are it was shot on Kodachrome. The film had one drawback—it is all but impossible for an amateur to process. Temperatures are very critical as are the exact measurements of the chemicals involved. The film, for all practical purposes, had to be processed by Eastman Kodak.

This put the Photographic Society in a quandary. Should it bar from exhibition one of the finest color films ever made, or should the exhibitions allow submission of color slides processed by other than the photographer. They had no choice—create divisions that allowed commercially processed film.

This was the shot-in-the-arm that the

hobby had been waiting for. A major barrier was removed. Now the average photographer could buy a camera, shoot a roll of film, let Eastman Kodak do the dirty work, and then send the picture to the exhibitions. Sounds like the no-code license doesn't it?

Still, some photographers could not learn how to focus a camera, or how to read a light meter. Manufacturers came to their rescue—automatic focusing, automatic exposure, self-loading cameras came on the market at reasonable prices. Only two things were left to the photographer—subject matter, and composition. Doesn't this remind you of modern transceivers? All that is left to the operator is who to work and why.

What about motorcycles? Thankfully, they have remained much as they were100 years ago. They still are somewhat noisy, they still have two wheels, and they still have the capability of 'biting back' if ridden improperly. Of course today they start easier, have less vibration, and deliver a smoother ride. Yet, the true believers, and they are many, have had the good sense to not be seduced by cheaper, light weight motorized bicycles, or by huge four cylinder, liquid cooled, ultra quiet, machines with windshields as large as small sailboat sails. They have also resisted the common sense approach to safety—the motorcycle helmet. Why? That's easy to answer if you have ever ridden a motorcycle, but a little more complex if you have not. You see, motorcycling appeals to many senses and blends them all together into one glorious sensation. Putting your head in a bucket changes the sound of the machine, the sounds of the tires against the road, and shuts out the delicate odors that riders enjoy.

When I was young I had a girlfriend who had an 11:00 pm curfew. On warm summer nights after taking her home, I often took a 20-mile ride through the countryside—purring along at 40MPH or so. I'd pass a grape vineyard, a newly cut wheat field, an apple orchard, and yes, sometimes a hog farm or chicken house. But whatever I rode past, my sense of smell was excited...far more than it would be in an automobile.

Motorcycling is alive and well, and if you have any doubt turn on your TV. It is rare to find an evening when there is not at least one program on motorcycling. Meets and Rallies all over the US, like the big one in Sturgis, S.D. for example, attract riders by the thousands. Their continued success is their resistance to change.

My lifetime hobby of Ham Radio is becoming weaker by the year. It is now painfully obvious that ham radio is entering its last years—slowly fading away. You think not—then I suggest you look at the facts. I will not attempt to chronicle all the steps that have led to this sickness that invades our hobby today, but I can pretty well plot the downward trend.

The demise of Ham radio began with the advent of Citizens Band radio. Then suddenly we were challenged by the computer age, and digital communication—which our national radio society, and many of the ham fraternity embraced with enthusiasm. Little did we realize that progress was the virus that would soon infect our hobby, sap our strength, and leave Ham Radio a doddering old entity?

Is there a way to save Ham Radio? Yes, I think there is still a small remnant of hope. Will those involved, the ARRL, our clubs, and our cadre realize what is happening, and make appropriate changes to save it before it is too late? I hope so, but I remain only cautiously optimistic.

Now before you rise to the defense of Ham Radio, and tell me I'm wrong, look at our hobby through totally unbiased eyes. Is the growth of our ranks positive or negative? Our world population is increasing rapidly. Are the ranks of ham radio growing along with that of the general population? How many radio magazines are published

today? How many old ones can you name that no longer exist? How many American manufacturers are building ham radio gear? How often do you read stories involving ham radio? How active are the hams you know? How does club attendance compare with that of ten years ago? How does attendance at local and National Hamfests compare with that of yesterday? Finally, how does technical knowledge of hams today compare with that of hams forty years ago? Look at QST, and tell me it is as interesting as it was only fifteen or twenty years ago. I know several Hams who used to keep a complete QST file. Now, they glance at the magazine, and toss it in the wastebasket the day it arrives.

Listen to 40-meters, or 20-meters, during the day. How many signals do you hear? Seventy-five meter phone used to be hopping with signals in the late afternoon and early evening. No more. There is plenty of room.

How much new equipment do you see advertised today? Take away the solid-state transceivers, and you don't have much left in the advertising section of magazines. In past years advertising was the most interesting part of our radio publications.

Where is the vast increase in our ranks that was supposed to follow lowering of entrance skills? Did the Novice ticket really help? What about incentive licensing? How many new active hams did we gain by the 'no-code' ticket? Are we better off with Volunteer Examiners? I will bet my last 807 that everyone reading this story knows an Extra Class Operator who can't read his call at speeds over 5 WPM. How did they pass their exam?

As progress continues to shrink the gap between commercial use of radio by the general population and the Ham Radio services, the allure of radio grows dimmer. Take 2 meter FM for example. Twenty-five years ago it was fun to carry a handi-talkie on your belt, and talk to other hams—perhaps thirty or more miles away. You felt a little special to be able to call your wife when she was out grocery shopping and remind her that you were out of cold drinks, or shaving cream, or whatever. Today a short trip to the grocer requires you to dodge drivers who have a telephone in their ear, and are not watching the road. Once you are in the market, you find the aisles blocked by shoppers talking on their cell phone totally oblivious of others shoppers. Where is the glamour in two meter FM? You suddenly become aware that you would be ashamed to walk around with your 2-meter rig at your ear—you might be mistaken for those irritating people using cell phones. Know something? They are capable of doing anything on that cell phone you can do on your 2-meter radio—and probably do it better, and at less cost. The attraction of 2-meter operation just went up in smoke. I sold my two-meter equipment at a huge loss because hams are no longer interested.

There is still a domain in ham radio that is yet to be invaded by the multitude—CW. Yet, CW requires a moderate amount of skill and practice so for years there has been pressure on both the ARRL and the FCC to work for relaxed requirements—like no code at all. You can bet it will come to pass. As CW operators die off, the CW portions of the bands will disappear.

What did old time hams talk about on their radios? They mostly talked equipment. "The rig here is a 6L6 Crystal oscillator driving a 807 buffer-doubler, into a pair of 813's. The receiver is a Super Skyrider with a home built preselector. I am running about 900 watts input. The antenna is a half wave Zepp up about 35 feet," said the operator. "What kinda rig you running there? You are a solid S-8 on my meter."

There usually followed a long discussion of the merits of Zepps over a conventional doublet, or the advantages of the Superhet over the TRF receiver.

Try to engage a ham today in a QSO. Far more than half the stations I work want to trade reports and go. They do not understand their equipment, they never built a radio of any kind, and they don't know your family—what's to talk about?

The result has been that we are lowered to playing games on our radios. The ten-ten club is an example. It used to flourish on ten-meter fone. I don't know if it still does, I lost interest very quickly and don't go up there very often. The object was to pay a fee to a 'club' that gave you a ten-ten number. You either called or answered a ten-ten station, swapped numbers with them, and when you got enough numbers the 'club' would award you a genuine cheaply printed certificate. Then you joined the 'fists' club, and did it all over again on CW. These games take a load off the operator. He is not expected to know anything, or say anything—just repeat his sacred number so someone can get another ten-cent piece of paper. Big deal! A fine example of boredom at its ultimate.

Yes, we are losing it, but there is a way to save it. If we want a radio hobby ten years from today we would do well to look at flying.

Back in the depression years of the late 20's and 30's there were a lot of fellows who liked to fly. The science of aviation was young, there was a certain glamour to the sport, and WW-1 training planes could be purchased for practically nothing.

Some enthusiasts shunned the old Jenny and preferred to build their own. The Heath company, for example, sold a kit to build the Heath 'Parasol' plane. It was claimed that it could be powered with a Ford engine—among others. Private flying was popular with everyone. If you could not afford to fly, air shows appearing in small towns across America provided a place to let your enthusiasm run wild.

Then very suddenly we were thrust into WW-2, and thousands of young men learned to fly. Of course they were flying planes that cost a small fortune. Once the war was over a few pilots with very deep pockets bought war surplus P-51's, and other hot airplanes. While the initial cost was not impossible, the cost of keeping such a plane hangered, filled with fuel, and certified by the FAA, was beyond the reach of almost everyone. Other pilots found that there were a number of small planes on the market at a price comparable to the family automobile—Luscomb, Piper, Taylorcraft, and Ercoupe all made planes that sold for a reasonable price. Then, almost overnight, we entered the jet age. Prices on airplanes went through the roof. Most companies building small single engine planes either went out of business or found a place in jet manufacturing. The cost of a modest two place Cessna soared out of reach of most aspiring pilots. Here was an ideal set of circumstances to kill the hobby of private flying.

State of the art in a hobby is interesting, but as any science progresses, at some point it is likely to exceed the financial and technical resources of the majority. It takes a smart group to realize this simple truth. So what could the average flying enthusiast with limited economic resources do to satisfy his desire to fly with the birds? One thing for sure, he did not buy a ticket on a 747 and fly from point 'A' to point 'B'. Flyers did not wish to participate as a fare-paying passenger—they wanted something more. They wanted to soar with Eagles. So they returned to the past.

In 1783, the first passenger carrying hot air balloon went aloft. As passengers the fragile balloon, heated by burning straw, carried one rooster, a duck, and a sheep high above the French countryside. I understand that the passengers survived. This seemed an ideal starting place for many who longed to fly. Hot air ballooning has grown into an important part of flying as a hobby. Every fall, the sky over Albuquerque,

New Mexico is ablaze with brightly painted balloons of every size and shape. People come from all over the world to take part in this exciting event.

And as the desire to fly stirred in the breasts and minds of hundreds of young people, someone invented a wonderful, inexpensive, low maintenance, form of flying—the hang glider. Not much later a way was devised to attach a small internal combustion engine to the hang glider—and the 'Ultra Lites' were born. "But they are not fast," you say. "They are not really practical. They employ technology that goes back hundreds of years—even as far back as Leonardo da Vinci."

Well, perhaps, but people are having a lot of fun, thousands are flying, and the hobby of private flying has never been healthier.

While all this was going on another group of flyers were busy restoring old aircraft. Another group was even building planes much like the old Heath Parasol. Others improved the parachute to a point to where it could actually stay aloft on air currents much like a sailplane. Someone else put a small motor and rudder on a parachute and thus created inexpensive and safe controlled flight.

Yes, flying enthusiasts discovered a very important truth—their future lies in the past. Let the Government build supersonic planes, and outer space rockets. There is still a world of fun and pleasure in flying aircraft at less than sonic speeds.

Do you really want to see radio stay an active hobby? Then pick up one of the magazines devoted to the vacuum tube era, or even crystal radio receivers. There is more fun in building and operating a crystal radio than in working one thousand stations on a factory built rig that you do not understand and could not possibly repair. Ham Radio is much more than buying a transceiver, an antenna, and contacting someone in the next country or state. Appliance operating is not ham radio anymore than fare-paying passengers in a 747 are aviators.

OK Bruce, you've talked a lot, but what is your point?

I believe the lessons learned from the study of other hobbies point to an obvious conclusion. Remove all the obstacles from any game or hobby, level the playing field to a point where everyone is equal regardless of ability, lower your standards to accommodate every man, woman, or child, then eliminate all discomfort, study, and effort, and you have killed the hobby or sport.

Suppose we put four wheels on a motorcycle, build an enclosed body on those four wheels, and add air conditioning. What happened to the motorcycle? I think I can answer that—the same thing that is happening to Ham Radio today.

With today's technology it should be possible to build a golf machine to fire a golf ball by compressed air. Sensors could detect such things as distance to the next hole, wind direction, humidity, etc. and feed that information into an onboard computer. I believe with the technology we have such a machine could fire a ball to within inches of the cup. The machine would be no larger than a full set of golf clubs and could be sold in quantity for a reasonable price. With such a machine I could probably shoot as well as Tiger Woods. Do you think it would improve the sport? I seriously doubt it.

I have been a ham for over sixty years and believe me, there is a very fine line between cell telephones, computers, and factory built transceivers. If we want to enjoy the future we must widen the gap by returning to our roots just as have to-days airmen. Let us look to our past to see our future. Technology is not everything—creativity and effort still have a place in our world.

ER

VINTAGE NETS

Arizona AM Nets: Sat & Sun: 160M 1885 kc at sunrise. 75M 3885 kc at 6 AM MST. 40M 7293 kc 10 AM MST. 6M 50.4 mc Sat 8PM MST. Tuesday: 2M 144.45 7:30 PM MST.

Boatanchors CW Group: QNI "CQ BA or CQ GB" 3546.5, 7050, 7147, 10120, 14050 kc. Check 80M winter nights, 40 summer nights, 20 and 30 meters day. Informal nightly net about 0200-0400Z.

California Early Bird Net: Saturday mornings at 8 AM PST on 3870 kc.

California Vintage SSB Net: Sunday mornings at 8AM PST on 3860 +/-

Colorado Morning Net: An informal group of AM'ers get together on 3875 kc Monday, Wednesday, Friday, Saturday, and Sunday at 7 AM MT.

Canadian Boatanchor Net: Meets daily on 3725 kc (+/-) at 8:00 PM ET. Hosts are AL (VE3AJM) and Ken (VE3MAW)

Collins Collectors Association Nets: Technical/swap sessions meet every Sunday on 14.263 mc at 2000Z. Informal ragchew nets meet Tuesday evening on 3805 kc at 2100 Eastern time, and Thursday on 3875 kc. West Coast 75M net is on 3895 kc 2000 Pacific time. **10M AM net starts 1800Z on 29.05 mc Sundays, QSX 1700Z.**

Collins Collector Association Monthly AM Night: Meets the first Wednesday of each month on 3880 kc starting at 2000 CST, or 0200 UTC. All AM stations are welcome.

Collins Radio Association nets: Mon. & Wed. 0100Z on 3805 kc., also Sat 1700Z on 14.250 mc.

Drake Technical Net: Meets Sundays on 7238 kc, 2000Z. Hosted by John (KB9AT), Jeff (WA8SAJ), and Mark (WBØIQK).

Drake Users Net: This group gets together on 3865 kc, Tuesday nights at 8 PM Eastern Time. Net controls are Gary (KG4D), Don (W8NS), and Dan (WA4SDE)

DX-60 Net: This net meets on 3880 Kc at 0800 AM, Eastern Time on Sundays. Net control is Mike (N8ECR), with alternates. The net is all about classic entry-level AM rigs like the Heath DX-60.

Eastern AM Swap Net: Thursday evenings on 3885 kc at 7:30 PM Eastern Time. Net is for exchange of AM related equipment only.

Eastcoast Military Net: Check Saturday mornings on 3885 kc +/- QRM. Net control station is W3PWW, Ted. It isn't necessary to check in with military gear, but that is what this net is all about.

Fort Wayne Area 6-Meter AM net: Meets nightly at 7 PM Eastern Time on 50.58 mc. This is another long-time net, meeting since the late '50s. Most members use vintage or homebrew gear.

Gray Hair Net: The oldest (or at least one of the oldest at 44+ years) 160 meter AM nets. Net time is Tuesday evening on 1945 kc at 8:00 PM EST and 8:30 EDT. Also check www.hamelectronics.com/ghn

Hallicrafters Collectors Association Net: Sunday on 14.293 mc, 1730-1845 UTC. Control op varies. Midwest net Sat. 7280 kc 1700Z. Control op Jim (WB8DML). Pacific Northwest net Sunday 7220 kc at 2200Z. Control op Dennis (VE7DH).

Heathkit Net: Sunday on 14.293 mc 2030Z right after the Vintage SSB net. Listen for W6LRG, Don.

K1JCL 6-meter AM repeater: Operates 50.4 mc in, 50.4 mc out. Repeater QTH is Connecticut.

K6HQI Memorial Twenty Meter Net: This flagship 20 meter net on 14.286 mc has been in continuous operation for at least 20 years. It starts at 5:00 PM Pacific Time and goes for about 2 hours.

Midwest Classic Radio Net: Meeting Saturday morning on 3885 kc at 7:30 AM, Central Time. Only AM checkins are allowed. Swap and sale, hamfest info, and technical help are frequent topics. Control op is Rob (WA9ZTY).

MOKAM AM'ers: 1500Z Mon. thru Fri. on 3885 kc. A ragchew net open to all interested in old equipment.

Northwest AM Net: AM activity is daily 3 PM to 5 PM on 3875 kc. The same group meets on 6 meters at 50.4 mc. Times are Sundays and Wednesdays at 8:00 PM. 2 Meters Tues. and Thurs. at 8:00 PM on 144.4 mc. The formal AM net and swap session is on 3875 kc, Sundays at 3 PM.

Nostalgia/Hi-Fi Net: Started in 1978, this net meets Friday at 7 PM Pacific Time on 1930 kc.

Old Buzzards Net: Daily at 10 AM local time on 3945 kc in the New England area. Listen for net hosts George (W1GAC) and Paul (W1ECO).

Southeast Swap Net: Tuesday at 7:30 PM Eastern Time on 3885 kc. Net controls are Andy (WA4KCY) and Sam (KF4TXQ). Group also meets Sunday on 3885 kc at 2 PM Eastern Time.

Southern Calif. Sunday Morning 6 Meter AM Net: 10 AM on 50.4 mc. Net control op is Will (AA6DD).

Swan Nets: User's Group meets Sunday at 4 PM Central Time on 14.250 mc. Net control op is usually Dean (WA9AZK). Technical Net is Sat, 7235 kc, 1900Z. Net control is Stu (K4BOV)

Vintage SSB Net: Sunday 1900Z-2030Z 14.293 & 0300Z Wednesday. Net control Lynn (K5LYN) and Andy (WBØSNF)

West Coast AMI Net: 3870 kc, Wed. 8PM Pacific Time (winter). Net control rotates between Skip (K6YKZ), DJ (K6RCL), Don (W6BCN), Bill (N6PY) & Vic (KF6RIP)

Westcoast Military Radio Collectors Net: Meets Saturday at 2130 Pacific Time on 3980 kc +/- QRM. Net control op is Dennis (W7QHO).

Wireless Set No. 19 Net: Meets the second Sunday of every month on 7270 kc (+/- 25 Kc) at 1800Z. Alternate frequency is 3760 kc, +/- 25 kc. Net control op is Dave (VA3ORP).

CLASSIFIEDS

Advertising Information

Subscribers receive 1 free 20-word ad per month. **Extra words are 20 cents.** Here is how to count the words in your ad: "For Sale" or "Wanted" and your contact information counts as 7 words. Hyphenated words count as 2 words. **Please count the words in your ad as described above, and if you are over 20 words, send payment for the extra words at .20 each.** Note: Not all readers use email, so it is a good idea to include phone numbers.

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Deadline for the November 2003 Issue: Fri., Oct. 31

FOR SALE: Repair and restoration on all vintage equipment; 45 years experience. Barney Wooters, W5KSO, 8303 E. Mansfield Ave., Denver, CO 80237. 303-770-5314

FOR SALE: Military Radio manuals, orig. & reprints. List for address label & $1. For specific requests, feel free to write or (best) email. Robert Downs, 2027 Mapleton Dr., Houston, TX 77043, wa5cab@cs.com

FOR SALE: Collins: 651S-1 freq. control board, 180S-1 manual antenna tuner, Spectrum 2000 pwr amp. 2020A, NOS S-line speaker grille, two Collins tubes. Bill Coolahan, 1450 Miami Dr. N.E. Cedar Rapids IA 52402-2933. 1-319-393-8075

FOR SALE: Countermeasures receiving set AN/WLR-1D, 50-10750 MHz, 9 bands, simultaneous display of frequency, spectrum, and modulation info on dual displays, manual, 1200 lbs., $4,500. Carl Bloom, 714-639-1679, carl.bloom@prodigy.net

FOR SALE: Galena crystal radios, homemade, also parts, with pix available. Radio tubes, most used, free lists. Len Gardener, 458 Two Mile Crek Rd., Tonawanda, NY, 14150. email: radiolen@att.net

FOR SALE: Drake B line R4b, T4xb, speaker & p.s. w/ manuals excellent condition $400.00. Bob, W1RMB work no. (508) 261-8231.

FOR SALE: SCR-284 transmitter/receiver with original code key, good condx. $300 plus shipping. Mike Bittner, 27215 Sunnyridge Rd., Palos Verdes, CA 90274 310-377-4797

FOR SALE: Two Johnson Valiants, $350 ea. National 303 & 300, $300 & $250. Jim, Plains MT. 406-826-5093

FOR SALE: Clegg 99'er 6M tube type transceiver w/ mic, crystal, and manual. Has factory supplied Drake LP filter. Excellent cosmetic and electrical condition. $65 plus shipping. Russ Gundlach, 38 Clinton St., Westfield, NY 14787, 716-326-2090

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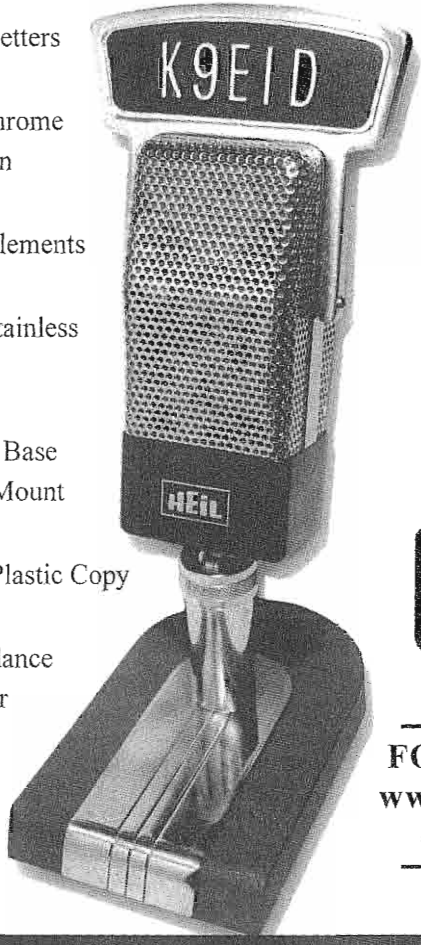

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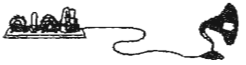

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Vintage Radio Auction

"The Harold Parshall Collection"
Saturday, November 15, 2003 at 10 am EST
at the "Expo Auction Center"
8157 Garman Rd., Burbank, Ohio

(Exit 204 off Interstate 71)

Estes Auctions has been selected to sell the Amateur Radio Collection of the late Harold Parshall, Radio Call Sign N8FRP. Harold was also a devoted member of SPARK, the radio club that he had helped to start. I knew Harold as a friend and fellow ham radio operator, and feel privileged to have known him.

Some of the items we will offer are: Collins KWS-1, Collins 75A-1 Receiver, Collins 32-V Transmitter, Collins R-390A URR, Heathkit Chippewa Linear Amplifier with P/S, Heath DX-100, Heath VF1-VFO, National NC-57, NC-183, National NCX-3 Transmitter, NC-173 Receiver, National SW-3, NC-190, NC-105, NC-100, NC-125, NC-98, NC-300, Hammarlund HQ-120, Hammarlund SP-600, Nice HQ-129X, Hammarlund Super Pro, Hallicrafters HT-32 Transmitter, SX-101A, S-36, Super Sky Rider, SX-99, S-38, SX-110, SX-28, Pilot Super Wasp, Johnson KW Match Box, Johnson Viking II, Viking Adventurer, Viking Ranger, Viking Invader, Viking Invader 2000, Viking II CDC, Viking 122 VFO, RME 4350 Dual Conversion, RME 50, Knight T-150 Transmitter, T-50 Receiver, Knight R-55A, Harvey Wells Bandmaster Deluxe, Lafayette HE-35 6 Meter Transceiver, Lettine 242 6 Meter Transmitter, Eddystone Model 770 R Receiver (England), World Radio Globe Linear LA-1, Globe Scout Model 65, Gonset G-50 Transceiver, BC-348 P Receiver, T-47 ART-13 Receiver, REP - Receiver (Navy) Mfd. by Crosley, RAL-7 Mfd. by RCA, Kenwood TS-440, Eico 723, Drake TR-3 Transceiver, Drake RV-3 VFO, T-368F Transmitter (Oneida Elect) Yaseu V-301 Monitor, Wells Gardner RBL-4 Receiver, Dentron GLA-1000 Linear Amplifier, RCA AR-88 Receiver, Millen Transmatch, B&W Linear Amplifier PT-2500A, 6000 BAC Receiver Mfd. Ind. Tool & Die.

Many other Amateur Radio Items in this sale, Transmitting Tubes, several AC Dayton Battery Sets, Head Phones, Parts, Meters, Wire, Books, Magazines, Power Supplies, much misc. combined with The David Swartzel Radio Collection from North Carolina.

This will be another Great Radio Sale!
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Bob Dobush - Tube Consultant Kim Graca - Tech Support & Historical Alan Ferris - Set Up Mark DeLauter - Set Up

Call Us to Sell One Radio or Your Entire Collection!

FOR SALE: Lafayette Comsat 19 CB, Gen Radio cap. test bridge, RCA WO-33A O-Scope, Solar cap analyzer, Hallicrafters S-120 w/manual, and S-119 Sky Buddy, offers. Al Jenkins, WA1RWB, 5 Daley CT. Nantucket MA. 02554. 508-325-7122

FOR SALE: RCA remote pickup unit, model MI-11230, works good, make offers to W7SC, 3932 Mesa View Lane, Boise ID, 83706-6052

FOR SALE: 1993 North American call book, as new, still in shrink-wrap, $30 + shipping. KØGVG, 641-752-5262

FOR SALE: Drake 2B, calibrator, redone by Jeff Covelli, VGC, $300. 2BQ, $125. Freight paid. National NC300, $300. Don, K5AAD, 1-713-942-9747

FOR SALE/TRADE: Numerous original manuals: EICO, B&W, RME, Harvey-Wells, Morrow, Ameco, Heathkit, B&K, Millen, others. ni4q@juno.com 407-351-5536

FOR SALE: Hallicrafters S-53A rcvr, vg, works. $90. Ron, MI, 517-374-1107

FOR SALE: Hallicrafters SR150 and SR160 with one PS/150-120. All work, front panels v.g. $300 + shpg. Cliff, WA9SUE, 608-625-4527 AFTER 6:00 PM.

FOR SALE: Naval Receivers RAK, RAL, RAO, RBA, RBB, RBC, RBL, RBM. Some checked, pwr splys available. $75-$450 depending on condx. Many other types. Carl Bloom, 714-639-1679. carl.bloom@prodigy.net

FOR SALE: National NCX-3 transceiver w/PS- $110, Simpson 260 VOM-$15, Heath GR64 SW receiver- $30. Carter WD4AYS, 434-979-7383.

FOR SALE: Heath Mohican, IM-18 VTVM, RCA WV-98C VTVM, RCA signal generator. Carter, WD4AYS, 434-979-7383, CElliott14@aol.com.

FOR SALE: Collins R-389 VLF receiver in excellent condition with a manual. Sell or maybe trade. Stuart T. Carter, II. W4NHC, 680 Fernwood Drive, Melbourne FL 32904-1995, 321-727-3015

FOR SALE: Collins 75A-4 (no serial #) with noise blanker (no serial #), three filters, 4:1 reduction drive, Collins RF amp and mixer mods, original manual (Animosa IA lab/production standard), $2000 shipped. Eldico SSB-100F xmtr, near mint, full output, with original manual & spare 5894 PA tube, $480 shipped. Hammarlund HQ-140XR (not rack kit!) true 19-inch rack panel w/handles, lighted "S" meter, manual copy, $375 shipped. PARTS: parts by mail for Gonset GSB-100, Heathkit Apache, Johnson Valiant I, National HRO-50 (no coil sets), NC-300, TMC GPR-90. Abe, W3DA, 202-388-2353 day phone.

FOR SALE: Ameritron linear amplifier, model AL-811, new in box, $500. Mike Grimes, K5MLG; 3805 Appomattox Cir; Plano, Texas, 75023, (972) 867-6373. Email: grimesm@flash.net

SALE/TRADE: BC-1335/Delco, RT-66/GRC, TA-12C. NOS: 304TL, 4-125A, 872/stacks. NCX-3, S-108. Wanted: RCA Radiomarine T-408/URT-12, info. Sam KF4TXQ PO Box 161 Dadeville, AL 36853-0161 stimber@lakemartin.net 256-825-7305

FOR SALE: Ten R390A receivers from excellent to parts units. Priced accordingly. Johnson Ranger, $300. Bill, KB8IJC, 304-842-4635

FOR SALE: Onan pre-wired generator instrument panel assy, 14 x 19 ¾, bottom hinged, new, $325. Many high quality, hard to find transformers for builders: filament, plate, etc. Pick up what you want or take it all. Must sell, no shipping. Joe, W6CAS, 916-731-8261, Sacramento, CA

FOR SALE: Hallicrafters SX-28, good, clean condx, works OK, $185. Pick-up only. W2PRR, 585-671-4228 or jandjm130@juno.com.

FOR SALE: DX-200 rcvr, mint, .14-30 mc, prod/detector, cal, book, box, $75 + shpg. Henry Mohr, 1005 W. Wyoming, Allentown, PA 18103-3131

FOR SALE/TRADE: Original manuals: National, Drake, Johnson, Hallicrafters, Hammarlund, Gonset, Swan, WRL, B&W, Knight, Lafayette, others. Ni4q@juno.com 407-351-5536

FOR SALE: QST's for sale. Postcard/phone for list. Many one DOLLAR. First $5, next 4, next 3, etc. Charles Graham, K2GVE, 4 Fieldwood Drive, Bedford Hills, NY. 10507. 914-666-4523

FOR SALE: Motorola and GE tube FM gear for sale, ask W2OQI@optonline.net, 631-878-1591, 17 Inwood Rd, Center Moriches, NY 11934

FOR SALE: Collins KWM-2 & "S" Line repair, Fast service. All work guaranteed 281-351-4953 WB7DYW@EV1.NET http://users2.ev1.net/~wb7dyw/index.htm

FOR SALE: GE mobile xmtr 40-50 mhz.

6V dynamotor 60 watts. Pair 807's. Mel, WØMLT, 970-249-1544

FOR SALE: KWM-2A plug-in relays K2 & K4 manufactured by Allied Signal, P/N T163-6C-115D and T163-4C-115D. $35.00 for a set + $3.85 priority mail. Mike Hutnick, 450 Riverview Ave., Bloomsburg PA, 17815, hutnick@epix.net

FOR SALE: Allied SX-190 Receiver w/ manual, $125: Heath HM-2102 VHF Wattmeter/SWR w/manual , $45. Richard Prester, 131 Ridge Road, West Milford, NJ 07480. 973/728-2454. rprester@warwick.net

FOR SALE: NOS Tungsol 26Z5W as used in the R390A, $16.00 each. Electron Tube Enterprises, Box 652, Springvale ME 04083. 207-490-5870

FOR SALE: Military whip antennas, 1938 Webber signal generator, make offer. Bruce Beckeney, 5472 Timberway Dr., Presque Isle, MI 49777, 989-595-6483

FOR SALE: Tested good globe 201A $14, 226 $15, 227 $10 and others. Slightly weak tubes guaranteed to work in early radios ½ price shown. Write or e-mail: tubes@qwest.net for a new price list or see www.fathauer.com. George H. Fathauer & Assoc., 688 W. First St. Ste 4, Tempe, AZ 85281, 480-968-7686. Toll Free 877-307-1414

FOR SALE: Authorized repairs and sales of all types of amateur radio and communications equipment, and also test equipment. Please call us at LAND AIR COMMUNICATIONS, 718-847-3090 and visit our web site: www.landaircom.com. We have over 3,000 items in inventory and carry all types of communications parts.

FOR SALE:. Detrola Mod. 658-I Beard & Chatfield St., BC/SW, Metal case, plays fair, $65. Lafayette CB mod 625 w/mic $45. National 77X rcvr, metal case @9 clean, $110. Bernie Samek, 113 Old Palmer Rd, Brimfield MA 01010, 413-245-7174 FAX 0441. NOTICE: If I don't return your call, please call again because message was garbled on my machine or I copied wrong.

FOR SALE: Vintage Radio Service. We repair radios, record changers, radios home, auto, tube & transistors. 1930-1980. Ken Hubbard, KA9WRN, POB 792, Beloit, WI 53512. 608-362-1896

FOR SALE: Radio books, magazines, catalogs, manuals (copies), radios, hi-fi, parts. Send 2 stamp, LSASE. David Crowell, KA1EDP, 40 Briarwood Rd., North Scituate, RI 02857. ka1edp@juno.com

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FOR SALE: Radio-Craft and other Gernsback radio magazines from the 1930's. Free List. Bob Ryan, 1000 S. Gilbert St., Apt 132, Hemet CA 92543-7065

FOR SALE: Your old QSL card? Search by call free, buy find at $3.50 ppd. Chuck, NZ5M, NZ5M@arrl.net

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FOR SALE: Repair, Restore, Sales of antique, vintage tube radios. John Hartman, NM1H, www.radioattic.com/nm1h

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FOR SALE: New Ranger 1, Valiant 1, & Navigator plastic dials, freq numbers in green, with all the holes just like orig. - $17.50 ppd. Bruce Kryder, W4LWW, 277 Mallory Station Dr., Ste. 109, Franklin, TN 37067. bak@provisiontools.com

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FOR SALE: Communications Receivers, Military Communications and some test equipment. SASE, Don Jeffery, 131 North Ivy Ave., Monrovia CA, 91016, boallan@aol.com

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FOR SALE: KWM2/S-line metal logo pins. Meatball or winged. Excellent replica of the original. Put one on your hat, badge, or replace a missing logo on your panel. $6.25 shipped. W6ZZ, 1362 Via Rancho Prky, Escondido, CA 92029. 760-747-8710, w6zz@cox.net

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FOR SALE: Used technical books: radio, electronics, math, military, magazines, etc. List: $1 (stamps OK). Softwave, 2 Dept. ER, 1515 Sashabaw, Ortonville, MI 48462

FOR SALE: R.L. Drake repair and reconditioning, most models including TR-7's, 35 years experience. Jeff Covelli, WA8SAJ, 440-951-6406 **AFTER 4 PM**, wa8saj@ncweb.com

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NOTICE: Visit Radioing.com, dedicated to traditional ham radio & vintage radio resources. Let's Radio! Charlie, W5AM. http: / /www.radioing.com.

FOR SALE: Heath Nostalgia, 124 PG book contains history, pictures, many stories by longtime Heath employees. (See BOOKS inside back cover.) Terry Perdue, 18617 65th Ct., NE, Kenmore, WA 98028

FOR SALE: TX'ers, rcvrs, parts, manuals, etc. Send a large SASE. More at http://come.to/AF4K/ Brian Carling, 117 Sterling Pine Street, Sanford, FL 32773 Brian Carling, AF4K, 117 Sterling Pine St., Sanford, FL 32773.

FOR SALE/TRADE: Transmitting/ Receiving tubes, new & used. $0.55 & LSASE for list. I collect old & unique tubes of any type. **WANTED:** Taylor and Heintz-Kaufman types and large tubes from the old Eimac line; 152T through 2000T for display. John H. Walker Jr., 13406 W. 128th Terr. Overland Park, KS 66213. PH: 913-782-6455, Email: jhwalker@prodigy.net

FOR SALE: Treasurers from the closet! Go to www.cjpworld.com/micromart to find some unique items many hams would lust for! Gus, WA, 360-699-0038 gus@wa-net.com

FOR SALE: Books, send SASE. **WANTED:** Anything by Fairchild or Langevin. send SASE for my want list. Richard Robinson, POB 1425, Wallingford, CT 06492, 203-949-0871 or richmix@erols.com

FOR SALE: Vintage equipment at the K8CX Ham Gallery Classified Ads section. Visit the largest Antique QSL Card Gallery http:/ /hamgallery.com

NOTICE: T-368 Registry. For info w2zr@ao1.com Subscribe to the T-368 & BC-610 reflector at http:/ / groups.yahoo.com/group/T-368_BC-610

FOR SALE: Lots of old radio & related books. Eugene Rippen, WB6SZS, www.muchstuff.com

FOR SALE: Strong steatite antenna insulators. Lengths from two to fifteen inches. SASE for list. John Etter, W2ER, 16 Fairline Dr., East Quogue, NY 11942. 516-653-535

FOR SALE: Please visit RadioWorld-Online.Come to see our ham gear, parts, and more. Carl Blomstran PO Box 890473 Houston Tx. 281-660-4571.

FOR SALE: Spun Aluminum Knob Inlays for most Boatanchors. Collins Dial Drum Overlays. Dakaware Knobs. Charlie Talbott, 13192 Pinnacle Lane, Leesburg VA 20176-6146. 540-822-5643, k3ich@arrl.net

FOR SALE: Some unused obsolete Triplett tester transformers. Free List. Bigelow Electronics, POB 125, Bluffton, OH 45817-0125

FOR SALE: Build your own "Midget" bug replication by KØYQX, ca 1918, featured by K4TWJ in CQ Magazine, May '98. 10 detailed blueprints. FAX: 507-345-8626 or e-mail bugs@mnic.net

FOR SALE: Parts, tubes, books, ECT. Send two stamp SASE or email for list. Wayne LeTourneau, POB 62, Wannaska, MN 56761 wb0cte@arrl.net

FOR SALE: Collins restoration. Everything inside & out to make it as Art Collins built it. 50 yrs experience. W9OJI / N4FZ, IL, 815-734-4255 or N4PZ@aol.com

FOR SALE: Convert any wattmeter to read PEP! Perfect for AM/SSB-$24.95 ppd for complete kit! HI-RES, 8232 Woodview, Clarkston MI 48348, 248-391-6660, info@hi-rescom.com

FOR SALE: Complete hardware set to connect Collins PM2 to KWM2 -$19.95 ppd. Warren Hall, KØZQD, FOB 282, and Ash Grove, MO 65604-0282.

FOR SALE: Repair, upgrade, performance modification of tube communications & test equip. Accepting most military, all Collins & Drake designs,

& the better efforts from others. Laboratory performance documentation on request. Work guaranteed. Chuck Felton, KDØZS, Felton Electronic Design, Box 187, Wheatland, WY 82201. 307-322-5858

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FOR SALE: New Release. For details send 2-stamp LSASE to: Olde Tyme Radio Co, 2445 Lyttonsville Rd. Ste 317, Silver Spring, MD 20910

FOR SALE: Military and commercial communications items. Murphy's Surplus, 401 N. Johnson Ave., El Cajon, CA 92020. 619-444-7717 www.Murphyjunk.com

FOR SALE: Tube list, new & used, wide variety audio, and ham. Recently expanded. SASE 52c. Bill McCombs, WBØWNQ, 10532 Bartlett Ct., Wichita, KS 67212-1212

FOR SALE: PANEL AND CABINET REFINISHING; Johnson, Hammarlund 180(a), R390(A), & others total restoration & sales; My updated web site: http://w4pnt.8k.com Patty & Dee's Marina; Dee Almquist, 534W. Main St., Waynesboro, VA 22980. 540-249-3161 Cell: 540-480-7179, FAX 540-249-5064

FOR SALE: RIT for Collins KWM-2/2A; No modifications needed. $79.95 SASE for details. John Webb, W1ETC, Box 747, Amherst NH 03031 bigspndr@bit-net.com

FOR SALE: Aluminum heat dissipating plate and grid connectors for all 3, 4 and T series Eimac tubes including 3-500Z, 4-1000, 304T's and others. Alan Price fixr7526@cs.com

FOR SALE: Ships radio room clock repros, boatanchor mugs and t-shirts, more. http://www.cafeshops.com/amradio,amradio2

FOR SALE: Galena crystal radios, with and without internal amplifiers, also radio tubes, all kinds, free list. Len. Gardner, 458 Two Mile Creed Rd., Tonawanda, NY, 14150. email: radiolen@aol.com

FOR SALE: I built hot-rod receivers;

R390A, SP-600, R-388/51J. NC-183D...and transmitters: Valiant, DX-100, T-4X-A-B, HT-32. 51J-4 filter replacements, R390A Hi-fi AM $245.00 ea. Chuck Felton, KDØZS, Wyoming, 307-322-5858, feltondesign@yahoo.com

FOR SALE: Collins reproduction items available through the CRA on www.collinsra.com. Join the CRA and subscribe to the Collins Journal. Dave, W3ST

FOR TRADE: Two good RCA 833A's for one Taylor 833A. Also looking for Taylor 204A, 813, TR40M. John H. Walker Jr., 13406W. 128th Terr., Overland Park, KS 66213. PH: 913-782-6455, Email: jhwalker@prodigy.net

WANTED: Scott Special Communications rcvr. EA4JL, please call Kurt Keller, CT, 203-431-9740, k2112@earthlink.net

WANTED: Diversity panel to hook up two Hammarlund SP-600-JX's in diversity mode. K8CCV, Box 210, Leetonia, OH 44431-0231, 330-427-2303.

WANTED: Manual/Technical Info For Navy Ls-518a/Sic Intercommunication Station. Jim Cavan, 603-487-5284, Jcavan56@Aol.Com

WANTED: Collins KWM-2A. Also need information on paint color on Johnson Viking Valiant cabinet. Jimmy Weaver, KB5WLB, 1007 E. Bridges, Wynne, AR 72396 870-238-8328

WANTED: Top cover (snaps on) for Viking II transmitter or will buy junker. Robert Haworth, W2PUA, 112 Tilford Rd. Sommerdale, NJ 08083, 856-783-4175

WANTED: Collins PTO 70E-12 (fits 75A-2-3); Allied Radio Knight Kit T-400 transmitter; several clear plastic 2 prong plugs to fit F-243 xtal socket. Dennis Henrichs, PO Box 1717, Medical Lake, WA 99022-1717. 509-299-3566

WANTED: CINCH-JONES connector, 12-pin plug with flush mounting plate: P-312-FP and 12-pin socket with cable clamp in cap: S-312-CCT. V. Yeich, 357 Mountain View Rd., Newfoundland, PA 18445. 570-676-4266

WANTED: Stancor transmitter, any model. Jim Schliestett, W4IMQ, 420 Lakeview Dr, Cedartown, GA 30125 770-748-5968, IMQ@BELLSOUTH.NET

WANTED: Western Electric AN/FGC-1 RTTY Terminal Unit; Northern Radio #107 RTTY Converter; Teletype Model 28's; Jack Hart WA2HWJ wa2hwj@arrl.org

WANTED: Gotham V80 or V160 vertical with paperwork for my rebuilt novice station. Gary Wagner, K3OMI, 11124 Oak Hollow Rd, Knoxville, TN 37932, k3omi@aol.com, 865-690-4217 work.

WANTED: Heath VF-1 VFO. Dale Martin, W7LOG, 2021 153rd Ave SE, Belleview, WA 98007, 425-746-3310

WANTED: Manual or copy for Gonset G-28, G-50, Heathkit VF-1 VFO. Warren, K1BOX, NC, 828-688-1922, k1box@arrl.net

WANTED: ANY Harvey-Wells speaker, aircraft unit, or military surplus component. Will answer all. Kelley, W8GFG, 9010 Marquette St., St. John IN, 46373, 219-365-4730

WANTED: SCR-602 components, BC-1083, BC-1084 displays, and APS-4 components. Carl Bloom, 714-639-1679

WANTED: ANY Harvey-Wells speaker, aircraft unit, or military surplus component. Will answer all. Kelley, W8GFG, 9010 Marquette St., St. John, IN 46373, 219-365-4730

WANTED: Lettine 240 Transmitter (Any Condition) to be restored. Jim Schliestett, W4IMQ, 420 Lakeview Dr, Cedartown, GA 30125, 770-748-5968, Imq@Bellsouth.Net

WANTED: James Millen 90700 "Variarm" VFO. Prefer a complete unit but basketcases considered! Contact Cal, N6KYR at catman351@yahoo.com or 805-234-1149.

WANTED: Hallicrafters PS-500 A-AC pwr sply for SR-400 transceiver. Bob, KL7HDY, 9501 Brien St. Anchorage AK, 99576, 907-346-1044

WANTED: Collins 310B-3, basket case OK, 70E-8A PTO per 1948. Chicago CMS-2, pair of Taylor T-21. Jerry, W8GED, CO, 303-979-2323.

WANTED: Manuals: OE-4/GR, GRA-94, PRR-15, PPS-15B, RD-140/TNS, ASB-5, APA-11A, 8D-3 xcvr. William Van Lennep, POB 211, Pepperell, MA 01463. 978-433-6031

WANTED: James Millen coils 42080, 42040, 42015, 43015. Navy SE2511/

The Collins Video Library

The Collins KWM-2 Video (4 hours, $89.95) Highly detailed video on operation, rebuilding, alignment, troubleshooting, and neutralization of this classic! A must for anyone who owns and operates a KWM-2 or 2A. Printed documentation included.

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The Collins Amateur Radio Radio Eqipment Video Spotter's Guide (1 hour and 40 minutes, $24.95) Close to 90 individual pieces of Collins Radio equipment are shown in the video. Examples of some of the gear covered are: KW-1, KWS-1, 30K-1, 20V-3, 75A-4, KWM-2, S-Line, KWM-1, 30S-1, 30L-1, KWM-380 and much more. Study up before that next hamfest!

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The Collins 75A-4 Video (4 hours, $89.95) This video is four hours of great information on how to repair, maintain and restore this classic receiver. Butch Schartau (K0BS) guides you through all aspects of keeping your 75A-4 running like a top.

R-390A Video (7 hours, $109.95) At last it's available! Long awaited by serious "boatanchor" enthusiasts this is a great video all about the ultimate receiver. Now you will have the ultimate video to go along with it. R-390A expert Chuck Rippel (WA4HHG) covers an absolutely incredible array of information in this "heavy duty" video. This video looks at operation, the receiver modules, complete circuit description, front and rear panel details, complete mechanical and electrical alignment, PTO details, and performance evaluation, modifications, troubleshooting, and restoration. There is nothing like this video available today, at any price!

R390A Addendum Video ($49.95) Another 3 hours and 40 miutes of R-390A information from Chuck Rippel (WA4HHG).

SP-600JX Video (4 hours, $89.95) In this video, Chuck Rippel takes us through all aspects of SP-600-JX servicing including repairs, restoration and modifications. This video is a must for any new owner needing to work on the SP-600.

Purchase three or more videos and get 10% off of the retail price!
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Produced by Floyd Soo, W8RO (ex-KF8AT)

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SE2512 receiver, SE2513 coil set. Gary Carter, WA4IAM, 1405 Sherwood Drive, Reidsville, NC 27320. Phone: 336-349-1991. Email: gcarter01@triad.rr.com.

WANTED: Sonar FR-104 30-50 MHz receiver, also Dynaco Mark II or Mark III audio amp. Bill Smitherman, KD4AF, 336-699-8699.

WANTED: R9 receiver by Harvey-Wells in good condx. Richard N. Pann, W1SVJ, 2447 Yates Dr., Augusta GA, 30906-2587. 706-798-7279. RPANN@COMCAST.NET

FREE: Enclosed Rack, 21" wide x 12" deep x 73" high. Front and back hinged door. Part of Dorm Phone system. Moving from Chicago area. Weigh about 80 pounds. Dennis Olmstead, WB9EMD, 431 Ridgewood, Glen Ellyn, IL 60137 630 469 0531

WANTED: Correspondence with others (am incarcerated) on Military (especially R-390's & backpacks) and tube rigs. Also looking for copies of old surplus catalogs postwar thru 90's. W.K. Smith, 44684-083, FCI Cumberland Unit A-1, POB 1000,

Cumberland, MD 21501.

WANTED: Manual for HP Down Converter 11710A. Richard Wieschhoff, 7 rue du Debuche, F-78120, Rambouillet France; T/Fax 0033 1 304 111 02

WANTED: #33A and #35 Universal SW-3 coils for cash or other coils. Hank Bredehorst 2440 Adrian St Newbury Park, CA 91320. 805 498-8907 quailhill@earthlink.net

WANTED: Coils Forms for National FB-7 and preselector. Mike Sanders 18169 Hwy 174 MT Vernon, MO 65712-9171 k0az@arrl.net

WANTED: Headset, mic, key, and AC power supply for the Navy/Marine Corps TBY transceiver. Ken Kolthoff, K8AXH, POB 215, Craig, MO 64437. Work #: 913-577-8422

WANTED: 23 channel tube-type CB radios for 10-meter conversions. Also tube-type 10-meter linear amplifiers. Ed, WA7DAX, 1649 East Stratford Ave., Salt Lake City, UT., 84106. 801-484-5853

WANTED: W.E. Type 215-A (military VT-5) vacuum tubes. Roland V. Matson, POB 956, Lake Panasoffkee FL 33538 1-352-568-1629

WANTED: Looking for the emblem of National "NC". Katsu JO1GEG/ ex.N8EYH, khirai@ieee.org

WANTED: National HRO-500-TS and LF-10 preselector. Information on improving SSB distortion in the HRO-500. Bob, WØYVA. bobs@isquare.com; 703-450-7049.

WANTED: Audio transformers, with good windings, for Westinghouse RADA and Aeriola SR. amplifier. Paying $40.00 each plus shipping. Roland V. Matson, POB 956, Lake Panasoffkee FL

WANTED: Waters Q-Multiplier for Collins KWM-2. Claude Fleureau, F6GGF, 14 Sentier-Du-Buvier, 92130 Issy-Les-Moulineaux, France

WANTED: Anyone interested in forming an email discussion group on OS-8/U oscilloscopes please email Mike at: mikehardie@shaw.ca

WANTED: One or two 12 Henry 80ma. (or better) chokes. Collins 310B3 power xfmr. Brian Roberts K9VKY, 130 Tara Dr., Fombell, PA 16123. 724-758-2688. k9vky@arrl.net

WANTED: Power transformer for Collins 310B3 exciter—will buy junk unit if needed. Brian Roberts K9VKY, 130 Tara Dr., Fombell, PA 16123 724-758-2688 k9vky@arrl.net

WANTED: WW-2 Japanese Military Radio of any kind. Yokohama WW-2 Japanese Military Radio Museum, Takashi Doi, 1-21-4,Minamidai, Seyaku, Yokohama, 246 Japan takadoi@carrot.ocn.ne.jp http://www.yokohamaradiomuseum.com/

WANTED: Collins R-389 LF receivers, parts, documentation, anecdotes, antidotes. W5OR Don Reaves, PO Box 241455, Little Rock AR, 72223 501-868-1287, w5or@militaryradio.com, www.r-389.com

WANTED: Any TMC Equipment or Manuals, what have you? Will buy or trade. Brent Bailey, 109 Belcourt Dr.,Greenwood, S.C. 29649 864-227-6292 brentw@emeraldis.com

WANTED: National NTE CW xmtr in working Condx. I love National. Sylvia Thompson, 33 Lawton Foster Rd., Hopkinton, RI 02833. 401-377-4912. n1vj@arrl.net

WANTED: National Co. emblems, escutcheons, and logos from equipment, also National AN/WRR2 in working order. Don Barsema, 1458 Byron SE, Grand Rapids, MI 46606. 616-451-9874. dbarsema@prodigy.net

WANTED: Hallicrafters SX 88 parts chassis with cabinet, power,audio output, 50khz IF and 2mhz I F transformers. Ops service manual for Eddystone EC958. Allan, Norco CA, 310-812-0188, alan.royce@trw.com

WANTED: ARC-5 rcvrs, racks, dynamotors. Jim Hebert, 1572 Newman Ave. Lakewood, OH 44107.

WANTED: Top prices paid for globe shape radio tubes, new or used. Send for buy list or send your list for offers. Write or email: tubes@qwest.net See WWW.Fathauer.Com or send for catalog of tubes for sale. George H. Fathauer & Assoc., 688 West. First St., Ste 4, Tempe, AZ 85281. 480-968-7686, Call toll free 877-307-1414

WANTED: Old military radar displays, scopes, antennae, receivers, manuals, etc. Even half ton items! William Donzelli, 15 MacArthur Dr., Carmel, NY 10512. 847-225-2547, aw288@osfn.org

WANTED: Seeking unbuilt Heathkits, Knight kits. Gene Peroni, POB 7164, St. Davids, PA 19087. 610-293-2421

WANTED: Western Electric horns, speakers, amps, and mics. Barry Nadel, POB 29303, San Francisco, CA 94129. museumofsound@earthlink.net

WANTED: Manuals, manuals, and manuals for radio-related equipment to buy or swap. Catalog available. Pete Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872. 732-238-8964

WANTED: Postcards of old wireless stations; QSL cards showing pre-WWII ham shacks/equip. George, W2KRM, NY, 631-360-9011, w2krm@optonline.net

WANTED: Stancor/Chicago PCC200, PCO/PSO15O, RC8150; Triad A-9-J, A-l0-J, A-1l-J, A-12-j. **FOR SALE:** Books, send SASE, Richard Robinson, POB 1425, Wallingford, CT 06492. 203-949-0871 richmix@erols.com

WANTED: R-390A rcvrs, parts rigs or restorable, will restore yours at reasonable prices. Walter Wilson, KK4DF, 706-733-8323 wewilson@knology.net, www.knology.net/~wewilson

WANTED: Info on xmtrs made by Clough-Brengle Co. Used by the CCC, in the mid to late 30's. Any help would be greatly appreciated. Ron Lawrence, KC4YOY, POB 3015, Matthews, NC 28106. (704) 289-1166 hm, kc4yoy@trellis.net

WANTED: WW II Japanese xmtrs & rcvrs (parts, plug-in coils) for restoration & ER articles. Ken Lakin, KD6B, 63140 Britta St., Ste. C106, Bend, OR 97701. 541-923-1013. klakin@aol.com

WANTED: Searching for RME CT-100 or 3R9 xmtrs and info about them. David Edsall, W1TDD, 156 Sunset Ave., Amherst, MA 01002. 413-549-0349, dedsall@crocker.com

WANTED: Orig Heath manuals for ham & test equip. Please state condx & price. Warren, K1BOX, NC, 828-688-1922, k1box@arrl.net

WANTED: WW II German, Japanese, Italian, French equipment, tubes, manuals and parts. Bob Graham, 2105 NW3Oth, Oklahoma City, OK 73112. 405-525-3376, bglcc@aol.com

WANTED: Heath Gear, unassembled kits, catalogs and manuals. Bill Robbins, 5339 Chickadee Dr., Kalamazoo, MI 49009. 616-375-7978, billrobb@net-link.net

WANTED: I wish to correspond with owners of National FB7/FBXA/AGS coil sets. Jim, KE4DSP, 108 Bayfield Dr., Brandon, FL 33511 j.c.clifford@Juno.com

WANTED: Tektronix memorabilia & promotional literature or catalogs from 1946-1980. James True, N5ARW, POB 820, Hot Springs, AR 71902. 501-318-1844, Fax 623-8783, www.boatanchor.com

WANTED: Collins promotional literature, catalogs and manuals for the period 1933-1993. Jim Stitzinger, WA3CEX, 23800 Via Irana, Valencia, CA 91355. 661-259-2011. FAX: 661-259-3830

WANTED: Any books featuring panel meters, gauges, or flight instruments. Chris Cross, POB 94, McConnell, IL 61050.

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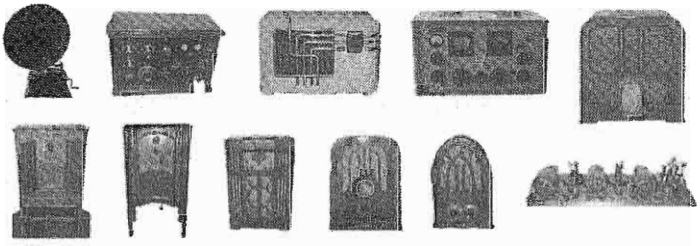

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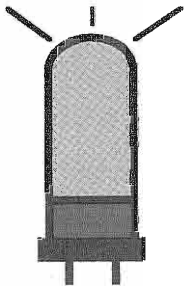

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