NRC RECEIVER REFERENCE MANUAL
VOLUME TWO

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Receiver Comparisons - What Do They Mean?

(2)

Certain problems come about when comparing product summaries, actual user reviews and comparisons, and other information on receivers found in DX news. An article on this subject by Russ Edmunds appeared in DX News on March 14, 11977. A condensation of it follows.

Any information we can provide a prospective receiver purchaser, presuming it is neither grossly inaccurate or misleading, we feel, is to his advantage. A product summary must depend upon readily available information such as advertising material, technical reviews, and very frequently, specifications provided by the manufacturer. Such specifications, however, may not prove entirely accurate outside the test environment. For our purposes, what counts is how the receiver perfroms for broadcast band DXing. For these purposes, it may seem that any veteran BCB DXer, who has experienced in nontechnical terms.

For an accurate, scientific comparison of receivers, some will insist that only receivers of a particular type of subtype should be evaluated together. In our case, whether the receiver be portable, a communications receiver, AM-FM, BCB only etc., we are interested in how the receiver compares to some generally-known and generally accepted criterion. Portables are generally compared to the Realistic TRF, which is the most popular and very close to the best of that genre. Communications receivers are compared to the "state of the art" the Hammarlund HQ-180. Sometimes other standards are used, simialrly, multiband portables may be compared to the Grundig line, although this line is less widely known.

If a multiband communications receiver is compared to an HQ-180, it is not because it will fall short, but rather because most DXers know something of the HQ-180 even if all they know is that a large number of DXers use them, and hear good DX on them. It is a standard, and thus, comparisons can be made which are meaningful to the DXer. Such a comparison by a veteran BCB DXer will be worth more by far to the potential buyer than a product summary, a specification sheet, or an advertisement. Why?? Because it suits his anticipated application.

Along the same lines, there are other sorts of standards relating to what a rig is designed to do. Some are disigned to cover many band adequately. Others are designed for one band or band group only. Still others are for listening, not for DXing. While it is useful for us to know what the receiver is designed to do and not do, the value of a comparison to a known standard is not diminished by this, because what the receiver does do is more important than what it is designed to do. Many Dxers hear about a rig, and start wondering about it. Hearing what is or is not designed to do is useful, but not as much as knowing what it will do.

A receiver which is designed to compromise desperate considerations, such as high-fidelity and DX; or large band coverage, portability and DX, must of necessity, be just that - a compromise. The nature of such a compromise is to detract from each in order to serve the other. Generally, although not necessarily always, the result is a sacrifice of each of proportions that neither is served more than adequately. The compromise fulfills a purpose, but that purpose is not necessarily that of a good BCB DX receiver.

In the optimum, we should know what a receiver is designed to do, and what it actually does. Either one is informative and helpful and both would be best. As publishers, we strive to publish the most information in this area which we can. We are however, limited by what is submitted to us. We have asked for information on rigs, but often have had to rely on cursory comments. Inasmuch as these have intrinsic value to the DXer, we run them. That's why if a receiver is known as not a particullarly good BCB DX rig, we say so, even if we must rely on comparing it to something "out of class".

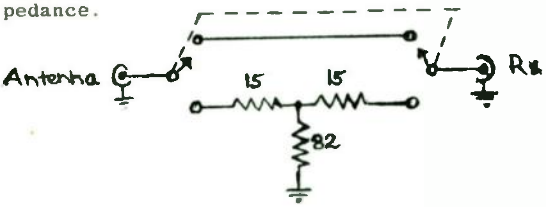
We suggest that those of you interested in purchasing rigs consult the NRC Receiver Manual for comparisons/reviews and reprints for same. Another source of information on many older rigs, including tube numbers, coverages, conversions, year of manufacture, etc, is the Ham Trader Equipment Buyers Guide. (Sample copies of the Ham Trader "Yellow Sheets" contain a description of the guide)

Further RX Hot-Rodding Hints

Chuck Hutton

As most technically oriented DX'ers know, even the best DX rigs come without certain useful accesories and with certain features that can be improved upon. While some of these modifications are complicated enough to warrant a whole article, due to space limitations I will describe these to a moderate degree and list references that will provide further practical details. All of these modifications will improve rx performance to some degree; some will make your rig into a new rx while others will not have so dramatic an effect. If you perform all or most of these modifications the net effect will be to give you an rx that easily outperforms even the best commercially available rig. This article is slanted towards rx's employing tubes as most of the popular high quality units (Hammarlund, Hallicrafters, Collins) were built before the semiconductor era. Many of the subjects covered are equally applicable to solid state devices however. Each individual rx has its own problems that perhaps another make does not suffer from; since the subjects I will cover are general I suggest that if you have a particular problem or need with your rx not covered herein search thru the last 25 years of CQ and QST where many excellent articles on specific rx's have appeared. Owners of Collins R388, R390, 51J series, and 75 series rx's are invited to contact me for a list of articles relating to these rx's.

Every rx suffers from cross modulation and overloading when presented with 50 kw in the back yard. In some sets the tremendous AVC voltage generated will either completely block up the rx or cause reduced gain when trying to DX a station next to the local. A cheap and easy method for reducing overloading is the circuit shown in figure one. It requires no change to rx circuitry but does have the drawback of reducing the weak station level by the same amount as the 50 kw heavy. Generally 10 dB of attenuation will bring you back into the safe area but not affect the ability to hear a weak station. This T-pad is designed for the common 50 ohm antenna impedance.



For 20 dB of attenuation make the resistors 40,40, and 10 ohms. Use the minimum amount of attenuation necessary to eliminate overloading in order to keep from degrading the S+N/N ratio.

A better answer to the problem of overloading and cross modulation is to do some substitution in your RF stage. The choice of RF amp tubes can be very,very important. A simple substitution of one tube type for another (the kind of modification people like most!) can dramatically improve gain, S+N/N ratio, and cross modulation. Caution- do not substitute sharp cutoff tubes for remote cutoff (variable mu) tubes. Remote cutoff tubes have better characteristics for strong signal handling; I replaced the 6AK5 sharp cutoff tube with a 6BZ6 and was rewarded with 10 dB additional gain, reduction of overloading and cross modulation, and longer tube life. DX'ing around 750 khz is now possible even with WSB running 50 kw at 2 miles. Be careful when substituting tubes- check a tube manual and your rx manual to determine biasing requirements, cathode current, and transconductance. Many tube types were developed after many of today's popular rx's were designed; in particular some of the remote and semi-remote cutoff tubes such as the 6BZ6 and 6DC6 were late arrivers that were designed specifically to solve the problem of strong signal handling. Each makes an excellent RF tube in my experience. The 6BA6 is an older and more common remote cutoff tube but it is also widely known as a noisy tube.

Delving further into strong signal handling, RF stages may or may not be helped by application of AVC. Some poorly designed rx's do not have the feature of delayed AVC- i.e. AVC is not applied until signal level exceeds a fixed value where S+N/N ratio is no longer a factor. If your rx does not have this feature the RF can

4 be disconnected from the AVC and run wide open without any serious degradation of AVC performance. Contrary to what you may think at first this may actually help overloading characteristics. The explanation is that if the applied signal voltage on the RF grid exceeds bias, rectified grid current flows in the circuit and charges the grid capacitor, which then discharges thru the AVC buss to the IF grids. Properly designed low impedance AVC lines will help to rectify this problem; if you suspect problems in this area disconnect the RF AVC and see what happens.

Mixer tubes are a weak link in the rx chain. The old adage of minimum gain before maximum selectivity was designed to protect the mixer from cross modulation and overloading, in addition to applying reasonable signal to the typical wide skirt crystal filter. A good bit of noise is also generated in the mixer stage and this problem is compounded by the fact that most rx's have declining gain at the higher frequencies. This problem is well recognized in the amateur literature; various articles have been published on how to improve the performance of mixer stages. Some of the suggested remedies include: (1) installation of that little g_{em} (pun intended) the 6DJ8 dual triode mixer which will provide increased S+N/N ratio with its gm of 13,000 in addition to improved cross modulation performance. A little bit of rewiring and chassis blacksmithing are needed in most cases. (2) the ultimate is probably the 7360 beam deflection mixer tube, usually thought of as a high level mixer or product detector but also a fantastic rx mixer. With reasonable design these tubes are always operated in the linear region. Also the two plates can be wired in push-pull mode and balanced to the IF, providing excellent image rejection. Installation of a 7360 mixer is a major production which I have not tried to date. If I ever have the time to design my own rx I'll certainly use one.

The same thing can be said for IF tubes that was said for RF tubes: newer types have higher gain and lower noise figures. If your rx is more than 10 years old it would pay you to check CQ and QST for articles specifically on your rx and see what other people have suggested for updating the tube complement.

Many a good rx has a simple one crystal filter with the accompanying narrow nose and wide skirts. About 20 years ago it was realized that by employing several crystals differing slightly in frequency an excellent bandpass characteristic for AM reception could be produced. Simple 2 or 4 crystal lattice filters have flat tops and reasonably steep sides much like mechanical filters but do not have quite the shape factor. In addition there are a few small side lobes, but these are usually around the 70 dB attenuation level and can be tolerated. Numerous are the articles which have been written concerning the use of surplus FT-241 crystals which are designed to operate in harmonic modes of frequencies that happily fall in the frequency area of most IF's. These crystals can be had through JAN crystals, hamfests, and surplus houses for as little as a nickel each up to 75¢ each depending on where you find them. If you want to go all the way with these things a filter can be constructed using 8 crystals that will certainly be equal to the expensive Collins mechanical filters.

Mechanical filters have been thoroughly covered by GPN in his excellent article. This article is more informative that anything that has appeared in the commercial literature so if you are interested in these wonderful devices that article is required reading. A few additional comments: (1) the 6 dB insertion loss quoted is for the newer Collins filters; if you have gotten ahold of a used older series filter the insertion loss will be in the 20 dB to 25 dB range. Plan on some sort of compensating amplification. (2) Collins produced a mechanical filter adaptor which plugs into the first IF tube socket and contains a filter and two stages of IF amplification. These are still around in used condition, albeit getting harder to find. If you don't trust your electronics you might want to look into these; current cost $125 or thereabouts. (3) beware of mechanical filters that have been treated roughly or mailed. I have never heard of a filter that survived a drop on the floor. Ask for protective packaging if you must risk them in a trip thru the P.O. Many articles have appeared in the amateur press describing clever little adaptors and circuitry- see the references for a listing

Q-Multipliers are overlooked devices these days. Admittedly they don't have the proper shape factor for AM dx but they can still be extremely useful devices. I currently have two installed on my R388; one for exalted carrier reception and the other for notching out second hets when DX'ing in tight corners. The second can prove quite valuable when fighting off a domestic and an LA split to hear a TA. If you are not up on exalted carrier reception by all means read the references. It really does wonders to make a weak signal seem clearer and cleaner. Heath Company used to make these things but they have not been available for some time. It is still easy to find them in club ads or perhaps the Ham Trader Yellow Pages. If not able to find one they are simple devices to build and can be whipped together for little cost. The Heath Q-M's are designed to operate from 450-460 khz and perform best in this range. The slug tuned coil can be adjusted to resonate at up to 500 khz quite easily; beware however that moving the slug around will lower the Q of the coil and the Q-multiplier will cease to oscillate. Therefore it is not possible to achieve maximum selectivity. A poor remedy is to lower the value of the cathode resistor from 8.2K to 4.7K; more satisfactory is a trip to the local parts house to purchase a different set of resonating capacitors. Buy 1% tolerance high quality components and be careful to maintain the 3:1 ratio of the capacitors or the feedback operation will no longer be up to par.

Noise limiting will be of some value to most DX'ers. The most effective limiter for impulse noise is the blanker type that actually cuts off succeeding stages of the rx for the duration of the pulse. This type of limiter is not very effective for continous QRM or QRN- lengthy bursts of energy such as sideband splash can be better handled by semiconductor diode clippers. See Ray Moore's article in the Receiver Manual for brief hints. I have found that an audio clipper is also of some help for severe bursts of slop if clipping is below the point where distortion occurs. I used an oscilloscope to set the desired audio just below the clipping point and found that this point corresponded with the point where distortion began to be audibly evident, making adjustment of the clipper quite simple if a scope is not available.

Audio filtering can be of some benefit to the serious DX'er. A simple notch filter as described by Wherry will eliminate the last of a heterodyne that a notch filter missed. Another simple device is the 300-3000 cps bandpass filter described by Wicklund. In my experience the active filters do not perform much better than the simple passive filters in listening comparisons. The SSB Crud-O-Ject popular in ham circles uses toroids and capacitors to produce sharp cutoffs at 300 and 2500 cps and would be much cheaper to build than an active filter. Even a simple R-C filter will do wonders to eliminate 60 and 120 cycle hum and the low grumble of hets on some frequencies.

No doubt there are other gimmicks and tricks that can improve performance. This group will certainly go a long way though in making any rx into a super DX rig. Please check the references for practical details on many of these; if you become stuck and need further help I will be glad to answer specific questions.

A BCB DXer's Review Of The Hammarlund HW-180 Series Receivers

Dallas S. lankford, October 1977

Introduction The Hammarlund HW 180 series receivers are sophisticated, tube-type, general coverage communications receivers. Not only are they very popular receivers among BCB DXers, but they also account for much of the foreign BCB DX that is heard in the continental USA. Moreover, the NRC rates them as the best compromise between price and performance on the new and used receiver market today (1).

Reviews of the HQ180 are in (2,3,4) and advertisements which summarise the circuitry and operating features of the HQ180 occur in many issues of **CQ** and **QST** between November 1959 and June 1963, and for the HQ180A between July 1963 and January 1970. A brief discussion of the HQ180, HQ180A, and X models is also found in the NRC Receiver Reference manual (5).

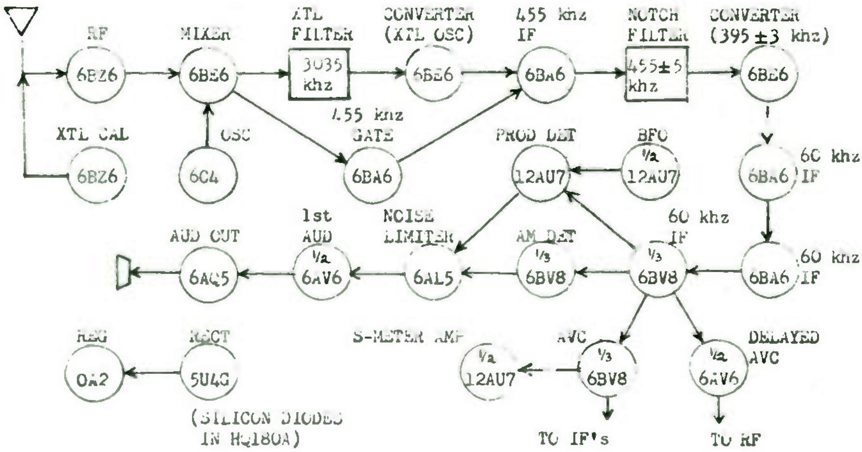
Description of the HQ180 The primary differences between the HQ180 and HQ180A are (1) B+ rectification is done with a 5U4G tube in the HQ180 and with two silicon diodes in the HQ180A, (2) the HQ180 does not have provisions for 230 volt 60 hz operation, while the HQ180A does, (3) the HQ180A has a separate filament transformer for the high frequency first oscillator and first mixer which is permanently on as long as the receiver is plugged in (which, according to Hammarlund advertisements, drastically reduces warm up time), (4) the HQ180A has a 500 ohm audio output (both have a 3.2 ohm output), (5) the HQ180A detector selection switch has three positions -- AM, SSB, (product detector with BFO fixed tuned to 60 khz), and CW (product detector with BFO variable tuned to 60 plus or minus 2 khz) -- while the HQ 180 provides only the first and third detector options, (6) the HQ 180A has an accessory socket and a system socket for use with external converters and transmitters, and (7) the HQ180A is newer (1963-1970) than the HQ180 (1959-1963).

Both the HQ180 and HQ180A also come in X models, which have an additional 6C4 oscillator that provides up to 12 crystal controlled reception frequencies. Except for the differences we have mentioned, the different models of the HQ180 series are virtually the same receiver, so we will often refer to them as the '180.

The '180 is housed in a grey-finished aluminum mesh case with a lift up lid in the top, and a grey-finished die cast front panel. A clock/timer is optional in the HQ180 and HQ180A, and when not present, a white plate with a clear plastic cover occupies the clock mounting hole in the top left corner of the front panel. The '180 tunes 0.54 - 30 mHz in 6 bands; (1) 0.54 - 1.05 (2) 1.05 - 2.05, (3) 2.05 - 4.04, (4) 4.0 - 7.85, (5) 7.85 - 15.35, (6) 15.35 - 30. Double conversion, 455 and 60 khz, is used on bands 1-4 while triple conversion, 3035, 455, & 60 khz is used on bands 5 & 6. Bandspread truning is inoperative on bands 1 & 2, and is calibrated for the 80, 40, 20, 15 and 10 meter amateur bands and also includes a 100 - 0 logging scale. The main and bandspread tuning shafts are flywheel weighted and edge-driven circular dials which in turn drive the tuning capacitors through reduction gears. This arrangement spreads the dial markings over about 320 degrees on both dials, and gives a tuning reduction of approximately 23:1. The circular dials are equilavent to at least 7" of linear dial on band 1 and up to 14" on band 6. Bands 1 and 2 are divided into 10 khz intervals, band 3 into 20 khz intervals, band 4 into 50 khz intervals, and bands 5 and 6 into 100 khz intervals. Sensitivity is rated as 1.5 microvolt for a 10:1 signal to noise ratio on AM, and 0.7 microvolt for SSB/CW. Maximum audio output is one watt into 3.2 ohms. Power consumption is 120 watts. The '180 is 10 1/2" H, 19" W, and 13" D and weighs 38 pounds. The serial number is located on the chassis rear, just above the S-meter zero and sensitivity controls.

Antenna input options on the chassis rear include balanced and unbalanced binding terminal arrangements, and an unbalanced coaxial socket. Antenna input impedance is rates as 50 - 60 ohms. A 100 khz crystal calibrator gives markers on all bands. The front end is a conventional tube RF amp, mixer, and variable high frequency oscillator, except that the antenna trimmer tunes the first RF tuned circuit. From the first mixer, a signal follows one of two paths, through a 455 khz gate on bands 1-4 or through a 3035 khz crystal filter and a crystal controlled converter bifillar T trap notch (slot) filter. The slot is tuned by an 8"l vernier plus or minus 3 khz and provides fine tuning. Selectivity is obtained by tuned circuits in the 60 khz IF strip, and is controlled by two switches, one three position switch that selects upper, lower, or both sidebands, and one four position switch that selects bandwidths of 0.5, 1, 2, & 3 khz at 6 db down, with a 60:6 db shape factor of 3:1. These two switches act together to give bandwidths of 0.5, 1, 2, 3 ,4, & 6 khz. Two detectors, a diode for AM, and a product detector for SSB/CW, are selectable. There are four positions -- off, slow, medium, and fast. When on, delayed AVC voltage is applied to the RF amp, and AVC voltage is applied to the 455 khz IF amp, the third converter, and the first two 60 khz IF amps. Manual gain is applied to the RF amp and the 455 khz IF amp in all AVC positions. The noise limiter is a diode type with adjustable threshold, and may be turned off. The audio section includes Hammarlunds, well-known auto-response circuit (6) which automatically narrows the audio bandpass as audio gain is increased. The headphone output is designed for high impedance headphones. Audio output may be also taken from binding terminals on the chassis rear. In the HQ180A, accessory and system sockets on the chassis rear provide B+ and filament voltages, audio output, and other features. 7

HQ180 AND HQ180A BLOCK DIAGRAM



Comments

I purchased an HQ180A serial no. 6652, with manual for $350 in January 1977. Currently, a typical price range for HQ180A's is $300-380, and about $100 less for HQ180's, although I have seen selling prices of $200- 380 for both. There are a variety of potential ways to locate a '180, such as, Buyers & Sellers (7) and for sale ads in **CQ** and **QST**. I found mine by placing a wanted ad in **QST** Ham ads (8). Regardless of how you locate a '180, be sure to give the receiver a careful personal inspection and use it for about an hour before you give any money. All '180's are at least 7 years old, and many of those offered for sale have at least a few minor problems. In addition, personal bad experience and conversations with others have convinced me that some sellers intend to rip off the buyer, and the remainder see major problems as minor problems, and often don't see minor problems at all.

By all means, get a manual if you purchase a '180. The 74 page manual (9) abounds with data which will assist you or a competent repair person in almost any repair or maintenance. The manual includes operating instructions, front end and IF alignment procedures (an error on line 4, pp. 48 reads "... bottom slug of T2 and peak T1...", but should read...bottom slug of T1 and peak T2..." (10)), chassis removal and replacement procedures, tube operating voltages and resistances, a parts list (inductances of coils and transformers, and capacitances of the main and bandspread tuning capacitors are not lsited), clock installation, 230 bolt wiring option (on the HQ180A), parts placement diagrams (tubes, coils, and transformers), and schematics. An addendum (10,11) describes changes and modifications made in the late model HQ180A's. These modifications include removing the plastic dust covers on the main and bandspread tuning capacitors, and removing tube shields from the RF, 455 khz IF, first two 60 khz IF's, and noise limiter tubes.

Superficially, the HQ180A I bought was in very good condition, with no scratches, dents, or noticeable signs of wear. It was in good electrical and mechanical condition, with some scratchiness in the antenna trimmer, RF, AF, and noise limiter controls. The scratchy antenna trimmer was fixed by am application of commercial contact cleaner (several brands are available at most electronics dealers), but the scratchiness in the other controls persisted. Disassembly and cleaning cured the AF control, but not the RF and noise limiter controls, and so far I have been unable to locate replacement parts. Presently, I have replaced the (linear) RF control with an audio (logarithmic) control. The scratchiness is gone, but gain control is now logarithmic rather than linear. This emphasizes that one can expect to encounter difficulties when one attempts to maintain or repair an older receiver.

The front end alignment of the HQ180A was good, almost perfect on the SW bands, and about 5khz off on the BCB. Using the manual, I went through the front end and IF alignment procedures with little difficulty. Some frozen cores in the 455 khz IF strip were unfrozen by careful application of force, thanks to a helpful hint from Arthur Peterson (10). A slight amount of dial spreading is noticeable at the ends of the dials, but calibration is still accurate throughout most of the bands.

Generally, I have been pleased with the condition and performance of my HQ180A and agree that the '180 deserves its popularity among BCB DXers. However, the '180 has a few idiosyncrasies which BCB DXers should be aware of.

Because the antenna trimmer tunes the first tuned circuit, an antenna tuner is needed for best long wire performance. But the '180's antenna input options are ideal for loops and beverages, which are superior to long wire antennas for weak signal reception on the BCB.

In my opinion, the inoperative bandspread on bands 1 and 2 is the most annoying feature. The slow main tuning is usually adequate for the BCB, and when it is not, the vernier fine tuning suffices. But estimating a split's signal's frequency would be easier and more accurate with operative bandspread tuning. Also, those who would add exhalted carrier reception via a Q-multiplier might experience tricky tuning on the BCB.

When using an amplified loop on the BCB, the first three harmonics of the third conversion oscillator are audible. For example, if the oscillator is tuned exactly to 395 khz, then the first three harmonics are heard at 790, 1185, and 1580 khz. The exact frequencies of these harmonics depend on the alignment of the oscillator and the setting of the vernier fine tuning. Fortunately, the vernier fine tuning can be used to move these harmonics approximately plus or minus 6, 9, and 12 khz respectively, and thus harmlessly away from any weak DX signals. Interestingly, using these harmonics, both the 455 and 60 khz IF strips can be aligned with only a 455 khz signal; first zero beat the first or third harmonic to 790 of 1580 khz using a domestic BCB signal, and then use the 455 khz signal to align both IF strips.

The manual indicates that low impedance headphones can be used satisfactorily with the high impedance headphone jack, but I have found the arrangement disappointing because of resulting objectionable 60 hz hum. For low impedance phones, I use a 4 watt 1000 - 8 ohm audio transformer, installed in a metal case and connected to standard phone jacks.

Conslusions

The '180 in good condition is indeed a prima donna BCB DX receiver. Through careful personal inspection, it is possible to locate and purchase a '180 with a few minor problems that you can either live with or repair. When last sold new, the HQ180A sold for about $600, which, given the high rate of inflation during the early '70's, is equivalent to over $1000 today. Compared with new narrow bandwidth receivers that start at about $3000, a reasonably priced '180 represents a very good value. I estimate that about 10,000 '180's were manufactured, which means they should be available in reasonalbe numbers on the used receiver market for several years to come. However, don't expect to find one easily. Reasonably priced '180's in good condition sell very quickly.

Acknowledgements

I would like to express my appreciation to Bruce and Evelyn Portzer for reading an earlier draft of this article and making helpful criticisms. I would like to also thank Arthur Peterson for his assistance.

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More on Comments Hammarlund Receivers

Bob Foxworth

Dallas lankford has written a very good article on what I consider to be the best BCB DX receiver series available to the average DXer - the Hammarlunds. I've owned several of these sets over the past 2 decades and would like to add some thoughts.

The Sp-600 series tunes band one from 540 to 1350 and band 2 from 1350 to 3450 kHz (in the commonly available model that has a top end of 54 mHz). Single conversion is used up to 7400 kHz. The selectivity provides 3 xtal and 3 non-xtal positions from 200 hz to 13 khz bandwidth at 455 khz IF frequency. This provides information shown as a "?" in the table on page 9 of the January 14, 1980 DX NEWS.

I have found in 2 HQ129 and 3 HQ150 receivers owned by me that the crystal used in the selectivity/filter can resonate close to 452 khz. The IF transformers are peaked up on the crystal filter frequency for optimum response. This makes use of inboard mechanical filters unsuitable unless the IF is "detuned" and peaked up at 455 khz; then the crystal filter no longer works properly. The only cure is either to build a separate outboard IF amplifier strip using mechanical filters, or replacing the quartz element inside the receiver with a new unit. This effect is verified, when the receiver is properly aligned for correct crystal filter operation, and a digital frequency counter is attached. The IF preset must be set to 99548 (and 00452 for the higher bands where the local oscillator injection becomes low-side) rather than 99545 and 00455 as would normally be the case with a standard frequency IF.

I have found the active notch on my two HQ150 receivers to be very effective indeed. The set labels this as "null" on the Q-multiplier. The secret is to first put the Q-mult in "peak" function and set the "peak gain" to just oscillating. Adjust "freq" to bring up the Undesired carrier. Then switch to "null" function. Note that the null potentiometer must NOT be set near full on but rather at a point near 2/3 to 3/4 full. This adjustment is very critical. A rocking of the "freq" and "null" pot will soon yield a point with the undesired carrier becoming totally inaudible. Both controls require careful adjustment. I can take out an undesired carrier 10 to 15 db stronger than the wanted one at a khz or less away and get solid copy in a case where there would be no copy at all with the Q-mult off. This is without resorting to the crystal filter, too. The HQ150 manual is totally lacking in any explanation of this. Fortunately hammarlund built receivers a lot better than they wrote manuals!

I used a HC10 from 1962 when it was sold (for about $140 new) to 1968 when mine was destroyed in a fire. They are quite scarce on the used gear market but are a very cost-effective way to get decent selectivity. They used both 455 khz and 60 khz IF circuitry and alignment may be required; the 60 khz may be a problem in getting proper alignment gear. Hammarlund made an even more attractive version of the same circuit - the SPC10 which came in a 5-1/2 inch rack panel and featured the same functions as the HC10 but included a S-meter and a 600 ohm line output providing 1 watt audio. I have never seen a SPC10 for sale but would pay $100 for a decent unit. Incidentally I have manuals for both the HC10 and SPC10 if any reader needs one - a xeroxcopy at cost can be arranged.

Technically oriented DXers may wish to look up the following articles, in addition to Dallas' bibliography. "HQ129X receiver improvements" by Stueber and Noe, page 38 of the May 1959 CQ and "Receiver Hotrodding Hints" by Geisler, page 36 of the January 1959 CQ. The latter, incidentally, has a good explanation of what the Miller effect is, and what it does to IF alignment. The HQ129X was reviewed in QST for June 1946. I can provide a xerox copy of a HQ129X manual to those in need. My experience is that the best place to buy and sell this type of radio gear is the classifieds in QST and the Ham Trader "Yellow Sheets". The Yellow Sheets are 20 sides, typed, and appear every 2 weeks to give a faster turnover than the magazines which may take 2 or 3 months, although giving a larger potential audience. Two individuals have advertised in the past in QST offering Hammarlund service/repair. They are C. Osteen, NC and Wayne Cordell K4HCS, NC. Cordell is a former Hammarlund employee and I understand he has access to parts. I cannot vouch for either of these names and assume no responsibility consequentially. The HQ150 is in my opinion the best receiver to use for BCB DX work, behind the HQ180 series which of course has superior selectivity. Two reasons come to mind; the BCB split into two ranges which makes dial calibration easier to read, and the presence of both a crystal filter and Q-multiplier make tuning AM signals a relatively painless proposition. Of course this receiver was brought out in the mid-1950's when AM Phone was the mainstay of amateur radio; the hetrodynes that resulted on the ham bands made this kind of selectivity necessary. This is a problem the MW DXer still faces. Of course the HQ150 has plenty of room for modifications to be added, new connectors put on the panel or rear deck, etc. I even mounted a 2-inch speaker on the front panel of one of my 2 150's, where the BFO pitch used to be. A more practical modification is the addition of a mixer trimmer control. This may be done mechanically by removing the shield can from the BFO socket, removing the limiter switch (leave it wired shut to disable it, it's not that effective) and running a shaft out through a flex coupling to a small variable mounted next to the bracket that holds the mixer coils. There is a point on the mixer bandswitch that replaces the two fixed padders for the 1320 and 3200 mixer alignment, it is a jumper between 2 lugs and is easily accessible. The variable replaces the two fixed padders; and as the jumpered lugs run to the extra section on the main tuning gang, the new trimmer works only on the 2 BCB ranges. The adjustment on the front panel then goes where the limiter switch was. Or the job can be done electrically with a varicap diode. Another offbeat trick is to put the receiver cabinet on a board so it's an inch off the tabletop. Loosen the chasis and slide it forward a couple inches. You can put your hand in under the chassis, just under the bandswitch knob and reach back and toung an exposed lug on the right side rear deck of the oscillator section of the bandswitch - closest to the panel of the 3 sections. With the radio tuned to the lowest.it will go, which is 535 khz, you can "load" the oscillator down to about 526 (receiver and trimmer has to be retuned, and the mixer, too, if you can do so). This makes reception of 530 and lower easy without upsetting the alignment of the receiver permanently. It helps to know that there are no DC voltages AT THAT POINT of the circuit but it is important to know, likewise, what to avoid. This is recommended to only the serious and knowledgeable person. . . but it DOES work and you CAN copy Cartage, C.R.'s Radio Rumbuos on 527 khz on a HQ150. Incidentally installing a switchable padder here doesn't work as the lead capacitance is too much and the oscillator won't track. Incidentally a digital dial is invaluable when loading the tuning down with finger capacity as the tuning is very touchy as to finger pressure on the bandswitch lug. The osc squeaks out near 524 khz received frequency, at which point the RF circuits no longer track.

---Bob Foxworth

More Comments on Hammarlund Receivers

Russ Edmunds

After reading Dallas Lankford's article, I dug out some items which might be of interest. First, re prices, HQ100's, 150's, 200's, 145's, 160's, and 180's can be had at a variety of prices and in a variety of conditions as can various editions of the Sp600. Any given issue of Ham Trader ("Yellow Sheets") will have a number of them, generally a bit cheaper than indicated in the article. HC10 converters were investigated by me about 5 years ago, and were double-checked by a then-Hammarlund employee Red Bank, NJ. They were all but unavailable at the time, and in the time since, I've seen maybe 2 or 3 in Ham Trader, and at higher prices.

Second, on parts and schematics availability, parts may also be obtained from G.R. Whitehouse Co., Newberry Dr., Amherst, NH 03031 or C. Osteen, Box 152, Mars Hill, NC 28754. I currently have manuals for the HC10, HQ129X, 150, 160, 180, and PRO310. Copies available for xerox and postage.

An additional note on those which I have used extensively; the HQ100 or 100A are simply unsophisticated for BCB, and do not take well to addition of an external Q-multiplier. HQ145 and 145A are subject to severe overloading as are the 100's. HQ150 crystals tend to be all centered between 451 and 453 khz, which requires substantial de-tuning of the receivers IFs to compensate, and at a cost of decreased performance. I don't recommend the practice.

A capsule rundown of all of these receivers is contained in the Ham Trader Buyer's Guide available from Ham Trader, or by xerox of the necessary pages (6 of them) from me.

Russ Edmunds

PANASONIC RF-4800 REVIEW

GRANT MANNING

At the end of this review is the block diagram, and technical specifications of this receiver. List price is $460.00 from Panasonic dealers. This is high, as it is available elsewhere for less. This set has electronic digital tuning readout on all but the FM band, MW, and a low shortwave band (1.6 - 3 Mhz).

After playing with the receiver quite a bit for a month now, I've sort of reached some opinions on it's performance across the bands.

The FM is quite poor. Poor sensitivity, poor image rejection, and cross-mod immunity. No digital tuning.

The AM is also a loss, with tons of spuriouses, and no digital on a 4" (lengthwise) dial. Loopstick antenna, and no provisions for a loop or shielded antenna input. Relatively insensitive, and broad as a barn door. While on the subject of selectivity, um, the specs say *plus* or *minus*; the best you get is 3 Khz at -6db and 12 Khz at -60db. It's worse than this, I'm quite sure. The AM, and all SW functions of IF amplification and frequency conversion are handled by one IC. There is, (unfortunately) so much leakage through the chip, you can break the signal path and still have audio! Ditto on the 1.6 - 3 Mhz segment of SW. Insensitive, no digital, easy to overload, broad, poor frequency calibration, etc.

On shortwave, it is sensitive as heck. Probably the most sensitive in the house. However, it overloads the easiest too, and will go into a cross-mod condition on R. Maldives. If the receiver is run with the RF gain cranked down to where the S meter sits around S9, the front end more or less operates in a sane manner, and it's okay.

The dial and tuning system, (it has a fast-slow tuning knob), is great except that it has about 0-1 Khz backlash. They provide a VFO offset to zero the receiver to the display on the front panel. I've found that once set, it need not be changed. The receivers' oscillators drift however, and my receiver exceeds their specifications of less than 500 hz per half hour. It's around 5 Khz per hour. So after you turn it on, you have to retune every so often to stay on frequency especially on marginal stations, where passband placement becomes important. The set is nice to operate, but the volume control is in the wrong spot, and it's the wrong size.

Power Source: AC 120V, 60 Hz
DC 12V; eight 1.5V batteries (Panasonic UM-1 or equivalent), or any external 12V DC source (such as a car or boat battery through a car-battery adaptor)

Power Consumption: 10W

Receivable-Signal Types: FM, AM, CW, and SSB

Frequency Range:

FM	88–108 MHz	
MW	525–1605 kHz	(571–187m)
SW1	1.6–3.0 MHz	(187–100m)
SW2	3.0–7.0 MHz	(100–42.9m)
SW3	7.0–11.0 MHz	(42.9–27.3m)
SW4	11.0–15.0 MHz	(27.3–20.0m)
SW5	15.0–19.0 MHz	(20.0–15.8m)
SW6	19.0–23.0 MHz	(15.8–14.7m)
SW7	23.0–27.0 MHz	(14.7–11.1m)
SW8	27.0–31.0 MHz	(11.1–9.7m)

Reception Method: FM Superheterodyne
MW/SW1 Superheterodyne
SW2–8 Double-Superheterodyne (variable oscillated-frequency up-converting, premixing system)

Intermediate Frequency: FM 10.7 MHz
MW/SW1 455 kHz
SW2–8 1st IF 2 MHz
2nd IF 455 kHz

Frequency Display: SW2–8 (3.0–31.0 MHz)
7-segment, red LED
5 digits
Easy reading to three decimals in MHz (below 1 kHz to the closest round number)

Antenna:

FM	External antenna (75Ω)
MW	Built-in ferrite-core antenna and external antenna (75Ω)
SW1	External antenna (75Ω)
SW2–8	External antenna (75Ω), or M-type coaxial-cable antenna (75Ω)

Sensitivity:

FM	3 dB down limiter 1.6μV S/N 26 dB 3μV
MW	S/N 10 dB 60μV/m S/N 26 dB 400μV/m
SW1	S/N 10 dB 1.0μV S/N 26 dB 6.0μV
SW2	S/N 10 dB 1.3μV S/N 26 dB 8.0μV
SW3	S/N 10 dB 0.8μV S/N 26 dB 5.0μV
SW4	S/N 10 dB 1.2μV S/N 26 dB 7.0μV
SW5	S/N 10 dB 1.2μV S/N 26 dB 7.0μV
SW6	S/N 10 dB 1.2μV S/N 26 dB 7.0μV
SW7	S/N 10 dB 1.3μV S/N 26 dB 8.0μV
SW8	S/N 10 dB 1.3μV S/N 26 dB 8.0μV

Image Ratio:

FM	30 dB (98 MHz)
MW	40 dB (1000 kHz)
SW1	30 dB (2.3 MHz)
SW2	65 dB (5 MHz)
SW3	60 dB (9 MHz)
SW4	55 dB (13 MHz)
SW5	50 dB (17 MHz)
SW6	45 dB (21 MHz)
SW7	35 dB (25 MHz)
SW8	35 dB (29 MHz)

(SW2–8 is 1st IF image ratio.)

Selectivity: FM ±200 kHz (35 dB), ±400 kHz (70 dB)
AM WIDE ±2.5 kHz (−6 dB), ±15 kHz (−60 dB)
NARROW ±1.7 kHz (−6 dB), ±6 kHz (−60 dB)

Frequency Stability (SW2–8): Thirty minutes after power-on, fluctuation is less than 500 Hz.

Input Jacks: AUX mini-type 20mV, 300kΩ

Output Jacks: REC OUT mini-type, 400mV, 4kΩ
EP/EXT. SP 4 – 8Ω

SW2–8 Tuning Control: Fast/Slow Ratio...12:1
Retardation Ratio...1:9.5 (Fast)
1:114 (Slow)

Semiconductors: 5 IC's, 3 FET's, 34 Transistors

Power Output: RMS 2.0W

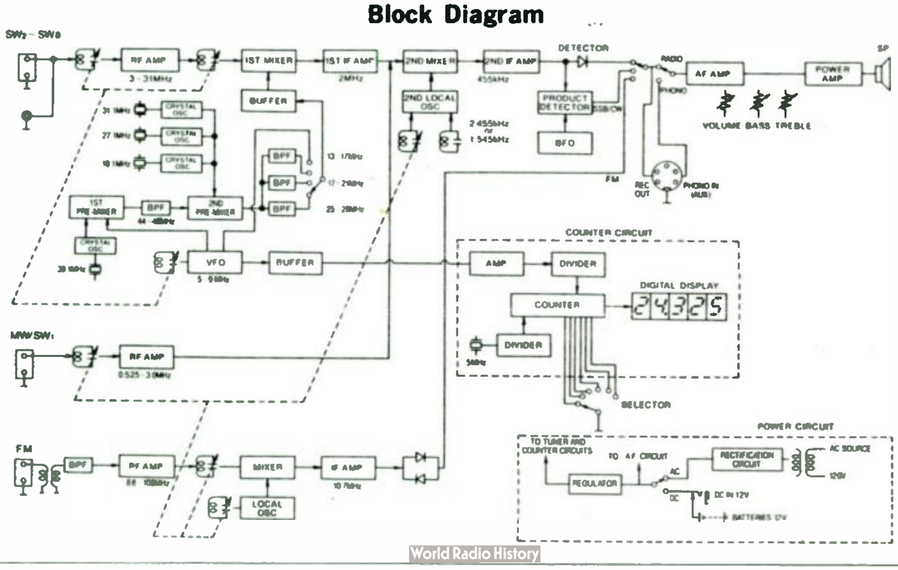
Speaker: 10 cm, 4Ω

Dimensions: 482(W) × 200(H) × 354(D)mm

Weight: 8 kg (without batteries)

Specifications subject to change without notice.

Block Diagram



Review of the Panasonic RF-2200

Michael A. Sapp

The Panasonic RF-2200 is a multi-band portable radio covering AM, FM, and 6 shortwave bands, 3.5 - 28 MHz. It features double conversion, RF amplifier, BFO, separate bass and treble controls, adjustable selectivity, 2 crystal calibrators, and fairly good frequency readout. It is available for between $115 - $150, depending where it is bought. The one the author bought cost about $125, including 4% local sales tax.

This review is non-technical, and the subjective opinion of the author. It also contains a comparison with two other well known portables. The basis of this comparison is mainly on the BCB, although other bands are noted.

Lately Panasonic and Sony have both brought out portable double conversion receivers, with accurate frequency readout. Being in the market for a receiver of this type, I was very interested in the comments on both of these receivers that have appeared in several DX club bulletins. It was these reviews that helped me make up my mind to get the Panasonic. The only reviews, at this writing, to appear in DXN concerned the Sony ICF-5900. I hope this review will be of some use to the BCB dxer.

Since owning the RF-2200, I have been pleased with its performance on the BCB. In the author's opinion, the receiver is aesthetically pleasing, with the controls well laid out. Below you will find a description of some of the features.

BFO. The BFO can be used for the reception of SSB and CW signals. It is very unstable when first turned on, and is very hard to keep SSB signals tuned in. According to the operating instructions, it stabalizes after about 5 minutes. It has been the authors experience that it takes longer than this.

S-Meter. The S-Meter is basically just a tuning indicator. It tends to pin on any half way decent signal, and is not calibrated in either S-units or decibels. One thing that takes some getting used to is that the meter deflects to the left when receiving a signal, rather than to the right as with most S-meters.

Tuning. Tuning is close to being linear. There is a very slight bunching at the top of the band, but it is very slight. The linearity is achieved by using a network of nylon reduction gears to drive the main tuning capacitor. Using the "SW Spread Dial" and crystal calibrators, you can read out to 10 kHz on the short wave bands, with interpolation to 5 kHz. The main BCB dial is calibrated every 20 kHz and using the SW spread dial you can interpolate to 5 kHz. The tuning can be calibrated from the front panel while using the 500 kHz calibrator. One switch disengages the SW spread dial at the same time it engages the 500 kHz calibrator. There is also a 125 kHz marker. The tuning dial has 2 speeds, as well as a spinner knob for fast tuning.

RF Gain. On the BCB slightly stronger reception was noted on some stations, with the RF gain backed off slightly. Advancing all the way caused the signal to be weaker. This normally only happened on strong stations.

Selectivity. There are 2 steps of selectivity, both ceramic filters, with wide skirts. While no match for an R-390A, the narrow position helps selectivity greatly.

BCB Antenna. For BCB reception, an 8 inch or so ferrite rod antenna is used. It is mounted on top of the receiver, and is capable of being rotated 180 degrees. The antenna is termed the "Gyro Antenna" by Panasonic, and appears to be very sensitive. Nulls are also very good.

Audio. Audio quality is very good. Separate bass and treble controls can adjust the audio to varied conditions, however the power output leaves something to be desired. There is no noise limiter or noise blanker.

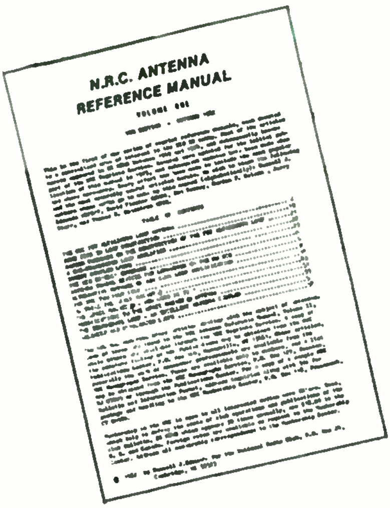
The beast is big! 18" x 11½"D x 7"H. Weighs nothing (12 lbs), is black, has R-390 handles (chrome no less), and NC-98 dials, with a digital display at the center top.

I tried to modify the biggest problem the beast has, namely, the lack of selectivity on SW. I can live with the cross-mod; (S meter freaks will have to learn that "lots" isn't necessarily "best" or be plagued with overload/resultant cross-mod.) The IC that *is* the IF, (plus two ceramic filters and a couple of interesting transformers), has so much leakage that I was unable to fit a mechanical filter to it, or so far anyway. A 3.8 filter would be just fine with this set.

Basically I like it. I wouldn't buy it for a main receiver, but as something nice looking for stand-by work and maybe some "easy" SWLing. On the 19, 31, and 49 meter bands, the wide filters, and quality speaker plus tone controls are great! Hi fi DX! However, if you "turn it up", the audio distorts, and pilot lamps flicker from poor power supply regulation.

So, if you are in the market for a fancy entertainment portable, with direct readout on SW, go for it. If you want a *communications* type receiver, keep looking.

The RF 2800 was also tested at this time – initial results were better, considering the price, and this will be covered in a later article.



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Power Supply. The unit operates on 6 volts DC (4 "D" cells) or 120 volts AC. The power cord is detachable and does not have a storing compartment as do most portable receivers made today. This creates a problem as the power cord can be easily misplaced or lost.

Carrying Strap. There is a black shoulder strap that comes with the unit for carrying. While it performs a useful function, it is very cheap looking compared to the rest of the receiver. It also gets in the way of the gyro antenna. It can be easily removed and replaced again, but something better could be made.

In the following paragraphs, the Panasonic RF-2200 will be compared with two other well known portable receivers. The Realistic TRF, which needs no introduction, about 6 months old, and a Sony TFM-1600. The Sony covers AM, FM, and short wave in 4 bands from 1.6 - 27 MHz. It was bought while in Viet Nam 7 years ago, and has never been realigned. Both the Sony and the TRF have tuned RF stages.

Sensitivity - The 3 receivers are very close in the area. Possibly a slight edge to the TRF.

Selectivity - An edge in this category to the RF-2200. The TRF ends up last in this one. With bad conditions the RF-2200 was able to separate Radio Cayman-1555 from WQXR-1560 and CBE-1550 both who put extremely good signals at this location. The TRF and the Sony could not separate it from WQXR. Most of the other easy splits (834, 1165, 1265, etc.) were heard on all three, however.

Frequency Readout - The RF-2200 wins this one easily. The main dial is calibrated every 20 kHz, and is easily calibrated and interpolated to 5 kHz. The TRF and the Sony cannot be calibrated from the front panel, contain no internal crystal markers, and do not have accurate markings any closer than 50 kHz. They also suffer from extreme high band bunching.

Audio - Quality of the Sony and the RF-2200 are similar, both very good. The Sony, however, has a decided edge in power output. While the TRF has good power output the quality is lacking. When DXing, the audio quality can make some DX stations more readable.

Antenna nulling - About the same in all 3 sets. The gyro antenna makes the RF-2200 slightly easier as the receiver itself does not have to be rotated. The TRF has its good points here too, as it is light enough to be easily tilted, to produce a deeper null.

Overall - The nod goes to the RF-2200. Despite comments the TRF and the Sony come very close. Frequency readout is really the only major difference.

The Sony and the RF-2200 were also compared on FM and short wave. The RF-2200 came out way ahead on shortwave. The Sony is in need of alignment, I guess, and only being single conversion, has images all over the last two shortwave bands. Frequency readout in the RF-2200 is again superior, as well as selectivity. FM is a close race. With just a whip antenna, reception is better than either my JVC 5040U, or Kenwood DR-7400 stereo receivers with an outside antenna. Sometimes the RF-2200 is suceptible to images on the FM band. You may find one strong local all over the band.

In conclusion I would have to say that the Panasonic RF-2200 is a very good portable receiver for the price. It has a lot of features not found in portables in that price range until recently. If you DX the BCB, short wave, or FM this just might be the backup receiver you are looking for. For the BCB unless you have a super location, it won't bring the TA's or TP's in, but for the domestics it can do a very good job. Reading other reviews on this receiver, there have been complaints of images on the BCB from powerful locals. While I do not live in an area such as New York or Chicago that has many 50 kw transmitters, I do not live in a rural area either. I have not noticed any image problems at all on the BCB.

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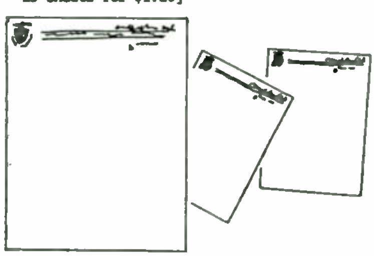

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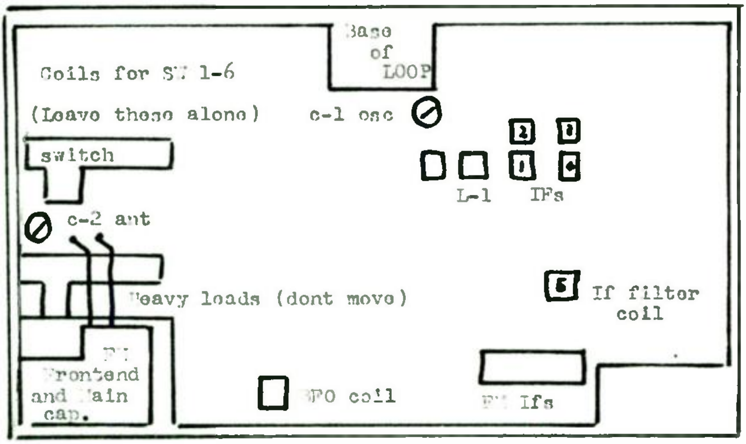
PANASONIC IF & RF ALIGNMENT

by Steve Kennedy

The Panasonic RF-2200 is a fairly popular portable receiver among several members of the National Radio Club. I have been an owner of this fine set for about 3 months, and it is an excellent set for DXing domestics and some LA splits. However, like many owners, I have noticed the main fault of this set is the dial on MW freqeencies does not maintain accurate calibration. This problem can be cured with some precautions taken to insure the set keeps its alignment. First off, be sure you have a good set of batteries if you operate it as a portable. I prefer to use alkaline batteries for long life and to insure stable voltage over the life of the batteries. Be careful not to expose the set to any moisture, and handle it with reasonable care. Avoid carrying it around like a $20 portable. I purchased a portable case to store my set in when not in use.

Panasonic didn't include any technical information on the circuitry of the RF-2200 in the owners manual. Herein is specific directions on how to align the set. Read them very carefully before proceeding to align the set.



Open up the battery compartment and remove the batteries. Next remove all six screws which hold the back on the set. Carefully unplug the antenna and battery leads from the PC chassis board. Put the back panel aside and reconnect the set to an AC line. Turn on the set and set the dial so that the hair line curser is directly above the heavy mark at 600 KHz on the AM band. Check for a station at 600 KHz and if it is slightly off from the dial marking very carefully turn L-1 (see diagram) until the station is properly centered at 600 KHz. Do not use a local station for this procedure and it will overload the set and make realignment difficult. If you cannot find a station of 600KHz use the 580 or 620 mark. The object is to make known stations appear on the dial where they are supposed to be.

Now tune in a station at 1400 KHz, or 1380 or 1420 if that is what available, and determine how far it is off from its proper location. Very slowly tune C-1, which is located northwest of L-1 in the bundle of wires, and set the station at its proper dial setting. You should go back and check the dial at the lower settting where you tuned L-1 to see if it is still at its proper location. Carefully touch up L-1 and C-1 until both 600 KHz and 1400 KHz are correct. When you are satisfied that the dial is properly calibrated then proceed. In most cases the above steps will only take from 5 to 10 minutes. If you wish to determine that a station is properly centered on its mark switch the bandspread to narrow and watch for maximum signal. It is possible to obtain a more accurate dial in this manner.

Alignment of the antenna circuit is quite simple. Tune in a weak but steady signal near 1400 and tune C-2 (see diagram) antenna cap for maximum signal. You should note that the dial of the RF-2200 will display stations from 530 to 1500 with reasonable accuracy. Above 1500 the markings are not very accurate.

Next comes the BFO circuit and the IF circuits. Directly to the right of L-1 are 4 IF coils. Tune in a very weak station near the lower end of the AM dial and switch the set to narrow bandwidth. Carefully tune the IF coil to the right of L-1 and watch the signal meter on the set. Be sure the signal is peaked for maximum signal strength. If the signal is strong enough to pin the tuning meter at 10 lower the RF gain for a midscale reading.

Now go to coil 2 (see diagram) and repeat the above procedure. Each time the signal should increase when the coil is tuned. Peak coils 3 thru 5 in the same manner. If your set is badly aligned you will notice an increase in signal strength each time you adjust coils 1 thru 5. When you have peaked up these coils you have carefully aligned the IF section of your Panasonic RF-2200.

The BFO coils is located in the lower left side of the main PC board (see diagram). Tune in a weak, no stronger than 5 on the tuning meter, station with the RF gain wide open. With the bandwidth in the narrow position carefully tune for maximum signal. Listen for the stations audio which should be quite bassy and most of the background noise absent. What you are doing is tuning the signal to center its carrier in the middle of the IF passband. Now switch on the BFO and wait a minute. If the BFO hetrodyne is audible tune the BFO dial for a zerobeat. You must be vary careful not to disturb the dial setting. You signal will sound like SSB when the BFO is set for zerobeat. When completed tune the dial back and forth and note if the BFO hetrodyne is egual in strength on either side of the signal. If all is well go ahead and re-connect the back and secure.

The alignment procedure described involves only the available on the air signal and is simple for most DXers to perform provided they have some basic knowledge of the inner workings of a radio receiver. I cannot over emphasize the importance of knowing what you are doing before you attempt to align your RF-2200 or any other receiver. If you feel you cannot do the alignment procedure properly by all means take the set to someone who knows how to align multiband communications equipment. Most Radio-TV shops are ill equipped to handle the work. In fact most technicians in the usual Radio-TV service shop have had no experience on servicing multiband radios. If you know of a knowledgeable ham or fellow NRCer ask him to do the work, it will pay off.

ROOM FOR YOUR NOTES !

DRAKE R7 REVIEW

CHUCK HUTTON

Drake has relased the R7 receiver as of late July 1979, having obtained one immediately on a loan-to-test basis, I hope the following theory and performance review will introduce the R7 to DXers. Two basic models are available: the R7 and the R7/DR7. The R7 has analog only frequency readout and covers 10-500, 500-1000, 1000-1500, 1500-2000, 2500-3000, 3500-4000, 5000-5500,. 7000-7500, 14000-14500, 21000-21500, and 28500-29000 khz. Frequency coverage is in 500 khz bands with generous PTO overlap of at least 125 khz at the top and bottom of each band. The R7/DR7 has digital and analog readout and covers 0-30 mhz with no gaps. Otherwise there are no differences in performance. The word is that as of mid-August Drake has not sent any R7's to dealers.

Some design features are very interesting so I will trace the signal path through the receiver in order to discuss them: (1) in the RF stage no amplification takes place unless a 10 db gain pushbutton controlled preamp is switched in. As can be seen from the sensitivity specs presented later, the sensitivity is very good even without the preamp. It is likely that the preamp will only be needed for very weak signal DX at the top end of the HF band. The preamp is non-operative below 1.5 mhz as Drake realized the extra gain could only hurt strong signal handling. (2) input selectivity is provided by 9 broadband bandpass filters, each covering part of the 0-30 mhz spectrum. Therefore, no preselector to adjust. (3) the incoming RF signal passes immediately to a special high level double balanced diode mixer that is designed for excellent strong signal handling. (4) the first IF is at 48.05 mhz for improved image rejection. Up conversion to such a high IF is made possible by a phase-locked loop HF oscillator.

Important controls/functions include: (1) front panel diode-switched selectivity filters. A 2300 Hz filter is standard; 300, 500, 1800, 4000, and 6000 Hz filters are optional at $52. (2) passband tuning, allowing some flexibility in selectivity. (3) receiver incremental tuning, for use in varying the received frequency up or down a matter of a few kiloherts. Not of great interest to MW DXers (4) a tunable IF notch filter for reducing heterodyne interference. (5) switchable AGC time constants for best reception of any transmission mode. (6) an "AUX PROGRAM" selector switch for choosing any of 8 500 khz bands or crystal controlled frequencies programmed into the accessory AUX7 program board. This board allows quick switching to often-used bands, in the case of the R7, it allows reception of any eight 500 khz bands between 0 and 30 mhz. This last option should allow the SW Dxer to make good use of the R7. (7) main and alternate antenna switch with back panel connections for each. (8) a crystal calibrator emitting markers every 25 khz. (9) on the DR7 model, the digital dial reads out to the nearest 100 hz. (10) an impulse type noise blanker is optional. Installation is easy as Drake has included a front panel switch for the NB and also provided for easy mounting a la the PSR4 noise blanker. (11) a "store" switch for the digital dial. It freezes the diaplay on the frequency you are tuned to, allowing you to tune away and remember where you were originally tuned to. Electronic scratch paper. (12) the digital dial may also be used as a 150 mhz frequency counter. (13) a tape out jack is provided. (14) an internal speaker is provided. (15) a front panel headphone jack. (16) can be operated either 110/240 VAC or 13.8 VDC.

PERFORMANCE EVALUATION

Obviously this is a high performance receiver. Sensitivity is very good. It is likely that nothing better will ever be needed. The filters have excellent shape factors and possess good ultimate rejection. In the above areas, I can find nothing to fault in the R7. Stability is excellent; sideband is stable within seconds of turning the rig on, making it unnecessary to chase the signal around. Image rejection is top notch. The area where the R7 really shines is the mixer specs. Third order IM figures are as goos as are available at the current time. Blocking is practically non-existent with a mixer capable of handling such strong signals.

I am able to fault the R7 in only two areas, after thorough comparison with a 390A, SPR4, FRG7 with 3 khz filter, AQ129X with 2 mechanical filters, HQ180A, and very briefly a RF4800. Firstly, the audio rates as very poor. Before someone accuses me of being too picky about audio, let me say that I have never considered any commercial receiver to have such poor audio that I would not own it. The R7 comes close. Whatever they used for an internal speaker, it needs to be replaced.

Distortion and tinniness are close to intolerable. The MS7 external speaker is satisfactory but still not top notch. The second criticism is their choice of broadbanding the input stage at MW frequencies. While this is OK at HF where no practical, attainable amount of input selectivity will protect the receiver from strong signals only 10 or 20 khz away, this is not the case at MW freqs. A good prselector has enough selectivity to be of great help to the urban MW DXer. In practical terms, this means that the R7 was able to defeat the 390A between 720 and 800 khz where super-local WSB is a terror, if and only if, the R7 was tuned so close to WSB that the 390A's input selectivity was of no use. That is, 740 was DXable on the R7 but not on the 390A but 720, 730, 770, and 780 were generally better on the 390A. The broadbanded RF input on the R7 also led to a handful of spurs from locals that were totally unheard on other receivers. This was true only on the Beverages, so it is possible that under less severe conditions the problems may dissapear.

If you own a 390A, don't plan to dump it for a R7. With a SPR4, 180A or FRG7, you most certainly will notice improvement when switching to the R7. Versus a 390A, the advantages will be ease of repair, portability, newness (most 390A's are 20 years old), digital tuning, better sensitivity for HF DX, and an ability to handly stronger signals as outlined above. I believe most DXers will not feel the advantages to be worth an extra $1000 however.

DOMESTIC LOG
This 3-ring hole punched, 8 1/2" x 11" volume contains listings for all U.S. and Canadian AM MW stations, including locations, addresses, powers, antenna operations, networks, schedules, formats, and other useful information. 7th Edition. Cost to NRC Members is $9.00 and $10.00 to Non-members.

Night Time Antenna Pattern Book - Includes Updater
This spiral-bound volume features the nighttime directional antenna patterns of Canadian and U.S. stations on Map pages of 8 1/2 x 14 inches. These patterns are drawn to scale from official government sources. Commercial publications of this sort cost more than ten times as much for this valuable DX reference. Cost to NRC Members is $9.50 and $10.50 to non-members.

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RADIO SHACK DX-300

Wayne Heinen

While I am not an expert on receivers I was able to lay my hands on a DX300 for a weekend and compare its operation with my old standby, a US Navy RBB3 built in 1943. The DX300 is small and compact measuring 6 x 15 1/2 x 10. It is a quartz synthesized unit and was found to be very stable after a 10 to 15 minute warm up time. The tuning has a drawback in that the course tuning must be calibrated with every one MHz shift.

My BCB experience found the DX300 to be plagued with common problems of a low priced receiver. First off, selectivity in the BCB was very poor. Using my Radio West MW-1 antenna I found extreme overloading and cross modulation with plus or minus 50 khz of any of my locals. Using the 200 foot longwire the results were similar in both day and night DXing. Split frequencies were impossible to receive. A comparison of the RBB to the DX300 went as follows:

RBB: 1005, 995, 834, 675, and 775.
DX 300: No splits audible or detectable with either antenna.

Sensitivity on domestic channels was also lacking. WCAU and WCBS were both readable on the RBB but neither was even detectable on the DX300 keeping all other variables the same.

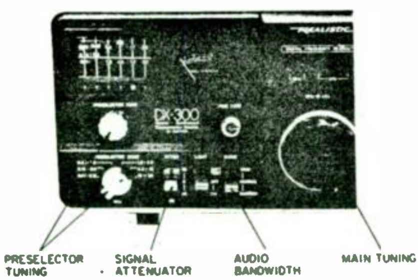
The digital readout is nice but it did present a problem in that it generated noise which was picked up with the MW-1 and the longwire. The DX300 is portable and runs on 8 "C" batteries or a 12 volt auto system. There was no difference in operation between AC and DC.

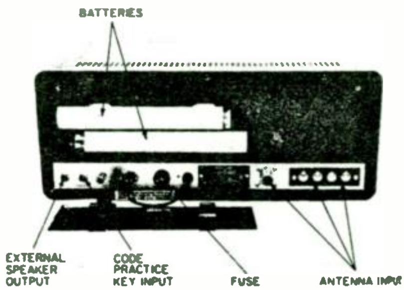
Shortwave is another matter. I found the DX300 to be very good on all bands above 5 mHz. Although I haven't DXed on shortwave in years, it seemed to bring in what I would consider adequate signals.

Once again a manufacturer has produced another receiver leaving the serious BCB DXer out in the cold. With some modifications, it might end up as an adequate receiver.

REALISTIC DX-300 COMMUNICATIONS RECEIVER

Digital readout ends the problems of guesswork tuning





After a little practice, you can zero the DX-300 in on any band in a second or two. The preselector is really sharp, and helps to attenuate unwanted off-frequency signals. The audio bandwidth control can really sort out a signal when two or more are bunched.

DX-300 SPECIFICATIONS

Daniel Bartek, Jr.

Dan passes along some specifications issued by Radio Shack. The rundown of this new LED readout general coverage communications receiver, catalog number 20-204, dubbed the DX300 follows:

Band coverage: Continuous coverage 10 kHz to 30 mHz in 30 bands. Provides Marine SSB, Standard AM, Longwave, SSB/CW Ham Bands, AM/SSB Citizen's Band Channels, Aircraft Weather, and WWV.

The DX300 is triple conversion. Features a Dual Gate MOSFET front end. A 3-step RF attenuator is designed to prevent strong signals from overloading the receiver. A 6 range preselector with LED indicators, according to Radio Shack, boosts signals and matches the DX300 to any antenna. The set also has a 6 element ceramic filter; a manual audio bandwidth control for adjacent channel interference.

There is also a product detector and plus or minus 1 kHz clarifier for best SSB and CW reception. It has a built in speaker, 1/4 inch headphone jack, tape output jack and terminals for any antenna. Also, a built in code oscillator with key for practice, a screw on whip antenna, a 3 way power switch to allow operation anywhere, a dial light switch to reduce battery drain, a meter acting as both battery condition and signal strength meter, and receiver muting terminals. Uses AC 8 "C" batteries or 12 volt DC external power.

Specifications: Sensitivity for 10 dB signal-to-noise ratio: Am, 1 V at 900 kHz and 0.5 V at 7.1 mHz; SSB, 0.5 V at 900 kHz and 0.3 V at 7.1 mHz. Selectivity plus or minus 3 kHz, -6 dB; plus or minus 10 kHz, -70 dB. RF: Triple conversion, quartz controlled. IF: 1st. 54.5-55.5 mHz; 2nd. 3-2 mHz; 3rd. 455 kHz. Antenna inputs: 50-ohm coax, balanced open line or single wire. Size: 6x14-1/2x9-3/4. Power requirements: 120VAC, 60 Hz, 12 VDC negative ground. Price is $379.95 as of October 1978 in the US.

This information is from Radio Shack specifications sheet.

DX-300 Another Look

The March 12, 1979 issue of DX NEWS contained a review of the Radio Shack DX300 by Wayne Heinen which was rather critical of, among other things, the tuning and selectivity of the receiver. A recent release by Rob Harrington, president of the Colorado Association of DXers, mentioned the problems encountered by Rob, Jeff White and Larry Cunningham with their receivers.
Following is a copy of an article from "The Marketplace Report" which is published monthly by the ANARC DX Equipment Information Committee, Harold Sellers, Chairman.

> Word of DXers problems with the DX300 reached Radio Shack Headquarters in Fort Worth, TX, as a result of Jeff White, ANARC Public Relations committee Chairman, talking with his local Radio Shack store manager. Jeff was contacted by Frank Roberts, Product Development Manager, who got details on the problems from Jeff. As a result four DXers who had written reviews received corrected receivers. Two of these people, Rob Harrington and Jeff are now satisfied with the DX300.
>
> The problem with the MHz tuning was a self-oscillating 52 mHz IF circuit. As a result, adjustment of the MHz dial would tune in other stations, whereas this should only have been accomplished by the Khz dial. radio Shack says that about 50% of the first production of receivers had this problem. They have promised to fix any receivers. If any DXer has difficulty with his local store manager, we would suggest that they contact Mr. Frank Roberts, Product Development Manager, 1500 One Tandy Center, Fort Worth, Texas 76102, telephone 817-390-3244.
>
> Other comments on the DX300 have been; outdoor antenna needed, the whip being quite insensitive; overloading from powerful medium wave stations; carrying handle fragile and unsafe. We heard two complaints of the digital readout being 1 to 1-1/2 kHz off of true. This should be correctable by a competent radio technician, since most frequency counters have an adjustment inside.

RADIO SHACK's New TRF

Gerry Thomas

As we all know by now, the revered Radio Shack TRF Model #12-655 is no more. In its place Radio Shack is offering the 12-656, a radio which shares the same aim as the old TRF, namely reception of distant MW stations, but at an increased price of $34.95. What's the story on the new TRF and how does it compare with the old? Read on.

Appearance

The cabinet of the new TRF was cast from the same mold as the old so their sizes and overall configurations are identical with the exception of color. Whereas the old TRF was grey, the new model sports a black front half and a greyish-beige back half. On the later model, the dial markings are a little "finer" and the pointer significantly narrower which should result in improved stock frequency resolution. Also, gone is the slide pot which continuously varied tonal quality on the earlier model, it being replaced by a two-position, horizontal-throw toggle switch. The rears of both cabinets are identical with the earphone jack and external antenna/ground terminals similarly located.

From a purely visual standpoint, I personally find the new TRF a little more appealing, but the older version certainly wasn't an eyesore.

Circuitry

Although both models are single conversion, superheterodyne designs and employ tuned RF stages, the circuitry beyond the mixer level differs in several important ways. The older TRF used two IF stages and depended upon a crystal bandpass filter resident in the first IF transformer to provide above average selectivity. The current model has done away with the crystal filter and instead has added a third IF stage to handle the selectivity parameter. (Like the older version, the new TRF uses discrete transistors to provide IF amplification.) In the audio section, the new TRF has replaced the standard individual components with an integrated circuit.

Another noteworthy difference between the two TRF's is the ferrite rod antenna. The antennna in the previous model measured 6-1/4" X 3/8" whereas the current model's antenna has decreased in size to 5-9/16" X 3/8". Assuming that both ferrite materials are of similar permeability values and that the primary and secondary windings are comparable, we can expect somewhat lower signal levels being fed to the RF stage of the newer TRF.

Performance

Okay, now that we've finished the visual once-over, how does the new TRF stack up as a DX machine? To answer this question, brand new, right-out-of-the-box, TRF's were compared. The older 12-655 and the current 12-656 were equipped with fresh C-cells and a midday test sequence begun. This sequence (which was conducted at my new location several miles distant from my previous RF-jungle QTH) encompasses both selectivity and pure sensitivity tests and provided the following results.

600 kHz (next to local masterblaster WHYM-610)--On the old TRF, CMW was in at a fair-plus level and was experiencing moderate slop from WHYM; under the Cuban was audible (but at a weak level) WVOG, New Orleans**********On the new TRF, CMW was judged to be at a fair level but was being severely troubled by intelligible splatter from WHYM; there was no sign of WVOG.

750 kHz (a test of pure sensitivity)--WSB, Atlanta was weak but audible on the older TRF**********Not a trace of WSB on the newer model.

970 kHz (local WBOP on 980)--On the old TRF, WFLA, Tampa was at a good level with only impulse slop from 980 audible**********WFLA was also at a good level on the new TRF but the slop from 980 was steady and intelligible.

1220 kHz (next to local WNVY-1230)--CMGY was very weak but readable on the old TRF despite heavy, but unintelligible, QRM from the local**********Only the local spilling over to 1220 was audible with no sign of the Cuban on the new TRF.

1380 kHz (5kW local WCOA on 1370)--The old TRF provided WLCY, St. Petersburg at a fair to good level with significant but unintelligible slop from WCOA**********On the new TRF, WLCY was nowhere to be found.

After obtaining the preceding results, the new TRF was carefully "tweaked" (i.e., RF and IF stages aligned) and the sequence re-run.

600 kHz--CMW at fair level and slop still moderate but now unintelligible; WVOG now audible under the Cuban but very weak.
750 kHz--WSB now audible but weak.
970 kHz--WFLA still good and QRM remains intelligible but slightly less heavy.
1220 kHz--Still no sign of the Cuban.
1380 kHz--Not a trace of WLCY.

As you can see, tweaking resulted in an improvement in the new TRF's performance, especially on the low end of the band, but it still didn't match that of the earlier model. (Incidentally, the GE Superadio was also put through this domestic test sequence and provided reception equal to or better than the old TRF under all conditions.)

24 One advantage which the newer TRF did have was in the area of current consumption. At "normal" listening levels, the earlier TRF consumed about 35 mA of current whereas the present model requires only about 18 mA---therefore, batteries should last longer. Finally, the two-position (i.e., high pass/low pass) audio filtering of the new TRF seemed to be as effective as the old model's variable filter in most situations.

Final thoughts

Well, on the basis of this one-sample evaluation, it looks as though we've taken a step backwards. The new TRF, while it is undoubtedly better than most portable or table-top "AM" radios, does not match the model it replaced in either overall sensitivity or selectivity.

It is highly likely, however, that modifying the IF's with "transfilters" or even a high quality bandpass ceramic filter and adding a Radio West "Shotgun" antenna booster would make this a very serviceable DX device. Besides, other than the leviathan GE Superadio, we MW DX'ers who require a portable, under$100, DX rig have little other choice nowadays. 73's---GT

For Your Notes!

S-Meter For The TRF
An Initial Attempt

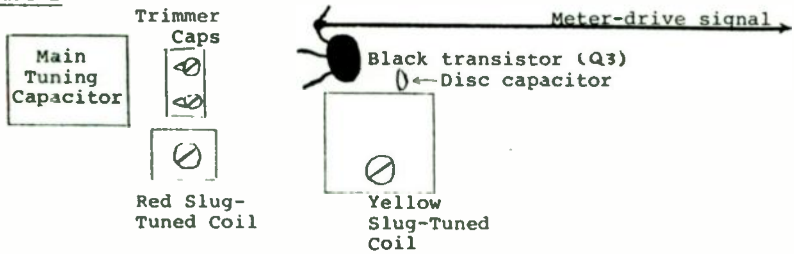
Mark Connelly

A signal strength meter (S-meter) has many useful properties to the DXer. It may be used to compare levels of groundwave stations, to observe fade characteristics of skip signals, to analysis sub-audible heterodynes (SAH's) and to accurately peak or null a station.

I had a zero-center "AM-FM Tuning Meter" scavenged from an old Sharp multiband portable lying around in my "junk box." Its small size made it a natural for use on the Realistic TRF. The meter movement is -100 uA for a full scale left deflection and +100 uA for a full scale right deflection.

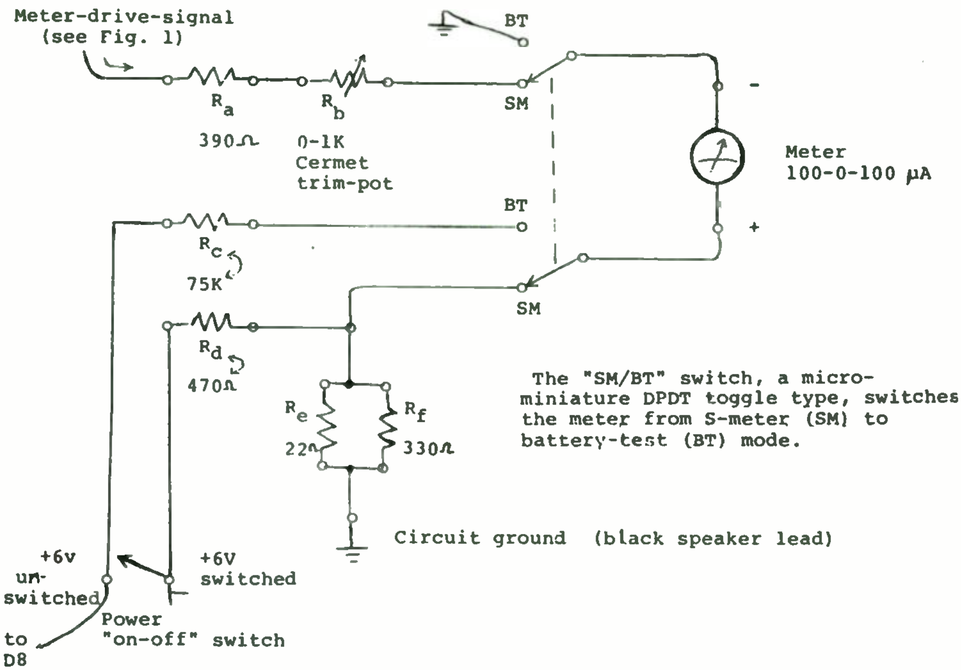
To obtain a voltage which varies with signal strength, I tapped the transistor lead shown in the figure below. (Open TRF, observe circuit card).

Figure 1



The meter drive signal measures approximately +0.5 volts for zero signal and about +0.2 volts for full scale signal (a strong local).
After some experimentation, I came up with the scheme of Figure 2:

Figure 2



The trim-pot is used to adjust for a full scale left deflection on the meter with zero signal received. Tuning the receiver above 1600 kHz will provide a nearly zero signal level under most conditions.

Rd sets the full scale right deflection. I found that 470 ohms will yield a 3/4 scale deflection on a strong local. 430 ohm may be used is you want a more "generous" meter reading. Alternately, you can keep Rd 470 ohms and increase the value of Rf (nominally 330 ohms) which shunts Re (22 ohms). The receiver's operation will be adversely effected if you use an Ra value much less than 390 ohm.

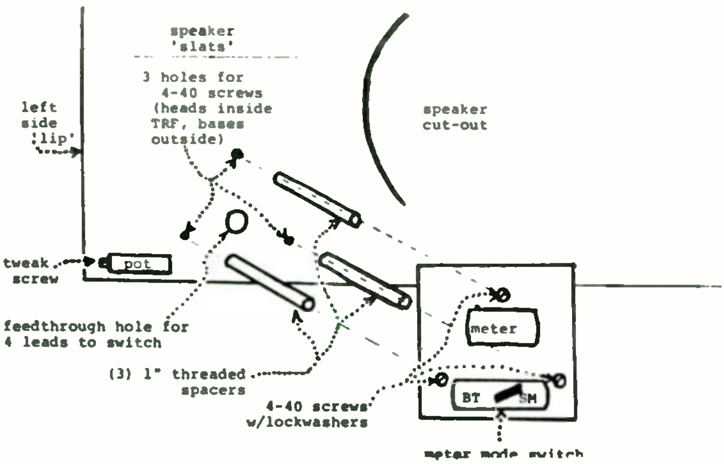
In the "BT" mode, the battery voltage is read whether or not the receiver is turned on. A good set of batteries will provide about 3/4 scale (right) meter deflection; full scale right is 7.5 volts in this mode. A useful battery check is to monitor the battery voltage under unloaded (TRF off), lightly loaded (TRF on, but volume down), and fully loaded (TRF on, volume high) conditions. A center reading in the battery test mode indicates zero volts: batteries are either dead or not installed.

A left deflection indicates that the batteries have been installed backwards. With the TRF plugged into mains, the AC to DC power suppply takes over; a nearly full scale right meter reading should be observed as the power supply DC output is about +7.3v (loaded).

Mechanical Assembly

Fixed resistors were mounted inside the TRF. The 0-1K Cermet/Bournes-type trim-pot was mounted in the lower left corner of the front of the receiver; see below. Trim-pot leads were fed directly through small holes drilled in the cabinet. A few drops of rubber cement ("RTV") were applied with a cotton swab to secure the pot.

Figure 3/ expanded view



The meter and the switch were mounted on a 1-5/8" by 1-5/8" square piece of epoxy glass (G-10) printed circuit board stock. This assembly was then attached to the left front side (above, and somewhat to the right of, the trim-pot) by using three 1" long threaded metal standoff spacers and 4-40 hardware (screws, lockwashers). The 4 leads to the switch from inside the TRF were fed through a hole drilled in the front grill. This hole should be fitted with a rubber grommet to reduce wear on the insulation on the 4 lead wires. Above gives an overview of the exterior mechanical assembly.

Concluding Comments

I have found that the S-meter is particularly useful in nulling and peaking applications; the meter shows changes in signal strength much more readily than audio output does.

My S-meter/battery-meter project was an unsophisticated first "stab" at this idea. Others will undoubtedly come forward with considerable refinements and improvements. As years have passed with no significant articles about S-meters for the TRF, I felt that the least I could do was to "get the ball rolling".

An active meter-drive circuit with an operational-amplifier chip was contemplated, but I opted for a simpler approach which all DXers could implement. Others are hereby encouraged to write of their designs using meters of different movements (such as 0-1 ma, 1-100 ua, 1-0-1 ma). A design utilizing a linear LED level meter (similar to those on some modern cassette decks and stereo receivers) would be of considerable interest to many. Also desireable; S-meter circuits for the GE Superradio.

FOR YOUR NOTES!

Modifying the Realistic TRF for 10KHz Readout

GERRY THOMAS AND CHARLIE BARFIELD

The Realistic TRF, as all TRF fans know, is an incredibly fine portable receiver for DXing the MW band, especially when one considers its low price. The chief shortcoming of this radio is its poor frequency readout, a situation that is incongruous with its comparatiuvely good selectivity. The dial face markings are woefully inadequate and the dial pointer is laughably wide, but, on the other hand, how much more would the TRF cost if each unit were precision calibrated before leaving the factory?

While it is a simple matter to stick a strip of tape to the dial face and custom calibrate an individual receiver, this alternative often gives the TRF an unmistakeably home-made appearance and unless the dial pointer is also modified, frequency readout can be less than optimal. Because we wanted the TRF to resolve frequencies to at least 10 kHz and at the same time have a fairly professional appearance, we decided to sacrifice a TRF in an attempt to improve it. As it turned out it wasn't necessary to perform major surgery on the receiver. In fact, the procedure is relatively simple, but can be somewhat tedious.

Our main objectives were to replace the present dial markings with ones that allowed at lease a 10 kHz readout, substitute a much thinner dial pointer for the stock wide one, and end up with a physically attractive TRF. The first problem encountered involved how to get at the dial face and pointer since they appeared to be inaccessible from all angles. Solvents applied to the outside edges of the plastic dial failed to loosen it, but it was discovered that, after removing the back of the reciever, a firm nudge from the rear to the corner of the dial face with the eraser end of a pencil (through the hole behind the "long Range TRF Circuit" dial face marking) was sufficient to break the gummy (rubber cement) glue holding the face plate. Needless to say, this was much simpler than we had originally anticipated. Next, the dial markings (including the logging scale) had to go. Nail polish remover and Q-tips readily removed these. Use sparingly and be careful not to get any solvent on the painted black border or the "AM" and "kHz" markings.

At this point we replaced the dial pointer, but as it turns out, this may not be the best time to make this change. We initially snipped off the metal stock pointer with a very sharp pencil and then remarked with ink. This calibration procedure required extreme precision (we used a magnifying glass and a bottle of Visine) and many attempts over a total of about 10 hours to obtain a satisfactory new frequency scale. This two step, pencil then ink process lends itself very readily to error since you must first line up the pencil with the dial pointer (much harder than it sounds) and then the ink pen with the pencil marks. There is absolutely no room for error in either of these steps because a misalignment of a tenth of a millimeter can become a noticable 2-3 kHz error on the frequency scale. With the benefit of hindsight it would appear that a much more accurate and far simpler procedure would be to use a stock dial pointer (its edge) as the straight edge and ink directly on the strip of underlying paper. We haven't tried this (we're out of unmodified TRF's) but can forsee no reason why this wouldn't work. With this refined procedure in mind, it's now time to recalibrate the receiver.

To avoid frequency guesstimates, the best time to calibrate is when stations are audible on all frequencies, i.e. night. Using a strip of fairly stiff paper that is free of blemishes, visible fibers, etc., we cut a strip of about 6-5/8" long by about 11/16" wide so that it fit snugly in the bottom and side borders of the face and flush against the flat black back wall. It's possible to slide this strip under the pointer if the pointer is pegged at the high or low end of the scale. We initially used a medium weight, white stock poster board but later changed to a light bluish-grey color when it was discovered that the white stock tended to cause eye fatigue rather quickly. In addition, the new color looks great in the TRF's grey and black cabinet. Now a decision had to be made regarding how precise a frequency readout was wanted. While it was possible (with the proper equipment) to mark every 10 kHz up to 1600, this became difficult to read above 1000 kHz due to the crowding of the lines. The preferred alternative was to mark every 10 kHz up to 700 and then start marking every 20 kHz. With this scheme readability was improved, eye strain reduced, and the 10 kHz resolution was still retained (through interpolation).

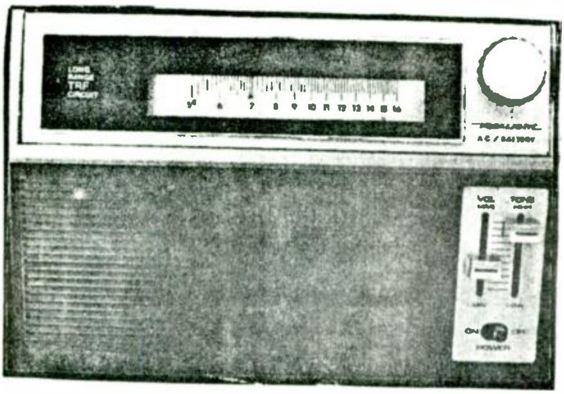
A major problem which we encountered involved finding a pen which drew an ultra fine, jet black line. It was estimated that in order to adequately resolve 10 kHz at the high end of the frequency scale a line no wider than .5 mm was required. In practice, this proved to be too wide and we ultimately used a .1 mm line. Fine tip flairs, extra fine tip accountant's pen, super sharp pencils, dry transfer lines, etc. all proved to be unstaisfactory because their lines, in addition to being too wide or faint, also sometimes produced excessively feathered lines, created blobs, smeared easily, etc. Although another alternative may exist, in our opinion the pen to use for professional results is an India Ink technical drafing/lettering pen.

These are sold under the names Rapidograph, Faber-Castell, etc and can be purchased at drafting or office supply stores. A drawback of this pen is the price...$8-$10 with one point. Another drawback is that the point that came with the pen was too broad (.5 mm) for our purposes and had to be replaced with a narrower point (another-$4-$6). Some stores/brands allow the purchase of the pen with your choice of point so check around. Be sure to practice with the pen before attempting to calibrate the dial and don't exert pressure on the point... the ink flows on. Again, while other less expensive alternatives (unknown to us) may exist, we found results with this type of pen to be very good.

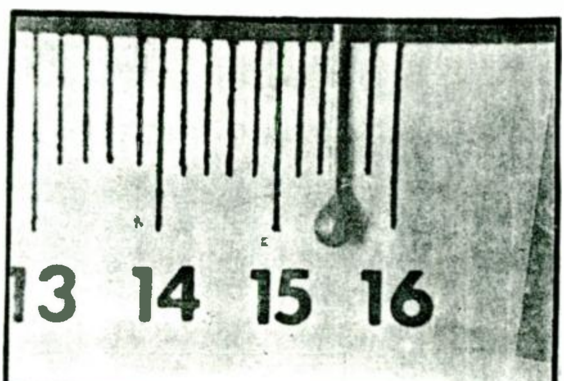
The refined calibration procedure follows. Using the stock dial pointer as a straight edge, carefully mark every 10 kHz up to 700 kHz and every 20 kHz above, making certain that the station representing each frequency is zeroed in. Beware of "broad stations" like locals which tend to alter the apparent kHz position of adjacent frequency stations. Except for the very low end of the scale, frequency markings within each 100 kHz range should be approximately equal. Chances are good that it will take more than one attempt to produce a professional looking precise scale.

After marking the frequencies and critically rechecking them we numbered the scale using a dry transfer lettering set. Some Radio Shacks carry these decal sets designed especially for radio (Markit Jr. Dri-Transfer Lettering). Suitable 1/8" high dry transfer numbers are also available from hobby and office supply stores but can cost $2-4 per set.

Replacing the dial pointer was a simple matter. Wire cutters were used to snip off the dial pointer, leaving about a 1/8" overhang, and a narrower pointer was glued to the underside of the stub. We initially used a straight 10 gauge, 1/2" wire painted orange as the new pointer, but found this to be somewhat difficult to locate on the scale. We discovered that a map pin or tacking pin (a straight pin with a very small colored ball on the end) mounted with the small ball crown and painted orange was very easy to locate and kind of good looking too.



Modified Realistic TRF. Gerry Thomas and Charlie Barfield's patience and persistence paid off in a fine looking, more convenient to use receiver.



Now remove and cut off about 1/8" from one end of the new dial scale and lightly coat the underside with a fairly slow setting glue (Elmer's will do fine). With the radio tuned to a known station and frequency, slip the scale under the pointer and position the scale to that frequency. This is to correct for the fact that the edge of the stock pointer was used for calibration.

As a final touch, to cover the old/new pointer connection and frame the new dial scale, we masked off (3/4" masking tape is about right) that area of the dial faceplate that corresponds to the dial scale and painted (3-5 light coats) with flat black spray. The face plate was then fastened in place with rubber cement to allow future removal.

We now have what we consider to be a fairly attractive looking TRF with 10 kHz readout (5 kHz below 700kHz) and one that is much more enjoyable and convenient to use. To give you an idea of what the finished product looks like, we've included some photos of the prototype.

For Your Notes!

ADDITIONAL TIPS ON MODIFYING THE REALISTIC 'TRF' FOR 10 KHZ READ-OUT

Gerry Thomas & Charlie Barfield

Since writing the article on re-calibrating the TRF, the experience of modifying additional TRF's, questions from members, and recently discovered procedural alternatives warrant a brief follow-up on the procedure.

PEN--The original article was written with utmost frequency resolution in mind. That is, we felt that if split frequency resolution were desired, read-out should be limited by one's ability to estimate physical distances, not by wide, ambiguous frequency marks. To this end, we recommend that a .1mm drafting pen be used. Even less critical resolution (i.e. domestic DXing) required a very narrow line width like that obtainable with a drafting pen. Unfortunately, the cost of this type of pen (about $10) was somewhat prohibitive. Since the original article was written we've continued searching for a less expensive alternative. Happile, Flair recently began marketing an "Ultra fine" tipped pen ($.69) which does produce acceptable results. If used with a minimum of pressure on the point, this pen will produce lines with widths in the .3mm to .5mm range, which is adequate for TRF re-calibration. The Flair's ink, however is not permanent, it runs when exposed to moisture, and the lines are not as cleanly drawn as with the drafting pen, but these drawbacks can be countered. First of all to protect the new scale from moisture, apply a transparent, dry transfer tinting screen. Ideal for this purpose are those made by Zip-a-tone ($1.50/sheet at art, hobby, and drafting supply stores). These tints are available in dozens of colors and densities but we've found that "cool grey" and "yellow green" are among those most suitable for dial scale applications. Using a tinting screen also allows the use of readily available, even at most drugstores, white stock poster board since the tinting very effectively eliminates glare. Choose a low porosity, semi-gloss poster board, not an art mat board, to reduce the feathering of lines caused by the Flair's lower viscosity ink. Using the preceding procedure, results will be favorably comparable to those attained with the more expensive drafting pen.

Removing the dial face plate--On some TRF's the face plate has been removed with simply a firm nudge. On others it has been necessary to add a measure of grunting, swearing, and a teeth-gritting committment not to be out done by a piece of plastic and a glob of glue. Following is the detailed procednre we've found to be most effective in removing the face plate:

> Lay the front of the TRF on a book or table top such that the tuning knob overhangs the surface and the face plate frame is flush against the surface. With an unsharpened pencil, the blunt end of which has been wrapped with a handkerchief, a firm downward push to the face plate with the eraser end will rupture (only) the glue. If necessary, after freeing one end of the face plate, take something akin to a popsicle stick and with it wedged under the face plate, slide it along the edges, releasing the remainder of the glue.
>
> **Recalibration**--(A) The "refined" recalibration procedure which involved using the stock pointer as a straight edge but was untested at the time the original article was written has now been tested and it works beautifully (maintain a constant pen angle for optimum accuracy!). (B) It should go without saying that the TRF should warm up for 20-30 minutes before recalibrating even though the pre-and post-warmup calibration error is usually very small.
>
> **Dial Pointer**--The parralax error that occurs when using the ball type pointer can be reduced to an absolute minimum simply by bending the ball tip slightly outward with wire cutters (pliers are too broad nosed).
>
> **Face Plate**--To prevent a shadow from being cast on the dial scale by the new black border framing the scale "window", allow a 1/8" gab above the top of the scale. In other words, shift the 3/4" masking tape slightly upward from the bottom stock black border before painting.
>
> **Tweaking**--By all means, tweak your TRF. While all of the TRF's we've seen have been in the ball park alignment wise, all could be improved by careful tweaking.

In conclusion, the recalibration procedure is actually much simpler than it may seem. (Note however, that some TRF's are easier to recalibrate than others due to differences in selectivity and stability so you might want to put off removing the stock dial scale and pointer until the end just in case you want to return to the stock situation.) With a little patience, you should be able to produce a neat (don't use the original article's photos as a standard... that was our very first, crude attempt), accurate scale.

Modifying the TRF for SM1 use

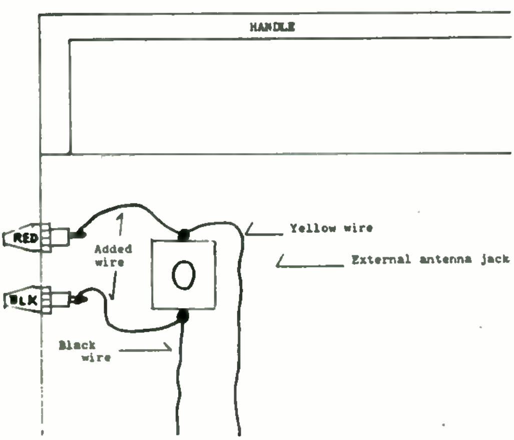
BRIAN SHERWOOD

While many people (myself included) feel that the Radio Shack TRF is a great receiver, especially at the low price of $30, performance can be greatly improved by the use of the Space Magnet antennas (SM1 or SM2), air core loop or possibly a Sanserino loop. I've tried my TRF with all of the above except the Sanserino loop but I see no reason why the Sanserino loop won't work too. Anyway, here's how to do it:

Parts Needed: (1) two binding posts, one red and one black (Radio Shack 274-662, $1.19 each), (2) enough coax cable (anything you can swipe from a local CBer will do fine) to extend the SM1 leading to five feet. With an air core loop the coax is not needed.

HOW TO: Remove the back cover and note the location of the EXT ANT jack. On the side of the back cover drill two holes about 3/4" apart, big enough to accept the binding posts (about 3.8" more or less). Mount the two binding posts in the holes with the fat ends outward. Now the fun part. Note the small lug on the inner end of each post. Solder a short piece of hookup wire (steal some from your house's doorbell circuit) from the red post to the small lug on the EXT ANT jack which has a yellow wire runnning to it. Then solder a piece from the black jack to the black wire on the EXT ANT jack. See diagram below. Now extend the SM1 lead-in by soldering the other coax to it, braid to braid and center to center. To use the rig, just connect the braid to the black post and the center to the red post. Turn the SM1 on. With an amplified loop, you will notice some regeneration if the loop amplifier is closer than about two feet from the TRF; this varies with different loops and receivers.

With the limiter switch off (or the local/DX switch in the DX position) move the TRF and SM1 far enough apart so that the regeneration ceases. With various headings of the stations from your location, it may be necessary to move them around a little more, but for 99 cents for Sm1 input I can move them a little.



A REAL EXTERNAL ANTENNA JACK FOR THE REALISTIC TRF AND OTHER TIPS

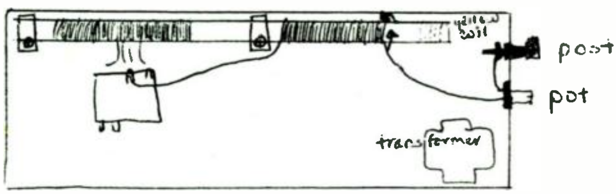
CHRIS BOBBITT

The Realistic TRF is an amazing receiver at an amazing price, but it is primarily a commercial, consumer product. For DXers it has two major drawbacks; poor dial readout and an antenna jack that is totally ineffective.

Gerry Thomas' and Charlie Barfield's article went a long way toward correcting the dial problem. Let me add a few thoughts on this. By all means draw the new scale using the old dial pointer as a straight edge. Draw a pencil line where you want the kHz marks to stop, or you will end up with lines of different lengths. A Rapidograph pen, #2 nib, india ink, and clay-coated, off-white poster paper worked well for me. I used 12 point press off numbers for 6 to 10 and 16; 8 point for 55 and 11 to 15. This prevents a cluttered look at the top of the dial. Coating the new scale with nail polish prevents smearing, but the nail polish may dissolve the numbers so be careful. When removing the orange dial pointer be sure to cut it VROM top to bottom, not from the two sides so that you'll have a flat surface to glue the new pointer to. I learned the hard way. For the pointer I used an orange-pointed straight pin, glued to a 1/8" square of tin can and this then glued to the top of the old pointer stub. There's enough clearance, and parallax is no problem.

Now for the antenna; you will need about 24" of hookup wire, 24-26AWG, a 100K miniature potentiometer (Calectro 25-304), a binding post (gov't surplus; a Fahnestock clip would work as well), rubber cement, and patience. Open the back of the TRF. Mount the pot through the back side of the chassis near the power transformer. Mount the post 1 1/4" above it. Starting about an inch from the right end of the ferrite bar, wind the hookup wire onto the bar. Start by going underneath, to the top, and toward you, the same direction as the useless yellow coil and the pickup coil at the left of the bar. I put on 33 turns, closewound, finishing off just to the right of the plastic white fastening strap. This end of your new coil is then soldered to the rotor of the variable capacitor (where the yellow and black wires are). Be careful not to damage the cap or the other wires. Solder the other end of the new coil to the bottom lug of the pot; the center lug is connected to the post. This way the pot will increase the amount of boosted signal as it is turned clockwise. Coat the coil with rubber cement or coil dope, and if you haven't noticed already, attach an external antenna, turn up the RF attenuator pot, and be prepared to hear things you've never heard before, such as 250 watt daytimers 300 miles away at high noon!

I had expected that the addition of a longwire to the ferrite bar would result in overloading by locals and a change in the frequency calibration. The RF attenuator is in the circuit as a precaution. I don't need it here in the boondocks but some of you might. Surprisingly an external antenna does not alter the calibration! It does bring in some interesting DX. Locally with no external antenna 580 is dominated by WCHS Charleston, WV. It can be nulled by rotating the TRF but just barely. Add a longwire and in comes WILL Urbana, IL at 1 pm with just traces of WHCS. I would heartily recommend these modifications of the Realistic TRF; I'm sure that other DXers are working to improve this receiver too. Please share your ideas. Maybe Radio Shack will take notice and come out with a new, improved model. In the meantime let's make the most of what we've got.



TILTING 'T-BAR' ANTENNA TUNER FOR THE REALISTIC TRF

Gerry Thomas and Charlie Barfield

Recently, in both the **DX Monitor** and **DX NEWS**, there have appeared a number of suggestions for improving the Realistic TRF's response to external antennas (Thanks--Nick Hall-Patch, Chris Bobbitt, Mark Connelly, et al.). While all of these suggestions represent a definite improvement over the stock state-of-affairs, we believe that the system described here offers some unique advantages and a measure of versatility that should be of interest to TRF owners.

Basically, this accessory is a simple antenna tuner that is built into the TRF's cabiner and inductively coupled to the TRF's ferrite loop. Since it is a **resonating** device, another stage of tuning is added to the TRF's circuitry before amplification (with the resulting benefits of increased sensitivity, improved selectivity, reduced spurious response potential etc.). However, what makes this system somewhat unusual for a built-in tuner is the fact that the degree of inductive coupling can be manipulated by the user. Being able to vary inductive coupling gives the DXer some control over two important variables. First, signal strength can be adjusted to an optimum level. Secondly, the "Q" or "sharpness" of the tuning curve can be varied from fairly broad to relatively sharp. In fact, when set for maximum "Q", the tuner we use requires peaking every 10 kHz at frequencies below about 1300 kHz. (Being able to peak a target frequency above adjacent frequency splash has some rather obvious advantages.) A bonus feature of this unit is that, since a fairly large ferrite core is used in the tuning circuit, the TRF's built in antenna is given a modest but noticeable boost even **without** an external antenna attached. This boost is most apparent below about 1000 kHz and also can be varied. Finally, this system exhibits a "notching" characteristic which, in some cases and with **extremely** careful tuning, can help reduce interference from nearby channels.

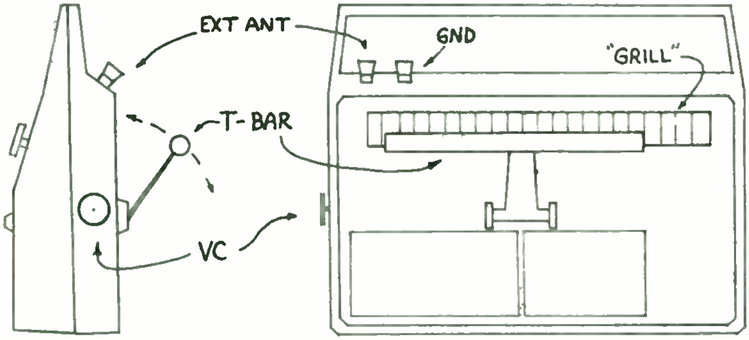
Given the preceding features of this external antenna tuner, one might think that its cost or construction would be prohibitive. In reality, this project is almost embarrassingly simple and fairly inexpensive. The key element in this parallel resonant circuit is the ferrite loop assembly which is of the "swing-away" or "tilting" variety used on the backs of AM/FM stereo tuners and receivers. Actually, the most difficult part of this project is obtaining one of these assemblies. It is possible to order one from stereo repair shops or departments, but rather than wait, we scavenged a nice "T-bar" type from a seldom used Pioneer AM/FM tuner. Besides terminal connectors, the only other component required is a miniature (the small 1" square size is important) mylar-gap 365 pF variable capacitor. These are available for less than $2.00 from several manufactureers but we used the Calectro A1-232. Our total construction time for this project was less than one hour and assembly was quite straight forward.

CONSTRUCTION

(To conserve space, these instructions are necessarily brief. Detailed step-by-step instrucctions can be obtained for a SASE from Gerry Thomas).

1. Drill hole and mount VC between earphone jack and battery compartment bulge on inside of cabinet. Shaft of VC exits from right side of cabinet.
2. Mount T-bar assembly on the rear (outside) of the TRF so that its ferrite bar (when closely coupled) touches and is parallel to the "grill" (running the length of the top, rear of TRF).
3. Drill hole to enter T-bar's wires to inside of TRF and connect wires across VC.
4. Mount connector (binding post, jack, etc.) for external antenna input and connect to one side of VC. Another connector can be added to the other side of the VC for an external ground connection, but at our location (with its poor soil conductivity) our apparently ineffective external ground seemed to have little effect.
5. Attach longwire and adjust T-bar's ferrite slug in the usual manner for high- and low- end peaks.

Notice that no physical connections to, or modifications of, the TRF's circuitry are required.



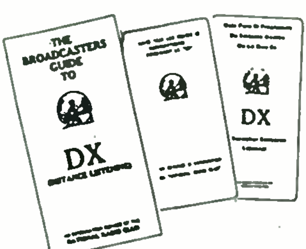
(Note: Exact T-bar mounting point for optimal performance will vary according to individual T-bar's size, gain, tilting assembly, etc.)

OPERATION

With no external antenna attached and the T-bar swung away, the TRF will perform as stock. Swinging the T-bar close to the grill and adjusting the VC will result (especially on weak stations below about 1000 kHz) in a signal increase above stock. Attaching a longwire will show a much larger increase (across the band) in signal level (VC might require re-peaking) that can be adjusted by re-positioning the T-bar. You will find that moving the T-bar closer to the TRF's grill will give you an increase in signal strength and a broadening of the tuning peak, whereas positioning the T-bar farther from the grill will give you a decrease in signal level but a sharpening of the tuning peak. Furthermore, you'll discover that by careful T-bar positioning and VC setting, interference from nearby channels can sometimes be lessened or eliminated. Realize that since several of the variables are functionally correlated (e.g., gain and "Q") optimal use of this system requires a "fine touch" and perhaps a bit of practice.

CONCLUDING REMARKS

The variable inductive coupling feature of the "T-bar tuner" has, at our location, been totally effective in preventing any overloading problems caused by strong locals. Living in the shadow of a 50 kW'er, however, might require the insertion of a potentiometer between the antenna input and its VC connection. Also, we have used this tuner on antennas ranging in length from 10' to 145' with no capacitance alteration...hopefully you'll be as lucky. Finally, suggestions for improvement are always welcome. Especially welcomed would be reliable sources (mail order) of the ferrite core assemblies.



GUIDE BROADCASTER'S GUIDE TO DX. A tri-fold guide for use with reception reports explaining DXing, how the NRC was formed and the importance of QSLs to DXers. $1 for 20.

SS GUIDE Spanish version of the above Broadcaster's Guide. $1 for 20.

FF GUIDE French version of the above Broadcaster's Guide. $1 for 20.

This product can be ordered from the NRC Publication Center, Box 164 Mannsville, NY 13661
Please Allow 4-6 weeks for Delivery.
Order Form can be found in the back of this booklet. Prices subject to change without prior notice. For a current price list, send 2 mint U.S. Stamps, and ask for the "Catalog of Information & Publications". From NRC Publication Center, Box 164, Mannsville, NY 13661

Selectivity Modifications for the TRF

About a dozen DXers have inquired as to how to install ceramic filters in a TRF, so rather than responding to each person individually, I am writing down the procedure.

Basically, this procedure involves removing the emitter bypass capacitors from two IF stages and replacing them with ceramic filters. No other parts are added or subtracted. The only difficulty involved is simply the physical operation of cutting away the capacitor body and soldering the filters to the capacitor leads in somewhat cramped space.

The filters I used were Vernitron TF01A's available from Radio West at 2 for $5. A couple of Murata filters were also used, but their minimum mail order of $100 discourages most people.

The procedure:

1. Remove the six screws holding the back of the TRF. There are two on the upper part of the case, two on the handle, one in the battery compartment, and one in the AC line cord compartment. Remove the back by pulling firmly. A gasket is used so you will have to pull and pull.

2. Locate the components pictured below. Push Q3, R13, and R14 away from C14 in order to create as much room as possible later on. Be careful not to apply too much sudden pressure to the resistors as some TRF's were furnished with extremely brittle resistors that fracture easily. Create as much room around C17 also. Some things to do include pushing Q4 away from C17 and rerouting the grey wire to the other side of T1 if necessary. Be careful not to allow pushed leads to short onto other leads.

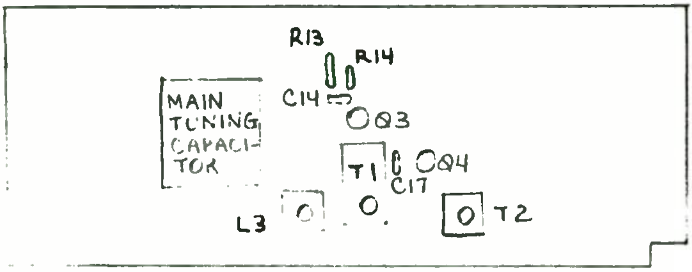
3. With a small pair of diagonal cutters cut C14 and C17 in half down the middle of the body. Be careful not to cut the leads of the capacitor. Next cut away as much of the body as possible. At this point all that should be left of the capacitors are the leads and a small piece of ceramic and plate at the end of the leads. Takes a pair of needle nose pliers and squeeze the ceramic in order to fracture all of it. Then squeeze the ends of the leads in order to wrap the remnants of the body around the leads. Now you should have a solderable surface.

4. Due to lack of room, it is best to melt some solder on the tip and then hold the filter onto the leads while applying the iron. Best of luck in getting this done quickly and easily. By sitting the filter on either a convenient transistor or transformer, this three-hand operation can be performed with only two hands.

5. While the radio is apart, it is a good idea to align the RF and IF stages. Of the 60 or so TRF's I have aligned recently, not a one could not be improved by alignment. This can be done without service equipment if necessary. A very high level of TRF's are badly misaligned coming from the factory.

6. Put the back cover back on the radio and hear some new DX!!

Some comments on TRF's with these filters installed (from happy purchasers of TRF's via me): "I am impressed with its performance and look forward to many years of DXing with it"; "Frankly I am impressed! Except for readout it is every bit as good as my Gilfer 4 KHz FRG7 and in fact I'm not so sure the TRF selectivity is not sharper"; and from a long time owner of Hammarlunds and Collins "The improvement in selectivity is immediately noticeable!". One fellow has ordered his second rx! Here in Atlanta, Karl Jeter could not hear 1470 due to local WYZE 1480, 1460 being clearly readable with a semi local 40 miles away. Well, Karl tuned his newly modified TRF to 1470 and thought he was on 1460 because there was a nice readable signal there. I've tried out many of the TRF with filters and have heard several TA's and a handful of Latin splits, including the new Radio Haiti-Inter on 1325.



TRF Circuit Board - Back View

SONY TR-6500 VS. THE "TRF"

-- SOME COMPARISONS AND IMPRESSIONS

Gerry Thomas Charlie Barfield

While flipping through a Sony radio catalogue a while back, we came across the Sony TR-6500, an AM-only portable that boasted of a "Tuned RF amplifier (that) provides clear and sensitive AM reception over long distances--even in mountainous areas." The catalogue's illustration of the TR-6500 showed a radio of about the same physical size and configuration as the Realistic "TRF," and a call to a local Sony dealer revealed an identical price--$29.95. So far, the potential of the Sony seemed pretty promising. But what about selectivity? There was no mention of that in the catalogue's blurb, although it did point out the Sony's "full fidelity" sound. Hmm, cause for concern? But wait a minute. The less expensive ($19.95) Sony TFM-6100W, an AM/FM portable, features a ceramic filter in the AM section. Surely an AM-only portable costing $10.00 more and designed specifically for long distance reception would also have some provision for better than average selectvity. The possibility that the popular Realistic "TRF" was facing a worthy challenger certainly crossed our minds at this point. But, on the other hand, why hadn't we heard of the TR-6500 before now? At the time, to our knowledge, no one in the major clubs was using the Sony. Whether the TR-6500 had been overlooked by MW DX'ers or we had simply missed earlier critiques wasn't known, but curiosity demanded that the Sony be given a hands-on test. (Locating a TR-6500 in stock on the Gulf Coast was impossible and one ultimately was ordered from Memphis.)

Before describing the results of the comparison tests between the Sony and the Realistic, we'd like to put forth a word of caution. Having come in contact with several Realistics, we were keenly aware of the fact that the Realistics vary considerably along the dimensions of sensitivity and selectivity and that the "TRF" we'd be using for the comparison tests had slightly better than average selectivity for this model. Similarly, the test Sony represented only one example of the TR-6500.

NON-PERFORMANCE IMPRESSIONS

Both cabinets are physically attractive with the Realistic having a somewhat "sleek" appearance when compared with the Sony's more squared-off, rugged look. Both have a fixed carrying handle that is integral with the cabinet. All controls are located on the right side of the cabinets with the Sony employing a rotary potentiometer and a two-position slide switch for the volume and tone controls, respectively, whereas the Realistic uses slide potentiometers for these functions. The frequency scale of the Sony is on a rotating (direct drive, horizontal axis) drum with a fixed indicator while the Realistic's frequency scale is stationary and has a moving (via string and pulley) scale pointer. Removing the backs of the radios resulted in the impression of better component quality in the Sony. As just one example, the Sony's three-ganged variable capacitor is of the air-gap type and larger than the miniature, mylar-gap variable capacitor used in the Realistic.

SENSTIVITY AND SELECTIVITY

Without the proper test equipment it was difficult to determine positively which of the two radios was the more sensitive. At no time during the comparison tests when a station was audible on one radio but not on the other could this advantage be attributed solely to a difference in sensitivity or signal-to-noise ratio. In fact, it was usually the case that a difference in selectivity resulted in a station's audibility or inaudibility. The audio quality of the Sony was, however, better than that of the Realistic which was due, at least in part, to the Sony's larger speaker. Regarding gain, or audio output, the Sony was definitely superior. For example, at midday, the Cuban on 720 kHz (CMGN) was rated as being "weak" in level on the Realistic but "fair-to-good" on the Sony (with both radios at full gain and equipped with fresh batteries). This gain advantage was evident across the band and over several days of testing and, in combination with the Sony's better audio quality, occasionally made monitoring a station somewhat easier than on the Realistic. A look at the circuitry of the Sony (a schematic for the Sony was not available, even from the local authorized service center) revealed at least a contributing factor in the Sony's superior gain--the Sony employs three levels of IF amplification whereas the Realistic uses but two.

This additional level of IF amplification also indicates a design philosophy difference between Sony and Radio Shack on the matter of improving selectivity. While neither of the authors of this review can be considered to be well-versed in radio engineering principles, those who are knowledgeable about such matters (eg., W.I. Orr, author of Radio Handbook) point out some expected differences between the Realistic's two IF stages and tuned crystal method of improving selectivity, and the Sony's three IF stage approach. According to Orr, adding additional IF stages improves the shape factor (but not the width) of the resulting passband. That is, the Sony's -60dB and -6dB points should more closely approach the ideal ratio of 1.0 (i.e., the skirts are vertical) than those of the Realistic's sharper-peaked, broader-skirted crystal system. The critical question remained, though, "Was the Sony's passband narrow enough (even with a superior shape factor) to outperform the Realistic?"
In a word--No. In every instance, the Realistic exhibited less adjacent channel splash than did the Sony. In some instances (eg., Antigua at 1165 kHz), the Realistic at times produced a readable signal while only garbled noise was audible on the Sony. Again, a word of caution: The Sony we tested would come very close in selectivity to some of the lesser Realistics we've seen and undoubtedly could be significantly improved by installing a set of transfilters, a ceramic filter, etc. If this (easily correctable) selectivity shortcoming were the only drawback of the Sony, its purchase might be worthwhile. Unfortunately, operating the Sony is another problem.

OPERATING CONSIDERATIONS

Tuning -- While the Sony's direct drive, tuning drum is very good looking (electric blue on black) and more durable than the Realistic's dial string system, its thumb wheel tuning knob is a full blown pain in the patoot. Tuning split frequencies was almost impossible and we found it necessary to install an 8:1 drive vernier knob to conduct these tests. On the high end of the frequency scale, even 10 kHz gradations required the touch of a pickpocket. Here, the Realistic's forefinger and thumb tuning knob is vastly superior.

Frequency Read-Out

On frequency read-out, the Sony proved to be a real match for the Realistic -- both were horrible. Nothing need be said about the Realistic's notoriously poor read-out and accuracy, but the Sony's read-out was about 8 kHz low at 540 kHz and 50 kHz high at 1550 kHz. Furthermore a minimum parallax error of 20 kHz was average on the Sony (although at the high end (1550 kHz), the indicator line could, by tilting the cabinet, be made to center on any frequency from 1400-1600 kHz!).

CONCLUSIONS

While the Sony we tested did enjoy some advantages over the Realistic (eg., a sturdier looking cabinet, superior audio quality), it cannot be said that the Sony outperformed the Realistic in actual DX'ing situations. In fact, it was always the case that if a station was audible on one radio but not the other, the radio receiving the signal was the Realistic. Another point that should be considered involves the fact that the frequency read-out of the Realistic can be fairly easily improved and its external antenna jack can be made functional by simple tuning devices. On the other hand, correcting the Sony's shortcomings requires a little more effort--but is far from impossible. In fact, after conducting these tests, the Sony's components were removed from its somewhat cramped cabinet and placed in a more spacious enclosure. Its tuning drum was replaced with a 5-1/2" circular dial scale (allowing 5 kHz read-out across the band), and an external antenna tuner and vernier tuning knob were added. These modifications greatly improved the Sony's operation and could be adapted to any portable or table model radio...but that's another story.

SPECIFICATIONS

	SONY	REALISTIC
Circuit:	Superhet w/TRF Amplifier	Superhet w/TRF Amplifier
Semiconductors:	9 Transistors 5 Diodes 1 Thermistor	1 FET 7 Transistors 10 Diodes
Dimensions:	6-3/4"(H) 8-7/8"(W) 2-5/8"(D)	7-5/8"(H) 9-1/4"(W) 2-3/4"(D)
Weight (w/batteries):	2 lbs., 9 oz.	2 lbs., 12.8 oz.
Color:	Black & Metallic Grey	Black, Grey, and Metallic Grey
Power:	AC or 4 "AA"	AC or 4 "C"
Speaker:	3-3/4"	3"
Tone Control:	High/Low	Continuous
Ext. Ant. Jack:	No	Yes (but of minimal value w/untuned ant.)
Accessories:	Earphone	Earphone
Price:	$29.95	$29.95

Room For Your Note!

(40) # RECEIVER REVIEW: SONY ICF-D11W

Jerry H. Reves

A couple of years ago I saw an ad in the magazine called "Asian Electronics Union" for a new Sony portable radio, the ICF-D11W. The ad caught my eye, mainly because of its features such as electronic quartz clock, digital display of the received frequencies, timer, alarm functions, etc.

I wrote to Sony in Tokyo and they advised me that this model would be introduced in the United States market around June, 1979. I purchased my unit in August, 1979. The instruction booklet mentions that this unit has ceramic filters on the FM band and mechanical filters for medium wave. These are non-switchable. The digital display presents the received frequencies (MW and FM) at the touch of a button, then reverts back to its clock function after about 30 seconds. The displayed frequency is displayed again by another touch of the button. The unit can also be turned on at any specific time automatically. It can buzz to awaken you. It also beeps on the hour (one beep for 1:00 o'clock, two beeps for 2:00 o'clock); has a timer that will shut the radio off after 60, 50, 40, 30, 20, down to 10 minutes.

The display has a light at the push of a button for night viewing, a bright red LED for proper station tuning. When the station is properly tuned in, the LED is very bright. It has sliding type tone and volume controls, jacks for tape recording, earphones and external DC power. There are no connections for an outside antenna.

The ICF-D11W is very sensitive and selective on the FM and MW bands. On the MW band it can easily separate stations 10 kHz apart; even powerful locals like XETRA-690 kHz can be separated from local pest KNBR on 680 kHz. I find it compares with my Sony ICF-5900 W as far as sensitivity and selectivity. The FM section is also very good. No images or spurs. All the different buttons are of the soft "touch" type, very smooth. The clock also displays the time that the alarm is set for; day, month, year and of course, the received frequency. All of this are in black LCD display. On FM, the frequency is shown down to 10 kHz and on MW it displays down to 1 kHz. The turning knob is very touchy! One slight touch and you have moved 2 or 3 kHz! However, once you tune a station, the station will not drift 1 kHz.

Overall performance: Very neat little portable. Quite selective and sensitive. Its LCD frequency display, clock and timer features spoil you. I have had a couple of TP's on it this season. I like the idea of having a set that you can have turn itself on automatically at a pre-determined time and pre-determined frequency. It's small and compact, smaller than my TRF. List price is $199.95 (OUCH!!!). I got mine for $179.95, still high and over-priced I believe.

Complaints: The frequency display on the MW is off by about 2 kHz at the low end of the band. Not really noticeable when tuning a station, but I'm a nut for accuracy! On rare occasions I will get CW (code) images on the MW band, but these are easily tuned out. The push button dial light is very weak for night viewing, but you can get by. No strength meter.

My biggest complaint is the inability of Sony technicians who I contacted to even try to correct the problem of calibration being off 2 kHz on the MW band. One guy told me it met factory specifications and he gave me the usual run-around. Another technician told me the calibration is off by 2 kHz because of station fading!*!*! This is not the first time I've had a problem and the Sony personnel look at you as if you are crazy!

Specifications:
Semiconductors = 1 LSI, 1 PUT, 1 IC's, 1 FET, 25 transistors, 17 diodes
Antenna = FM telescopic, MW internal ferrite bar
Speaker = 4 inch dynamic (it has a good sound)
Power requirements = Radio - 2 D cells, Clock - 2 AA cells
Weight = 3 lbs, 4 oz.
Dimensions = 5½ H x 10¾ W x 2 D.
Color = Silver gray metal and plastic
Carrying handle is removable.

A Few Additonal Remarks on the SONY LCF-D11W

Jerry H. Neves

As you will recall I had a review on the Sony ICF-D11 W receiver in the December 17, 1979 issue of DX News. I would like to add a couple of remarks to more or less complete the original review.

First of all, at the bottom of the original review I mention that the HANDLE on this receiver is removable. THIS IS NOT SO. IT IS ADJUSTABLE. I don't know how this came about!

The other item was the MW frequency display--it was off by 2 kHz throughout the MW spectrum. After about three months of letters to SONY, they finally agreed to let me test another unit, which to my delight was right on frequency throughout the MW band.

The second unit I got from SONY has a lower serial number, but I don't think that had much to do with the set calibration problem. Sony took my old set back and I got to keep the other set as a replacement. I really enjoy it now.

Another item I forgot to mention in the original review was the ability of this set to display the hours on a 24 hour mode or AM/PM mode at the flick of a switch in the battery compartment.

My advice, if you buy the ICF-D11 W, is to arrange to have it exchanged within a couple of days if the frequency display is not right. For what you pay for the set, it should be right on the nose!!

(42) A Review of the SONY ICF-5900W

Dan K. Phillips N4NU

During the month of April a catastrophe happended in my shack. Lightning hit my thousand foot four wire fence beverage, ran in on my Sony TFM-1600W, and completely destroyed it. With one short swift bolt my favorite receiver disappeared.

As soon as this happened I began shopping around for a new receiver. Two in particular came to mind at this point. The Sony CRF-5100 ($299) and the Zenith Trans-oceanic ($329). These were the top of the line sets for all I could gather. Both would cover through 26 Mhz with Public service band added.

In July I was in Asheville, N.C. and happened by Gibbs Radio Co. The owner, Rudy Gibbs (W4HX), showed me his stock. I listened to the Zenith Trans-Oceanic, talked about price and asked him, "Which is better the Zenith or Sony CRF-5100?" In response he replied, "The Sony will run circles around it but I don't have one in stock." He then added this, "But I do have one of the most fantastic radios anywhere that I want you to see. The FM section particularly is fantastic." With that I was introduced to the $159.95 Sony ICF-5900. Since he had already promised his I couldn't buy one that day. Two months later, after numerous phone calls to state distributors all who said, "We can't keep them in stock," I finally found and bought one in Atlanta.

EXPERIMENTAL RESULTS

MEDIUM WAVE BAND: In an effort to determine how good the Sony is I tried three different experiments:

#1 - With the Sony sitting directly beside a Radio Shack TRF, both plugged in the wall socket, in broad daylight, I covered the entire broadcast band. There were few differences. On 540 khz I encountered a carrier, much like the 910 khz carrier on 455 khz radios, which was almost equal to WDAK. The carrier was on the Sony but not the TRF. One other difference I noted was that on 1380 and 1400 stations could be received beside WHMA (nearest local 15 miles away) on the Sony which could not be heard as clearly on the TRF.

#2 - The second experiment was carried out at night. With both receivers again side by side I covered the entire dial. Both receivers picked up the identical same stations. Absolutely no difference.

#3 - The third experiment was carried out during the daytime to test for images. Using the Sony and a 120 foot longwire I noted images on the following frequencies: 540, 590 and 640. In no case did the images override the normal station on the frequency. But it was there. Special note: In his musing in the August 22, 1977 edition Malcolm Kaufman makes this statement, "This unit will simply not meet the needs of the MW DXers, especially if he lives in a major metropolitan area." I add his comments because it is possible he is correct. I am a rural DXer. The nearest local is 15 miles away. From my location it is a toss-up between the Sony and the TRF. Both equal out. However, a metropolitan area might be different. I would suggest a complete check before buying if one lives in such an area.

SHORTWAVE BANDS: With the crystal calibrator, BFO, and the linear readout it is possible to precision tune with accuracy as high as within 5 khz on the SW bands. This feature is found on no other radio in this category that I know of. The results are fantastic. I have tuned to 14 mhz and heard a ham in Argentina on CW and one on phone in Italy with the 32 inch whip on the radio. This is unbelievable. This radio is ideally suited for a ham, SWL or CBer. Only qualm is that the eighty meter ham band doesn't go below 3.75 mhz.

FM BAND: Absolutely nothing compares on FM. It runs circles around my Stereo receiver tied to a channel 13 rhombic. Just a quick twist across the band shows at least 40 stations audible with just inside whip. Perfect for FM DXer.

SUMMARY

In summary I would say that if you are a BCBer only a TRF from Radio Shack would be an ideal companion. If you DX SW, Ham, CB, BCB, or FM though I would highly suggest that you consider the Sony ICF-5900. As Sony says, "Revolutionary three short wave, FM and AM Band Portable." That statement is correct. I wouldn't trade mine EVEN for a Zenith. One other thing of note that makes it worth considering is the size. It weighs only 4 lbs 7 oz. as compared to the 14 lbs 2 oz. Sony CRF-5100 which is its big brother. It is slightly larger than the TRF. It is an exciting radio for the traveler.

SPECIFICATIONS: Sony ICF-5900

Semiconductors: 1 IC, 1 FET, 14 transistors plus 10 aux transistors.

Frequency range: MW 530-1605 khz, FM 87.5-108, SW1 3.9-10 mhz, SW2 11.7-20 mhz, SW3 20-28 mhz.

Power requirements: Battery D size x 3 (4.5 volts), 120 volt AC adaptor supplied.

Dimensions: 9 1/4" x 8 3/4" x 4" D.

Cost: Retail $159.95. I bought mine at Citizen's Jewelry, 241 Peachtree Street in Atlanta, Georgia for $129.88.

SONY ICF-5900W - Another View

Member Perry Ferrell of Gilfer Associates, Inc. wrote us expressing interest in the report by Dan Phillips on the Sony ICF-5900 W which appeared in the Oct. 10th DX News. In his experience, Perry has noted several deficiencies in that receiver. His letter follows.

Basically, Dan is right on all points, although I think that as time goes by he may change his mind about the 5900.

We brought a 5900 into the States from Japan when the receiver was announced several years ago. It is certainly sensitive and like all Japanese portables is reasonably well constructed and has surprisingly good FM band sensitivity.

However, in the model we imported and subsequent models we found that the soft nylon gears on the main tuning dial began showing wear and there in now substantial backlash on all of these receivers after a year or so of use.

The crystal calibrator in the 5900 uses a very cheap crystal and these are almost invariably off frequency. It's rare that a calibrator in these units is within ±5 kHz at 15 MHz--and is usually worse. But a major headache that disturbed us the most was that receiver is drift-prone!! Although billed as a portable, you can't really take this receiver out in the sun and leave it sit around and then expect it to anywhere near on-frequency. It is very temperature sensitive--far more than anyone should expect.

Lastly, the medium-wave band on the 5900 is badly overloaded in metro New York--as pointed out previously by Kaufman.

After using the 5900 for several months we decided not to stock them because the necessity to continuously re-calibrate while tuning the shortwave bands was a gold-plated nuisance. We found the CW and SSB mixing ratio bad and the BFO injection far greater than the signal input from the i-f. This is a small, handy receiver for the very casual listener, but not anything worthy of note for the semi-serious SWL.

THE SONY ICFS5W

A Side by Side Comparison with the Realistic TRF & the GE Superadio

by Mark Connelly

As part of a recent marketing effort, Sony Corporation made ICFS5W portable AM/FM radios available to selected DXers for a one-month trial evaluation. I was lucky enough to be chosen as one of the DXers involved in this project.

Before I plunge into the main body of this article, a thorough comparative study of performance of the ICFS5W versus that of the Realistic TRF (#12-655) and that of the GE Superadio (#7-2880B), I would advise the reader to refer to the article "Coming Soon - the Sony ICFS5W" by Gerry Thomas and Armand DiFilippo. This article appears in DX News, 5 JAN 1981, page 24 and in DX Monitor, 27 DEC 1980, page 16. The Thomas/DiFilippo article gives a rather complete physical description of Sony's latest offering, so there is no reason to repeat it all here. We shall immediately proceed to the results of "hands-on" testing which addresses the following: I - Sensitivity II- Selectivity III - Spurious Responses (Strong Signal Handling) IV-Audio Quality V- Operation with External Aerials VI- Ability to Null (using internal rod antenna) VII- Frequency-readout Accuracy VIII- Special Features IX-Suggested Modifications or Engineering Change Orders ("Proposed ECO's") X. FM Performance Evaluation XI- Conclusions/Overview.

I - STRAIGHT SENSITIVITY: The daytime groundwave signals of stations judged to be weak here in Billerica, MA (about 20mi./32km. NW of Boston) were checked: these stations take in 18 channels throughout the AM band. In addition to the ICFS5w, a stock TRF, a TRF modified for improved selectivity & improved external aerial performance, and the GE Superadio; the main DX receiver, a Hammarlund HQ180A, fed by an SM2 loop was used as an additional sensitivity reference. All stations used are over land routes.

	ICFS5W	Stock TRF	Modified TRF	Superadio	HQ180A/SM2
WICC-600, 1kW. Bridgeport, CT	fair/good	poor	poor	fair	S-7½ good
WLBZ-620, 5kW. Bangor, ME	poor	poor	poor	poor	S-7/fair-good (o/S5 WVMT VT)
WJR-760, 50kW. Detroit, MI	nil	carrier in noise	nil	nil	S-5 /poor, noisy
WABC-770, 50kW. New York, NY	good	good	fair	fair	S-9/good
WNYC-830, 1kW. New York, NY	in noise/ poor	in noise	nil	high hiss/ nil	S-7/fair
WRCQ-910, 5 kW. New Britain, CT (o/WABI ME SAH)	fair faint 2X455 spur	no good: bad IF Spur	poor/fair slight IF Spur	poor	S-9/good
WINS-1010, 50kW. New York, NY	fair/good	good	fair/good	fair	S-9/good (o/S5 WCNL NH)
WKDR-1070, 1kW. Plattsburgh, NY	in noise/ poor	in noise	nil	nil	S-6½/poor, noisy
WHLI-1100, 10kW. Hempstead, LI, NY	in noise/ poor	in noise	nil	in WILD slop	S-8½/fair
WNEW-1130, 50kW. New York, NY	poor/fair	fair	fair	poor	S9+10/xlnt.
WHAM-1180, 50kW. Rochester, NY	nil	nil	nil	nil	carrier in WJMQ/WKOX slop
WCAU-1210, 50kW. Philadelphia, PA	nil	in noise	in noise	nil	S-5 to S-6 poor-fair, noisy
WICE-1290, 5 kW. Providence, RI	good	good	good	fair	S9+5 very good
WPLM-1390, 5kW. Plymouth, MA	fair/good some WLLH slop	fair audible WLLH	fair slight WLLH slop	fair but bad WLLH	S9+10/xlnt. o/WCAT

tation	ICFS5W	Stock TRF	Modified TRF	Superadio	HQ180A/SM2
WFIF-1500, 10kW. Milford, CT	nil	nil	nil	too much WHAV/WITS slop	S-7/poor some WITS slop
WDJZ-1530, 10kW., CT over/under WRXV-1530, 1 kW., ME	nil	nil	nil	nil	S-6 to S-7 fair/even mix
WQXR-1560, 50kW. New York, NY	poor	too much WNTN	nil	too much WNTN	S-8½/fair
WYFA-1580, 10kW. Patchogue, LI, NY	in noise	nil	nil	nil	S-8/poor, noisy

The ICFS5W had a slight sensitivity edge over the stock TRF on the bottom and top ends of the band (520-650 kHz., 1450-1620kHz.). The stock TRF had a very slight edge over the ICFS5W in mid-band (950-1200 kHz.). The (transfilter) modified TRF exhibited a consistent 5 dB lower gain than the stock TRF. The Superadio had a fairly high noise floor that covered really weak signals with hiss: its performance was inferior to the three other portables, although only by a slight margin.

II - SELECTIVITY

Section a: Domestic stations

The ICFS5W, stock TRF, TRF w/transfilter mod., & the Superadio were tested on one separation of 20 kHz. and six separations of 10 kHz. The slop produced by a given strong local against a desired weaker adjacent signal was gauged on each receiver. Steady daytime groundwave signals were used for all tests. Each receiver was physically oriented such that its loopstick antenna produced the maximum pickup in the direction of the weak (desired) station.

		ASSESSMENT OF INTERFERENCE			
Desired Station tuned in	VS. Adjacent Slop-Causing Local	ICFS5W	Stock TRF	Modified TRF	Superadio
WNYC-830 NY	WHDH-850 MA	moderate ticks	no QRM	no QRM	slight ticks
WTAG-580 MA	WEEI-590 MA	no QRM	some audible WEEI	very slight ticks	very slight ticks
WCFR-940 MA	WBOL-950 MA	no QRM	no QRM	no QRM	audible WBOL killing 940!
WYNZ-970 ME	WCAP-980 MA	slight QRM	moderate to heavy ticks	very slight ticks	970 impossible: heavy WCAP QRM w/clear " audio
WARA-1320 MA	WDLW-1330 MA	moderate to heavy ticks	moderate to heavy ticks, but 1320 still clear	slight to moderate ticks	clear WDLW audio totally killing 1320.
WOKW-1410 MA	WLLH-1400 MA	slight ticks	moderate ticks	no QRM	moderate to heavy ticks
WPOE-1520 MA	WITS-1510 MA	slight to moderate ticks	audible WITS equal to 1520 audio level	moderate ticks	bad WITS ticks

The ICFS5W seems to have a selectivity on 10-kHz. domestic separations slightly better than that of an unmodified Realistic TRF (12-655). ICFS5w domestic selectivity, however, is not as tight as that of a TRF modified with the addition of the Vernitron transfilter. The GE Superadio is a hair less selective than the ICFS5W or either of the TRF's.

Section b: Foreign stations / splits of 5 kHz. or less

Of course, the modified TRF (with transfilter) performed the best. The stock TRF had a slight edge over the ICFS5W. The Superadio ran a poor fourth, unable to satisfactorily slice Langenberg-1593 away from WQQW-1590 even though 1593 was only 10 dB weaker than 1590. On a 5-kHz. split situations with the split equal in strength to the adjacent 10-kHz.-channel stations (e. g. sunset receptions of Dakar-765, Surinam-725, St.Kitts-825,&Antigua- 1165), all portables deliver acceptable reception. In the case of Cayman Islands-1555, normally heard mid-evenings about 10 dB weaker than CBE-1550 & 20 dB or more weaker than WQXR-1560, the Superadio drops by the wayside in terms of selectivity adequacy. The stock TRF shows a selectivity decline on the top & bottom ends of the band: this is analogous to its comparable sensitivity degradation on the extremes of the dial - - both seem to result from compromises in factory alignment needed to get relatively flat sensitivity across the greater spread of the dial.

III - SPURIOUS SIGNAL RESPONSE CHARACTERISTICS

Each radio was carefully checked for any signals appearing in the "wrong places" on the dial. The writer has one extremely strong local, WRKO-680 50kW. 3mi./5km. distant; and numerous other locals of considerably lower strength but still of urban quality level. Results of the spur-test, receiver by receiver, follow:

Realistic TRF (Stock) Strong 2X455 = 910 & 3X455 = 1360/1370 IF Harmonics
(Modified) Slight " " " = " " "

NO OTHER SPURIOUS SIGNALS NOTED ON TRF

ICFS5W (WXKS-1430) - (2X455) = 520 image at fair strength
(WITS-1510) - (2X455) = 600 slight image noted as variable-pitch squeal against WICC-600
(WNTN-1550) - (2X455) = 640 only audible in low-sensitivity position

USING LOW-SENSITIVITY POSITION CAUSES SIGNIFICANTLY STRONGER IMAGES.

(WRKO-680) X2 = 1360 internally-generated harmonic strong in low-sensitivity position, not audible in normal (high) sensitivity position
(WRKO-680) + (WHDH-850) = 1530 internally-generated mix spur noted at fair level only in low-sensitivity position.

MISC. - occasional traces of shortwave-frequency leakthrough included RTTY & SSB signals which appeared as weak variable-pitch squeals against AM-MW-BCB stations. This problem was judged to be minor, though.

GE SUPERADIO NO SPURS NOTED

IV - AUDIO QUALITY

The GE Superadio was best both in terms of fidelity and output level achievable. The big speaker and the separate bass & treble controls make the difference. The audio from the ICFS5W is very good for the size of the receiver: fidelity is far superior to that of the Realistic TRF which is of comparable physical dimensions. The ICFS5W's single high/low tone control slide-pot is adequate, although separate controls would have been preferable. The Realistic TRF has the poorest audio quality of the portables discussed here. The tone & volume slide-pots get noisy very quickly: the ICFS5W also is equipped with slide-pots. It would take a year or so of constant use to determine if the slide-pots in the ICFS5W developed the same noise problems as those in the TRF.

V - PERFORMANCE WITH EXTERNAL AERIALS

The ICFS5W, the TRF, and the GE Superadio all have provisions for external antenna connections for improving AM reception in "weak signal areas". The aforementioned "modified TRF" was modified for an improved external antenna operation as well as for better selectivity. Briefly, this modification entailed removing the low-side lead (of the coupling coil on the ferrite rod adjacent to the main antenna coil on the rod) from the tuning capacitor where it was joined to the lead going to the high side of the coupling coil. This low side lead was then routed to real circuit ground through a DC-blocking capacitor of approximately .01 µf. To improve performance further, a few more turns were wound onto the coupling coil. The modified TRF totally outdid the other receivers when a single wire aerial was connected with no ground. This is the normal "in the field" mode of operation when the receiver is being used outdoors away from a convenient grounding point. On a typical beach or mountain DXpedition, a longwire is haphazardly stretched out and the DXer sits in his car or under a tree. The chassis of the car or a simple ground spike is ineffective at best, so it is advisable to have an external antenna input that provides real signal enhancement, even with a 20m/65ft. shortwire antenna & no ground connection. All portables except the modified TRF fell down flat on the job when no ground was available.

Providing both a 37m/122ft. longwire and a good water-pipe/mains ground gave readily perceptible improvements on weak stations on all portables tested; however, each receiver had idiosyncracies of performance outlined below:

Changes noted between performance with internal rod only and performance with 37m external longwire & a ground connected.

ICFS5W: Fair improvement , but receiver could not handle the overloading by WRKO-680, WHDH-850, WCAP-980, WBZ-1030, and WDLW-1330. Spurs and squeals popped up across the dial.

GE Superadio: Good improvement on the lower frequencies, but very little improvement on the higher frequencies. No spurs were introduced, fortunately.

Stock TRF: Good improvement, but some shortwave spurs were introduced. These included RTTY, SSB, CW, and international SWBC signals. (When either the ICFS5W or the stock TRF was used with a longwire & no ground, shortwave images/spurs were very objectionable.)

Modified TRF: Excellent improvement; spurs & overload problems negligible at this QTH. Performance with the longwire connected and the ground disconnected was only slightly less than when both aerial & ground were provided.

When a Worcester SM-2 active ferrite loop was connected to any of the four radios, nearly identical improvements in reception occurred (over no-external-antenna levels of performance). In every case, this brought a signal rated "poor" up to a "good" rating and a signal which had been rated "fair" using internal rod only up to "excellent" when the SM-2 was connected, turned on, tuned, and properly positioned for peak signal pickup. This was the only condition for which the external-antenna inputs of all four radios acted identically.

VI - ABILITY TO NULL

The Sony ICFS5W and the Realistic TRF could be turned while standing up normally on a non-metallic surface in such a direction that an undesired groundwave or low-angle skip station could be nulled down quite successfully. The GE Superadio had to be tilted more frequently to produce nulls: this is especially inconvenient when you consider the Superadio's bulkiness. If you DX with a Superadio, using an SM-2 loop (fed into the external antenna input ports) is highly recommended for easier nulling of "pests".

VII - FREQUENCY-SET ACCURACY/DIAL CALIBRATION

a. Frequency markings on dial face

ICFS5W - 530 600 700 800 900 1000 1100 1200 1300 1400 1500 1600

TRF - 54(0) 60(0) 70(0) 80(0) 100(0) 120(0) 140(0) 160(0)

Superadio- 55(0) 60(0) 70(0) 80(0) 90(0) 100(0) 120(0) 140(0) 160(0)

b. Dial length:

	bottom to 800k.	800-1200kHz.	1200kHz. to top	total
ICFS5W -	2.7cm (1-1/16in)	3.4cm(1-5/16in)	3.8cm(1½ in)	9.9cm(3-7/8in)
TRF-	4.4cm (1-3/4in)	2.8cm(1-1/8in)	2.8cm(1-1/8in)	10cm (3-7/8in)
Superadio -	7.4cm (2-7/8in)	4.2cm(1-5/8in)	4.5cm(1-3/4in)	16.1cm(6¼in)

c. Accuracy & total tuning range

The dial was set as closely as possible by sight to the indicated frequency. An RF generator nearby was used to couple a signal (through the air) to the receiver under test. The generator drove a digital counter; when the generator signal was adjusted to be in the centre of the receiver passband, the counter reading was recorded.

Dial setting, "eyeballed"	Actual frequency to which receiver under test was tuned			
	ICFS5W	Stock TRF	Modified TRF	Superadio
(bottom)	519	514	517	515
600	595	605	603	607
800	797	816	803	808
1000	994	1009	988	1000
1200	1204	1210	1192	1194
1400	1408	1403	1389	1394
1600	1610	1600	1583	1592
(top)	1650	1633	1635	1626

VIII - SPECIAL FEATURES

The ICFS5W has a drum-dial mechanism which can display frequency (AM), or one of ten "zone dials" indicating some frequencies and numerous clear-channel stations within that zone. Radio amateurs will recognise the zones as the same as those used for US ham radio call prefixes. Zones only cover the 48 contiguous United States (no Alaska, Hawaii, Canada, or European-oriented listings). The zone charts are useful for the novice DXer and the average AM listener who occasionally tunes out-of-town stations for sports, etc. The charts may help draw users of the radio into a greater involvement with real DXing. For more experienced DXers, it would have been better if Sony had taken the money spent on the zone dial and used it for an LCD digital display accurate to 1 kHz. & continuously-tunable (in other words, Bordeaux-1206 would show as 1206, not as 1210 baubling to 1200).

An LED indicator shows band selected on the ICFS5W: this doesn't offer anything a mechanical indication couldn't supply; it just looks snazzier. A tuning light scheme (again using LED's) surmounts the dial cursor: 2 green lights indicate weak signal or no signal and 1 red light indicates a signal of fair to excellent strength. It should not be construed as an accurate centre-tune meter; it works solely on strength. You can be tuned to the unreadable slop of a potent local and get a nice steady red ED indication. This tuning light scheme is less accurate as a tuning aid than is e ear. An LED string (5 or more LEDs) S-meter would be vastly preferable.

IX. SUGGESTED MODIFICATIONS

(48) The following is a "wish list" that is applicable to ALL RECEIVERS TESTED.

MOD- 1: LCD digital readout. A read-out accurate to 1 kHz. or better resolution on AM and to 0.1 MHz. on FM is the ultimate tuning aid. When such a frequency display is combined with an accurate signal strength meter, perfect tuning and accurate frequency measurement are both possible, even with stations on "oddball" channels not conforming to any 9 kHz. multiple, 10 kHz. multiple, or 5-kHz. multiple channelization plan. (Examples of such oddball freq. stations: RANI Surinam- 914, Belize - 834.) LCD's are preferable to LED's for the digital frequency display because their drain on the batteries is much less.

MOD -2: Record output "RCA phono jack". Such an output would send audio to tape recording equipment , regardless of whether listening was being done with the speaker or with earphone/headphones. A switch could select "High Impedance Out" for home recording equipment or "Low Impedance Out" for the inputs of some portable cassette recorders.

MOD- 3: A well-designed two-position selectivity switch offering a supertight 2.8 kHz. "serious DXing" filter and a 6 to 8 kHz. normal-listening IF bandpass filter.

MOD -4: An adaptor plug to allow the use of stereo headphones should be included with any top-grade portable radio. The earphones supplied with portable radios are so uncomfortable and have such wretched fidelity that anyone who has been exposed to good audio soon searches for a better method of private radio listening. Radio Shack makes an adapter which has a mini-phone plug on the end to go to the radio's earphone-out jack and a jack on the other end into which stereo headphones may be plugged for hi-fi mono from your portable. The adapter is Radio Shack cat. # 274-361 and should be included with better portables; cost is less than $2.

MOD- 5: Adequate circuitry documentation. The ICF55W instruction pamphlet wasted a whole page on "how to attach the carrying strap", but nowhere was a schematic of the circuit to be found! A radio intended for the hobbyist market should include (1) a schematic (2) a "roadmap" or PC board components-layout drawing and (3) a parts list as minimum documentation. An alignment procedure would also be valuable. The receiver should be considered a component which the user may want to build into a larger operating system.

MOD -6: Data pins for remote control & outputting of bits which activate frequency readout. It is my belief that a consumer-equipment control buss scheme similar to the "GPIB" or IEEE-488 system used in controlling of instruments in industry will soon be common in first-class portable radios, amateur radio gear, SWL/MWDX communications receivers, and home audio equipment (e. g. cassette decks). Such a data-buss would allow a timer unit to turn a radio & linked tape deck on & off to record music while you are work or DX while you're asleep. Furthermore, if a home computer could be data-linked to a receiver's "frequency bits in" control pins, complicated scanning, automated DX hunting, and parallel frequency routines could be set into motion. A stereo cassette deck could then be fed audio on one channel and frequency/time/date data pulses on the other channel, the contents of which could be flashed onto the screen of a CRT terminal as the tape was being played back.

MOD -7: Signal strength meter, either mechanical or solid state.

MOD -8: IF-out coax jack for oscilloscope-observation of subaudible heterodynes, analysis of the spectral content of stations received, etc.

X -FM PERFORMANCE Superadio VS. ICF55W

The differences between the ICF55W and the GE Superadio with regards to FM reception were slight. The ICF55W received stations on 46 FM channels with its FM whip fully extended; the Superadio received stations on 50 channels with a fully-extended antenna. The ICF55W had an image at the bottom of the dial from WXKS-107.9 MHz. This was probably on 86.5 MHz. (107.9 - (2 X 10.7 MHz. IF)). It was not noted on the Superadio; this may have been outside its low-end tuning range. Several stations received poorly on the ICF55W were given a "fair" rating on the Superadio. So in the FM sweepstakes, the nod goes to the Superadio, although not by a tremendous margin.

XI - CONCLUSIONS

a. A "Report Card" on the Four Receivers Tested

	ICFS5W	Stock TRF	Modified TRF	Superadio
Sensitivity	B	B	B-	C
Selectivity/domestics	B	B-	A-	C
" /foreign splits	C	B	A-	D
Spurious response rejection	C	B	B	A
Audio Quality	B	D	D	A
Performance w/External Aerials	C	B	A	B
Ease of Nulling	B	B	B	C
Dial Accuracy	B	C	C	B
Extra Features	B	D	D	C
FM Performance	B	N/A	N/A	A
Appearance	A	C	C	B
Portability	A	A	A	C

b. Comments

It is up to the reader to weigh the relative importance of each of the above criteria, also taking into account price. The Sony ICFS5W is clearly a wise choice for those looking for an AM/FM receiver of similar size and having AM DXing capabilities like the Realistic TRF #12-655, no longer marketed. It can be inferred from recent reviews of the current #12-656 TRF that the ICFS5W's AM performance would easily surpass that of the "presently-marketed. The ICFS5W's audio is vastly superior to that of any of the Realistic TRF's of recent vintage. The Sony surpasses the GE Superadio in most considerations of immediate interest to MW DXers. The only forseeable problem that could be serious to some ICFS5W users is the mediocre strong-signal handling characteristic. This problem would most obviously manifest itself in terms of spurious responses appearing when the receiver is used in an urban area with many strong locals. The "transmitter alley" area in the N.J. Meadowlands area west of New York City would provide the site for a real acid test of all of the receivers tested above. Until other DXers come forth with the results of such strong-signal "stress-testing", using different ICFS5W's; we cannot say with assurance that the ICFS5W would have more spurious responses than the other radios tested. Overall, the ICFS5W is a hot little receiver in an attractive package at a fair price: it may be the TRF replacement many of us have been looking for, with FM capability to boot in a much more convenient size than the GE Superadio. Now, if they'd only include the schematic for the thing, we could get our hands inside & modify this radio into a real DXin' Machine.

RECEIVER REVIEW...THE ICF-S5W

By Paul Swearingen

Medium-wave DX'ers have been hoping that some company would produce an affordable, selective, and sensitive portable receiver as a worthy successor to Radio Shack's defunct Realistic 12-655, affectionately known as the TRF. GE's Superadio (7-2880B) at about $60 seemed to be the logical choice -- indeed, the only choice -- until Sony unveiled its ICF-S5W in June, 1980, and introduced it to the U. S. market in August at an average price of about $70-75.

The Sony Corporation claims that the Japanese version of the S5W became the most popular of Sony's portables in Japan. The Japanese version incorporates crystal reception of NSB (domestic shortwave channels) and the Japanese version of the "zone dial" listing key stations in selected zones on a rotating drum. The U. S. version divides the lower 48 into 10 zones (imprinted on the back of the RX) and lists key stations by call letters on the slide-rule dial -- clear channel stations in blue, others in green. FM stations are not zoned. (See the following articles in DX News for further description of the S5W: Vol. 48, #25-p. 29 and 32; #22-p. 18; #11-p. 16.) Otherwise, the Japanese and American versions are identical.

Sony decided to institute a unique monitor program to test-DX the S5W in the U. S. According to Jon Strom, U. S. Manager of Consumer Audio Product Planning, ten monitors were selected from 100+ applicants (nine accepted) from several clubs on the basis of (1) quality of letters of application, (2) broad geographical representation, (3) familiarity to Mr. Strom through their activities in DX clubs. Nine sets were shipped to monitors (including this writer) in early March, and the nine were expected to supply Strom with information about the performance of the S5W in comparison to other RX's. And, according to Strom, the overall "rating" of the S5W was "very good;" plus the monitor reports were of "great benefit" to him.

Will he offer other RX's for test-Dx'ing again? Says Strom, "I hope to continue other receiver tests in this manner if my management approves it."

The S5W is apparently the first medium-wave receiver since some console models of the early 1940's to incorporate call letters into the dial. "We planned the zone dial as a means of getting average people interested in listening to distant stations ... a unique case of a manufacturer trying to promote the hobby of DX'ing," Strom said.

The monitors received the RX's with the stipulation that they would not modify the sets in any way. Reports from NRC monitors seem to indicate some inconsistent reception from receiver to receiver, indicating the need for internal adjustment for the S5W to achieve peak reception. Strom says, in addition, that Sony believes that the S5W's FET RF amp is "superior to a TRF." Further information in the form of a service manual and schematic may be obtained from Sony's Technical Publications Department: Sony Corporation / 10707 AirWorld Drive / Kansas City, MO 64153 / Attn.: Charlene Dougan. (Phone: (816) 891-7575).

Detailed reports in DX News from Mark Connelly, Gerry Thomas/Charlie Barfield, and others seem to give the unmodified ICF-S5W an edge in performance in AM and a nearly equal performance rating in FM tests, conducted on several receivers. With the availability of a schematic so that DX'ers can tweak the S5W and even modify it (Sony, of course, does not advocate any modification) for optimum DX performance, the S5W could easily put some non-portable and more expensive RX's into mothballs.

This writer's tests revealed similar results to those of the above DX'ers. A few other items of interest were revealed.

First, the switchable AM sensitivity circuit seems to "jump" the frequency up about 5 khz. at the lower end of the scale -- enabling me, with the switch in "low" position, to tune in another beacon below the normal range of the S5W, listed at 530-1605 khz., but more likely 515-1625 khz, and including at least one audible beacon at almost all times, just above the extreme bottom of the normal range.

As I live about 120 miles from the nearest population center (Kansas City) and almost 20 miles from the nearest transmitter, overloading of signals on both AM and FM is not a problem. I received the set too late in the DX season to make much of a test of its AM selectivity (it did separate 655-San Salvador and 834-Belize easily from adjacent stations), but I found that it easily separated signals on adjacent strong channels on both AM and FM; and weak signals were audible on channels adjacent to strong stations, without much splatter (superior to the HQ-180's so-called splatter factor).

A daytime bandscan (with the S5W both attached to a longwire/ground and unattached) revealed that the S5W pulled in several stations which the HQ-180, attached to a box loop, could not (including 730-KWRE, 770-WEW, and 1030-KTWO, with the S5W attached to a longwire), although the HQ-180 pulled in 830-WCCO and an unidentified signal on 1130.

With one bay of a 2-13 Channel Master antenna clipped to the TRF's antenna, the FM section of the S5W pulled in stations as far away as 255 miles (103.3-KJLS) and [illegible] miles (104.1-KOFM). With whip antenna only, I could hear 104.5-KKMA at 125 miles. FM performance is not to be sniffed at, either.

I personally prefer the cleaner sound quality of [illegible] "booming" bassy sound. Its compact size is another factor. [illegible] is not a problem, although I would recommend to Sony that [illegible] separate bass/treble pots -- with the clumsy slide pot eliminated, [illegible]. I would also ask for a 300-ohm antenna terminal to [illegible], as [illegible] did to its Superradio, apparently in response to consumer demand. The white-on-brushed aluminum numerals for FM are a bit difficult to read, and the [illegible], while useful, are a rather poor replacement for a signal-strength VU meter. Other modifications could be made to improve the S5W, of course, but the cost would mount accordingly.

The S5W's problems are for the most part minor ones which do not really detract from its DX'ing performance, which I feel is the best for the money of any under-$150 MW receiver.

Room for your notes!

THE SONY ICF-S5W----ANOTHER LOOK

Gerry Thomas

(with help from Charlie Barfield)

As many of you know, Sony recently released a new AM/FM portable and, in an unprecedented move among manufacturers, has sought the help of DX'ers in the evaluation of the radio. Having been selected as one of the ten "monitors," I've had the opportunity to test the ICF-S5W for the past few weeks and offer the following results and impressions.

First of all, according to the letter accompanying the "loaner" ICF-S5W, the availability of the Sony is not limited to the New York City area; in fact, it was released nationwide last fall and should be obtainable through any Sony dealer. As an interesting aside, the ICF-S5W is, at the present time, the most popular Sony portable in Japan, according to the letter.

Because Mark Connelly's superb review of the ICF-S5W covered the radio in significant detail, I submit this article as a supplement to Mark's and will limit my discussion to points of difference between our impressions and to observations not made by Mark.

I would also like to remind the reader that the conditions under which Mark's and my comparison tests were conducted differed in several important ways, not the least of which was the fact that two different samples of the ICF-S5W provided the results. Equally important is the realization that the radios with which I compared the Sony were all optimally aligned for MW DX'ing, whereas the ICF-S5W was untouched, straight out of the box.

The radios with which the Sony was compared were a modified (3 kHz muRata IF filter) FRG-7 with a four-foot passive box loop; an SPR-4 (stock selectivity) with a 30-foot longwire; a General Electric Superadio; an unmodified Realistic TRF 12-655; and an unmodified Realistic TRF 12-656.

PERFORMANCE

For the sensitivity and selectivity tests I used a modified "SIO" grading system of the following description:

S (signal strength)	I (adjacent channel interference)	O (overall reception quality)
5 = excellent (local-like)	5 = totally free of splash	5 = entertainment grade
4 = good	4 = weak, minor splash audible well under signal	4 = good, armchair listening quality
3 = fair	3 = moderate splash but not interfering with intelligibility	3 = easily readable but not of a "5" or "4" quality
2 = poor	2 = heavy interference (up to 50% masking of signal)	2 = readable with effort
1 = very weak/barely detectable	1 = splash is intelligible <u>or</u> signal is masked over 50% of the time	1 = marginally readable
0 = not detectable	0 = 100% masking of signal	0 = unreadable

Two types of reception tests were conducted over several sessions---a daytime domestic DX test and a night test of foreign split-frequency reception.

<u>Daytime reception</u>---

	FRG-7	SPR-4	ICF-S5W	Superadio	TRF 12-655	TRF 12-656
WSUN-620 (messy local WHYM on 610)	444	433	444	444	433	412
WSB-750	242	343	343	343	232	121
WFLA-970 (local WBOP-980)	444	433	444	434	434	333
WABF-1220 (local WNVY-1230)	101	101	322	000	000	000
WLCY-1380 (WCOA-1370)	455	444	455	333	312	000
WZEP-1460 (WBSR-1450)	322	100	222	100	000	000

As can be seen, the Sony provided reception that was largely equal to or better than any other receiver/antenna combination. Reception on 1220 kHz is usually possible on both the Superadio and TRF 12-655 but for several days running the reported ratings were the norm. An especially impressive sensitivity showing by the Sony occurred at my place of employment. I work in an underground ferro-concrete laboratory where reception on the BCB is abysmal. In fact, the best showing of any portable I own has been the Superadio, which manages to pull in all of my local stations (and nothing more). I was more that a little astonished when I put the Sony to this acid test and it not only provided the best ever reception of my locals but also pulled in a number of stations over 200 miles distant---unheard of!

Of the portables then, the Sony I had was the best performer, with the Superadio second, the TRF 12-655 third, and the TRF 12-656 last.

Split-frequency reception---

	FRG-7	SPR-4	ICF-S5W	Superadio	TRF 12-655	TRF 12-656
TICAL-525 (Costa Rica)	353	353	353*	353	253	252
TIRN-575 (Costa Rica)	433	433	343	433	233	222
YSS-655 (El Salvador)	444	433	423	433	343	311
Radio Belize-834	454	454	444	433	354	323
HRIC-1255 (Honduras)	322	211	211	211	222	000
Cayman Islands-1555	354	333	322	322	232	211

*"Birdie" interfering with reception

Overall, I'd have to rate the TRF 12-655 the best (by a hair) of the portables for foreign DX despite its generally lower signal levels. The ICF-S5W and Superadio were not far behind and, in my opinion, essentially equal. I hasten to remind, however, that my Superadio has been aligned for optimal foreign DX'ing; the Sony would have "beat the pants off" of a stock Superadio.

OTHER CHARACTERISTICS AND OBSERVATIONS

Spurious responses---

The area where the ICF-S5W really fell down was in its handling of spurious responses and this, in my mind, seriously reduces its desirability. Significant images were evident on 540, 570, 590, and 640 kHz in the RF "normal" attenuator position and the band really came alive with images, mixing spurs, and harmonics when the attenuator was placed in the circuit. In addition, CW and RTTY was audible at night at a few spots on the dial (even without an external antenna attached). Cross-modulation was noted in only one instance (WHYM-610) and only on occasion. Also, pegging the dial pointer at minimum frequency (about 520 kHz) provided WWWQ-1430 at a fair level.

As Mark noted in his review, the Superadio and TRF 12-655 are essentially free of these problems (at least at our locations) although IF harmonics do show up on the TRF 12-655 (on the TRF 12-656 too).

Incidentally, my Sony ICF-5900W (which is now in its third year of 40+ hours/week duty at work---totally trouble-free) performs similarly to the ICF-S5W with respect to these various types of spurs so this is apparently a design problem. Additional front-end selectivity (neither Sony is a "TRF" (as we know it)) would go a long way toward correcting this shortcoming.

Attenuator---

This RF gain control feature is operative only on the AM section and can, I found, be useful in some situations. One of its peculiarities, however, it that, for some reason, inserting the attenuator into the circuit adds capacitance (I presume) to the tuning section. That is, if you are tuned to a weak station adjacent to, and higher in frequency than, a strong local, switching in the attenuator can actually increase the presence of the local (if tuning isn't readjusted). Optimal reception in this kind of situation, then, requires decreasing the capacitance by moving the dial pointer up about 2-3 kHz. As Mark noted, a schematic would have helped explain this problem and also shed some light on the increase in spurs that occurs with the attenuator in-line.

Zone Dial---

I really like the Zone Dial idea, primarily because it is an excellent vehicle for exposing casual listeners to BCB DX. Stations from all ten zones were audible here in Pensacola but one of the stations listed for my zone is audible at night only on rare occasions. This is WAPE-690 whose night antenna pattern directs most of its power into the Atlantic---NRC's night pattern book would have been of use to Sony in creating the zone lists. Another station listed for my zone is WKVM-810 which has never been logged here (in western Zone IV) with any receiver. Also, WBT-1110 was positioned at about 1170 kHz on the zone dial. Finally, Sony might consider mentioning in their owner's manual that it is possible to hear stations outside of a listener's designated zone (there's no station overlap between zone listings, so the 50 kW clear channel stations appear only in their "home" zone).

Although the monitors were not to remove the back of the ICF-S5W, I obtained permission from Mr. John Strom of Sony to examine the inside of the cabinet and noted the following.

Ferrite rod antenna---
The Sony's ferrite rod antenna is 6½" x 3/8" in size (slightly long than the TRF 12-655's, but smaller than the Superadio's) and is not mounted horizontally but rather at a slight (est. 20 degrees) angle. Conceivably, this could result in improved skywave nulling though I did not carefully investigate this possibility. Also, instead of using a few turns of wire around the ferrite rod with which to couple an external antenna (as in the TRF's and Superadio), the Sony uses about 70 turns of litzt. This tighter coupling provided, in my opinion, the largest external antenna signal "kick" of any of the portables but, unfortunately, also exacerbated the spur and feedthrough problems.

Circuitry---
Despite the lack of mention of an integrated circuit in the ICF-S5W's brochure, IF anplification is handled by an IC (there goes the emitter by-pass transfilter modification). Somewhat surprisingly, audio section amplification is provided by discrete components. It would seem that since most of the current draw in a radio circuit is by the audio section, Sony would have used an IC for this function (and kept the discrete components in the IF section (for our benefit, hi)), especially since the ICF-S5W draws about twice as much current (40 mA) as, for example, the Superadio. With this current consumption and its three C-cells, the ICF-S5W is not much of a match in the battery life area for the Superadio (and its six D-cells). Speaking of battery life, the ICF-S5W's manual reports an expected life of 50 hours (mine dropped to under 1.4 VDC per cell after about 25 hours).

One thing about the circuitry that really disturbs me is the mounting of the printed circuit boards. They are mounted etching side out with no access to the transformers. So, unless you can find a right-angle alignment tool, removal of one of the circuit boards is necessary if you intend to align the Sony.

FM PERFORMANCE
And finally, a few words about the FM section. Whereas Mark reported FM performance largely on par with the Superadio, my Sony performed very poorly in this mode. Sensitivity was well below that of the Superadio but more significant was the presence of my locals all over the dial. Local WOWW-107.3 MHz appeared on no less than 13 spots on the dial and WMEZ-94.1 MHz showed up on seven. Apparently my Sony's FM section needed some work, so I'm reserving judgment pending additional reviews.

CONCLUSIONS
Excellent sensitivity and selectivity in a classy, compact package make the ICF-S5W an attractive choice in the DX portable field. It consistently gave the best reception of distant domestic stations of any of the portables tested and provided creditable signals on the foreign splits. Its principal drawbacks included susceptibility to spurious responses of varying types, relatively short battery life, and inconvenient circuit board placement. Despite these shortcomings, however, the performance of the Sony ICF-S5W should appeal to a large number of DX'ers and the unique Zone Dial will make it a collector's item in the future.

73's---GT

THE SONY ICF-S5W STILL ANOTHER REVIEW

r. j. edmunds

FOREWORD:

I had completed most of my tests, but not yet compiled the results when Mark Connelly's review hit DXN. Fearing that I'd have to start over again to avoid duplication, I read it, and made only slight modifications to my test format. I made a few basic assumptions: 1) I would not test the sets with an external antenna other than a loop, as only the Sony had provision for connexion, and as most use of portables, and certainly all of mine, is restricted to loop or internal antenna ; 2) I did not go into great detail as to trying to work through my locals, because Mark hit that well, and because I don't have all that many, as you will see herein; and 3) I have deliberately meshed the dicsussions of sensitivity and selectivity into one, as in a no-instruments type of test, the two are inextricably interrelated.

Upon receipt of the Sony ICF-S5W for testing, I determined to pit it against my current reigning champion, the Hammarlund HR-10, which is most comparable; the "original" Radio Shack TRF (vintage 1970 or so); and against the Nordmende Galaxy Mesa 6000, which is in a higher bracket than the Sony. This was done to keep everything in perspective. The Sony, utilizing 3 "C" cells, is the lightest of the receivers tested, either with or without batteries. It is 2 lbs, 9 oz. with batteries vs. the Hammarlund's 4 lbs., 2 oz. It feels even lighter. The dimensions are similar, except in one important particular, that of width, (8.813" vs. 9.844"). The importance of that is in that this is the dimension which determines the length of the ferrite bar antenna for AM. The Hammarlund antenna is 7.094" and the Sony is 6.281". The Sony, however, has the ferrite antenna mounted on a slant, to allow for a longer bar than would otherwise fit. As we will see later on, this is a compromise which need not have been made.

The Sony features slide pot tuning, which may result in quicker control noise appearance than the other two smaller receivers, if the slide pots on the Nordmende are any indication. Also as a result of the smaller width, the Sony has a narrower dial width, with the resultant increase in "bunching", however this is not considered to be significant. Dial play was, as with the Hammarlund, non-existent. Both the TRF and the Nordmende (which is much larger,and tunes some 11 bands on one marker) exhibited some sloppiness in this regard. Audio quality on the Sony was judged similar to the Nordmende -- excellent fidelity for music listening, though somewhat bassy. To my ears, this is a distinct negative for DX'ing, as weak spoken audio tends to become muddy, and less readable with a bassy audio than with one which carries more treble. This characteristic was most obvious when tuning by TVI, as the "whistle" component of the buzz was barely audible, even with the tone pot in the "treble" position on the Sony, while all of the other receivers had both whistle and buzz.

In testing the rigs side-by-side, several tests were performed, and several were done without the TRF, which was already outclassed, as per my prior review of the HR-10 some 8+ years ago. In a test of interference rejection, the Sony was slightly less able than either the Hammarlund or Nordmende to cope with SCR dimmer noise at close proximity. A test with TVI yielded the same result, subject to the aforementioned tone characteristics. The Sony seemed to do even worse at greater distances from the noise sources, as well as at diagonals to the wiring carrying the noise.

In terms of relative signal strength, the Sony was superior to the Hammarlund and easily the equal of the Nordmende, especially at the lower end of the band. In terms of selectivity and sensitivity together, the Sony appeared to be almost as good as the Nordmende at first look, but a channel-by channel survey proved otherwise. The so-called "capture ratio" on the Sony apparently makes the rig appear more sensitive and selective than it is, for in a test of channels with readable audio in the evening hours, the Sony came in third. With 107 possible channels, the Nordmende pulled audio on 102 (all but 720, 1120, 1200, 1040, &780); the HR-10 pulled audio on 96 (all but the above plus 760, 640, 650, 670, 700, and 1160); while the Sony added 820 and 870 to the list to come in at 94. While this might seem to indicate a lack of selectivity, after running the rigs together, I am convinced that the sensitivity is somewhat masked by a strong capture effect similar to that resulting from switching in the AFC on FM. The sideband splatter normally common to portables, and present to a small extent on the HR-10 was non-existent on the Sony, with a very sharp cutoff. This is apparently the result of the 4-pole ceramic filter on the Sony. It should also be noted here, that I did all tests with the Sony's sensitivity switch in the DX position for peak sensitivity. Lowering the sensitivity to locals also lowers the sensitivity to adjacent channel DX. All of the above tests were also completed with the internal antennae nulling the New York clears.

This area is the one which led me to enquire about the Sony's internal antenna, as the nulls were decidedly shallower than those of any of the rigs tested against. I can only conclude, after much re-positioning of the radio during testing, that the slanted mounting configuration for the antenna accounts for this inability to completely null out locals. Granted, greater sensitivity in the DX position would result in a greater amount of signal level to remove for a complete null, however the amount of signal remaining at null appears to be in excess of the apparent gain differential between the Sony and the Hammarlund or Nordmende at peak.

All of the receivers were then tested for operation within the field of a 4-foot altazimuth loop antenna for overload. Here, the Nordmende clearly showed its superiority over the three lesser-priced rigs, with no noticeable impairment of performance. The HR-10 exhibited an objectionable increase in "birdies", while the ICF-S5W exhibited more in the way of actual spurs. This may also be attributable to the tonal characteristics previously noted. In any event, the loop has too much gain for either of these two, or the TRF. A substantial reduction of the trim on the loop's gain pot was necessary to bring the overload within manageable proportions..

Working through tough locals is not one of the big problems at this QTH, in terms of daytime locals, as most of the offenders are the NYC clears, which have nothing there to go for in the daytime. The only locals which are at all troublesome by day are WMTR-1250 at 15 miles, 5kw, directional this way; WVNJ-620, at about the same distance, same power, and similarly directed by day; and WKER-1500 at 5 miles, 1000 watts, directional more or less away. WMTR caused the most problems on all radios, with only the Nordmende able to pick out anything on 1240 or 1260, even with a null in effect; WVNJ posed some problems with 630 reception, but 610 was audible on all sets (at only about 90 miles); and 1500 proved to be no problem at all, as semi-local (15 miles, 10kw tight DA away and weak here) WRAN was easily heard on all sets, and the usual daytime jumble on 1490 also audible. These results were just about what was expected.

FM operation came next, and I should note here that the Nordmende has no switchable AFC, while the Hammarlund and Sony both do. The Nordmende, nonetheless pulled audio on 62 of 99 channels, while the HR-10 pulled it on 60, and the ICF-S5W on 57, the latter two in the AFC-out position. This difference is just about consonant with the differences in tuning width on the respective dials. In terms of signal strength, fidelity, and crispness of signal, the Sony won hands-down. The only criticism I could find in its FM operation was that even with the AFC out, the set seemed to have a larger capture ratio than expected, which also may have accounted for its coming in 3rd in stations heard despite superior gain. The AFC operation was also much cleaner than that on the HR-10, which is subject to some bleed-through. The directional characteristics of the whip antenna were slightly less effective on the Sony than the Hammarlund or the Nordmende, but the net effect of this is not significant even for FM DX purposes.

FM overload is easily tested here, as is adjacent channel rejection, with the prime signal source coming from WFME-94.7, easily the biggest signal on the band here even at a good 15+ miles, the tower is essentially line of sight. Here again, the Sony came out on top, yielding audio on 94.3 where even my stereo tuner and rotatable yagi have trouble due to the stations being collinear from here.

Overall, I would rate the Sony ICF-S5W as an excellent receiver in its class and pricerange. It easily disposes of the TRF by comparison, and is roughly equivalent in most respects to the Hammarlund HR-10, which has been off the market for some time, and is therefore not to be considered. I am unaware of any competetively priced portable which can compare performance with it.

I would, however, like to stress that with a few changes, this could be THE DX machine for AM/FM users concerned with price and portability. In any future edition of this radio, I would strongly recommend the utilization of a straight ferrite rod antenna, parallel to the body of the receiver. I believe that this would aid nulling ability, image rejection, noise and interference rejection which I submit are not as well inhibited by present design. Secondly, I would suggest that while the ceramic filter's deep skirts are fine, the shape factor is a bit too flat, resulting in a more broad peak than would be optimum for DX use. Neither of these failings are likely to be user-correctible, but as it is, the ICF-S5W is still an excellent radio at a very reasonable price.

A Look at GE's SUPERADIO

Gerry Thomas and Charlie Barfield

When we first read the flyer on General Electric's new "Superradio" (model 7-2880), we thought, "This is too good to be true!". Here, according to the brochure, was a radio designed to not only produce "extraordinary" quality audio from favorite stations in distant cities", but also pull in "weaker, hard-to-receive stations adjacent to strong stations." These were not just casual marketing catch phrases either. The brochure backed them up with mentions of a 7-7/8" ferrite rod antenna, an air-gap variable capacitor, TRF stages on both AM and FM, and 4 (four) tuned IF circuits on AM (3 on FM plus a ceramic filter). As if this weren't enough, the brochure also boasted of a 6-1/2" speaker, 460 hours on a set of alkaline batteries, separate bass and treble AF controls, and "careful quality control." As the opening paragraph of the flyer stated, the objective of GE's engineers was to design the best performance portable in their history...we had to get our hand on one. A few phone calls revealed that the Superadios were enroute to the warehouses and weren't yet available. Luckily, Mr. Ray Douglas, the local GE rep, had one he was willing to let us test for a couple of days. We thank him and present the following results. "Please realize that these results are based on a sample size of one. Other Superadios may differ from the one tested, but hopefully the following performance findings will be fairly generalizable. Also, because a schematic was not availalable (and because we were reluctant to dismantle the circuitry of our "loaner" Superradio), this review will be limited to operating performance considerations.

Outward Appearances

First impression? It's Big. Measuring 12" wide by 10-1/2" high (handle up) by 4" deep and weighing an estimated 6-7 pounds (with its 6 D-cell batteries), the Superadio has to be one of the more substantial AM/FM portables on the market. Its cabinet is black and silver in color and sports a rugged seeming fold down handle. All controls are on the right side and include separate loudness, bass, and treble controls (all rotary pots), an AM/FM selector switch (flipper toggle), defeatable AFC for FM (also a flipper toggle), a vernier tuning knob, and a push-on, push-off power switch. There is an earphone jack and a collapsible, fold-down 38" whip antenna (with insulated grip) but no provision for an external antenna connection. Also eye-catching; a large, expanded steel speaker grill; a frequency scale that is "tilted back" for easier reading; and the musical words, "long range" and "high selectivity" on the dial face.

Turning it on

For a second we thought we had a Wurlitzer. Audio quality was astounding for a portable and audio gain was almost ridiculous. Never were we able to open the gain control above 1/3 on a daytime AM or FM local (at least not in an enclosed area)...this has to be one of the higher efficiency speakers around. The separate bass and treble controls allow audio shaping to taste and, combined with its juke box sized sound, the Superadio is one excellent listening/entertainment portable.

But What About DX?

Since the Realistic TRF has become the standard of comparison for portable MW DX, we spent a few hours comparing the TRF and Superradio in side-by-side tests.

Sensitivity.....

Differentiating sensitivity from audio gain in simple listening tests is always a little tricky. With its 4 IF's and audio output the Superadio certainly gave the impression of being much "hotter" than the TRF, but real differences in pure sensitivity were less overwhelming. Sunset skip did occur a minute or two earlier on the GE but daytime DX produced nothing on the GE that wasn't also audible on the TRF. Like the TRF, the sensitivity of the Superadio below about 600 kHz was poor. Nonetheless, the edge in sensitivity has to go to the GE.

Selectivity.....

This comparison was very interesting due to the fact that the two radios use different methods of attaining selectivity. The TRF's 2-IF plus single tuned crystal system produced a narrow-based, broad-skirted passband, whereas the GE's 4-IF circuit resulted in a broader-nosed, but steeper-skirted passband. The performance results of this were that the TRF tended to give slightly cleaner split frequency (i.e., foreign) reception while the GE tended to better reject strong splash that was originating at least 10 kHz distant (i.e., domestic channels). As an example of the latter condition, distant WFLA-970 can be heard during daylight next to WBOP-980 (a moderately strong local) on the TRF only if the TRF is positioned to null WBOP. Rotating the TRF out of its null results in intelligible WBOP audio. The Superadio, on the other hand, need not be rotated to null the local in order to hear distant WFLA. Interference from WBOP is still present but is at a lower level and is unintelligible. It seems as though the GE's passband has a superior shape factor but its width is designed for domestic (i.e., 10 kHz separation) selectivity and for optimal fidelity. As a result, the TRF's narrower peak performs better on most splits despite its less selective, broader skirts. This is not to say that the GE is incapable of split-frequency reception, far from it. Every split that was audible on the TRF was also audible on the GE albeit at a slightly reduced quality. The selectivity question, then, is just about a toss-up--the GE seems a little better for domestic DX, the TRF for foreign splits.

Frequency read-out

Like the TRF, frequency read-out is poor on the GE. Unlike the TRF, a fairly high resolution logging scale is provided on the GE which, by means of a self-constructed conversion chart, can easily provide 10 kHz determinations (parallax error is insignificant). For those who like recalibrated custom dials, the Superadio appears to be a far simpler project than was the TRF (e.g., easier access scale, 5-1/2" scale as opposed to the TRF's 3-1/2" dial).

FM Performance

Neither of the authors feels qualified to make difinitive statements regarding the FM section of the Superadio. Our impression, however, is that the GE's FM performance is very good. Apparently the TRF circuit in the FM section is responsible for our stronger locals appearing only on their desigated frequencies (and not all over the band) and for the establishment of several New Orleans stations (about 175 miles to the west as new "locals" here. A more intelligent evaluation of the FM performance of the Superadio is needed.

Some Closing Thoughts

The new GE Superadio has alot going for it. Besides being a capable MW DX device, it also provides excellent audio fidelity (hearing distant clear channel stations in hi-fi is a disarming experience) and an FM section that also appears to be DXable. Its principle drawback, from a DXers standpoint, probably is its weight. A few minutes of tilting and rotating to null and peak stations gives the impression that the Superadio is gaining weight by the minute. A rotatable external antenna (like the Panasonic RF-2200) would have been nice, but a turntable contraption could be rigged to reduce arm-weariness. The only other thing that might be considered a shortcoming is the lack of external antenna terminal. However, any number of plans for external antenna coupling are in the DX literature so this is a minor complaint.

All in all, GE's new Superadio fills a niche in the market, and at a list price of "about $72," does it quite reasonably.

GE SUPERADIO Revisited

Dallas Lankford

The GE Superadio has been discussed and compared with the Radio Shack TRF (old model) in a very good article by Gerry Thomas and Charlie Barfield which a prospective buyer is well-advised to read. Their general conclusion is that the Superadio is about equal to the TRF under most listening conditions. However, Andy Rugg was understandable critical of a Superadio, mentioning hets all over the AM dial and significantly less sensitivity than his TRF as severe defects. Since I have recently gotten a Superadio for my office, I was naturally inclined to take a closer look at the Superadio's performance on the BCB.

Before describing the results of my listening tests, a few words are in order concerning the price, appearance and general features of the Superadio. My Superadio was purchased from a nearby discount store for $59 plus tax. This may be one of the lower selling prices since I have also found it elsewhere for $65 plus tax. The Superadio was backaged in a 14.5 by 11.25 by 5.5 inch cardboard shipping container covered with pictures of the Superadio and some of its more notable parts as well as a considerable amount of descriptive information. On one end of the container were pictures of the 6.5 inch high-sensitivity speaker, the AM/FM integrated circuit (presumably the IF amplifier), the air-spaced 6 gang (3-AM, 3 FM gangs) tuning capacitor, the 7.75 inch AM ferrite rod antenna, the two-way power supply with automatic AC/DC switching (six 1.5 volt D cells are required for portable DC operation), AFC on/off switch, and separate bass and treble controls. On the other end of the container some of the main features are described, including; tuned RF on AM and FM, 38 inch swivel FM whip antenna, external AM and FM antenna terminals (metal screw type, ceramic IF filter plus three IF tuned circuits on FM, four IF tuned circuits on AM, 700 mw RMS audio output, loudness (volume) control boosts bass at low listening levels, up to 460 hour D cell operation, earphone jack (3.5 mm), steel speaker grille, fold down carrying handle. The Superadio is fairly large for a portable, 12 by 9 by 3.75 inches, with a very sturdy two-tone black and grey plastic case. The slide rule dial is about 6.75 inches long and is covered by about 7.5 turns of the tuning knob. My Superadio covers about 510 - 1640 kHz on AM with the BCB (540-1600 kHz) covered by about 6.5 turns of the tuning knob. The power cord, when not in use, may be stored in a compartment in back, though it is a tight fit. My Superadio was a model 7-2990B, suggesting that there may be both "A" and "B" models, with date code (serial number?) 4935 located inside the power cord storage compartment and on the shipping container. The back of the Superadio is held on by six phillips-head screws, but there must be some trick to removal of the back since the back of mine would not come off even after removing a seventh screw inside the battery compartment. The Superadio comes with a seven page "use and care guide", a list of authorized service facilities and their addresses, and an accessory order form (from which you can order an FM dipole antenna, a pillow speaker, two kinds of headphones, a remote speaker, rechargeable batteries and charger, stereo headphone adaptor and stereo headphones, and an external AM antenna kit.).

Tests were conducted about 2-3 pm and about 8-11 pm local time on several evenings. Comparisons were made with my HQ150 and HQ180A using their widest selectivity positions in combination with both a 100' longwire and my "TRF loop" which is the front end of a Radio Shack TRF. The TRF loop has been my main antenna for about the last four years and has pulled in numerous foreign DX when used with my various communications receivers.

In the 2-3 pm tests the Superadio and HQ180A/TRF loop were judged about equal except plus or minus 50 kHz of superlocal KRUS 1490 where the Superadio produced several spurious responses. These were not hets, or "birdies," but were IF products, with KRUS superimposed on several channels between 140 and 1540. However, when tuned to KRUS the Superadio does not seem to overload, as does my HQ180A/100' LW. The image of KRUS was found about 580 kHz on the Superadio, but the KRUS image is also observed on both the HQ150/100' LW and the HQ180A/100' LW. On the Superadio, a weak het was found about 910, suggesting some reradiation of the first harmonic of the 455 kHz IF. No other spurious responses were noted except when using our 100' longwire, which produced hets all over the AM dial. We haven't had an opportunity to try our Superadio with a longwire away from our location near KRUS antenna, so we don't know if the overload problems of the Superadio/LW are a result of the very high KRUS signal levels at our test location or if there is a general tendency for the Superadio to overload when used with a longwire. However, it should be remembered that our HQ180A also has overload problems at our location within a mile of the KRUS antenna. Also, at night without an external antenna the Superadio's spurious responses are much less noticeable, probably because of the generally higher nighttime signal levels on the BCB. Of course, neither the Superradio nor any other portable we have tested is the equal of a good communications receiver and longwire antenna for weak daytime signals which are strong enough to be definitely ID'd, but which are too weak to be definitely ID'd on either the Superadio or HQ180A/TRF loop, such as WMAQ 670, WHAS, 840 and WOAI 1200. In addition, very weak signals were noted on 640, 650, and 780 kHz with the HQ150/100' LW where no signals at all were observed on the Superadio and HQ180A/TRF loop.

At night there is very little noticeable difference in sensitivity and dynamic range among the Superadio, HQ150/100' LW and HQ180A/TRF loop. All but the HQ150/TRF loop were generally useless on 1480 and 1500 kHz. However, the Superadio performance at night is much better near local KRUS, with fair to good reception of 1470 and below and on 1510 and above. The Superadio seemed to give deeper nulls on some channels than the HQ180A/TRF loop, and the Superadio beats the HQ150/100' LW handily at night because of the Superadio's nulling capabilities. Two and sometimes three stations per channel could often be logged by rotating and tilting the Superadio where the HQ150/100' LW produced only unreadable jumbled signals. Conditions were not good for Latin American splits, although R. Belize 834 was audible about equally on all three receivers. At the top end of the dial all three receivers were tuned to 1613 and the low-powered beacon RAB in Rabinal, Guatemala was observed to fade in and out of the noise/slop more or less simultaneously on all three receivers. Here we should mention that with narrower selectivity both the HQ150/100' LW and HQ180A/TRF loop occassionally produced readable signals from RAB when it is not audible on the Superadio. Neither the HQ150 nor the HQ180A tune below 535 kHz so it was a new experience for me to do a little bottom ending. Beacons BG, EO, PKH, and SRD were heard. Dick Truax has BG on 513 at Fairfax Municipal Airport, Kansas City. We haven't been able to locate any information on any of the other beacons. We also had R. Rumbo 525 in and out of beacon interference throughout our evening tests.

The Superadio tuning seemed a littly mushy at times, and is somewhat delicate above 1200. But that is to be expected with "string dial" portables, including the TRF. Our Superadio would not produce the earsplitting volume reported by Thomas and Barfield, except on superlocals. Still our Superadio produced plenty of good quality audio which can be adjusted for individual listening preferences by separate bass and treble controls. We did notice that the audio began to distort on about the highest 1/6 of the volume control range when listening to strong stations. On weak stations no distortion was observed up to the maximum volume control setting. The AM and FM external antenna terminals share a common ground terminal which seems curious to us since the Superadio's external FM antenna terminals are rated for 300 ohm twin lead. The Superadio does not come with a schematic, a disadvantage for those who might contemplate modifying the Superadio. We don't know enough about FM receivers or FM DXing to make detailed comments about the Superadio's FM performance. But there were numerous FM stations at good listening levels, and no hets were noticed when tuning around the FM band without an external FM antenna. We didn't test the Superadio with an external FM antenna.

In conclusion we would say that the Superadio is a respectable portable AM/FM receiver for all but the most extreme listening conditions. The Superadio is not and should not be expected to be the equal in performance of a reasonably good communications receiver and amplified loop antenna on the BCB. Even our HQ100A with its Q-multiplier selectivity will run circles around the Superadio when DXing foreign splits.

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