A REVIEW OF THE R390A RECEIVER

JOHN R. TOW WITH KEVIN ATKINS

The R390A is a multiple conversion superhetrodyne receiver covering 0.5 - 32 MHz in 1 MHz increments except for the 0.5-1.0 MHz range. It was designed for reception of CW, MCW, and AM transmissions with the capability of receiving SSB via an external adapter. It was designed to be used simultaneously with several transmitter/antenna combinations in a communications station type setting.

The R390A has antenna inputs to service a balanced two wire antenna as well as a high impedance single wire whip or random wire antenna. Audio output is via a front panel high impedance headphone jack and a 600 Ohm 0.6 Watt back panel screw terminal that comprises the Local AF channel. A Line AF channel also exists that places 60 mW on either a 150 or 600 Ohm balanced line on the back panel. The Line level is monitored by a VU meter. Other back panel connections include 455 kHz IF output, AGC, RF gain control, detector output, and break-in.

The front panel adjustments permit a wide range of listening options to be employed. The loading effect of the antenna can be compensated through the use of an antenna trimmer control on the front panel. Tuned frequency is determined by the position of the MHz knob (one MHz per increment) and the kHz knob (continuously variable from 000.0 - 999.9 kHz calibrations). Selectivity is step adjustable to 0.1, 1.0, 2.0, 4.0, 8.0, and 16.0 kHz. AGC response is defeatable and step adjusted to slow-medium-fast AGC. RF gain is front panel adjustable with the overall IF gain determined by an internal adjustment. The previously mentioned Local and Line AF channels have independent front panel gain adjustments. Audio filtering for CW or MCW reception is available via a front panel Wide/Sharp switch.

The R390A can be used for both critical SWLing and hardcore DXing. The range of AGC time constants and defeat permits its tailoring to fit a wide range of propagation conditions, from rapid flutter fading typical of polar path SW signals to the slow fading typical of MW signals. The MGC (AGC off) position offers the greatest sensitivity, albeit at the expense of a propensity to overload.

The excellent selectivity of this receiver, with its near hi-fi quality when using the 8 or 16 kHz bandwidth or its band slicing ability with the 2 or 4 kHz bandwidths, is beyond compare. DXers weaned on receivers like the Icoms or even the NRD-515 with their bassy, distorted audio will undoubtedly be shocked by the crystal clear sound coming from a good speaker properly matched to the R-390A's Local audio output. The audio selectivity can be sharpened to the point of ringing for improved CW or MCW reception when the audio Wide/Narrow switch is in the narrow position. The R-390A receiver becomes one of the most selective CW receivers available when both the Narrow audio filter and the 0.1 kHz selectivity is employed.

The sensitivity of this receiver is actually adjustable. That is, the overall gain of the IF amplifier stages is adjustable by an internal potentiometer. Fortunately, this potentiometer is located on the topside of the IF module and is both easily accessible and well marked. Unfortunately, highest gain brings with it greatest background noise. With my receiver as an example, the IF gain can be reduced to lower the background noise and still yield a sensitivity better than my Icom R70's without its pre-amp. The background noise is relatively low in level, especially in comparison to the levels present in today's modern receiver's "synthesized" front ends. Only a minor amount of background 120 Hz power supply hum is perceptible in low impedance headphones at minimum audio level, no doubt partially due to poor impedance matching and partially due to old power supply filter capacitors.

The R390A was used by the military for the reception of AM, CW, MCW, and FSK (RTTY). SSB reception is possible, although the receiver is not designed for it and thus, offers poor SSB performance. An outboard SSB adapter was used by the military to improve the SSB performance to fair. This converter hetrodyned the 455 kHz IF output down to an even lower frequency, around 20 kHz, I think, where it was filtered by an LC bandpass filter and fed to a ring type product detector. The receiver was simply designed as an AM/CW/MCW/FSK receiver and had too much RF gain for effective conversion to SSB.

Many installations used two or more receivers tuned to the same frequency but fed by different polarization antennas in a diversity reception system. The AGC lines and audio outputs would be essentially paralleled to give the benefit of the better of the two signals at any given instance. The receivers were designed for use in the proximity of operating transmitters with little desensitizing, i.e., reduction of sensitivity due to RF overload, permitted.

The R390A makes an excellent SWL receiver - within reason. The wide selectivity makes extremely comfortable clear signal reception possible. A connection from the diode detector to an external hi fidelity audio amplifier allows greater freedom in adjusting the audio power level and response and can be effected via a back panel connection.

Band scanning is a bit of a problem, but not nearly as great as band hopping! Changing from the lower reaches of 49 meters to the upper reaches of 25 meters requires two revolutions of the MHz knob (large amount of torque required) and nine turns of the kHz knob (3 MHz/rev. and 100 kHz/rev. respectively). Frequency readout and variations in linearity force frequent recalibrating to retain accuracy to the 100 Hz mark. As the Permeability Tuned Oscillator (PTO) ages, or more exactly, as the tuning slug's core ages, the linearity of the variable oscillator suffers. In addition, slight differences in the first conversion oscillator's crystal's frequencies require the recalibration of the dial when changing from one MHz band to another. The "S" meter is actually linearly calibrated in 20 db increments from 0 - 100 db in lieu of S1 - S9 +40 db as is common in other receivers.

The R390A comes into its own as a SWBC DXer's receiver. The 4 kHz bandwidth seems optimal for all but the most critical of hairsplitting. When signals are closer than 5 kHz apart, the 2 kHz selectivity can be helpful. It has to be since exalted carrier reception is not available. The absence of a tunable IF notch filter like the Icom R70, R71A, Drake receivers, etc., can be most upsetting in the tropical bands. It can be somewhat remedied by the use of an audio notch filter (Autek QF1A, MFJ filters, etc.). An IF type "Q" multiplier, like the Heathkit QF-1, HD-11, or GD-125, would require some internal modification to connect to the appropriate place in the IF strip. If connected ahead of the mechanical filters, and the appropriate place for the Q multiplier is ahead of the selectivity determining components, then the mechanical filters could possibly be damaged when the Q multiplier went into oscillation!

The IF output located on the back panel of the R390A permits external detectors to be utilized. Such detectors could include AM synchronous types, FM detectors, and SSB/CW product detectors. I have a synchronous detector using a hard-to-find Signetics NE-561B PLL integrated circuit that I have used for nearly thirteen years which I normally plug into the IF output. This detector is routed through a high fidelity amplifier to a wide range speaker for casual listening to strong, low QRM, stations. The synchronous detector really does improve reception fidelity and reduces the distortion normally associated with selective sideband fading. In addition, external AGC circuits characterized for SSB and/or CW can be easily connected via the back panel to the internal AGC lines. If building electronic circuits is not your thing, then the Sherwood SE-3 detector could be connected very easily to the IF output for synchronous detection, permitting exalted carrier reception.

MW DXers require a strong mix in their receivers. High level signal handling capability is paramount in a good receiver. Excellent shielding is also required, especially when a well balanced loop antenna is to be used. The R390A is unsurpassed in both regards. It also is most useful in splitting 9 and 10 kHz channel spacings with its extremely steep skirted IF selectivity. I fully expect to hear the new Nevis Island MWer on 895 kHz when the QRN drops in the fall-winter, despite powerhouse WLS 890 and local WATV 900 (Kahn stereo).

The receiver suffers from the absence of the aforementioned IF notch filter as well as its tuning anomalies. To go from 960 kHz to 1030 kHz requires some ten turns of the kHz knob, no mean feat when in a hurry! An external audio 5, 9, and/or 10 kHz 'whistle' filter could be connected via the back panel to improve the audio quality.

One cannot overlook the attraction that a "hollow state" device has. Vacuum tubes, with their warm alluring glow, seem to attract quite a following these days. The R390A is, in my opinion, the finest example of a tube type receiver. It has 24 little glowing bottles within. Quite nostalgic. It also makes a dandy space heater!

Why ever would one use a boat anchor like the R390A when there are NRD's and Icoms about? Two main reasons come to mind: operational advantages and price.

I have owned and operated many receivers over the last 25 years or so, including Drake 2B, R4C, SPR-4, Kenwood R-1000 and 2000, Yaesu FRG-7 and FR-101, Hallicrafters SX-111 and SX-115, Collins 51J3 and 75A4, and Icom R-70 and R-71A to name a few. None of these compare with the R390A in terms of overall performance.

One particular problem that this receiver circumvents is that of intermodulation and cross modulation distortion products in the front end. This is a direct result of its military heritage. High level input signals do not overdrive its front end. Those strong evening signals in the 49 meter band that sometimes produce IM products above the 49 mb (all the way up to the 19 mb) in most of the modern receivers I've used offer little if any challenge to the R390A's front end. Simply stated, if a signal is detected on this receiver, it came in from the antenna!

The availability and price of the R390A is another strong suite. They became available in limited quantities in the late '60's at $1,000 - $2,000 for new surplus. Today one can be purchased in fair shape for as little as $100, about $1.33/lb.

The main reason that the receiver commands so little respect in today's surplus market revolves around the earlier stated omission of a product detector for SSB/CW reception. Another detriment is the need for service and/or alignment. In addition, its size, weight, and power requirement are somewhat limiting as well. One man's junk is another man's DX rig!

Okay, I want an R390A... where can I find one, you might say. Currently there appears to be two obvious sources: hamfests and surplus dealers. Many radio amateurs have tried to use the old receiver over the years on SSB or CW with poor results. Their best outlet for such a "boat anchor" has always been the flea market sales at the local hamfest.

All radio hobbyists need to attend a hamfest if possible. You can purchase anything from antenna wire to old WRTH's at such a gathering. Most areas of the country have one or more hamfests or ham-conventions during the course of a season (April - October). They are generally held in convention centers, auditoriums, malls, or small parks. The minimal requirement is simply an area where hams, etc. can back up their cars and sell their 'junque' from their respective trunks and compare stories of band pile-ups, QSL card hunting, awards collecting, etc. At the opposite end of the spectrum is the hamfest-convention with its collection of new equipment dealers, forums, and license examinations. Generally, the latter type of hamfest is held in an air conditioned space with more overhead for the vendors and an admission charge for the visitors. The Birminghamfest this year will charge $10 per table/day for the flea market and at least $6 admission. The Huntsville hamfest is generally free admission. Atlanta is more expensive than Birmingham, etc.

Now, you're in a 'hamfest... so what? Look for an R390A it'll probably be on the floor or the end of the table with other goodies stacked on it. Be careful, the R390 looks very much like the R390A. You must insist on the A version. It has a selectivity control on the upper left hand side with 0.1, 1.0, 2, 4, 8, 16 kHz positions. Look for the manufacturer's nameplate. Collins is undoubtedly the best with Motorola a distant second. The other manufacturers were not quite as good in my book, although they all had to meet the same specifications.

Cosmetic appearance is important. A tough looking set has probably seen a rough life - avoid it. Check the kHz and MHz knobs for looseness. Watch the gears (the receivers are hardly ever found in cases) as the aforementioned knobs are rotated. The gears, cams, and slug racks should be there and move freely with no binding. Turn it over (Ugh, it is heavy!) and look towards the left side rear of the power supply chassis. You should see two empty 26Z5 tubed sockets indicating that the tube type rectifiers were replaced by solid state devices, a field change made in the 1960's. Try the receiver out if at all possible. Place the function switch in the 'CAL' position and try to tune in one of the 100 kHz calibrator signals. Peak the antenna trimmer control and read the carrier level meter. It should read 35 - 60 db depending on the MHz knob position, with the higher levels at the lower frequencies. If all is okay at this point, start your haggling. Try to get a manual with the receiver. A good R390A will probably cost from $100 to $350 depending on the hamfest and the radio's condition.

Another source for the R390A is a reputable surplus dealer, such as John Meshna in Lynn, Massachusetts and Fair Radio Sales in Lima, Ohio. Expect to pay $200 plus depending on condition (generally sold 'as-is', 'used-repairable', or 'operating'). Current surplus stock is sold without the panel meters because of the Radium dials in the original meters. Try to get meters with the receiver as well as a manual and an exchange guarantee if defective. The receiver will be shipped UPS in at least two boxes because of its weight, so plan on some assembly. You'll need a long shank Phillips head screwdriver and a truss!

Now I own a boat anchor - how can I insure its longevity? Keep the cams clean of dirt and grime yet well lubricated. The slug tuning rack's bearing surfaces should also be cleanly lubed. Try to keep sawdust, cat hair, etc. out of it's innards. Allow plenty of room for ventilation below, beside, and above the radio. Leave it on for extended periods rather than turning it off and on several times a day. They were designed for constant use. Enjoy it!

What kind of spares should I have, you might ask. Another receiver would be best. Spare vacuum tubes are a must. The radio has many duplicates, i.e. 5749/6BA6W, 5814, 6C4, 6AK6, etc. Singles, like the 6AK5, 6DC6, and 3TF7 current regulator should also be stocked. That last one is a bear to find! It might be easier to replace with a solid state voltage regulator, should it fail. The 3TF7 replacement has been the subject of several articles over the years with the best being the one available from the National Radio Club.

My receiver has been in my possession for over thirteen years with only a microphonic 6DC6 RF amplifier, open diode load choke, and broken coupling (I over tightened it!) as failures - and all of those were in the radio's first year of my use! What do you do if it does need servicing? Find a 'hollow state' enthusiast/repairman. It really is simple to troubleshoot, especially if you have the military manual with its step by step procedures for testing at hand. I would rate that manual, available from a number of surplus sources, as the #1 spare!

An especially good source of information on the R390A and its maintenance is the Hollow State News, a quarterly available from Chris Hansen, Box 1226, NY, NY 10159. The National Radio Club also has printed a

number of R390A articles. Both of these resources have addressed the 3TF7 tube replacement, receiver alignment, PTO non-linearity, etc. Additional resources, such as Ham Radio, QST, 73, etc. can be checked for information concerning the R390A and other Collins receivers. As an example, an article in Ham Radio nearly 18 years ago addressed the non-linearity aging problem in other Collins PTO's.

I have included my measurements taken in my 'lab' on my equipment. (My lab also includes a complete woodshop, metal shop, auto shop, electronic junk collection, and laundry facilities.) I have tried to be as fair as possible with my measurements. Keep in mind that my radio, a Collins, has not been aligned in years! Maybe ten, in fact!! The comparison I've made with my R70 was most interesting, indeed. The old radio just sounds better than the Icom, even when comparing the R390A on 4 kHz to the R70 on wide (6 kHz BW). Unfortunately, I could not obtain another signal generator to compare IMD and cross modulation products correctly. Let it suffice to say: I have never heard an internally generated signal on the R390A. For the rest, let the spec's speak! (See Table 1.)

How does the old boat anchor work, you might say. Well, mine works pretty damn well!!! Seriously, it is a triple/double conversion superhet with 455 kHz mechanical filters in the final IF. It is double conversion above 8 MHz and triple below. The first variable IF, used only below 8 MHz, is gang tuned from 17.5 - 25 MHz when the radio is tuned from 0.5 - 8 MHz. It is then translated to the second variable IF along with the 8 - 32 MHz signals. The second IF tunes from 2-3 MHz and is gang tuned with the kHz and MHz knob. This IF is mixed with the output of a highly linear permeability tuned variable oscillator (infamous Collins PTO). So far the signals have passed through a 6DC6 RF amplifier and two 6C4 triode mixers with a total of ten slug tuned and mechanically coupled tuned circuits. A stout and selective front end!

The Collins Permeability Tuned Oscillator is an extremely stable variable frequency oscillator whose output frequency is varied by rotating a shaft that advances a slug into or out of the oscillator's resonating inductance. The linearity of the PTO when new is much better than the variable capacitors found in many other analog designs. One turn is exactly 100 kHz variation for over ten consecutive turns. This permits the mechanical turns counter 'digital' display used on this receiver, a display whose frequency can be read to 0.2 kHz. Drake also used the PTO type design along with permeability tuned front end circuits as well.

The first local oscillator uses a 17 MHz quartz crystal while the second oscillator switch selects one of 15 crystals depending on the MHz switch position. Band changes thusly can result in a slight calibration shift since the crystals cannot be "rubbered" on frequency. This recalibration can be effected by using the internal 100 kHz calibrator circuit. The procedure is simple: Turn the receiver to Cal, thus turning on the 100 kHz calibrator. Set the selectivity to 0.1 kHz and the BFO to 12:00. Tune the kHz knob to the nearest 100 kHz position. Turn the Zero Adjust knob CW to lock the readout in place. Adjust the kHz knob to maximize the Carrier Meter reading and simultaneously zero beat the BFO if it is in proper alignment. (If it isn't, you can simply loosen the shaft and adjust it if you have the proper Bristol wrench, so that zerobeat occurs with the BFO Pitch at 12:00.) Loosen the Zero Adjust knob by turning it CCW and you are ready to go.

The third IF is at 455 kHz and consists of a half lattice crystal filter that can provide either 0.1 or 1 kHz selectivity followed by a 5749/6BA6W IF amplifier whose gain is set along with the RF amplifier by the RF gain control. This amplifier is in turn followed by a choice of 2, 4, 8, or 16 kHz Collins Mechanical filters with the 2 kHz filter automatically following the 0.1 or 1 kHz selectivities. The half lattice crystal filter is bypassed when using the 2 - 16 kHz selectivity. A few words concerning those infamous Collins mechanical filters are in order.

A mechanical filter is actually a very simple device. It consists of two separate coils physically coupled by a thin rod or wire. The wire is made to vibrate by passing an alternating current through the input coil. This vibration is coupled to aluminum discs calibrated to mechanically resonate at the desired IF frequency. (This mechanical vibration requirement limits the highest frequency of operation for mechanical filters to less than 1 MHz.) The output coil generates a minute alternating current as the opposite end of the rod vibrates within its core. The selectivity and shape factor are determined by the size of the inter-disc coupling rods or wires. Greatest efficiency as far as coupling is concerned occurs when both the input and output coils are electrically resonated and properly matched for impedance. Generally, In/Out impedances range from 3 - 10 kOhms, shape factors are less then 2.0:1, and ultimate rejection exceeds 100 db. Unfortunately, loss generally runs 6 - 12 db. Loss can be minimized by resonating the transducer coils to the center frequency by placing trimmer capacitors across each coil and properly peaking them. These capacitors were retrofitted to many of the earlier runs of R390As, and standard on later runs. Check the square cover over the mechanical filters on the back of the IF strip, just in front of the back panel IF output jack, for four holes with screwdriver slot adjustments (trimmer capacitors) within. If present, your receiver has the trimmer modification.

The physical layout of the R390A is largely responsible for its tremendous skirt selectivity. A good quality mechanical filter would not, for example, exhibit its ultimate rejection when used in a receiver where it was mounted on a large motherboard such as the Icom employs. Neither would it be as useful on a plug-in board in close proximity to other circuits. Simply stated, in most modern applications, too much signal can "leak"

around a good filter because of poor layout design. The R390A has tremendous isolation! The mechanical filters pass through a metal chassis with a cover over the tops of the filter. The straight line signal paths and totally enclosed (shielded) circuit sub-assemblies exemplified by this receiver are responsible for its excellent selectivity, both in the RF circuitry and the IF circuitry. These design philosophies dictate larger, more complex assemblies. This type of design would be cost prohibitive today.

The filters are in turn followed by another IF amplifier whose gain is adjusted by the front panel RF gain control, a third IF amplifier whose gain is adjustable internally, and a fourth and final amplifier. The IF amplifiers are stagger tuned and/or have swamping resistors placed across their windings to spoil their "Q". All of this is to provide the wide but very flat 16 kHz bandwidth, hence the lower gain per stage and larger number of stages required. Some used receivers, generally 'converted' by a well meaning amateur, have had the IFs retuned and, in some cases, have even had the swamping resistors removed, resulting in very tight selectivity and too much gain.

The last IF amplifier is followed by a diode type AM detector, AGC amplifier, detector, and AGC time constant circuitry. The diode detector is followed by a full wave diode noise limiter (useless - and by passed in my radio!), a selectable 800 Hz audio filter (for CW), and both a local and line level audio amplifier, the latter including a calibrated VU meter. The audio is available via the front panel headphone jack or the local 600 Ohm output on the back. As stated previously, a whopping 0.6 W is available. The balanced line output is available at 600/150 Ohms with 60 mW output also on the back panel.

The AM only diode detector is augmented by a well calibrated tunable Beat Frequency Oscillator for CW and/or SSB reception. The half wave diode detector is a poor substitute for a product detector and thus CW/SSB reception is suboptimal. Since the detector overloads with the BFO signal and a strong received signal, one should set the receiver on manual gain control (MGC) with the AF gain at maximum and the level adjusted by the RF gain control. Reception is still well below par on SSB and CW. An AM receiver, indeed!!

I traded a Drake 2B with a homebrew digital display and $60 for my Collins R390A to a ham at a hamfest flea market over thirteen years ago. I had been trying to find an R390A I could afford for years, especially since I attended a U.S. Navy E.T. school on the radio in '69. When I purchased the radio I had just graduated from Auburn with a BS in Physics and was unemployed and living with my wife, two sons, and Harriet (our pregnant 4 yr. old tabby) at my mother-in-law's house. The radio was in a metal modern Bud cabinet and Harriet began a career of reposing atop the warm radio. With a pair of headphones I could drown out my mother-in-law's incessant "Why don't you go out and get a job?" diatribes.

The electrical interference was nearly as bad as the QRM-in-law, so I finally did get a job as director of field engineering at a small computer company and we moved into a large apartment complex. Reception was quite good at that location, but I wanted more of an antenna farm. I bought my current house a year or so later. I couldn't take the computer job, after all, I might really make some money! I started teaching fulltime in the fall of '75.

I used the R390A as my main receiver for eight years. Only after acquiring my R70 did it fall to the second echelon. As I have previously stated, I have owned many radios over the years. I would be hard pressed to exist without my easier-to-band-scan (yes, I have even 'list-logged' a few stations in my days!) Icom, but if allowed only one radio, it would still have to be the Collins R390A. Of course, I would have to have my spares and a good source of power, even if stuck alone on the proverbial desert isle. I'd probably still have power line interference. It follows me everywhere. It must be my electromagnetic personality.

How do I use my R390A? Sometimes I don't use it! In fact, I just recovered it from my darkroom after a hiatus of several months due to my temporary DXing burnout. My desk was under a great deal less of a strain without the old receiver (Ha! It oughta be glad I'm not sitting on it!), but it does look much better with the hollow state behemoth on it! Unfortunately, I missed Ramadan and extended hours of operation of all of those rare Indos. No doubt those rare 120 & 90 mb PNG's have already dropped off as well. Oh well, I'll probably even miss that opening to Tristan da Cunha and even Nibi Nibi as well!

When DXing, I generally use the radio as follows; General band conditions, WWV propagation reports, DX programs, etc. are monitored on either my Sangean '803 or my Uniden '2021. Specific DXing requires the use of the R70 and its tiring audio until a signal is heard 'in the noise' or undetectable because of adjacent channel QRM. Now it is time for the large caliber artillery, the R390A.

The R390A's superb selectivity allows channel splits, even on MW, to come roaring through. I always start on 4 kHz and occasionally move to 2 kHz. The diode detector does introduce distortion when offset tuning a sideband with the 2 kHz filter, but sometimes it is necessary. Generally, an in-the-noise signal on another radio will have a slightly improved signal to noise ratio on the R390A and will be more intelligible on it. The audio is much cleaner as well, making reception of difficult signals much less tiring than with the Icom.

I placed a 10 k and a 1 k Ohm resistor in series across the diode load terminals with the lower value grounded. An audio patch cord is wired across the 1 k Ohm resistor (shield grounded) and fed to the input of a 5

band equalizer with the output fed to an amplifier and tape deck for monitoring and recording. With the other channel of the stereo equalizer, amp, and cassette recorder connected to my Icom, I would generally DX 'in stereo'. Feeding the receivers from different antennas gave me a crude form of diversity reception, a definite aid to weak signal DXing, as the old brain is fooled into disregarding some of the QRM and QRN by the 'stereo' effect. For most of my better 'catches', I switch over to the R390A. In fact, my QSLs from FIBS, Cook Is., Solomon Is., Kiribati, CKFX, etc., were all results of my R390A loggings made while the R70 resided by its side!! The external audio help is definitely a boon to DXing. Continuously recording a listening session on cassette tape via an inexpensive stereo cassette recorder on inexpensive C-60 tapes is also a big help, as you can replay that elusive ID as much as you want. Amazing how the old gray matter can turn "crzzzzz snap pop crxx crackle" into that wanted ID!

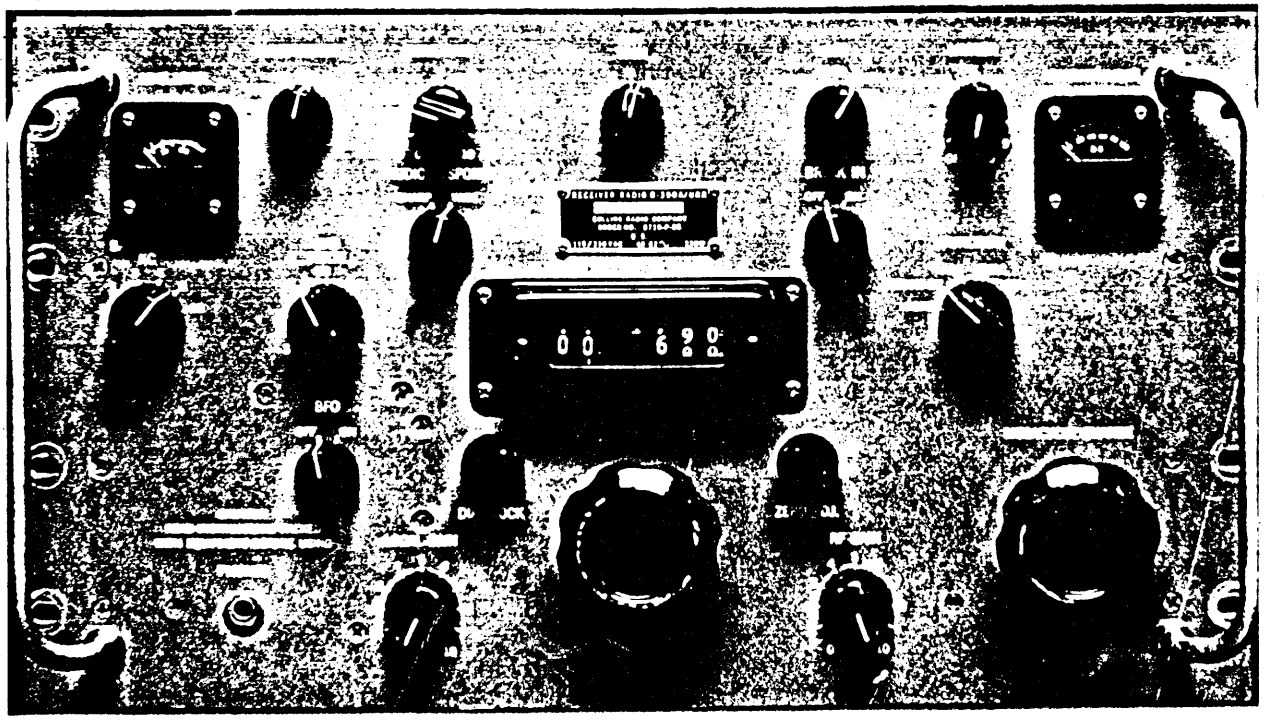


Figure 1. Receiver radio R390A/URR

The R390A can be used in a true space diversity reception system at quite a reasonable cost. Two receivers, each being fed from a different antenna, can be matched in gain by the adjustable IF gain, have their AGC/DIV lines connected together to 'track' with the better signal, and either have their audios combined or fed as 'stereo' to the listener. The sets were designed with this as an option. You could, of course, try the same thing with two NRD-525s at a bit higher cost.

How about other, less fanatical R390A nuts, how do they use the radio? Let me introduce my good friend, even if he has a QSL from Sierra Leone, the first SWL/DXer I have ever met, Kevin Atkins. Kevin's a super sleuth DXer. I am often in awe of his ability to follow the gray line and catch those rare and exotic South Pacific goodies. Kevin's day begins at 4:00 AM CST as he tries to catch the gray line goodies. I often yawn at his recounted catches! Kevin's shack includes the R390A, R70, and CR-2021. Witness a few of Kevin Atkin's comments on the radio:

Why I Love My R390A — Kevin Atkins

After several marginally successful attempts to log Malawi during the 0345-0400 window on my R70, I finally got tired of Chinese music from Okeechobee and Soviet slop from Havana. I love my Icom, too, but on 49 mb after dark I'd just as soon use a Star Roamer. (I guess I'm a little overly sensitive, if you will, after having owned a DX-300 a few years ago.) An R390A does not overload. Period. If you hear it, it's there. This receiver

was designed for use in close proximity to point to point transmitters. You sometimes get splatter, but you don't get overloading. You guessed it - I got Malawi!

Advantages over modern receivers:

* Practically immune to overloading.
* Excellent AM selectivity: .1, 1, 2 (with this filter you don't miss exalted carrier SSB too much), 4, 8, & 16 kHz.
* A quality of audio rarely found in conjunction with such selectivity.
* Probably the most accurate frequency readout ever produced in the pre-synthesizer era... a mechanical digital readout in conjunction with the 100 kHz calibrator. Readout to within +/- 200 Hz is possible with practice.

Disadvantages:

* You'll need a B&D Workmate to hold it. In a metal case, it weighs over 90#.
* Cumbersome to tune. You could hurt yourself trying to go from 3215 to 4995 too quickly.
* Uses BFO for sideband reception. ECSSB not possible.
* It's hard to believe the lack of a notch filter on a receiver of this caliber.
* No nifty memory presets or dual VFO's - it tunes one signal at a time, does it extremely well, then moves on. (Not by itself! JRT.)
* You won't find many people who'll work on it.

Postscript by John Tow

My R390A May reside in my darkroom for several months out of the year, but when it comes time to seriously listen or DX, out it comes. I have found it to be an excellent test bed for new detectors, a tool for evaluating new antennas and tuners, and a warm spot for poor old arthritic Harriet, my DX kitty, to curl up on!

R390A VERSUS R-70

JRT 3/88

TABLE 1

Signal Generator = URM-25D
30% AM modulated by 1 kHz sinusoid

	R390A		**R70** (w/preamp/w/o preamp)	
(S+N)/N	10 db	15 db	10 db	15 db
MHz	Generator Signal Strength in microvolts			
0.900	1.00	3.00	0.30/1.00	0.60/2.00
4.900	0.45	0.95	0.22/0.53	0.52/1.00
15.400	0.40	0.90	0.27/1.00	0.50/1.50
29.400	1.00	5.00	0.40/0.72	0.73/1.20
0.200	-----	-----	2.30/0.95	4.00/1.60

(R390A Bal Ant input connected unbalanced to 50 Ohm source.)

CW SENSITIVITY:
R390A with 0.1 kHz IF selectivity, MGC, Narrow AF filter: 0.06 microvolts for 10 db (S+N)/N
R70 with narrow CW filter (0.500 kHz): 0.07 microvolts for 10 db (S+N)/N

SELECTIVITY:

Receiver:	R390A				R70 (modified)	
Setting:	2.0	4.0	8.0	16.0	Wide	Narrow (FL-44A)
BW @ -60db	3.8	6.9	15.8	22.7	10.0	3.1 kHz

Carrier Meter (4.900 MHz)

R390A	20 db	40 db	60 db	80 db	100 db (reading)
	7.5	27	130	1,600	30,000 (microvolts)

S Meter (4,900 MHz)

R70	S1	S3	S6	S9	20db/S9	40 db/S9 (reading)
	1.8	4.0	16	100	950	10,000 (microvolts)

DRIFT:
R390A From 1 - 30th minute from cold start < 0.2 kHz
R70 Unmeasurable

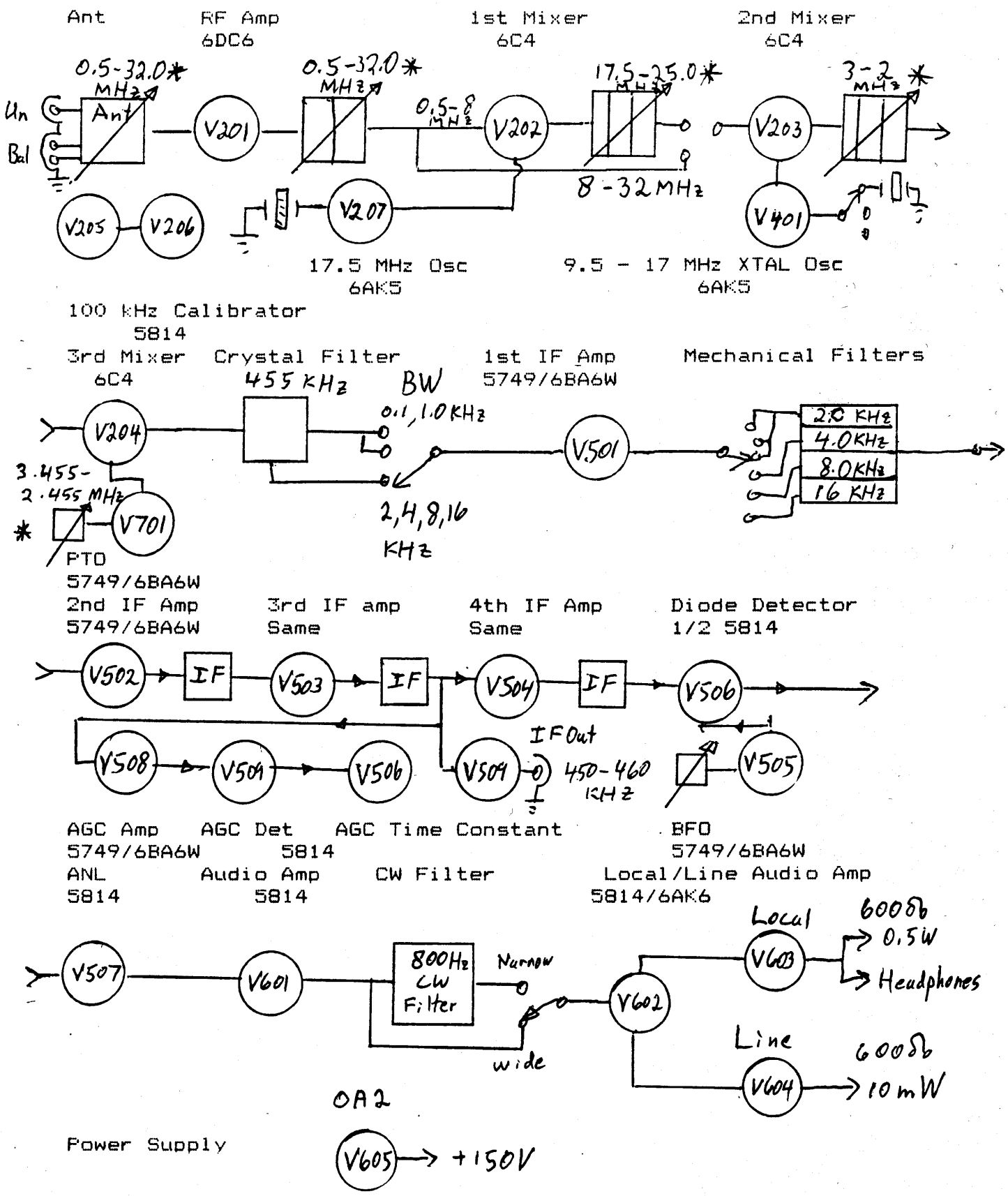
LINEARITY:
R390A with calibration @ 500 kHz: +/- 600 Hz from extremes
+/- 200 Hz within +/- 100 kHz

A.C. POWER: R70: 18 VA R390A: 200 VA (ovens off)

SIZE: (W x H x D)
R390A: 19" x 10.5" x 18" (allowing for handles and connectors)
R70: 11.25" x 4.875" x 14" (allowing for knobs, feet, & conn.)

WEIGHT:
R390A >75 lb. R70: ~10.3 lb.

R390A BLOCK DIAGRAM



* Mechanically Tracking KHz and MHz Knobs

fine tuning