

R-390A OPERATING PROCEDURE:How to Tune and Operate an R-390A/URR

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Having been asked to describe or demonstrate the operation of an R-390A to DXers, and having been requested to write an Operating Procedure for U.S. Navy radiomen concerning this same receiver while at U.S. Naval Air Station Bermuda, I thought that it may be worthwhile to pass these along to IRCAsers and to whoever else would be able to use them. First of all, I will present the Operating Procedure in its entirety, and then some notes and expanded explanations:

R-390A OPERATING PROCEDURE

## 1. Initial Setup:

- A. Set FUNCTION switch (right center of receiver front panel) to STANDBY.
- B. BREAK IN switch position is irrelevant.
- C. Set LIMITER control (top right center of front panel) to OFF (fully counterclockwise).
- D. Set AGC switch (at left of LIMITER control) to MED.
- E. Set ANT TRIM control to midrange ("0").
- F. Set LINE GAIN control (upper left center of front panel) to "0" (fully counterclockwise).
- G. Set LINE METER switch (left of LINE GAIN control) to OFF.
- H. Set AUDIO RESPONSE switch (below LINE GAIN control) to WIDE.
- I. Set BFO PITCH control (lower left of AUDIO SWITCH) to "0".
- J. Set BANDWIDTH KC switch (left of BFO PITCH control) to one of the following positions for corresponding types of emissions:

BANDWIDTH KC	EMISSION
i. 16	local AM or SW broadcast
ii. 8	semilocal AM or SW broadcast
iii. 4	distant AM or SW broadcast
iv. 4	strong SSB transmissions
v. 2	weak SSB transmissions
vi. 1	CW, low level of interference
vii. 0.1	CW, heavy interference

- K. Set BFO ON/OFF switch (left of BFO PITCH control) to OFF.
- L. Set LOCAL GAIN control (lower left of BFO ON/OFF switch) to "0" (fully counterclockwise).
- M. Set DIAL LOCK control (upper right of LOCAL GAIN control) fully counterclockwise.
- N. Set ZERO ADJ control (lower right center of receiver front panel) fully counterclockwise.
- O. Set RF GAIN control (lower right of ZERO ADJ control) to "10" (fully clockwise).
- P. Allow at least 120 seconds of warmup time after placing receiver in standby condition.

## 2. Calibration:

- A. Set FUNCTION switch to CAL.
- B. Set MEGACYCLE CHANGE control (lower right of FUNCTION switch) so that the first two digits (i.e., the digits to the left) of the odometer-type readout dial (central to the receiver front panel) correspond to the first two digits of the frequency to be received.\*
- C. Set KILOCYCLE CHANGE control so that the last three digits of the odometer-type readout dial indicate the nearest even one hundred kHz step to the desired frequency.\*

\*As examples, if ZBML on 1230 kHz is the station to be received, set the first two digits of the frequency dial (using the MEGACYCLE CHANGE control) to read 01, and the last three digits of the frequency dial (using the KILOCYCLE CHANGE control) to read 200. If AFRTS on 15430 kHz is the station to be received, set the first

two digits of the frequency dial to read 15, and set the last three digits of the frequency dial to read 400. If ZFBL on 960 kHz is the station to be received, set the first two digits of the frequency dial to read 00, and set the last three digits of the frequency dial to read +000 (Note that the last three digits of the frequency dial progress from 700 to 800 to 900 to +000, rather than to 1000). If WWV or WWVH is the station to be received, set the first two digits to read 20, and the last two digits to read 000.

- D. Set BFO ON/OFF switch to ON.
  - E. Set LINE METER to "0".
  - F. Set LINE GAIN control "4".
  - G. Tighten down ZERO ADJ control fully clockwise.
  - H. While observing the indication on the LINE LEVEL meter (upper left-hand corner of the receiver front panel), tune the KILOCYCLE CHANGE control until an indication is observed on the LINE LEVEL meter. When this indication is obtained, adjust the LINE GAIN control for an approximately midscale indication on the LINE LEVEL meter, then continue to rotate the KILOCYCLE CHANGE control slowly. Somewhere in the range of rotation of the KILOCYCLE CHANGE control, the indication on the LINE LEVEL meter will be observed to dip and rise again sharply. Set the KILOCYCLE CHANGE control for the minimal indication at the dip of the LINE LEVEL meter. At this point, the odometer dial is calibrated to read frequency accurately, but only within the frequency span to which the MEGACYCLE CHANGE control is presently set. If the MEGACYCLE CHANGE control is set to another frequency span, the calibration procedure should be repeated in order to assure accurate frequency readout.
  - I. Loosen ZERO ADJUST control by rotating fully counterclockwise.
  - J. Set FUNCTION switch to AGC.
3. Tuning:
- A. Set KILOCYCLE CHANGE control so that the last three digits of the odometer-type frequency dial correspond to the last three digits of the frequency to be received. Using the examples cited earlier, in the case of ZBML on 1230 kHz, set the KILOCYCLE CHANGE control to read 230 on the last three digits of the frequency dial. In the case of AFRTS on 15430 kHz, set the KILOCYCLE CHANGE control to read 430 on the frequency dial. In the case of ZFBL on 960 kHz, set the KILOCYCLE CHANGE control to read 960 on the frequency dial. In the case of WWV or WWVH on 20000 kHz, set the KILOCYCLE CHANGE control to read 000 on the frequency dial.
  - B. When the station or stations on the desired frequency is/are audible, rock first the KILOCYCLE CHANGE and then the ANT TRIM control for a peak indication on the CARRIER LEVEL meter (upper right-hand corner of the receiver front panel). Then again adjust the KILOCYCLE CHANGE control for clearest, most intelligible audio from the desired station.
  - C. Set either LINE GAIN or LOCAL GAIN for a suitable level of audio output from the receiver (depending on whichever audio channel, either local [e.g. via the front panel PHONES jack] or line [via rear panel terminal board connections] are used).

Notes and explanations

Here are some additions to the basic Operating Procedure that will be of interest and use to the DXer. The additions are keyed to correspond to the basic step of the procedure:

- 1.(D.) AGC Switch In general tuning, set this to FAST. The reason is that if the AGC Switch is set to MEDIUM or SLOW (especially SLOW), the receiver's AGC response and recovery time is longer. This means basically that if one tunes from a strong station, the receiver will be desensitized for a

length of time (depending on the setting of the switch), possibly allowing the user to pass over a weaker signal which would not be immediately audible because the receiver has not recovered its full sensitivity yet. Conversely, in passing immediately from a weaker to a stronger signal, the stronger signal will be distorted until the time constant set by the AGC switch has allowed the AGC to rise to the level corresponding to the stronger signal.

- (H.) AUDIO RESPONSE Only rarely would the non-radio amateur have occasion to use the receiver with the AUDIO RESPONSE switch in the NARROW position. In the NARROW position, a 800-Hertz bandpass filter is placed in the audio path of the receiver. This is intended for use in copying CW under conditions of extreme noise and/or interference. It can be used to advantage, also, under similar conditions for performing PFM's.
- (J.) BANDWIDTH KC The 2-kHz and 1-kHz bandwidth positions can be used to advantage for receiving signals under weak-signal or severe interference conditions. In general, especially with the 1-kHz bandwidth, the 2-kHz and 1-kHz bandwidths should be used in conjunction with the BFO. The narrower the bandwidth in use, the less the noise and interference that will be heard. But about 3 kHz bandwidth minimum is necessary to pass voice frequencies when receiving A-M transmissions to allow for inclusion of the carrier. Since the lowest voice modulation frequency likely to be of use is about 300 Hz, this means that frequencies of 0 to 300 Hz are of little practical value in generating intelligibility. There will likely be noise and heterodynes around this area of 0 to 300 Hz. By setting the receiver bandpass so that it "straddles" the range of frequencies about 500 to 2,500 Hz above (or below) the frequency of the desired signal, and reinserting the carrier frequency using the BFO, much reduction in interference can be realized in some cases. No further effort will be made to describe this technique here. The technique is simple, but is very difficult to describe.
- (O.) RF GAIN control This will most always be operated "wide open" (fully clockwise). About the only time that it won't is when reinserting a carrier on a fairly strong signal, in order to prevent distortion due to characteristics of the diode detector used in the R-390A. This is more likely to be done when listening on shortwave frequencies.

2. Calibration It may not be obvious, but is nonetheless true that the R-390A may be calibrated for frequency readout on signals of exact known frequency. If signals of known frequency are available, follow this procedure:

- L. Set FUNCTION switch to AGC.
- M. Set MEGACYCLE CHANGE control (lower right of FUNCTION switch) so that the first two digits (i.e., the digits to the left) of the odometer-type readout dial (central to the receiver front panel) correspond to the first two digits of the frequency of the known station.\*
- N. Set KILOCYCLE CHANGE control so that the last three digits of the odometer-type readout dial indicate the last three digits of the frequency of the known station.\*

\*As an example, if WABC on 770 kHz is the station to be used for receiver calibration, set the first two digits of the frequency dial (using the MEGACYCLE

CHANGE control) to read 00, and the last three digits of the frequency dial (using the KILOCYCLE CHANGE control) to read 770.

- O. Set BFO ON/OFF switch to ON.
- P. Set LINE METER to "0".
- Q. Set LINE GAIN control to "4".
- R. Tighten down ZERO ADJ control fully clockwise.
- S. While observing the indication on the LINE LEVEL meter (upper left-hand corner of the receiver front panel), tune the KILOCYCLE CHANGE control until an indication is observed on the LINE LEVEL meter. When this indication is obtained, adjust the LINE GAIN control for an approximately midscale indication on the LINE LEVEL meter, then continue to rotate the KILOCYCLE CHANGE control slowly. Somewhere in the range of rotation of the KILOCYCLE CHANGE control, the indication on the LINE LEVEL meter will be observed to dip and rise again sharply. Set the KILOCYCLE CHANGE control for the minimal indication at the dip of the LINE LEVEL meter (note that station modulation will cause a residual, varying LINE LEVEL meter indication, in contrast to 2. (H.) of the basic procedure). At this point, the odometer dial is calibrated to read the station frequency accurately. Note that if the MEGACYCLE CHANGE control is set to another frequency span, the calibration procedure should be repeated in order to assure accurate frequency readout.
- NOTE: Because of the range of adjustment of the KILOCYCLE CHANGE control when the ZERO ADJUST control is tightened down, it is possible to mistakenly calibrate the frequency readout dial on a side channel 5 or even 10 kHz from the desired, standard station. Listen to ascertain that the tuned station is the desired one. Set the BFO ON/OFF switch to the OFF position when doing this.
- T. Loosen ZERO ADJUST control by rotating fully counter-clockwise.
- U. Set BFO ON/OFF switch to OFF position.
- 2.(K.) Set BFO ON/OFF switch to OFF position. (This was inadvertently omitted from the original Operating Procedure. This would be obvious to anyone except to whoever is likely to be using this procedure.)

Assuming that you own an R-390A/URR, you may be interested in two other reprints of articles that I wrote concerning the R-390A. They are: R-390A/URR: A Receiver Review (reprint R18, 5 pages) and R-390A/URR Optimization and Alignment Check (reprint T34, 2 page), available from IRCA Reprints; P.O. Box 17088; Seattle, Washington 98107. These are 9¢ per page (11¢ per page for IRCA non-members) plus an SASE.