



# PROCEDURE FOR TUNING RECEIVER TO TRANSMITTER

3/15/82

Three methods are offered here for tuning your receiver to match your transmitter (any make or frequency): using an oscilloscope (most accurate); a voltmeter (reasonably accurate); or without any test equipment except your transmitter and a working servo.

When using an oscilloscope or voltmeter, the instrument should be connected between ground (-) (which is the land where the black battery wire connects) and the connection point indicated on page 2. If needed, solder a 2" length of insulated wire to the connection point to facilitate connection of scope or meter. Be careful this lead does not short out to anything or the detector transistor could be destroyed.

Oscilloscope to be used must have a minimum sensitivity of 100 mv/cm, preferably greater. A calibrated time base is not essential, but vertical voltage scale calibrations are helpful.

A vacuum tube voltmeter or multimeter of 20K ohms-per-volt is recommended for accurate voltage measurements. An AC scale of 5, 6 or 10 volts is needed.

For all tests, a properly calibrated and operating transmitter is required.

Depending upon equipment available, select your tuning method and proceed as instructed below. Note - During tuning, receiver should be positioned on non-metallic work bench with antenna hanging vertically.

## RECEIVER TUNING USING AN OSCILLOSCOPE

1. Connect oscilloscope between ground (-) and scope connection shown on page 2 for specific Rx being tuned. Set scope on high scale. Readjust sensitivity during tuning for best display.
2. Using a small screwdriver or tuning wand which exactly fits the slots in the front end tuning slugs, run both slugs up and down within their coil forms several times to loosen the thread fit and prevent binding and slug breakage. Set tuning slugs on both receiver coils approximately 1/8" below top of coil form. Do not adjust I.F. cans.
3. Place transmitter on work bench 2 to 3 feet from receiver, with antenna on, but down. Turn transmitter ON.
4. Turn receiver ON and observe oscilloscope. Adjust scope for best display. Output should be a positive-going waveform with no negative spikes.
5. Adjust yellow I.F. can for maximum positive signal scope amplitude. Do the same on white and black cans, then RF and Mixer coils. Amplitude should show some increase or change with each adjustment.
6. Move transmitter 10-15 feet away and repeat peaking procedure on I.F. cans and front coils.
7. If receiver is showing a correct strong signal at this time, remove transmitter antenna completely and place transmitter a few feet from receiver so that a signal is discernible on scope at maximum sensitivity setting. Repeak I.F. cans and front end receiver coils for maximum amplitude.
8. Reposition transmitter as far as possible from receiver and still maintain scope output signal. Very carefully repeak all I.F. cans and front end coils. Basic tuning should now be complete.
9. Melt a very small amount of candle wax over each I.F. tuning adjustment. Caution: Too much hot wax will pull I.F. cans out of adjustment.
10. Install receiver case and perform final tuning as covered in steps 26 through 30.

## RECEIVER TUNING USING A VOLTMETER

11. Connect voltmeter between ground (-) and output on page 2. Set Meter to 5V, 6V or 10V AC scale.
12. Tune receiver in same manner as outlined in steps 2 through 10

above, except that meter reading will be for a maximum dip (minimum reading) on voltmeter in all cases. Please note that antenna - off readings will be higher than antenna - on readings. Under any circumstance, transmitter must always be positioned so that a voltmeter change can be observed with any tuning change. Very careful observation is necessary to obtain optimum peak tuning of all coils.

## RECEIVER TUNING WITHOUT TEST EQUIPMENT

13. Place transmitter on work bench, about one foot from receiver antenna, with Tx antenna on, but down.
14. Plug battery into receiver. Connect an operating servo to Channel 1 receiver output.
15. Set tuning slugs on receiver RF and Mixer coils about 1/8" below top of coil forms. Do not adjust I.F. cans.
16. Turn transmitter and receiver ON. If everything is working properly, servo should move to approximately neutral position. If not, the problem must be located and corrected before proceeding with tune-up.
17. Have a second person hold transmitter and move Channel 1 control back and forth to operate servo. Move transmitter away from receiver until servo stops operating properly. At this point, have helper continue to operate control on transmitter.
18. Tune RF coil, then Mixer coil until servo once more follows transmitter control.
19. Rotate slug on RF coil to find both adjustment extremes where unit stops operating. Set coil slug midway between these extremes.
20. Do the same thing on the second (Mixer) coil.
21. Move transmitter away until servo fails to respond to control signals. Adjust yellow I.F. can, then white and black I.F. cans until all are tuned to mid-point settings and servo follows correctly.
22. Remove transmitter antenna. Move Tx close to receiver antenna until control is lost. At this Tx position, carefully retune all three Receiver I.F. cans in turn until operation is regained.
23. Continue moving transmitter further away and tuning all I.F. cans and front end coils until no more range can be obtained.
24. Apply a small amount of melted wax to the I.F. can adjustments.
25. Install receiver case and perform final tuning as follows.

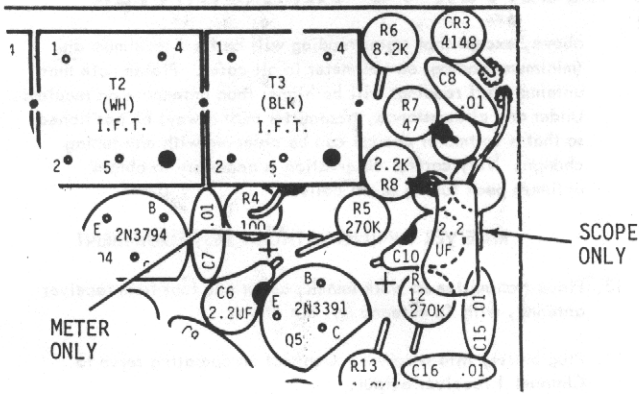
## FINAL RECEIVER TUNING

Final tuning of RF and Mixer coils must be performed with receiver in case, or a false tune may result.

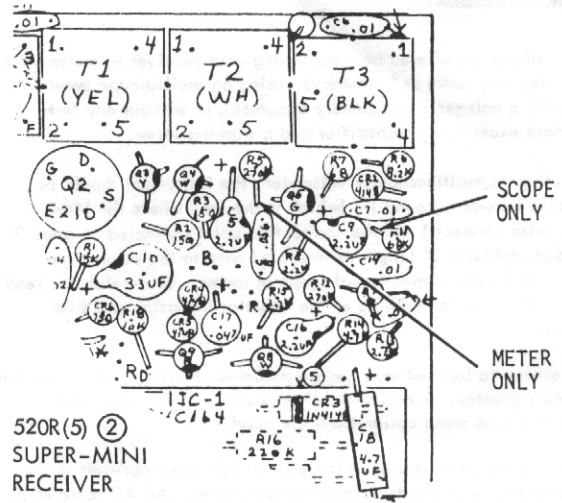
26. Set receiver on a large cardboard box in an open area away from buildings, wires, autos, etc., with antenna hanging vertically.
27. Plug battery into receiver. Connect servo to Channel 1 receiver output only.
28. Remove transmitter antenna. Turn transmitter and receiver ON. Have another person hold transmitter near receiver and operate Channel 1 control. Servo should follow control action.
29. As transmitter operator moves away from receiver, tune both Rx front end coil slugs alternately until maximum range is obtained. Use a small plastic wand for tuning. Do not attempt to adjust I.F. cans.
30. Once tuned, seal RF and Mixer coil slugs with wax.

## RANGE TEST

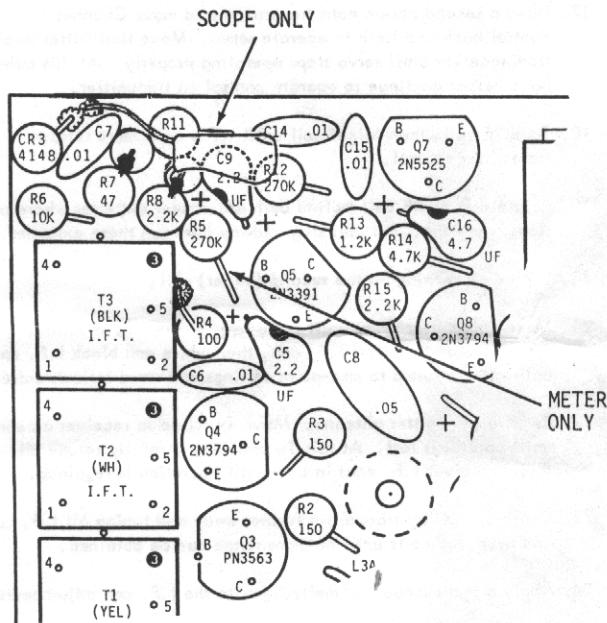
Refer to system operating instructions for range test procedures. Basically, average antenna-up ground range should be 1000 feet or more with receiver positioned 3 feet above ground level. Air range will be 3 to 5 times your ground range.



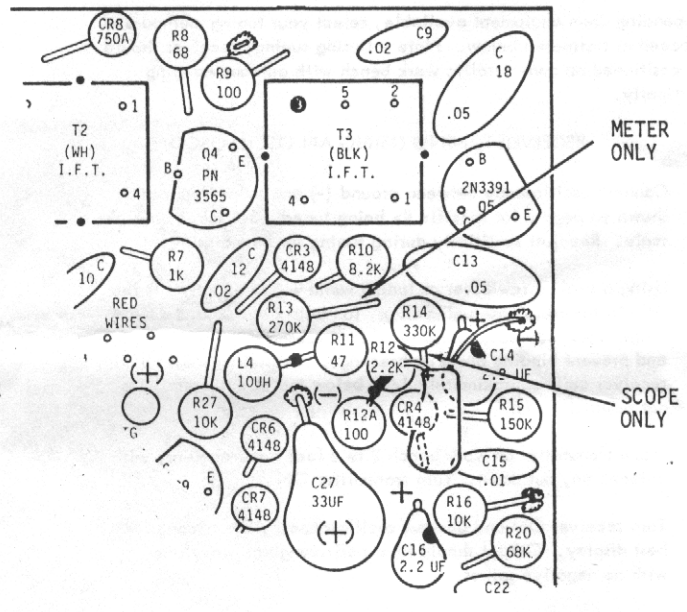
520R(5) TINI  
RX & TINI-  
TWIN BLOCK



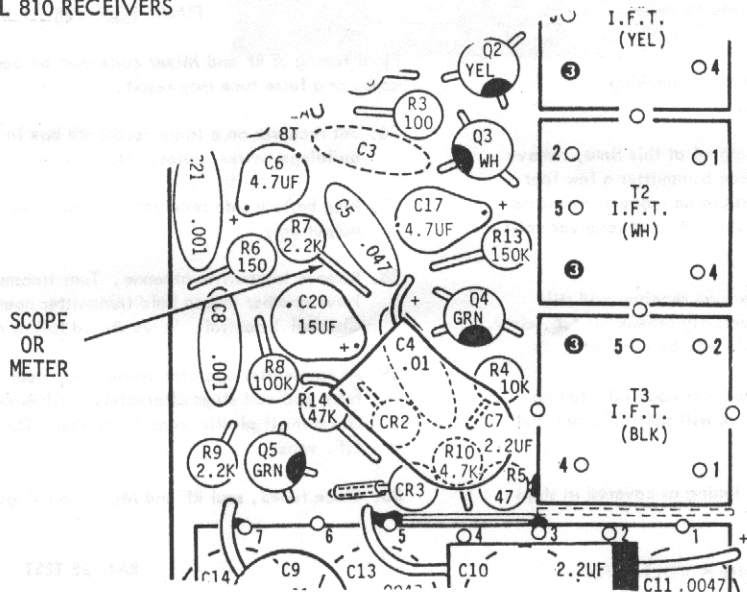
520R(5) ②  
SUPER-MINI  
RECEIVER



520R(5) ④ AND ⑤  
MODEL 810 RECEIVERS



540R(6) PROFESSIONAL  
RECEIVER



520R(5) ⑥  
SUPER-MICRO  
RECEIVER

CONNECTION POINTS FOR TUNING RECEIVERS