

INSTRUCTIONS FOR OPERATION  
OF  
CITIZEN-SHIP MODEL RSH  
SINGLE CHANNEL SUPERHETERODYNE RECEIVER

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DRAWINGS

INSTRUCTIONS FOR OPERATION  
OF  
CITIZEN-SHIP MODEL RSH  
SINGLE CHANNEL SUPERHETERODYNE RECEIVER

1. INSTRUCTIONS FOR INSTALLATION AND OPERATION OF MODEL RSH RECEIVER.

- A. Your CITIZEN-SHIP RSH Receiver is a highly selective, miniaturized, relayless, superheterodyne crystal controlled tone operated receiver that will operate on any of the F.C.C. frequency assignments from 26.995 through 27.255mc with no interference from a transmitter on any other of the five frequencies. CITIZEN-SHIP escapements are performance matched for best operation with this receiver.
- B. This receiver will operate only from a Tone Modulated transmitter tuned to the correct frequency. CITIZEN-SHIP Model SPX is especially designed to operate it and should be used. However, our TTX, SL-6 or TMS and many other tone transmitters with an audio frequency of 400-1000 cycles may also be used when tuned up with the proper crystal. (An on-off carrier transmitter will not operate this set.)
- C. The RSH Receiver is shipped adjusted and tuned for reception on the frequency which is stamped on the box. The transmitter used must, of course, be tuned and adjusted to transmit on the frequency for which the receiver is operating.
- D. Before you become alarmed at the frequency of the crystal in the receiver, the frequency of the receiver crystal is always 0.455mc lower than the frequency at which the transmitter operates. Example: If you have a receiver tuned for 27.145, the receiver crystal should read 26.690 (i.e.  $27.145 - .455 = 26.690$ ).

2. CRYSTALS AND SELECTION OF OPERATING FREQUENCY OF RECEIVER.

- A. If you desire to select another of the available 27mc frequencies, and feel that you can not or do not wish to do the work yourself, you may ship the set to CITIZEN-SHIP and we will exchange crystals and realign and retest the set for \$2.50. (The receiver crystal is soldered in place, and although eyelets are provided to facilitate resoldering a different crystal, care must be used not to injure the circuit board.)

Your transmitter will also need to have the crystal changed to match your receiver. Instructions with your CITIZEN-SHIP transmitter describe how you can change crystals and retune the set with the use of a field strength meter. If you prefer to ship the set to us for this work, charges will be \$2.50 for it also. No transmitters other than CITIZEN-SHIP manufactured will be adjusted.

- B. Warning! It is absolutely essential to obtain crystals of the correct frequency and tolerance. Because of the selectivity of the receiver, the crystals must be ground to a tolerance of .0025%.

- C. Crystals must be used in pairs as follows:

TRANSMITTER CRYSTAL FREQ.	RECEIVER CRYSTAL FREQ.
27.255	26.800
27.195	26.740
27.145	26.690
27.095	26.640
27.045	26.590
26.995	26.540

3. ESCAPEMENTS

Either CITIZEN-SHIP Escapement available with this receiver, the PSN-2 or the SE-2, is best suited for proper operation. Other types, however, may also be used. In general, 8 to 10 ohm escapements work best. It is advisable to use the lightest weight escapement rubber possible, a 1/8" loop being recommended. See escapement instructions.

4. WIRING

- A. With CITIZEN-SHIP Escapements:

The RSH requires only 2.4 - 3 Volts and is intended for operation on two pen cells when used with either the CITIZEN-SHIP PSN-2 or SE-2 escapement, or the CITIZEN-SHIP SE-2-M Escapement



for quick blip motor control (See Figure 1).

B. With Other Escapements:

Escapements produced by some manufacturers pull in at 1.8 Volts or even higher. This does not give enough safety factor when two cells are used for receiver and escapement. Figure 2 shows wiring with three cells (recommended for all escapements with 1.8 Volt or higher pull-in values).

5. BATTERY REQUIREMENTS.

Energizer Type pen cells can give extended battery life and improved reliability of operation. Two excellent types are the Eveready #1015 and E91. The 1015 has the advantage of lower cost, more easily obtained, and lighter in weight. However, this cell is constructed with what is known as a "false bottom". This cap must be removed before soldering to the cell by carefully cutting the cardboard case approximately 3/64" from the negative end.

The E91 is of similar construction, but the cap is welded to the inner electrode and must not be removed.

Nicads should have a 450 MAH capacity.

6. END USE OF BATTERIES.

A. Pen Cells.

Discard batteries when voltage of each cell drops to 1.1 Volts with signal being received from transmitter. After battery drops below 2.2 Volts escapement may still pull in, but range will be greatly reduced.

B. Nicads.

See manufacturer's instructions for recharging.

7. MOUNTING.

- A. The CITIZEN-SHIP RSH Receiver has two recommended mounting positions: with the printed circuit base vertical and forward, or horizontal and downward. The vertical position is definitely more crash-proof. If space is available, completely wrapping the receiver in 1/4 - 3/4" thick sponge rubber is ideal. Make the width of the sponge 2 - 1/2" or more and the length enough to make the wrapped receiver fit snugly between the fuselage sides.

Another good mounting method is to use a vertical removable plywood board with receiver on one side and batteries on the other. Sponge rubber with 1/2 - 3/4" thickness or some other shock protection material should be used between receiver base and plywood to protect the receiver. Either rubber bands or glue may be used to secure the receiver to the sponge rubber. Do not glue the entire printed circuit base to the sponge rubber as this makes very difficult any repairs to the receiver that might be necessary. Use glue only at the ends of the receiver and possibly one spot in the center.

- B. Batteries and receiver must be mounted to give proper balance to the plane, but batteries should always be forward of the receiver.

8. ANTENNA.

- A. Several arrangements of antenna are possible. A stiff steel wire at least 18" long may be mounted vertically at any convenient point and the antenna lead from the receiver soldered to this. A wire may be stretched from the receiver through the fuselage or to the top of the rudder fin. With a super-heterodyne receiver, the longer the antenna the better the range. A total antenna length of 28-30" is usually entirely adequate. Leave some slack in the antenna lead into the receiver, but do not wind this lead in and around other wiring as range might be reduced.

9. RETUNING AND ADJUSTING.

- A. The RSH Receiver is tuned and adjusted at the factory. Only the antenna coil may need adjustment after the receiver is installed in the plane and connected to the plane's antenna. If ground range is adequate (2 to 2 - 1/2 blocks) retuning is not necessary nor recommended.

- B. Assuming that the proper voltages have been connected to the receiver, connect a voltmeter (0 – 3 or higher range) across the escapement coil (See Figure 1). Make sure that the transmitter you are using is equipped with the correct crystal to go with the frequency of the receiver.
- C. With the transmitter turned on, you should get a reading of 2.4 – 2.8 Volts when the operate button on the transmitter is pushed. If you get nothing, recheck your crystal frequency and make sure the set is wired properly. DON'T START ADJUSTING ALL THE COILS on the assumption that they are out of tune. We know they were properly adjusted at the factory.
- D. Now remove the antenna from the transmitter and place it as far away from the receiver as a reading of 1.5V – 2.0V can be seen. This is probably only a few feet. Using an all-bakelite screw driver or a wooden dowel sharpened to a wedge-shape, turn the antenna coil core back and forth until the highest reading is obtained on the volt meter. See Figure 1 again for location of antenna coil adjustment.
- E. If the voltmeter reads 2.5 Volts with the antenna out up to two feet or more, it is inadvisable to make any further adjustments. If, however, the set seems definitely weak, and this can only be ascertained on a distance check with the antenna in the transmitter, it is permissible to readjust the IF coils for the highest reading in the same manner that you adjusted the antenna coil. Never turn these cores more than an eighth of a turn, because if more adjustment than that is necessary it means the crystals are wrong. It is advisable to mark the location of each coil adjustment before beginning as it is easy to get confused.
- F. The oscillator coil slug adjustment has been made at the factory and will never need changing.
- G. If there is any doubt in your mind, distance check the receiver before flying.

#### WARRANTY

Your CITIZEN-SHIP Model RSH Receiver is warranted by the manufacturer to be free from defects in material and workmanship. However, the transistors are known to be operative from testing of the set and we cannot guarantee them against damage caused by incorrect voltage.

Any receiver failing to operate within 30 days after date of purchase will be repaired or replaced free of charge upon being returned to the factory. This warranty does not apply to failure of operation due to exhausted or improper batteries.

If your receiver is damaged in shipment, you should file a claim with the carrier immediately upon noting the damage.

This warranty does not apply if, in our judgment, the receiver has been tampered with or received abusive treatment beyond that encountered in normal usage.

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## MODEL RSH WIRING DIAGRAMS

FIG 1

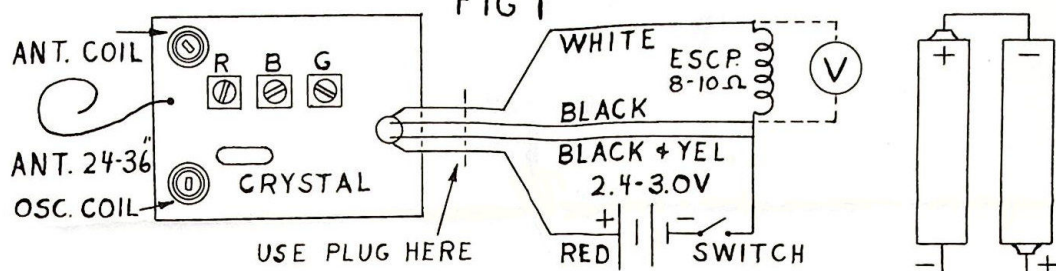


FIG 2

