desired. (See catalog.) If you wish to order your own, be sure to use the following specs.

Resonance	Parallel
Load Cap.	22 PF
Mode	Third O.T.
Holder	HC-25/U
Tolerance	.0015%
10M Formula	F - 10.7
6M Formula	F-10.7
2M Formula	(F-10.7)/3
220 MHz Formula	(F-10.7)/4

POWER AND SPEAKER CONNECTIONS.

Operating power required is +13.6 Vdc at 150 to 200 mA peak. Idling current is 40-50 mA. A well regulated power supply should be used. Be sure the power source does not carry high voltage or reverse polarity transients on the line, since semiconductors in the receiver can be destroyed. Positive and negative power connections should be made at E3 and E1, respectively. OBSERVE POLARITY! Be sure to run a ground lead to the power supply; do not depend on chassis ground, which may cause noise pickup.

An 8 ohm loudspeaker should be connected to E2 with ground return to E1. Use of lower impedance speaker or shorting of speaker terminal can result in IC damage.

ALIGNMENT.

NOTE: The tuning slugs in coils L1-L6 should always be adjusted with the proper plastic tuning tool. A loosely fitting or rounded tool may crack the slugs. The variable capacitor should be adjusted with a plastic tool with a small metal bit. I-F transformer T1 can be adjusted with any screwdriver, but do not force it at the ends of its range. All adjustments should be set to the center of their ranges before power is applied, except squelch control R27 which should be set fully counterclockwise. The variable capacitor has a small arrow stamped in the metal rotor plate. Maximum capacitance occurs with the arrow pointing to the round end; and center range occurs with arrow pointing to one side or the other.

a. Install channel crystal in socket Y1.

b. Connect speaker and 13.6 Vdc.

c. Connect signal generator with coax clip lead to TP4 and ground. Set for about 1 mV output at exactly 10.700 MHz. Check with counter if necessary. Connect accurate VTVM to TP3 (right hand lug of volume control). Adjust detector transformer T1 for exactly + 2.75 Vdc. Remove test leads.

d. Connect VTVM to TP2. Adjust oscillator coil L1 until oscillator starts and then peak it for maximum. (Typical indication is + 1.5 to 2.8 Vdc.)

e. Connect vtvm to TP3. Connect signal generator to antenna jack J1 and set it for a strong signal at the exact channel frequency. Adjust netting capacitor C2 for exactly + 2.75 Vdc at TP3, same as obtained in step b when detector was aligned. This is the reference voltage you should get whenever an on-frequency signal is received. Disconnect vtvm.

f. Connect oscilloscope with 10:1 probe to TP2 (top of R30). Set scope for most sensitive range (e.g., 20mV P-P) to view 455 kHz signal. Alternately adjust the following coils for maximum response on the scope, keeping generator level as low as possible to still get an indication for tuning: L2, L3, L4, L5, and L6. Remove scope.

g. If desired, L2-L6 can be readjusted slightly for best noise figure, i.e., best quieting with ac voltmeter connected across speaker, or best SINAD. A slight improvement may be made in some cases if you want to bother. Expected sensitivity should be about 0.2 to 0.3 uV for 12dB SINAD (if you have equipment to measure such) or about 0.3 to 0.4 uV for 20dB quieting. (This receiver has an extremely square passband which results in less quieting sensitivity than SINAD sensitivity, which is the true measure of how well a receiver hears.)

h. Try adjusting SQUELCH control R27, and observe action with various signal levels. If desired, values of R26 or R28 can be changed to set minimum or maximum squelch range. Note that a 3 dB hysteresis is built into the squelch circuit to prevent squelching on fluttering signals. I.e., once the squelch opens, the signal level must drop at least 3dB below opening level before squelch closes again. R22 may be removed to lessen the hysteresis effect, or it may be replaced with a lower value for more hysteresis if desired.

COMMERCIAL BAND OPERATION.

If the unit is to be used on a frequency outside the normal ham band for which the unit was designed, capacitor values in tuned circuits can be changed where necessary. If a tuning slug tends to be out of the coil as a tuning peak is approached, less capacitance is required; and more capacitance is required if the slug tends to be fully engaged in the coil winding.

TROUBLE SHOOTING.

The usual troubleshooting techniques of checking dc voltages and signal tracing work well in troubleshooting the receiver. A dc voltage chart and a list of typical audio levels are given to act as a guide to troubleshooting. Although voltages may vary widely from set to set and under various operating and measurement conditions, the indications may be helpful when used in a logical troubleshooting procedure.

The most common troubles in all kits, based on our experience, are interchanged components (so you don't notice while building), cold solder joints, and solder splashes. Another common trouble is blown transistors due to reverse polarity or power line transients. It is a good practice to use a fuse and a reverse diode at the input of any homebrew gear. This practice can save much work and expense after an inadvertent mistake later on. Any relay coils on the B+ line should also have a reverse diode connected right across the coil to absorb the reverse transients which relays produce. Remember if you encounter problems during initial testing that it is easy to install parts in the wrong place. Don't take anything for granted. Double check everything in the event of trouble.

If the receiver is completely dead, try a 10.700 MHz signal applied to TP4. Trace the signal with a scope. Also, check the 10.245 MHz oscillator with a scope. A signal generator on the i channel frequency can be injected at various points in the front end. If the mixer is more sensitive than the if amplifier, the if stage is suspect. If audio is available at the volume control (as indicated on scope) but not at speaker, U1 may have been damaged by a transient on the B+ line or a short on the speaker line, or the squelch circuit may be bad or out of adjustment. The wiper of the SQUELCH pot can be grounded to force the squelch circuit open.

Be sure to use proper tools for alignment, as described in Construction section. Powdered iron slugs are made by compressing fine carbon-iron powder into shape. They are rugged under normal conditions; however, a worn tuning tool can slip in the hex slot and apply lateral pressures great enough to fracture a core.