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**International Crystal 750H 750HB Owner's Manual**

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Manual 170-327  
Issued 3/18/64  
Revised 7/15/64

**EXECUTIVE**  
**MODELS 750-H & 750-HB**  
**OPERATION and MAINTENANCE**  
**MANUAL**

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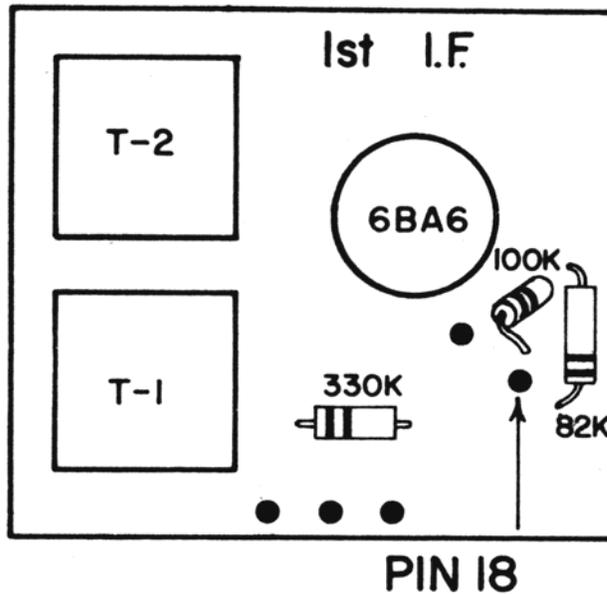
INTERNATIONAL  
Crystal Mfg. Co., Inc.  
18 N. Lee  
Oklahoma City, Oklahoma

MODEL 750-H & 750-HB

When the RMO-24HB is to be used with a Model 750-H TRUNK unit, the following addition must be made to the trunk unit.

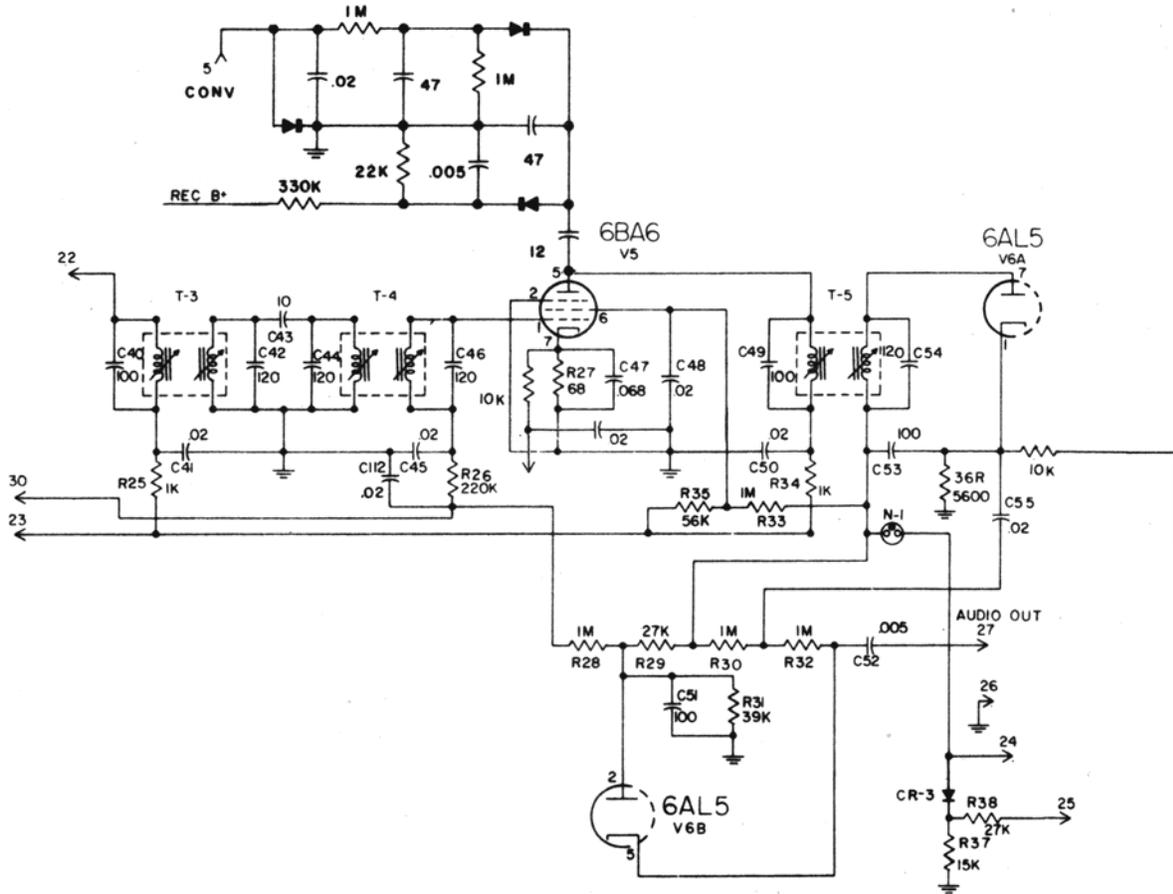
Furnished with the RMO-24-HB you will find a blue terminal connected to a piece of blue wire with a printed circuit board power pin connector fastened to the other end of the wire.

Slip the power pin connector end of the wire through the opening in the trunk unit front panel marked PL-10. Snap the blue terminal bushing in place in the front panel and connect the other end of the blue wire to power pin #18 on the 1st IF board.



MODEL 750-H & 750-HB

Beginning with units bearing serial Nos. YF-20000 and XF-14000 respectively the last IF board part #300-178 has been changed as shown below.



New printed circuit board part No. 300-178-1.

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## SECTION I

### GENERAL

The INTERNATIONAL EXECUTIVE, Models 750-H and 750-HB are the latest of the Executive series designed for remote control operation. This Citizens Band unit combines a sensitive and selective dual conversion receiver with a highly stable and efficient crystal controlled transmitter. The transmit and receive frequency selector circuits are housed in the RMO unit.

A frequency synthesizer is provided in the RMO unit for the selection of any one of the 23 citizen band channels. A squelch circuit is built-in to provide receiver quieting during periods when no signal is being received. The crystals supplied have a frequency tolerance of .005% when used in the EXECUTIVE.

The illuminated 12 position CHANNEL selector dial allows the operator to instantly select the desired channel in two ranges. With the HI-LO switch in the LO position, channels 1 through 12 are selected by the CHANNEL selector dial and when placed in the HI position, channels 13 through 23 are selected by the CHANNEL selector dial.

The EXECUTIVE has been designed with flexibility of installation in mind. The Executive models 750-H and 750-HB are identical as far as circuitry is concerned. The model 750-H with its smaller remote control unit and separate speaker case is designed primarily for mobile installation whereas the 750-HB with the larger remote control unit, enclosed speaker and "S" Meter is designed for base station operation. Both units will operate from 6 or 12 VDC and 115 VAC. They may be used with a base loaded whip antenna, regular whip, ground plane, beam and other types of antennas.

Though the unit is very versatile, it is not to be expected that either receiving or transmitting results will be the same in every installation. As in all radio communications and particularly in VHF application, the type of antenna, its location above ground, the noise present in the area and other factors are bound to affect the results obtained.

## SPECIFICATIONS

### Receiver:

Tuning Range	Crystal Controlled-any channel, 1 through 23
Sensitivity	Usable to .5 microvolts
Selectivity	50 db down at 10 kc 60 db down at 20 kc
Image Rejection	Better than 50 db down
Audio Output	2.5 watts into 4-6 ohms
Speaker Impedance	4-6 ohms
Squelch range	.5 to 20,000 microvolts. On-Off differential is approximately 1 microvolt, at 5 microvolt input
Noise Limiter	Automatic, series-gate

### Transmitter:

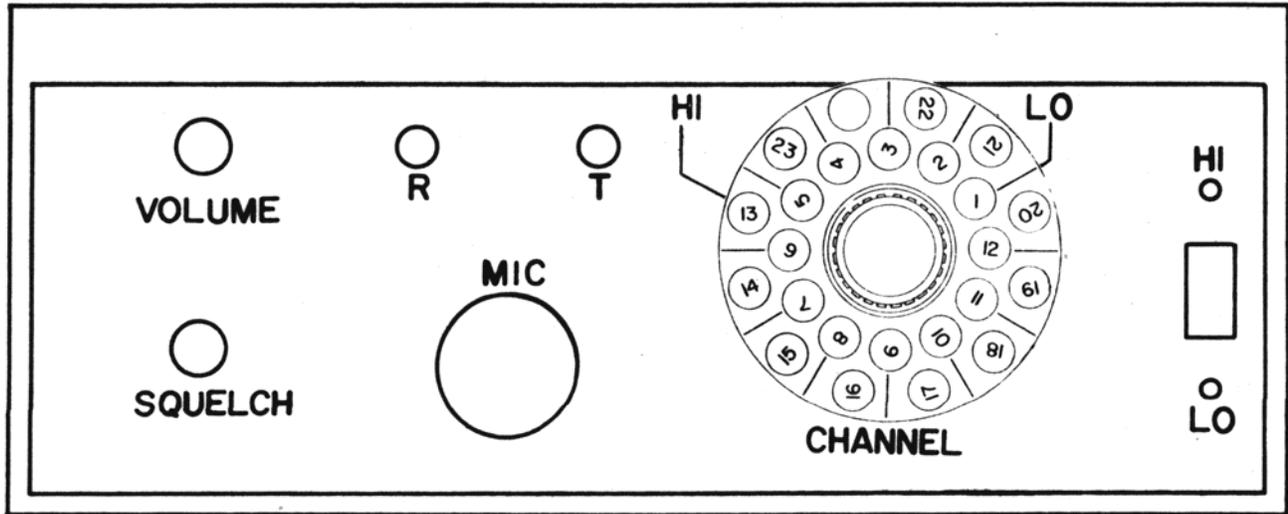
Tuning Range	Crystal Controlled any Channel, 1 through 23
Frequency Stability	$\pm .005\%$ @ $0^{\circ}$ to $125^{\circ}$ F, when used with INTERNATIONAL high stability crystals
RF Power input	5 watts maximum (FCC rules)
Modulation	Capability-100%

### Power Consumption:

Transmitting	65 watts (approximately)
Receiving	60 watts (approximately)

### Microphone:

High impedance, ceramic or  
dynamic type with (push-to-talk  
switch)



RMO 24-H FRONT PANEL



RMO 24-HB FRONT PANEL

## RMO-24-H CONTROLS

### ON-OFF SWITCH

The on-off switch on the VOLUME control completes or breaks the primary 110VAC or 6 or 12 VDC circuit to the power supply and is fused in the RMO Unit.

### VOLUME

The function of this control is to set the audio level in the speaker. With the unit turned on, the AUDIO LEVEL control on the transmitter/receiver is set then the RMO control is used in the normal manner.

### SQUELCH

The RMO Squelch Control is used to eliminate background noise when no signal is being received. Upon initial warmup, turn this control fully counterclockwise until a click is heard. The switch in the squelch control is OFF in this position. To operate, turn squelch control on and fully clockwise. Then slowly turn the control counter-clockwise until the background noise just disappears. Leave the control set at this point. Do not turn the control too far counter-clockwise as this will reduce the receiver performance and weak signals will not be heard.

### CHANNEL SELECTOR

The RMO contains an illuminated 12 position channel selector. When used in conjunction with the HI-LO switch this control switches transmit and receive crystals simultaneously to any one of the 23 citizen band channels.

**CAUTION:** With the HI-LO switch in the HI position DO NOT operate the transceiver with the CHANNEL selector dial on the blank button between channels 22 and 23.

### HI-LO SWITCH

This control located to the right of the Channel Selector dial selects the transceiver operating frequency range. With the switch in the LO position channels 1 through 12 are selected by the CHANNEL selector. When placed in the HI position channels 13 through 23 are selected by the CHANNEL selector dial. Pilot lamps are automatically switched to illuminate the proper channel indicating button.

**CAUTION:** With the switch in the HI position DO NOT operate the transceiver with the CHANNEL selector dial set on the blank button between channels 22 and 23. This will result in operation on an unauthorized frequency.

### MICROPHONE (Recepticle)

The RMO Microphone connector requires a four-prong lock-on plug which is furnished with the unit as a part of the microphone. High impedance crystal or ceramic and dynamic microphones may be used with this transceiver.

### INDICATOR LAMPS

#### RECEIVE INDICATOR

This indicator identified by the letter "R", functions as an on-off (plate voltage) indicator for the receiver section of the transceiver. When the transceiver is operating in Receive position the lamp will glow steadily and go out when the transceiver is placed in the Transmit position.

#### TRANSMIT INDICATOR

This indicator identified by the letter "T", functions as an on-off (plate voltage) indicator for the transmitter section of the transceiver. When the transceiver is operating in Transmit position the lamp will glow steadily and go out when the microphone button is released and the transceiver returns to receive position.

### RMO-24H BACK PANEL

#### FUSE

A 15 ampere fuse is installed in the fuse holder and may be changed or replaced if necessary by unscrewing the red insert in the center of the holder. If the transceiver is to be operated on 12 volts dc the fuse should be replaced with one having a rating of 7.5 amperes.

#### PL-4

This 15 contact connector mates with the 15 contact female cable connector for interwiring between the RMO console and the trunk unit.

#### SO-3

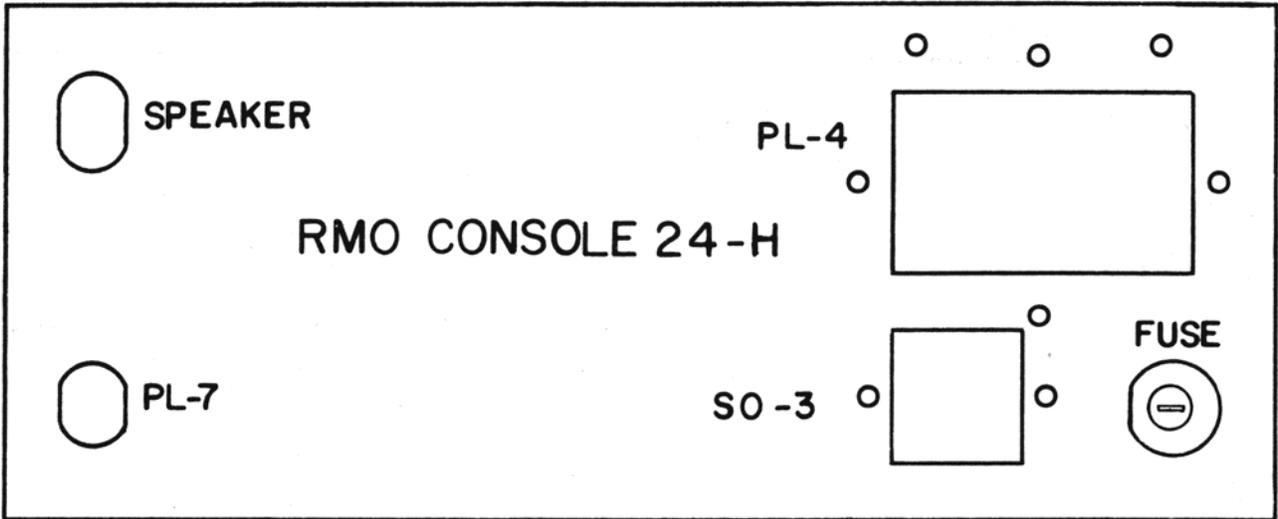
This 4 contact connector mates with a 4 contact jumper plug. This plug may be wired for 115 VAC operation or 6 and 12 volt DC operation. See wiring instructions in cord kit.

#### SPEAKER

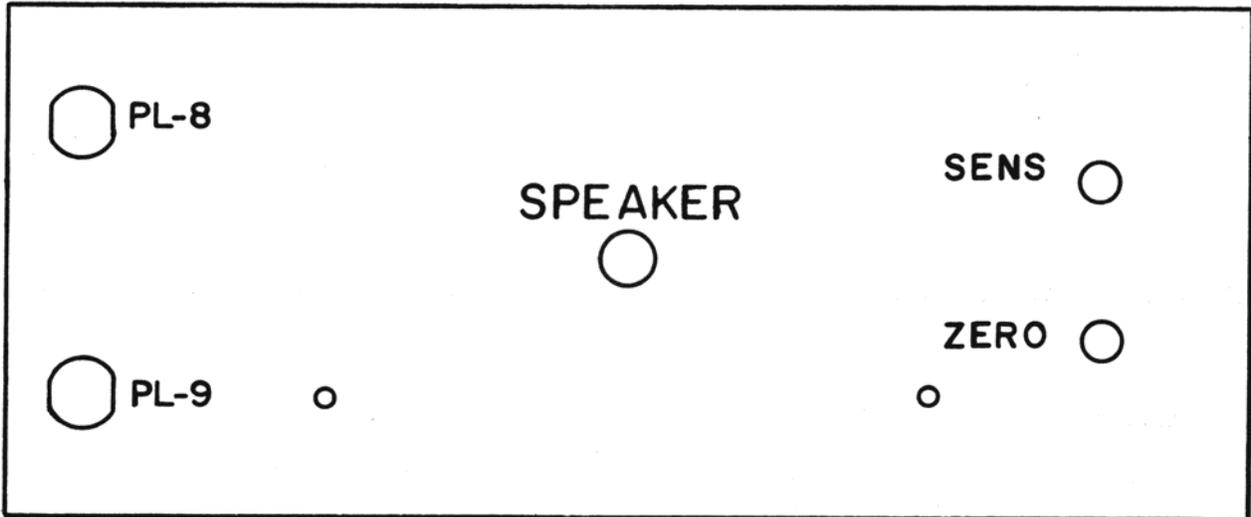
This two contact connector (Green) is used for connection between the RMO console and speaker unit with connectors attached to end of the speaker unit wires.

## RMO-24HB BACK PANEL

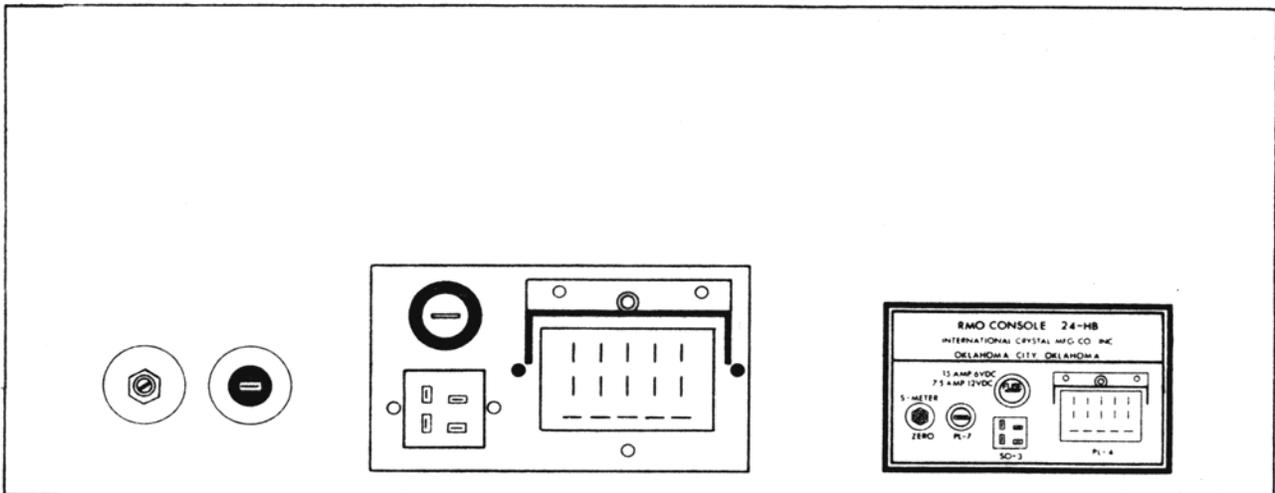
The connections made to the back panel of the 750-HB are the same as the 750-H except there is no speaker connection since the speaker is mounted internally in this unit. The 'S' meter is included in the unit. An additional connector is provided for interwiring the 'S' meter with the main unit. The 'S' meter zero control is also mounted on the back panel next to the single contact (blue) connector.



RMO 24-H BACK PANEL



RMO 24-H SPEAKER BACK PANEL



RMO 24-HB BACK PANEL

## TRUNK UNIT

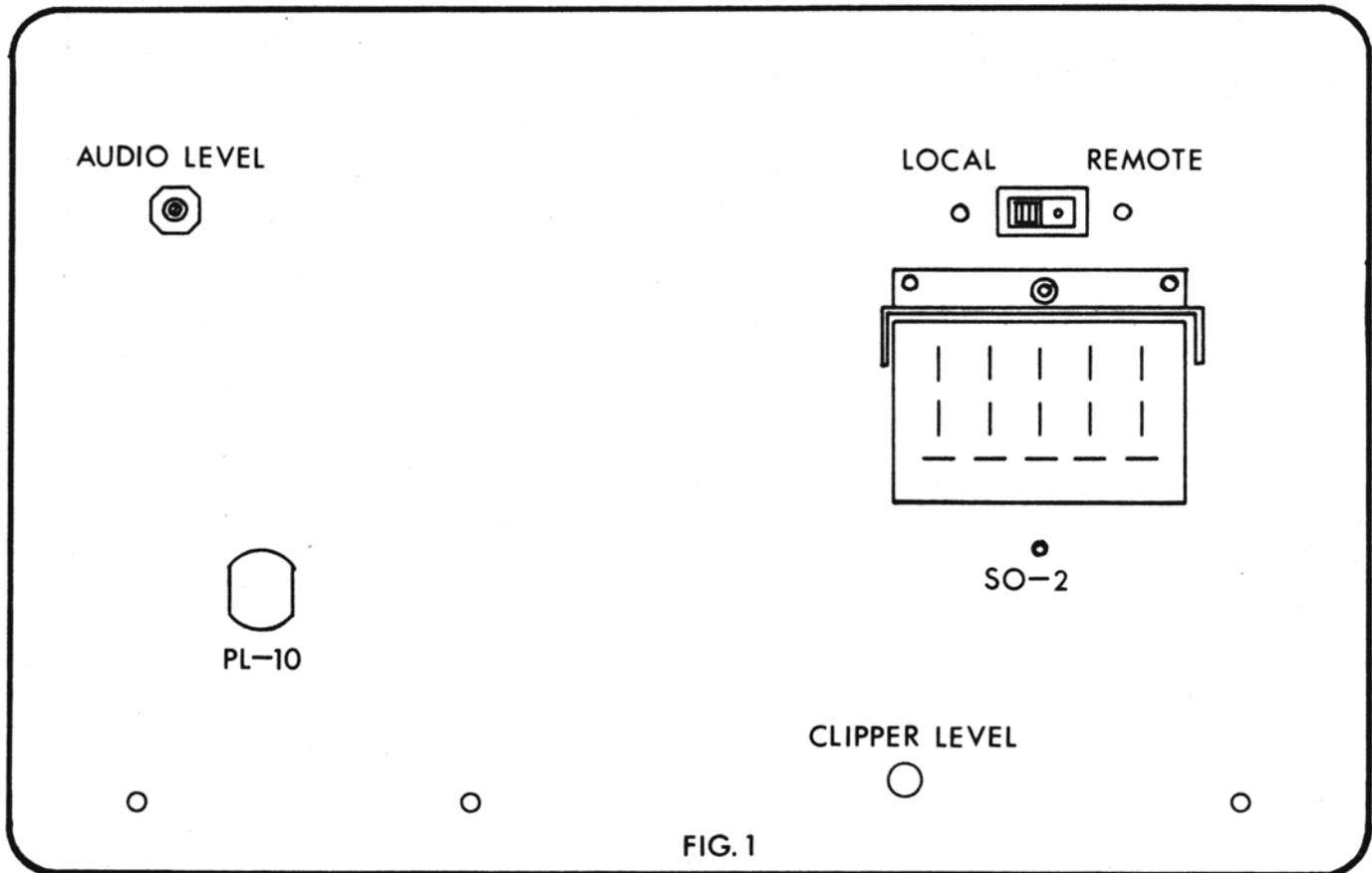


FIG. 1

### FRONT PANEL CONTROLS

#### AUDIO LEVEL

This control sets the overall gain of the receiver audio section. With the antenna connected to the transceiver and squelch control completely off set the RMO speaker 1/2 open. Then set the AUDIO LEVEL control for normal listening level. The speaker volume may then be controlled by the speaker volume control on the RMO.

#### LOCAL-REMOTE SWITCH

The LOCAL-REMOTE switch is placed in the REMOTE position when the transceiver is shipped from the factory. This control allows the operator to switch the transmitter ON from the trunk compartment for final tune-up. After tune-up this control must be returned to the REMOTE position.

#### SO-2

This 15 contact connector mates with the 15 contact male cable connector for interwiring between the RMO and the trunk unit.

#### CLIPPER LEVEL

This control is used in conjunction with the microphone gain control to allow the operator to maintain a higher average level of modulation without exceeding the 100% limit. Both controls have been pre-set at the factory for a normal voice level when speaking about three inches from the microphone.

PL-10

This connector is supplied on the Model 750-HB unit only. It's function is to interconnect the 'S' meter in the RMO unit. This connector is supplied for installation in the Model 750-H in the 'S' meter kit #150-263.

## TRUNK UNIT

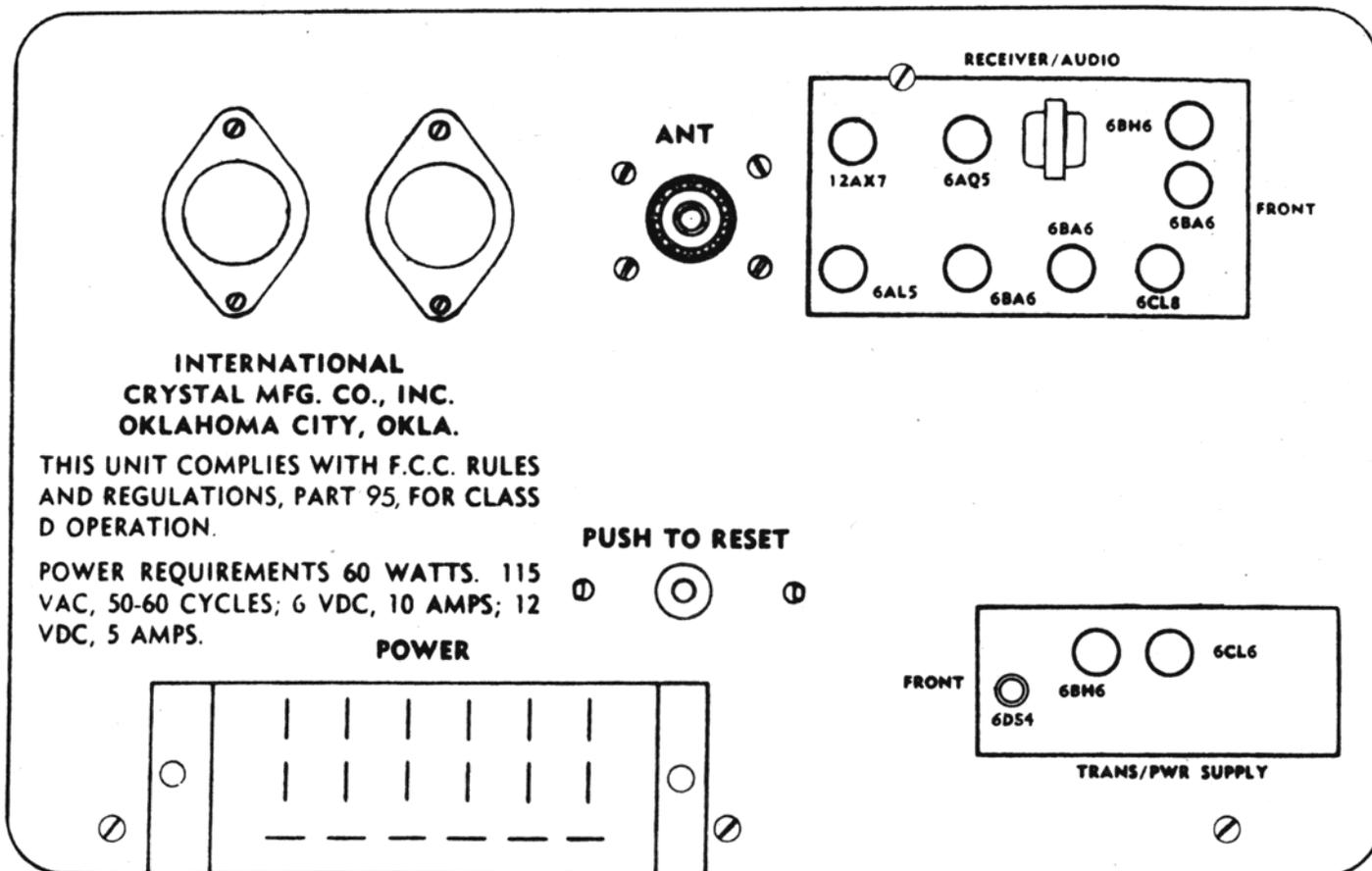


FIG. 2

### REAR PANEL CONTROLS

#### ANT (Antenna Receptacle)

This receptacle is used to connect the transceiver line to the transmit-receive relay, TR-1. The receptacle is a standard low-loss, VHF type designed for 50-75 ohm coaxial cable.

#### PUSH TO RESET

This is a thermal cut-out. It protects the unit when it is being operated on 115 volts ac. If overload causes it to cut out, it can be reset by pressing in on the plunger and holding it in for about two seconds.

#### POWER

An 18-contact plug is used as a power connector. This allows various input voltages to be used without requiring changes within the unit. All necessary connection changes are made on the external plug. Five different cord assemblies are used; 115VAC, 6VDC negative ground, 6VDC positive ground, 12VDC negative ground, and 12VDC positive ground.

## SECTION II

### RECEIVER CIRCUIT DESCRIPTION

The receiver section of this transceiver is a double conversion unit employing the superheterodyne principle of frequency conversion. The first conversion is composed of three basic sections; an RF amplifier, mixer, and oscillator which is crystal controlled. The crystal controlled oscillator is housed in the RMO console.

A received signal from the antenna is coupled to the control grid of the RF amplifier through a double tuned circuit consisting of coils L1 and L2, their respective shunting capacitors, and coupling capacitor C3. This double tuned circuit aids greatly in the elimination of unwanted signals outside the passband to which it has been tuned. The gain of the RF amplifier is controlled automatically by the receiver's AVC system coupled to the control grid of V1 through a 1 megohm resistor.

After reaching the control grid of V1 (6BA6) the signal is amplified and coupled to the control grid of the mixer, V2. Here the signal is heterodyned with a signal in the 17mc region coupled through the cable from the crystal controlled oscillator in the RMO unit. A difference frequency signal of 10,000kc or 10150kc is selected by coil L6 in the plate circuit of the mixer, V2 and coupled to the grid of the second mixer in the IF strip. The first IF signal frequency is dependent upon the position of the HI-LO switch in the RMO. In the LO position channels 1 through 12 are received and the resulting IF frequency is 10000kc. In the HI position channels 13 through 23 are received and the resulting IF frequency is 10150kc.

The second section of the receiver consists of a mixer and crystal controlled oscillator, two 455kc intermediate frequency amplifiers, a second detector and noise limiter, and a special squelch circuit. Additional selectivity is obtained by the use of two lightly coupled transformers between the mixer and 1st IF amplifier stage and also between the 1st and 2nd IF amplifier stages.

The 1st IF signal received at the grid of the second mixer, V3A, is heterodyned with a 10455kc or 10605kc signal from the crystal controlled oscillator, V3B. The difference frequency of 455kc is selected in the plate circuit of V3A and coupled to the control grid of the intermediate frequency amplifier, V4. The gain of this amplifier is also automatically controlled by the AVC system connected to the grid of V4 through the secondary of transformer T2 and a 220K ohm resistor. The signal is further amplified in V4 and coupled to the grid of V5 through transformers T3 and T4. AVC voltage is also applied to this stage through the secondary of transformer T4 and a 220K ohm resistor.

The signal is further amplified in V5 and coupled from the plate through transformer T5 to the plate of the detector, V6A, where the audio component is detected. V6A is also used to produce the AVC voltage. The detected signal is coupled to V6B which acts as a series-type noise limiter removing noise pulses which may ride through on the signal. The squelch circuit consisting of a neon lamp, N-1, silicon diode, CR-3 and associated components is connected so that the audio section of the receiver is cut off and background noise eliminated when no signal is being received. The cut-off level may be varied by use of the squelch control.

The third section of the receiver is a conventional audio amplifier consisting of a twin triode audio voltage amplifier, 12AX7, V7A-V7B followed by a 6AQ5, V9 tetrode power amplifier. When the transceiver is in RECEIVE position only one-half of the 12AX7 is used. The second triode section, V7B, receives the audio signal from the center tap of the volume control. The audio signal is amplified in V7B whose output is RC coupled to the control grid of the power amplifier, V9, through a bandpass circuit consisting of choke L10 and capacitors C64 & C65. The audio signal is further amplified in V9. The plate of V9 is connected to transformer T-6, which performs a dual function. In RECEIVE position this transformer acts as a normal output transformer with its secondary connected to the speaker. In TRANSMIT position, its function is that of a modulation transformer.

In TRANSMIT position, V7A is utilized as a straight voltage amplifier. This stage is preceded by a level clipping circuit consisting of a 6DS4, V8, diodes CR-4 and CR-5 and associated components. This clipping circuit allows a higher average level of modulation without the danger of exceeding the 100% limit.

#### TRANSMITTER CIRCUIT DESCRIPTION

The transmitter is a multi-stage unit consisting of a crystal controlled frequency synthesizer signal generator located in the RMO console, a buffer amplifier and neutralized tetrode final amplifier.

The frequency synthesizer has 12 channel crystals in the 17 mc range which are selected by the CHANNEL selector switch and two heterodyning crystals in the 10 mc range selected by the HI-LO switch. With the HI-LO switch in the LO position a 10 mc crystal is placed in the grid circuit of the triode section (V12A) of V12. This signal is cathode coupled to the pentode section (V12B) of V12. A 16.965 mc to 17.105 mc (channels 1 through 12) signal is coupled from the plate of V13 to the control grid of the pentode section of V12B. The resulting sum frequencies of 26.965 mc to 27.105 mc (channels 1 through 12) are selected in the plate circuit of V12B by L17.

The same procedure is followed for channels 13 through 23 except the HI-LO switch is placed in the HI position and a 10.150 mc crystal is switched into the grid circuit of V12A. This signal is heterodyned as before with the 16.965 mc to 17.105 mc signals from V13 and the resulting sum frequencies of 27.115 mc to 27.255 mc (channels 13 through 23) are selected in the plate circuit of V12B by L17. The output of V12B is inductively coupled through the cable to the grid of buffer amplifier V10. The output of buffer amplifier V10 is also inductively coupled to the grid coil of final amplifier V11. The plate circuit of V11 is a shunt fed pi-matching network. Neutralization is accomplished by capacitor C86, and link coil L13 coupled to the cold end of coil L12.

#### POWER SUPPLY CIRCUIT DESCRIPTION

A three-way power supply is used in this transceiver. It operates as a conventional, full-wave rectifier circuit on all voltage inputs followed by a capacitor input RC filter network. On 6 or 12 volt battery operation, a transistor oscillator circuit is used to provide the necessary AC voltage for the primary circuit of the power transformer.

The transceiver is supplied with a power cord kit. The unit may be operated either from 115 VAC, 6 volt negative ground, 6 volt positive ground, 12 volt positive ground, or 12 volt negative ground by use of the proper power cord connections. The power supply is equipped with a thermal circuit breaker for protection on AC operation. For protection on 12 volt DC operation a 7.5 ampere fuse is used with the transceiver. Protection on 6 volt DC operation is provided by a 15 ampere fuse which is supplied with the unit. When 12 volt DC operation is desired the 7.5 ampere fuse must be substituted for the 15 ampere fuse.

#### TRANSMIT-RECEIVE RELAY CIRCUIT DESCRIPTION

By including a transmit-receive relay (TR-1) in this transceiver, the many advantages of "Push-to-talk" operation and maximum transfer of energy to and from the antenna are afforded the operator at no extra cost. The circuit consists of a half-wave rectifier which receives its AC voltage from a 12 volt secondary winding on the power transformer. The rectifier is followed by an RC filter network whose output is connected in series with one end of the relay coil. The other end of the relay coil is connected through the microphone socket to the microphone switch button. This completes the 12 volt DC relay circuit to ground and the relay performs the following switching functions:

RECEIVE- In this position the relay is not energized and the antenna is connected to the receiver input, B+ voltages are furnished to the receiver section and one side of the speaker is grounded.

TRANSMIT- The relay is energized and the antenna is switched to the transmitter output circuit, B+ voltages are furnished to the screen and plate circuits of V7A, V8, V9, V12, V10 and final amplifier V11. The speaker voice coil is removed from ground.

## WIRING POWER PLUG FOR MODELS 750-H AND 750-HB

The 3-way power supply may be operated from any one of 5 different power systems; 115 VAC, 6 VDC positive ground, 6 VDC negative ground, 12 VDC positive ground, 12 VDC negative ground. Depending upon voltage to be used, connect the jumper wires to the plug as indicated below:

Remove the cover from the power plug by removing the two retainer pins and then separating cover and base. The sketches below are of the connection side of the plug base. Use the #18 buss wire supplied to make jumpers. Where jumpers cross and there is danger of a short, use a length of the insulating sleeving over the wire.

### PART #150-174

#### 115 VAC

115 VAC to pins 1 and 4

Jumper pins 2 and 3

Jumper pins 13 and 18

#### 6 VDC Neg. Gnd.

∕ 6 VDC to RMO

-6 VDC Gnd. to pin 1

Jumper pins 1 to 11 to 12 to 14 to 15 to 18

Jumper pins 2 to 5 to 17

Jumper pins 7 to 8

Jumper pins 6 to 9

Jumper pins 10 to 16

#### 6 VDC Pos. Gnd.

-6 VDC to RMO

∕ 6 VDC Gnd. to pin 1

Jumper pins 1 to 9 to 12 to 15 to 18

Jumper pins 6 to 11 to 14

Jumper pins 2 to 5 to 17

Jumper pins 7 to 8

Jumper pins 10 to 16

#### 12 VDC Neg. Gnd.

∕ 12 VDC to RMO

-12 VDC Gnd. to pin 1

Jumper pins 1 to 10 to 14 to 15

Jumper pins 7 to 8 to 16

Jumper pins 2 to 5 to 18

Jumper pins 6 to 9

#### 12 VDC Pos. Gnd.

-12 VDC to RMO

∕ 12 VDC Gnd. to pin 1

Jumper pins 6 to 10 to 14

Jumper pins 7 to 8 to 16

Jumper pins 2 to 5 to 18

Jumper pins 1 to 9 to 15

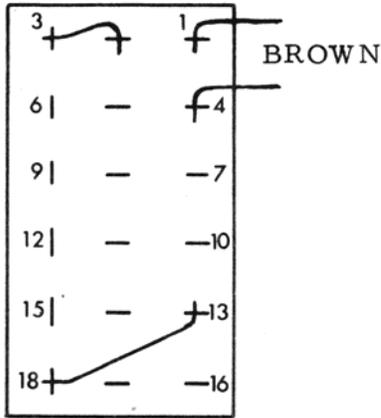
NOTE: Battery voltage connects to the RMO console unit, the black #12 wire from the transceiver plug connects to ground.

### JUMPER PLUG WIRING

To facilitate ease of switching between AC and DC operation, a four contact jumper plug is provided. This plug may be wired for 115 VAC operation or 6 and 12 VDC operation as described below.

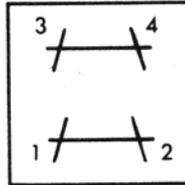
POWER PLUG WIRING  
 (Models 750-H & 750-HB)  
 (All views from back of plug)

115 VAC  
 150-174



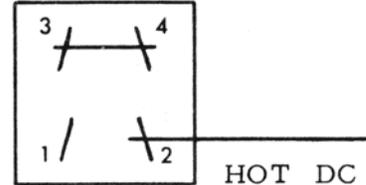
JUMPER PLUGS

115 VAC



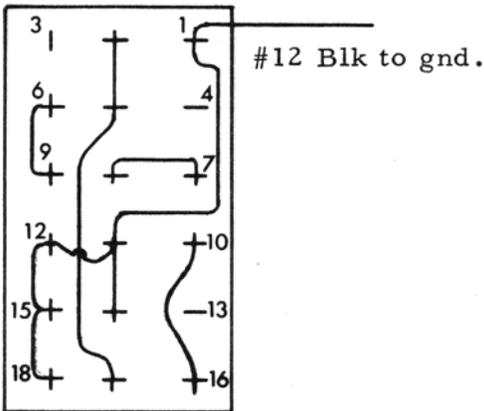
150-267

6-12 VDC

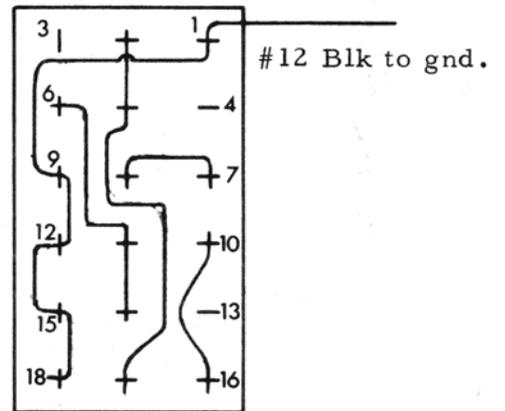


150-268

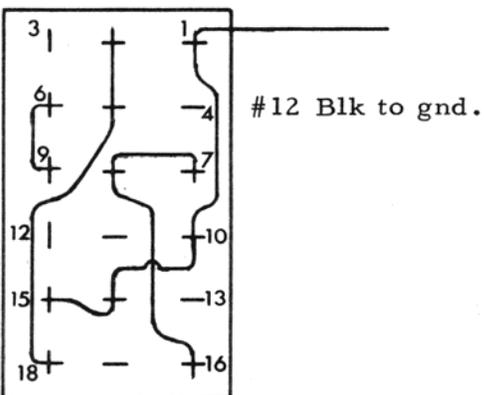
6 VDC Neg. Gnd.  
 150-259



6 VDC Pos. Gnd.  
 150-260



12 VDC Neg. Gnd.  
 150-261



12 VDC Pos. Gnd.  
 150-262

