



**MODEL 13-861**

**4-WATT 23-CHANNEL  
MOBILE PORTABLE TRANSCEIVER**

**OWNER'S GUIDE**



## FEDERAL COMMUNICATIONS COMMISSIONS REQUIREMENTS

Your new Midland 13-861 is a combination receiver-transmitter designed and built for licensed Class D operation on any of the 23 frequencies designated as citizens band channels by the Federal Communications Commission. You are required to read and understand Part 95 of the F.C.C. rules and regulations prior to operation of this unit. Part 95 regulations are available from the Superintendent of Documents, Government Printing Office, Washington D.C. 20402. You are also required to complete F.C.C. form 505 and submit it to the FCC, GETTYSBURG, PA. 17326 in order to receive your license to operate this unit. F.C.C. regulations will be violated if you transmit with this unit without complying with procedures examined on F.C.C. temporary license form 555-B.

You may use Form 555-B as a temporary permit while your regular Form 505 application is being processed by the F.C.C.

Both Forms are packed with the transceiver for your convenience.

### NOTE

The technical information, diagrams, and charts provided in this manual are supplied for the use of a qualified holder of a first or second class radiotelephone license in servicing this transceiver. It is the user's responsibility to see that this unit is operating at all times in accordance with the F.C.C. Citizens Radio Service regulations.

If you install or service your own transceiver, do not attempt to make any transmitter tuning adjustment. Transmitter adjustments are prohibited by the F.C.C. unless you hold a first or second class radiotelephone license or are in the presence of a person holding such a license. A Citizens Band or Amateur License is not sufficient.

When service is performed by an authorized and licensed person, care must be taken in the replacement of parts to use only authorized parts, in order not to void the type acceptance of this model.

Midland International Corporation, Communications Division, hereby certifies that this unit has been designed, manufactured and type accepted in accordance with Vol. 6, Part 95 of the current F.C.C. rules and regulations as of the date of manufacture.

### UNDERSTANDING YOUR NEW 13-861

#### **RECEIVER:**

Sensitive dual conversion circuit with all crystals supplied for 23-channel reception. One microvolt sensitivity, built-in controlled squelch circuit and noise limiting give noise-free operation. Active AGC circuit eliminates fading and over driving.

#### **TRANSMITTER:**

Precision crystal-controlled oscillator circuit with all 23 Citizens Band channels built in. A maximum of TVI filtering is employed.

### **SIGNAL-BATTERY-TRANSMIT POWER METER:**

A combination meter on front panel provides a constant visual monitor of incoming "Signal Strength" when receiving and "Relative Output Power" when transmitting, and indicates battery condition.

### **CONTROLS:**

A full set of controls is employed, including volume ON-OFF switch, 23-channel selector switch, full variable squelch. The transmitter Power HI-LO switch and push button to check channel indication and meter function, when unit is operated as a portable – saves batteries !

### **POWER SUPPLY:**

The 13-861 is designed to operate on 12 volts DC. Any 12-volt automobile system is adequate. For base station application, use Midland 18-802 (optional extra) power supply which plugs into 110 volts AC and delivers 12 volts DC to your transceiver. For portable operation, use 8 pieces of standard "AA" size penlite battery or 10 pieces of rechargeable 1.2V Nicad battery.

### **ANTENNA REQUIREMENT:**

This transceiver will operate with any standard 52 ohm ground-plane, vertical, mobile whip, or other CB antenna. A standard SO 239 type connector is provided on the back panel for use with popular PL259 antenna plug. The telescopic antenna is provided for portable use. Optional model 18-249 rubber whip antenna may be used instead of telescopic antenna for short distance communications.

## **FREQUENCY:**

Each unit is completely equipped with crystals for operation on any of the 23 Citizens Band channels. It is not necessary to purchase any additional crystals for this unit. Refer to part 95 of the F.C.C. rules and regulations to determine which channels may be used for various kinds of communication.

## **MOBILE INSTALLATIONS**

A location in the car or truck should be chosen carefully for convenience of operation and non-interference with normal driving functions. Mounting may be under the dash or instrument panel or any place a secure installation can be made.

## **GROUND INFORMATION:**

This transceiver may be installed and used in any 12 volt DC negative or positive ground system vehicle. Most newer U.S. and foreign made cars and small trucks use a negative ground system while some older cars and some newer large trucks may use a positive ground system.

A negative ground system is generally identified by the – battery terminal being connected to the vehicle motor block, but if you cannot determine the polarity system of your vehicle, it is suggested that you consult your vehicle dealer for definite information.

## **NEGATIVE GROUND SYSTEM:**

In the case of a negative ground system connect the red DC power cord from the transceiver to the positive or + battery terminal or other convenient point and connect the black power lead to the chassis or vehicle frame or – battery terminal.

**POSITIVE GROUND SYSTEM:**

In the case of a positive ground system connect the black DC power cord from the transceiver to the negative to - battery terminal or other convenient point and connect the red power lead to the chassis or vehicle frame or + battery terminal.

With regard to the connection of the power cords, it may be possible or desirable to connect the (red lead for negative ground system) or (black lead for positive ground system) to the ignition switch accessory terminal so that the transceiver is automatically turned off when the ignition switch (key) is turned off.

Alternately, the power lead may be connected to an available terminal on the fuse block or even to a point in the wiring harness. Care must be taken however to guard against a short circuit condition so when in doubt, please contact your vehicle dealer for specific information for your vehicle.

**IGNITION INTERFERENCE:**

Engine ignition interference should not be a problem and vehicles equipped with standard broadcast radios will have enough suppression to eliminate ignition interference. If interference is present, any skilled auto repairman should be able to eliminate it for you.

## **BASE STATION INSTALLATIONS**

For base station use, the Midland 18-802 power supply is recommended. When this power supply is used, simply connect the red (+) and black (-) terminals on the power supply to the (+) and (-) leads on your 13-861. Do not attempt to operate this transceiver by connecting it directly to 110 Volts AC.

## **ANTENNA INSTALLATION**

### **BASE STATION:**

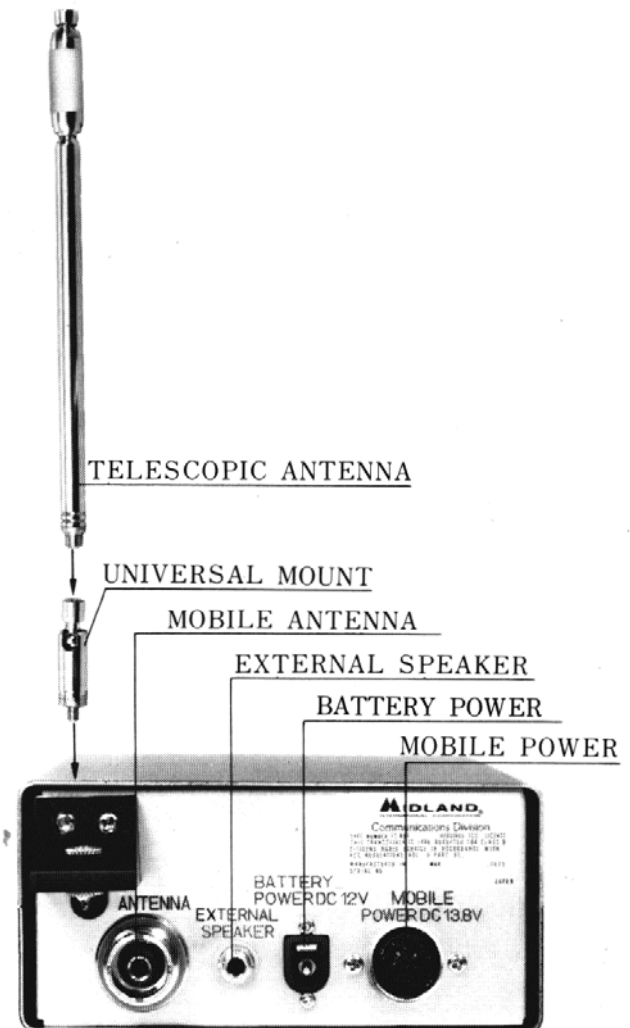
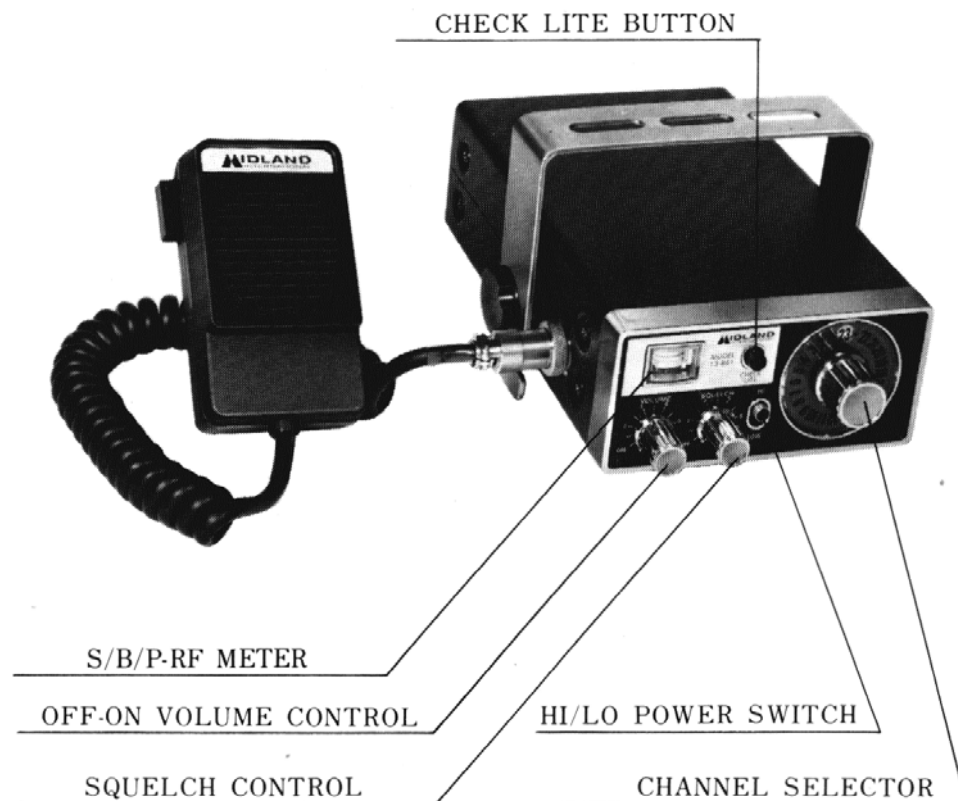
When the 13-861 is used as a base station, any Citizens Band beam, dipole, ground plane or vertical antenna may be used. A ground plane type will provide greater coverage and, since it is essentially non-directional, it is ideal in base station to mobile operation. From base station to base station, or point to point operation, a directional beam will give greater distance even under adverse condition. The range of the transceiver depends basically on the height of the antenna and, whenever possible, select the highest location within F.C.C. limits.

## **MOBILE ANTENNAS:**

A vertical whip antenna is best suited for mobile use. A non-directional antenna must be used for best results in any case. The base loaded whip antenna will normally provide effective communication. For greater range and more reliable operation, a full quarterwavewhip should be used. Either of these antennas use the metal car body as a ground plane and the shield of the base lead as well as the metal case of the transceiver should be grounded. A standard antenna connector (type SO 239) is provided on the transceiver for easy connection to a standard PL 259 cable termination.



## OPERATION OF CONTROLS



### **TELESCOPIC ANTENNA:**

Model 13-861 comes complete with a telescopic antenna screwed into a universal mount. This antenna is used for portable operation. At 12 volts using fully charged batteries, effective range is up to 3 miles (depending on terrain) with the unit in "High" power position.

NOTE: Model 18-249 Rubber-whip Antenna is intended to be used for short distance communications when 13-861 is operated as a portable. Depending on terrain, maximum communication range is up to two miles using fully charged batteries (12 Volts DC) with model 13-861 in "Hi" power position.

One mile or less communication range can be achieved with 13-861 in the "Lo" power position.

### **VOLUME CONTROL AND OFF-ON SWITCH:**

The volume control varies the sound output of the loudspeaker. It also, functions as "off-on" switch. Clockwise rotation increases volume.

### **CHANNEL SELECTOR SWITCH:**

Tuning the receiver and transmitter is simultaneous by rotating the 23 channel selector switch. Set switch to desired channel 1 to 23 as indicated directly on switch knob.

**SQUELCH CONTROL:**

The squelch control is designed to maintain a quiet standby operation. This control must be set when only noise, no signal is heard. Turn the control fully counterclockwise and increase the volume until noise or a signal is heard. When only noise is present, turn the squelch control clockwise until the noise is blanked out.

**PRESS-TO-TALK SPEAKER/MICROPHONE:**

The receiver and transmitter are controlled by the press-to-talk switch on the microphone. Press in this switch and the transmitter is activated, Release this switch to receive. When transmitting, hold microphone 3 to 4 inches from mouth and speak clearly and in a normal voice.

**BATTERY POWER JACK:**

The Jack allows the use of an external 12 volts DC power source such as 12 volts DC adaptor or battery provided in carry case.

**THE POWER HI-LO SWITCH:**

When model 13-861 is used as a mobile or base, place the switch in "Hi" position. "Hi" position may also be used for maximum performance when model 13-861 is used as a portable. "Low" power is recommended for short distances to conserve batteries.

### **S/B/P-RF METER:**

This meter can be used in 3-ways.

- (a) During reception incoming signal will cause the pointer to deflect leftward on the S area, giving an indication of relative signal strength of the received signal.
- (b) In receive mode of operation with no incoming signal the meter pointer is in blue area battery voltage is normal. When the pointer is outside (left side) the RED area, battery voltage is low and batteries should be replaced (or recharged if rechargeable batteries are used).
- (c) During transmission the pointer will swing in to the blue area, indicating the RF power is being radiated from the antenna.

### **CHECK LITE:**

A "Check Lite" button is located on the control panel of model 13-861. When the unit is operated as a portable, the "check lite" acts as temporary lighting for the channel selector and meter. This is designed to save battery consumption. When the mobile DC power cord is used, channel selector and meter are constantly illuminated. Battery power is automatically disconnected when the mobile DC power cord is connected.

### **CHARGE JACK:**

This jack allows charging of rechargeable batteries without removing the batteries from the carry case.

**CAUTION:** Do not try to charge the conventional non-rechargeable batteries. Use only nickel-cadmium batteries for recharging. Carbon-zinc, mercury, and alkaline batteries may be used to operate the transceiver, but do not attempt to recharge these types because leakage or battery damage may occur. A regulated battery charger and not an AC power supply should be used for recharging purposes.

## GENERAL OPERATING INSTRUCTIONS

### CAUTION:

Before operating this transceiver, you are required by law to read and thoroughly understand part 95 of the F.C.C. rules and regulations. Check to see if the proper connections have been made on power cable, antenna system and microphone and that the correct cables have been used. Be sure that the transceiver is adequately grounded (if not mounted directly to a metal surface).

For portable use, open the cover of carry case. The battery compartment is designed to accept 10 pieces of standard "AA" size penlight batteries. However, when using conventional nonrechargeable 1.5 volt batteries, insert 8 penlight batteries (and two dummy battery spacer supplied with the unit), since the unit is designed to operate at 12V DC. Insert each battery into the compartment as illustrated on the compartment bottom, carefully observing polarity. Check to see that batteries are firmly seated.

Extend the telescopic antenna to its full length for maximum communication range.

To transmit, press the push-to-talk switch and hold it down. Speak directly into microphone. Release this switch to receive. Actual receive and transmitting power should be monitored by watching the SIGNAL-BATTERY-TRANSMIT POWER METER. Select the channel on which you wish to operate by rotating the Channel Selector Switch to the desired channel.

The speaker/microphone should be held approximately 3 to 4 inches away from your mouth. Use a normal speaking voice. Speak slowly and clearly. Talking louder does not increase transmitting power and will only cause distortion. You will notice the **SIGNAL-BATTERY-TRANSMIT POWER** meter moving as you transmit. This indicates that you are transmitting. Always release the microphone switch when you complete your transmission.

**NOTE:**

For best transmission and reception, the antenna should be held in vertical position.

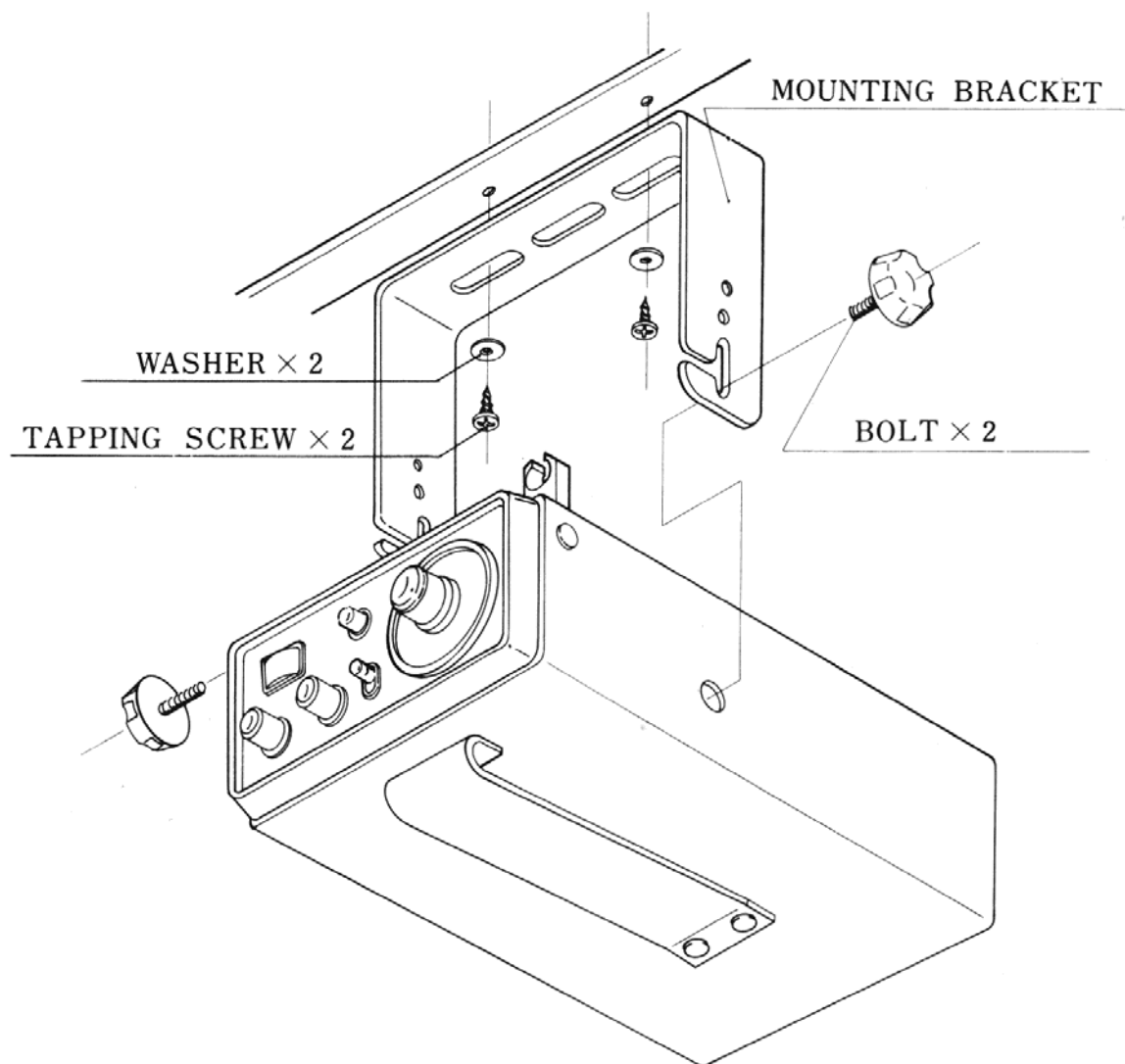
## SERVICING YOUR TRANSCEIVER

The technical information, diagrams and charts provided in this manual are supplied for the use of a qualified holder of a first or second class radiotelephone license in servicing this transceiver. It is the users responsibility to see that this unit is operating at all times in accordance with the F.C.C. citizens radio service regulation.

If you install your own transceiver, do not attempt to make any transmitter tuning adjustments are prohibited by the F.C.C. unless you hold or are in the presence and under the supervision of a first or second class radiotelephone licensed person. A Citizens Band or Amateur license is not sufficient.

When service is performed by an authorized and licensed person, care must be taken in the replacement of parts to use only authorized parts, in order not to void the type acceptance of this unit.

## MOUNTING INSTRUCTIONS





## SPECIFICATIONS FOR 13-861

### GENERAL

**Circuitry:** 19 transistors, 2 squelch transistors, 9 diodes, 1 Zener diode  
**Frequency Control:**  $\pm 0.005\%$  crystal  
**Channels:** 23, all supplied  
**Controls:** On/off/volume, variable squelch, channel selector, hi/lo power switch, push-to-talk (on speaker/mike), "Check Lite" button  
**Jacks and Connections:** Mobile antenna, mobile power, external power (co-axial), battery charger (in case), external speaker, universal portable antenna  
**Power Sources:** 13.8 volts DC (mobile) positive or negative ground; 12 volts DC (portable)  
**Unit Size:** 2" h. x 4-3/8" w. x 6-3/4" d.  
**Overall Size (In Case):** 3-1/4" h. x 4-5/8" w. x 7-5/8" d.  
**Unit Weight:** 3-1/4 lbs.  
**Accessories Included:** Texon carry case with removable strap and shoulder pad, battery compartment and connector, battery charger jack, belt loop, metal microphone clip. Removable universal mount, center coil loaded telescopic antenna. Mobile mounting bracket.

### RECEIVER

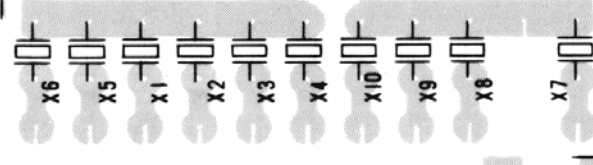
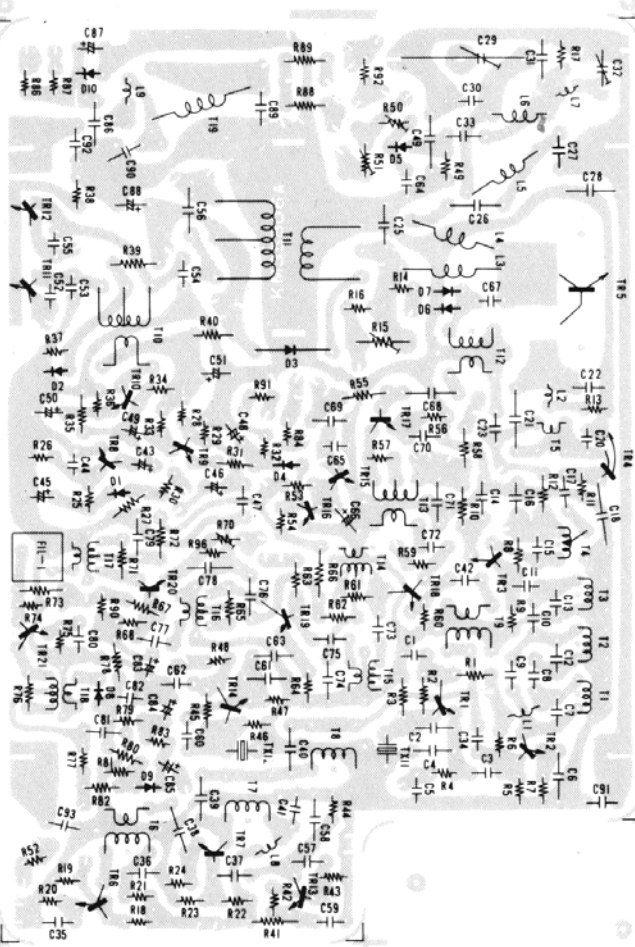
**Receiving System:** Dual conversion superheterodyne with tune RF, AGC, built-in ANL  
**Sensitivity:**  $0.5\mu\text{V}$  for 10 db (S+N)/N  
**Selectivity:** 8 KHz @ 6 db down  
**Spurious Rejection:** More than 40 db  
**Audio Output:** 2.8 watts  
**Squelch Range:** .5-300  $\mu\text{V}$   
**Intermediate Frequencies:** 1st IF: 11.275 MHz  
 2nd IF: 455 KHz

### TRANSMITTER

**Modulation:** High level  
**RF Output Power:** Mobile: 4 watts  
 Portable: hi - 3 watts  
 lo - 1 watts

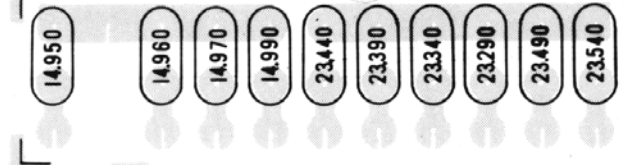
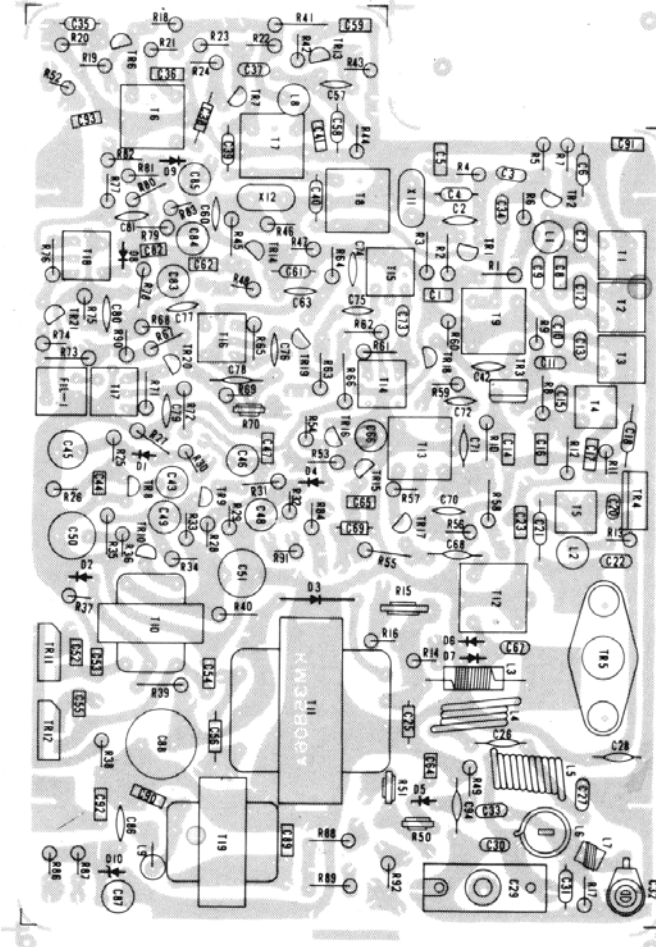
# MODEL 13-861 PARTS LAYOUT

BACK VIEW



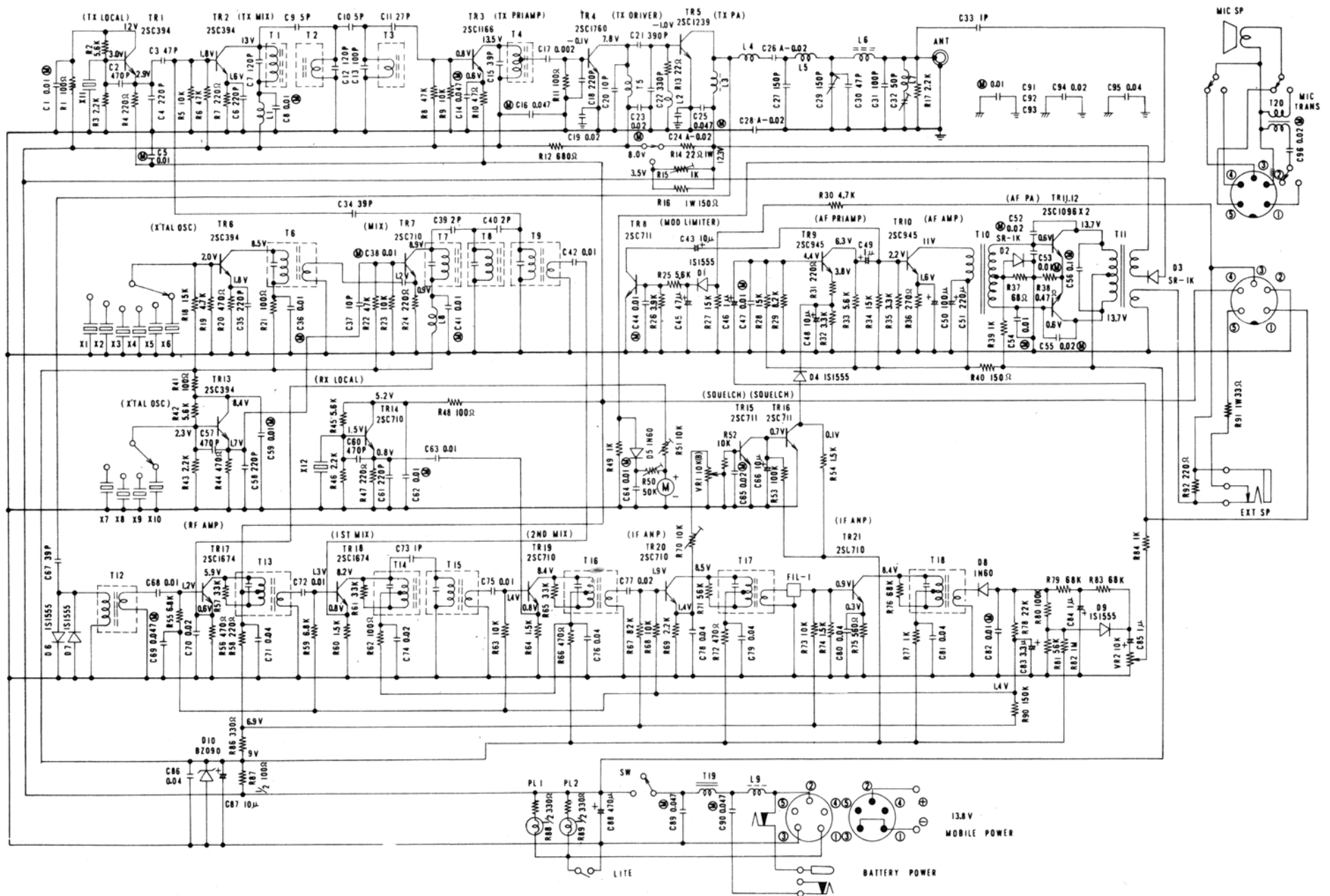
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FRONT VIEW

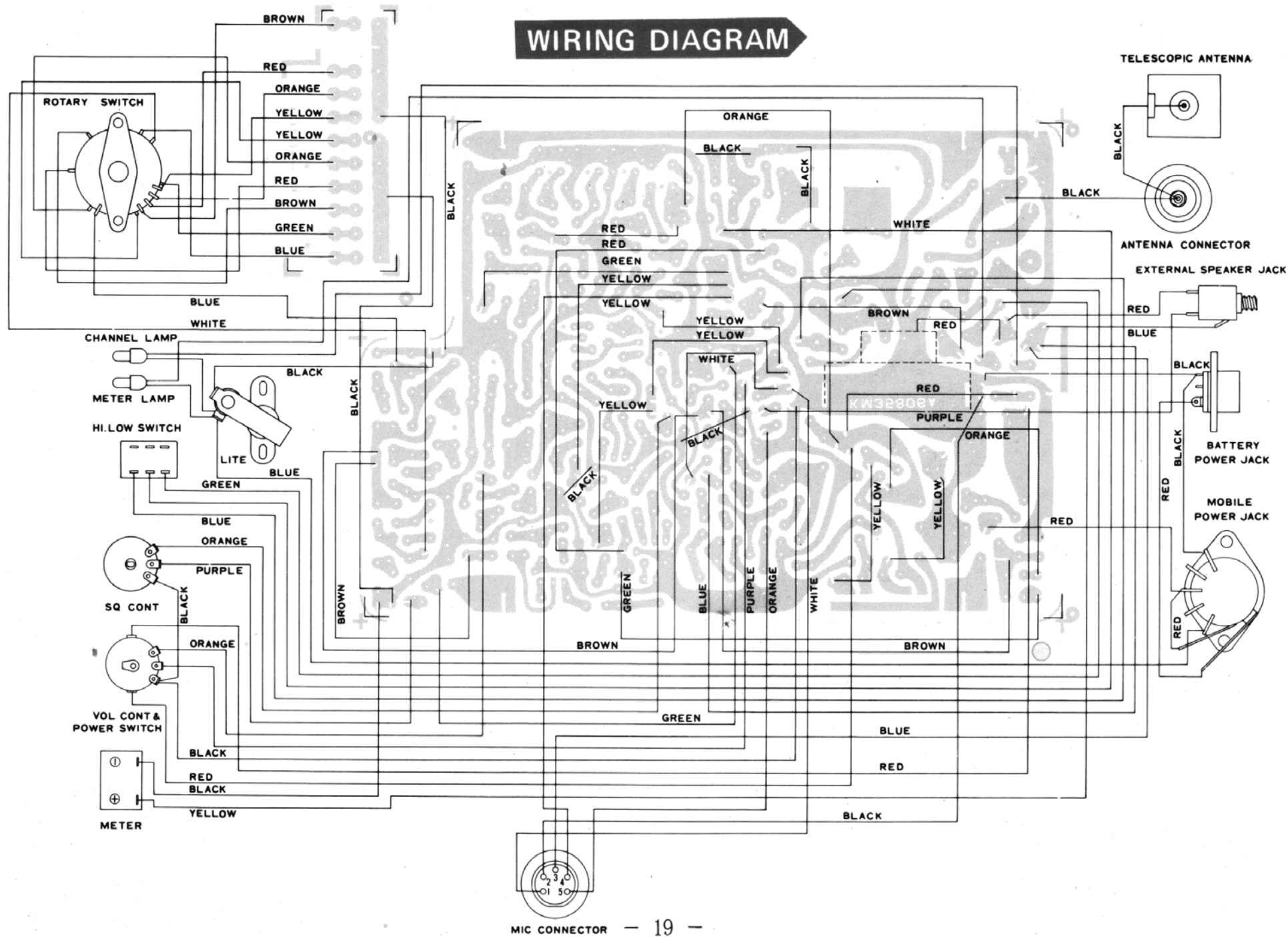


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# MODEL 13-861 SCHEMATIC DIAGRAM



# WIRING DIAGRAM



# CRYSTAL FREQUENCY CHART

XTAL	CHANNEL																						
MASTER1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
23.290	○	○	○	○																			
23.340					○	○	○	○															
23.390									○	○	○	○											
23.440													○	○	○	○							
23.490																	○	○	○	○			
23.540																					○	○	○
MASTER2																							
14.950	○				○				○				○				○				○		
14.960		○				○				○				○				○				○	
14.970			○				○				○				○				○				
14.990				○				○				○				○				○			○
XMTR																							
11.275	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
RCVR																							
11.730	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

## LIMITED WARRANTY

Midland International Corporation warrants each new Midland product to be free from defects in material and workmanship under normal use and service for a period of 90 days after delivery to the ultimate user and will replace or repair the product at our option, at no charge should it become defective and which our examination shall disclose to be defective and under warranty.

This warranty shall not apply to any Midland product which has been subject to misuse, neglect, accident, incorrect wiring not of our own installation, or to use in violation or instructions furnished by us, nor extended to units which have been repaired or altered outside of our factory.

This warranty does not cover carrying cases, earphones, batteries, antenna, broken or cracked cabinets, or any other accessory used in connection with this product.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our products.

Sales receipt must accompany product to validate the date of purchase.



### Communications Division

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