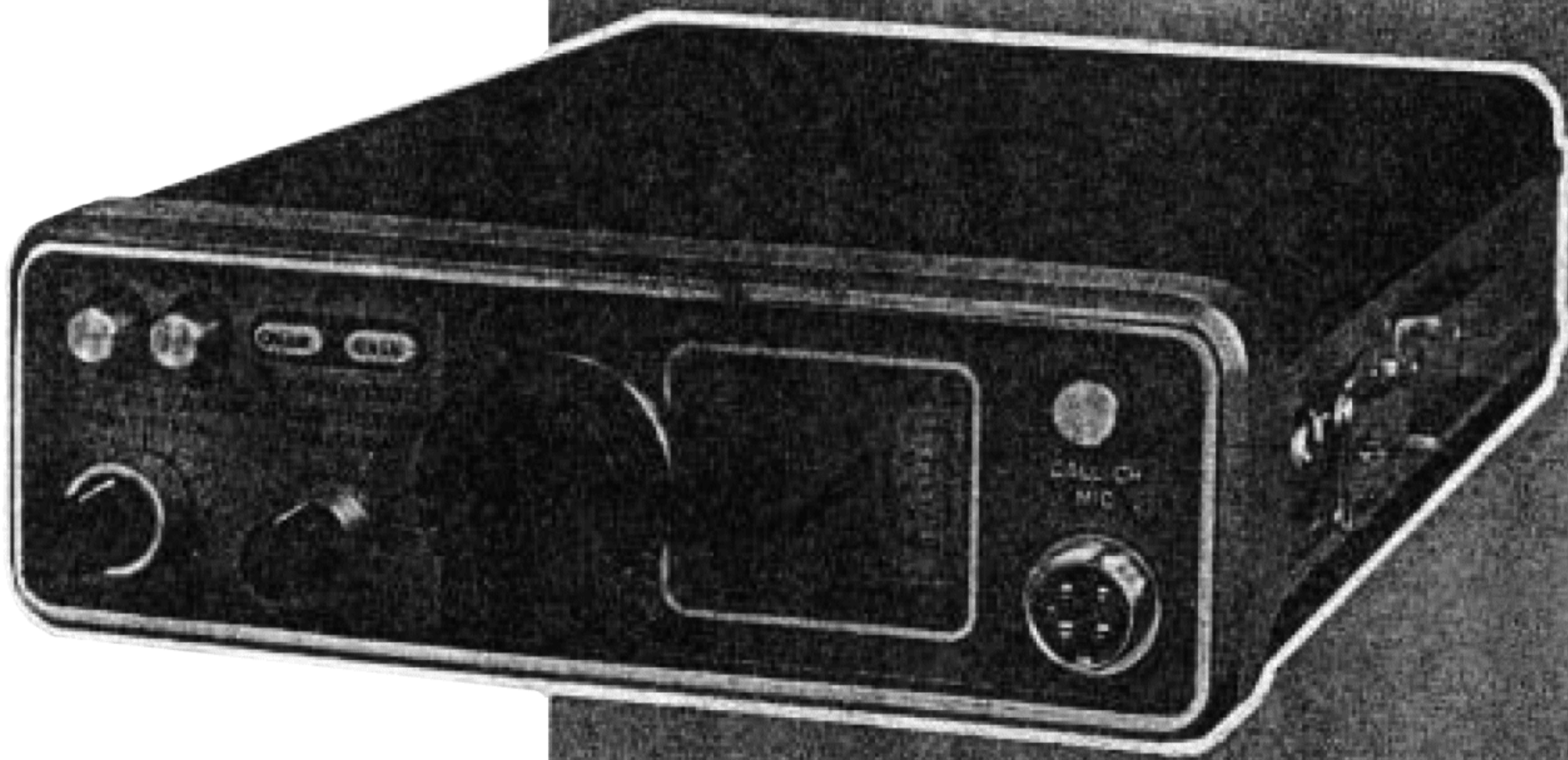




# UHF FM TRANSCEIVER

## Model TR-8300



OPERATING MANUAL



# INTRODUCTION

Your KENWOOD Model TR-8300 FM transceiver is designed for use as a 440 MHz band amateur radio mobile transceiver. It may also be used as a fixed station. Engineered by KENWOOD's elaborate UHF technology, it provides high performance and these outstanding features:

- Highly reliable final transistor (2N5946).
- Highly dependable, stable operation.
- Built-in monitor circuit.
- Three channels installed. 20 additional channel positions available.
- 10W/1W transmit power capability.

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# TR-8300 SPECIFICATIONS

## GENERAL

<b>Frequency Range</b>	
<b>Transmit</b> .....	445.0 ~ 450.0 MHz
<b>Receive</b> .....	442.0 ~ 447.0 MHz
<b>Mode</b> .....	FM
<b>Antenna Impedance</b> .....	50Ω
<b>Number of Channels</b> .....	23 channels
<b>Built-in Channels</b> .....	3 channels

Receive	Transmit
446.00 MHz	446.00 MHz
446.50 MHz	446.50 MHz
444.10 MHz	449.10 MHz

<b>Semiconductor</b> .....	Transistors: 38 ICs: 2 Diodes: 25
<b>Power Requirement</b> .....	11.5V DC to 16.0V DC (nominal 13.8V DC)
<b>DC Current</b> .....	Transmit (HI)           less than 3.5A Transmit (LOW)       less than 2.0A Receive (No Signal) less than 0.5A
<b>Grounding</b> .....	Negative grounding
<b>Operating Temperature</b> .....	-20°C to +60°C (-4°F to 122°F)
<b>Dimension</b> .....	180 mm (7-1/16") width 60 mm (2-3/8") high 240 mm (9-7/16") deep
<b>Weight</b> .....	2.3 kg (5.1 lbs.)

## TRANSMITTER

<b>RF Output Power</b> .....	Hi 10W (min.) LOW approx. 1W (adjustable up to 10W)
<b>Modulation</b> .....	Phase modulation
<b>Multiplication</b> .....	18 times
<b>Max. Frequency Deviation</b> .....	±12 kHz (Set at ±5 kHz in factory)
<b>Spurious Radiation</b> .....	Less than -60 dB
<b>Microphone</b> .....	Dynamic microphone with PTT switch, 500Ω

## RECEIVER

<b>Sensitivity</b> .....	More than 0.5μV for 20 dB quieting
<b>Squelch Sensitivity</b> .....	More than 0.3 μV
<b>Circuitry</b> .....	Double superheterodyne
<b>Intermediate Frequency</b> .....	1st IF 10.7 MHz 2nd IF 455 kHz
<b>Pass Band Width</b> .....	20 kHz at 6 dB down
<b>Selectivity</b> .....	More than 70 dB at ±30 kHz
<b>Audio Output</b> .....	More than 1.5W across 8Ω load (10% distortion)



# SECTION 1. PREPARATION FOR USE

## 1.1 ACCESSORIES

Carefully unpack your TR-8300 transceiver and check that the following accessories are included.

- (1) Dynamic microphone equipped with 4-pin plug ..... 1 piece
- (2) Mounting bracket ..... 1 piece
- (3) Mounting parts
  - Screws, 6 mm diameter ..... 4 pieces
  - Plain washers, 6 mm diameter .... 4 pieces
  - Spring washers, 6 mm diameter .. 4 pieces
  - Nuts, 6 mm diameter ..... 4 pieces
- (4) Stand-off bracket ..... 1 piece
- (5) DC power cord with plug and fuse ..... 1 piece
- (6) Spare fuse (5A) ..... 1 piece
- (7) Miniature plug for external speaker 1 piece
- (8) Operating manual ..... 1 copy
- (9) Warranty card ..... 1 copy

## 1.2 ANTENNA

Any 50 ohm 440 MHz band antenna system may be used with your TR-8300. The 50 ohm coaxial cable should be kept as short as possible in order to minimize line loss. Attach a UHF type connector (PL-259) to the coaxial cable for easy connection to the connector on the transceiver.

## 1.3 INSTALLATION CAUTION

Your TR-8300 Transceiver to be operated as a mobile station should be securely mounted under the dashboard (or similar location) using the accessory mounting bracket and bolts. Improper installation will result in damage to the transceiver and dashboard. Consideration must be given to the dashboard material prior to installation. More detailed information on installation will be found in SECTION 3.1, "MOBILE USE", or page 7.

# SECTION 2. CONTROLS AND WHAT THEY DO

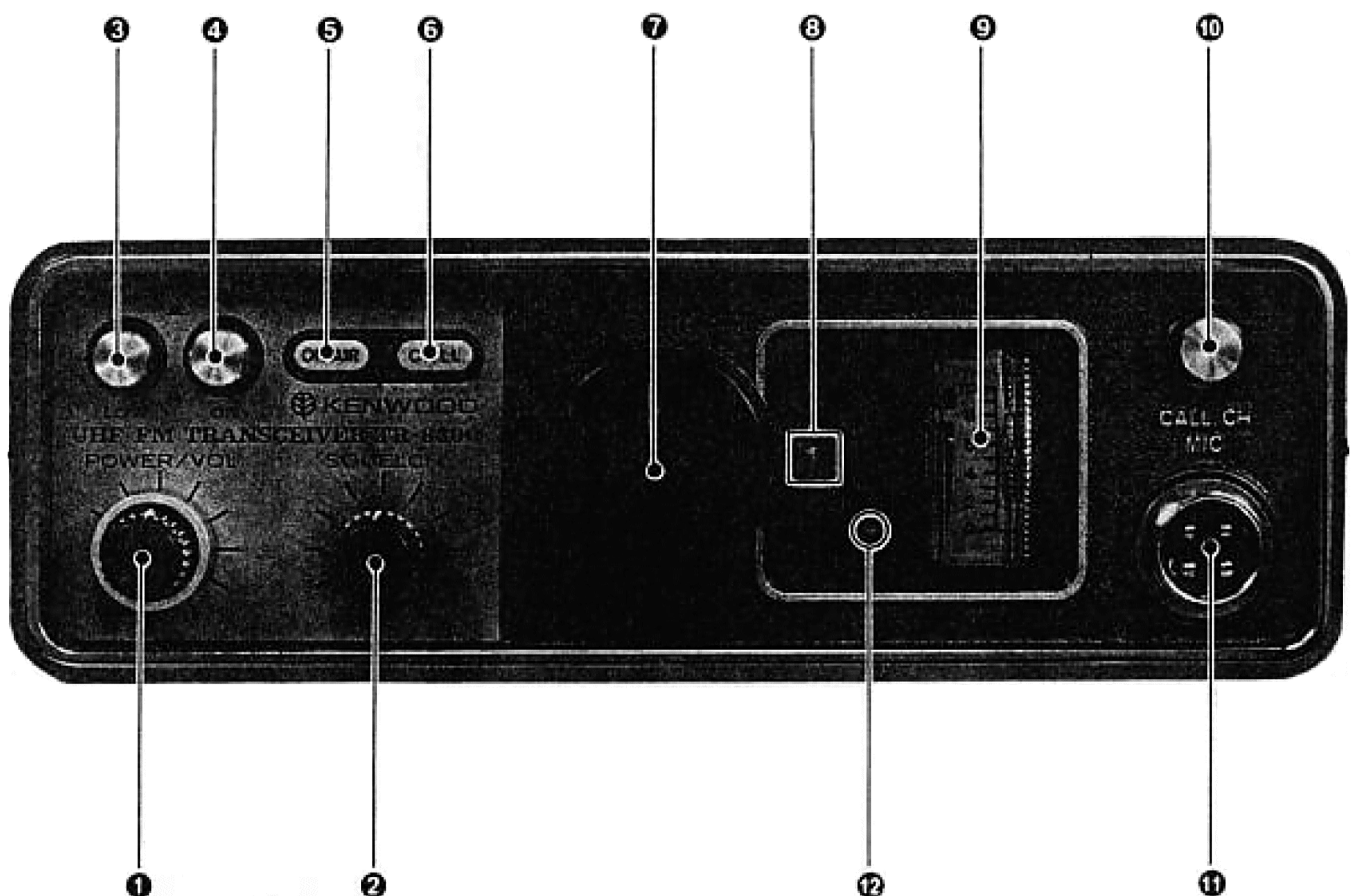


Fig. 1



## 2.1 FRONT PANEL (Refer to Fig. 1)

- ① **POWER/VOL Knob**  
Volume control combined with pushbutton power switch. A single push of the button turns the power on and another off or vice versa. Volume is increased by turning the knob clockwise.
- ② **SQUELCH/Knob**  
Turn the knob clockwise to the point where internal noise disappears.
- ③ **HI/LOW Switch**  
HIGH or LOW transmit output is selected by setting the knob in the normal position or pushing the knob in.
- ④ **Monitor Switch**  
This switch turns on the monitor circuit, permitting you to listen to the transmitted audio through the receiver when operating on a simplex frequency when the monitor function is activated, the PTT line is opened so you do not transmit.
- ⑤ **ON AIR Indicator**  
Lights during transmit.
- ⑥ **CALL Indicator**  
This lamp lights when the CALL CH Switch is on.
- ⑦ **Main Knob**  
Channel selector knob. Turned in either clockwise or counterclockwise direction, to select the desired channel from the 23 channels available.
- ⑧ **Channel Indicator Window**  
The selected channel number is indicated when the POWER/VOL knob set to ON. The semi-transparent covering prevents observation of the channel numbers while the power switch is in the off position. The ■ marking corresponds to a vacant channel, in which the signal cannot be transmitted nor received.
- ⑨ **Meter**  
Dual-purpose meter indicates input signal strength and RF output.

- ⑩ **CALL CH Switch**  
This switch is for turning on a sub-audible tone encoder. The encoder may be any one designed to be used on 12 VDC.
- ⑪ **MIC Connector**  
Connect the accessory microphone to this connector.
- ⑫ **Receive Indicator**  
Indicates a channel of a built-in crystal unit in the receiver. The indicator turns red in the built-in channel and does not light in a vacant channel. This indicator employs a light emitting diode.

## 2.2 REAR PANEL (Refer to Fig. 2)

- ⑬ **ANT Connector** — For connection of any 50 ohm 440 MHz band antenna.
- ⑭ **Center Meter Jack**  
Connect the center meter of  $\pm 50$  to  $\pm 100 \mu\text{A}$  to this jack.
- ⑮ **DC Power Connector** — Accepts normal DC operating voltage through the DC power cord supplied with the TR-8300.
- ⑯ **EXT SP Connector** — External AF output (8 ohm).

## 2.3 SIDE PANEL (Refer to Fig. 3)

- ⑰ **Stand-off** — Can be attached to your TR-8300 during operation to provide a convenient angle of viewing for the operator.
- ⑱ **Snap Lock** — Use to lock the transceiver body on the supplied mounting bracket.
- ⑲ **Mounting Rail** — Used to install the transceiver on the supplied mounting bracket.



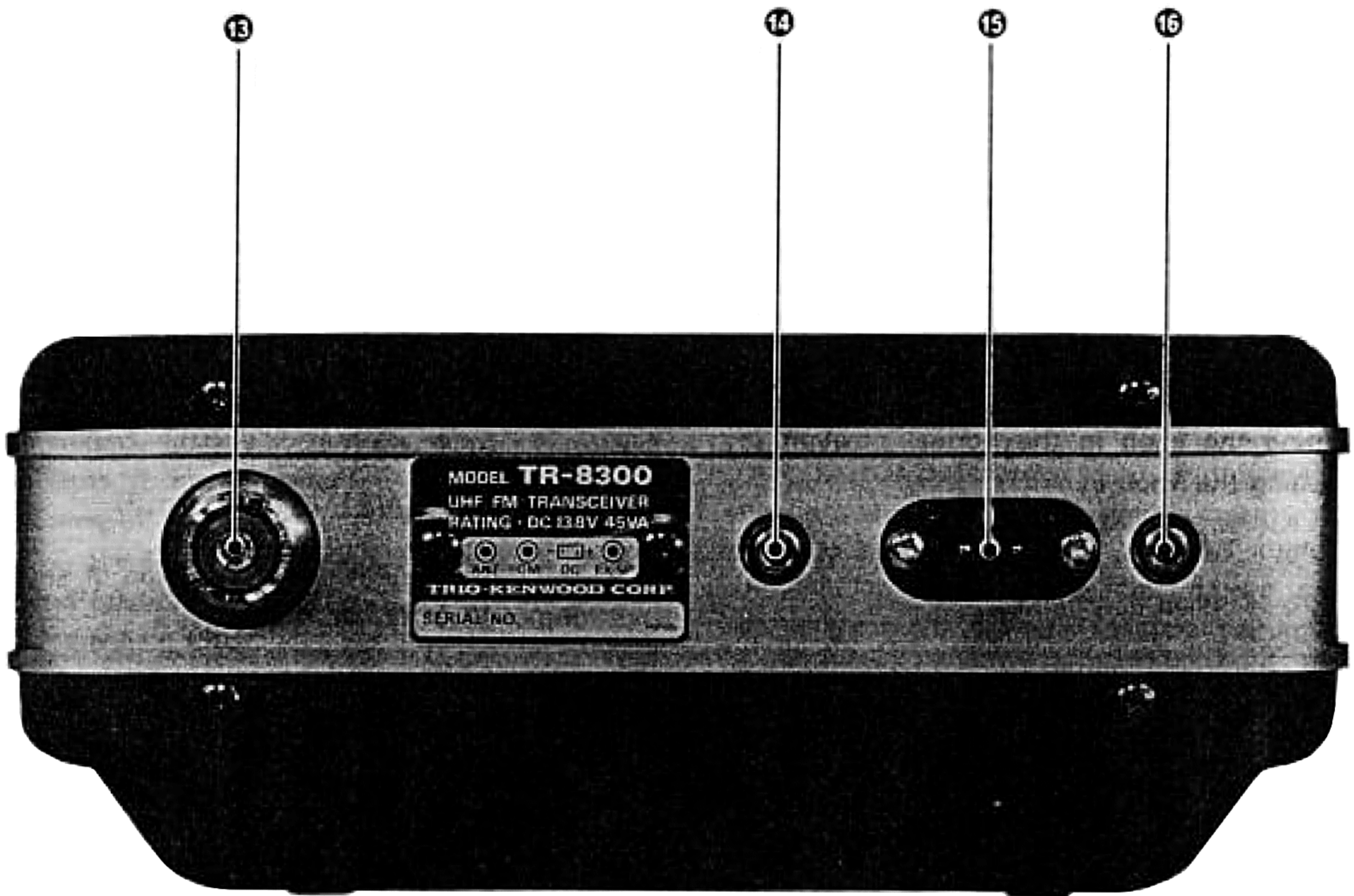


Fig. 2

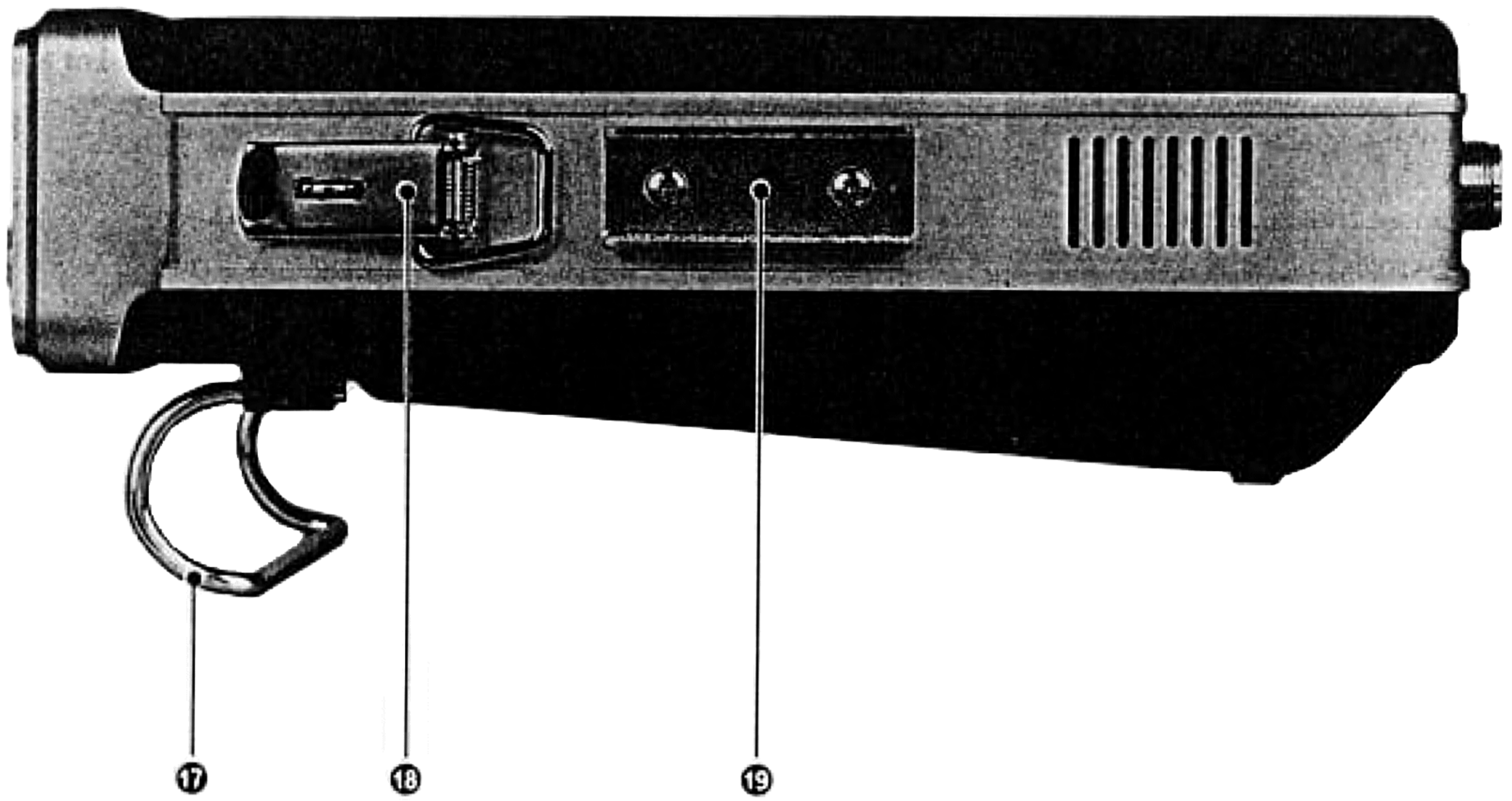


Fig. 3



## SECTION 3. GENERAL TIPS ON INSTALLATION

### 3.1 MOBIL USE

#### 1. Installation Position

Your TR-8300 may be installed under the dashboard of your vehicle for convenient operation. Be sure that its position does not restrict your leg movement to the brake pedal. A typical installation is shown in Fig. 4.

#### 2. How to Install (Fig. 5)

##### IMPORTANT:

The TR-8300 is designed for a negative ground installation.

- Securely install the mounting bracket with the supplied bolts and nuts.
- Insert the transceiver into the mounting bracket using the mounting rails.
- Adjust the rail angle for the desired position of the transceiver. This assures operational convenience and safety while driving the vehicle.

- Unfold each snap lock, hook on the pawl, then clamp the snap lock. Both locks should be fully fastened to get full effect of the springing action.

##### CAUTION:

Be sure that both rails are fully seated in the mounting bracket before clamping the locks.

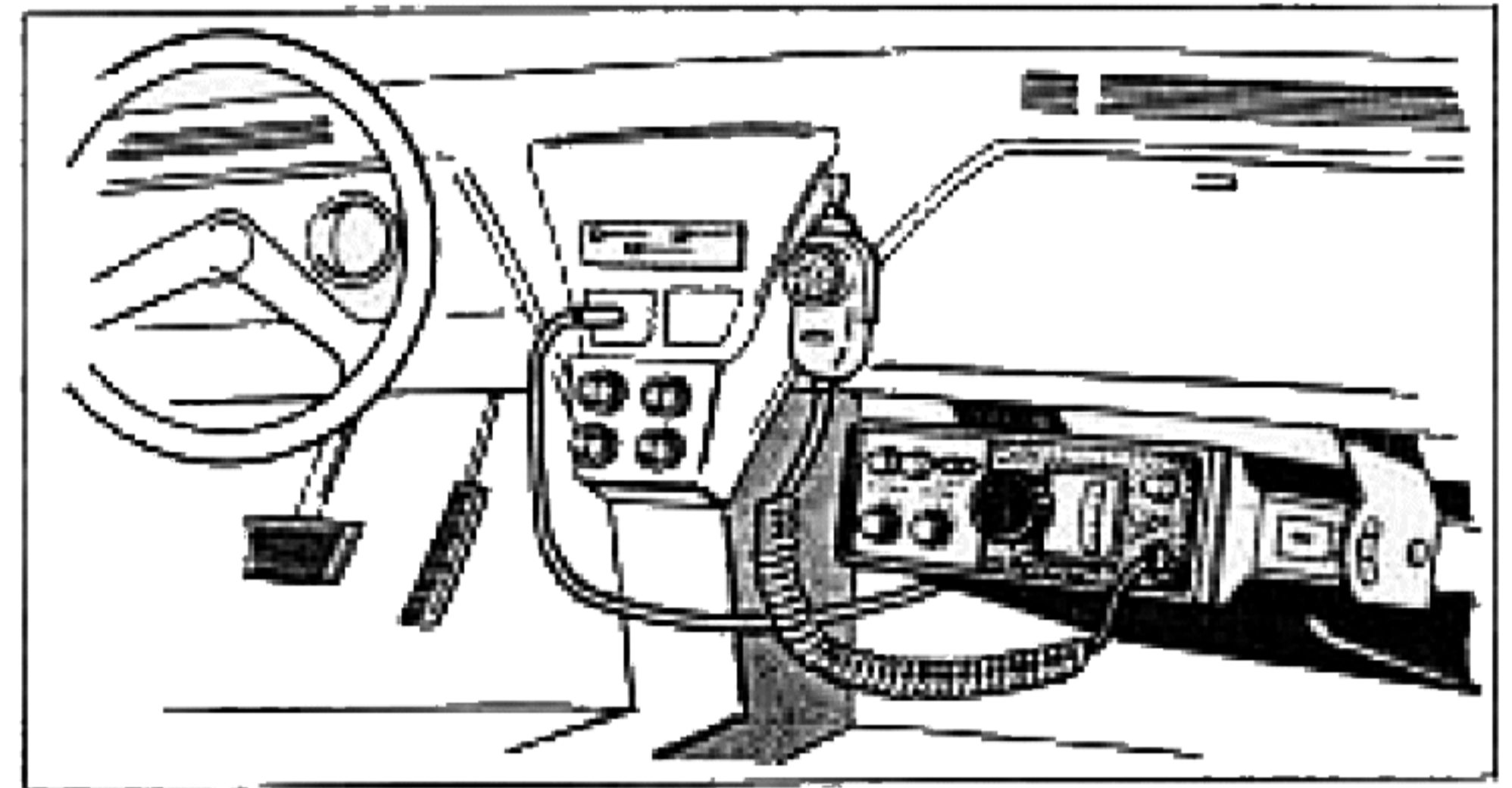


Fig. 4

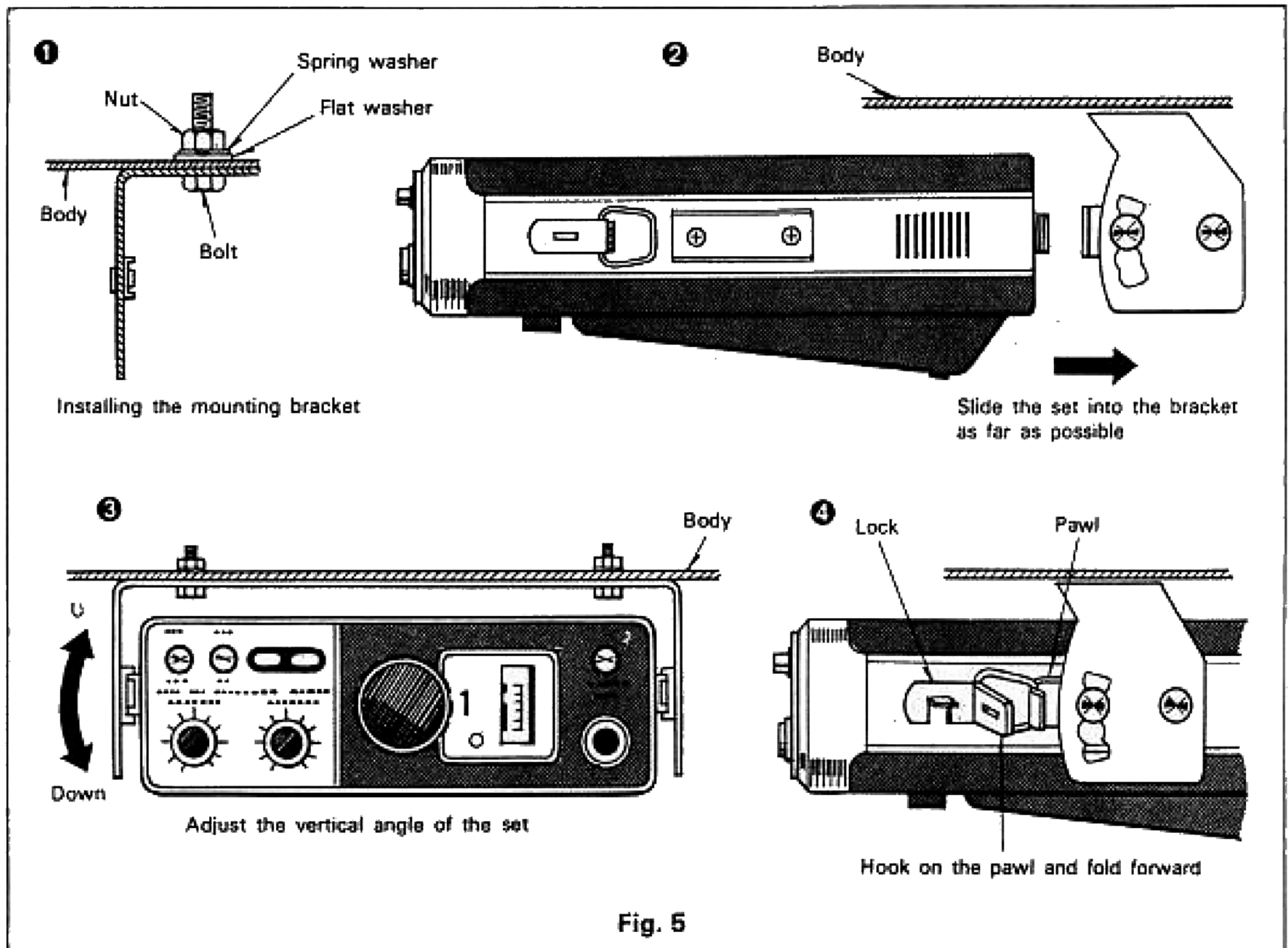


Fig. 5



**Channel Table**

Channel	Transmit	Receive
1	446.00 MHz	446.00 MHz
2	446.50 MHz	446.50 MHz
3	449.10 MHz	444.10 MHz
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		

Fill out this table with your additional channels. Cut off along the dotted line and keep it handy for your communication convenience.

**3. Connecting the Power Supply**

Connect the supplied power cable securely from your transceiver to the battery/power supply

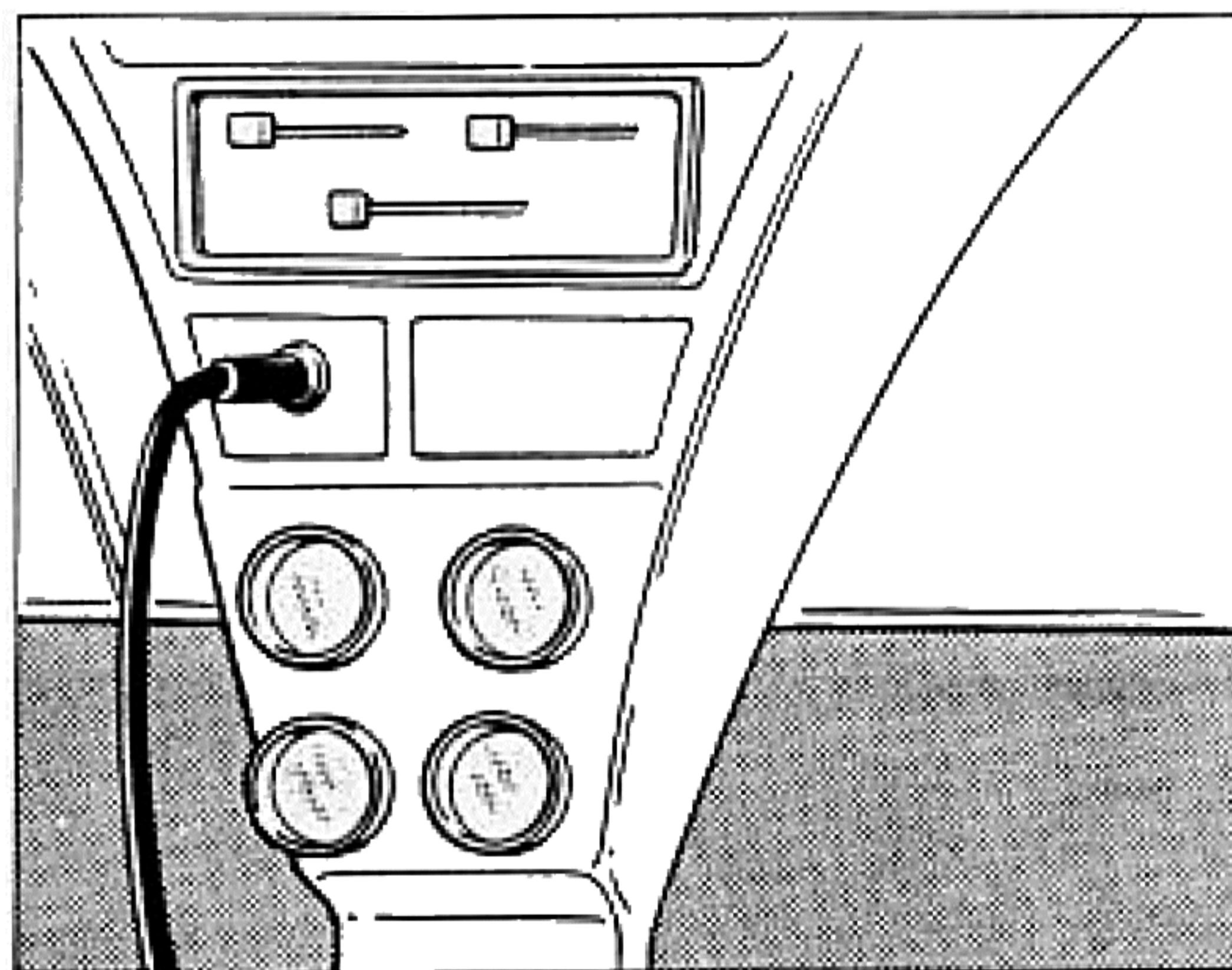
posts. Make certain that the red lead is placed to the positive (⊕) post and the black lead to the negative (⊖) post. If necessary, attach the power cable to the vehicle body at the appropriate points to avoid dangling.

**NOTES:**

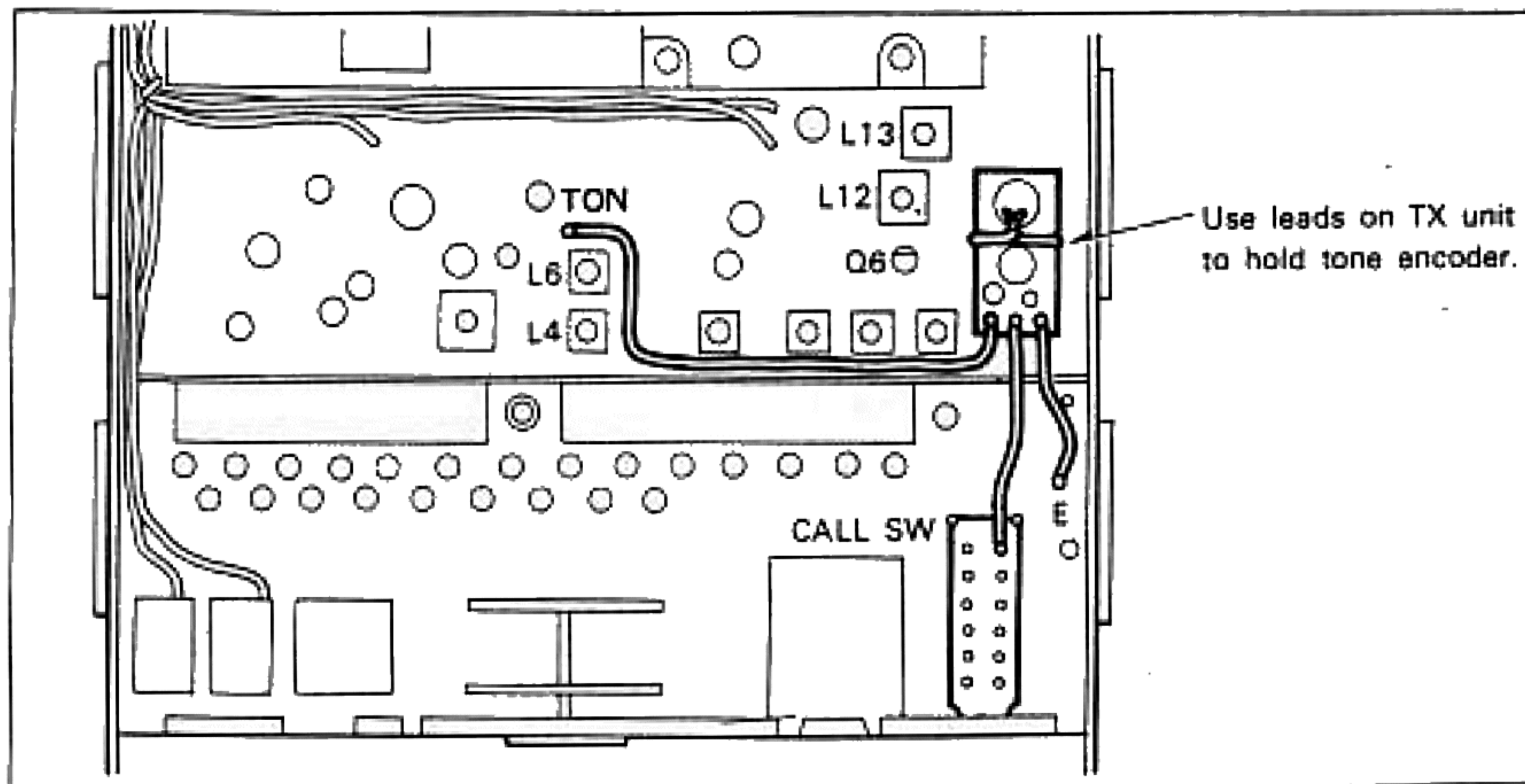
- 1) The power cable should be as short as possible.
- 2) An alternative way of obtaining power is to plug the cigar lighter arranged in most vehicles. Such a plug, shown in Fig. 6, is available at auto accessory shops or electronics parts stores.

**3.2 FIXED-STATION USE**

If you operate the TR-8300 as a fixed station, attach the supplied Stand-off bracket ① to it as illustrated in Fig. 3. The TR-8300 is designed so as to be used with a DC power supply having a current capacity of around 3.5A at the rated operating voltage of 13.8V.



**Fig. 6 Use of Cigarette Lighter**



**Fig. 7**



## SECTION 4. OPERATION

### 4.1 RECEIVING

1. Connect the supplied power cable to the DC power connector ⑫ and the antenna cable to the ANT connector ⑬. Select a DC power supply or battery pack having 3.5A current capacity at 13.8V.

#### CAUTION:

Make certain that connection of the positive (⊕) and negative (⊖) power cable leads have been connected properly.

2. Depress the POWER/VOL ① knob on the front panel. The channel indicator window will then indicate the number of the selected channel. Then turn the knob clockwise to obtain operating noise. Position the knob to the point at which any appropriate sound volume is obtained.
3. Set the main knob ⑦ to the position of "1" (Channel Indicator Window ⑧). This is the 446.00 MHz channel.
4. Slowly turn the squelch knob ② clockwise to effect the squelch until the internal noise disappears from the speaker. This adjustment should be made on the crystal oscillator contained channel with no input signal.
5. The speaker will produce the sounds with the input signal. With no input signal, sound will not be heard from the speaker because of the squelch circuit.

The meter ⑨ will deflect with changes in the strength of the input signal.

### 4.2 TRANSMITTING

1. Plug the supplied microphone cable plug into the MIC Connector ⑪.
2. Depress the microphone push-to-talk switch to operate the TR-8300 in the transmit mode. The ON AIR Indicator ⑤ will light and the meter ⑨ pointer will deflect to indicate the RF output power.
3. The best separation between your mouth and microphone is 5 to 10 cm.

#### NOTE:

You can check the operational condition of the antenna system by observing the reading on a standing-wave ratio (SWR) meter. It is recommended that the antenna system SWR is 1.5 : 1 or less.

The transmit power will be reduced by a protection circuit when the SWR is too high. The TR-8300 is designed so that the Meter ⑨ will read "7 ~ 9" when operating high power (10 watts) into a 50 ohm load. The antenna system, therefore, is acceptable if the meter reads around this value. The meter, in this sense, acts as an SWR indicator.

### 4.3 HOW TO USE THE CALL CH SWITCH

Your TR-8300 has a CALL CH switch pre-wired for use with a tone encoder unit. For use, hold and wire the unit with the leads as shown in Fig. 7.

### 4.4 HOW TO USE THE HI/LOW SWITCH

QSO between locals can be enjoyed with less interference and power consumption by reducing the output power to only the required value. This is accomplished by depressing the HI/LOW pushbutton switch, which reduces power from the normal 10 watts to approx. 1 watt. The ON AIR lamp will remain unchanged in luminous intensity, whereas the meter indication will drop to 3.

### 4.5 MONITOR SWITCH

The MONI switch on your TR-8300 is used to check whether a channel crystals are placed in it or not. The switch also is used when adjusting oscillation frequencies. Adjustment can be made easily with use of an external center meter (see "FREQUENCY ADJUSTMENT" page 11).

#### CAUTION

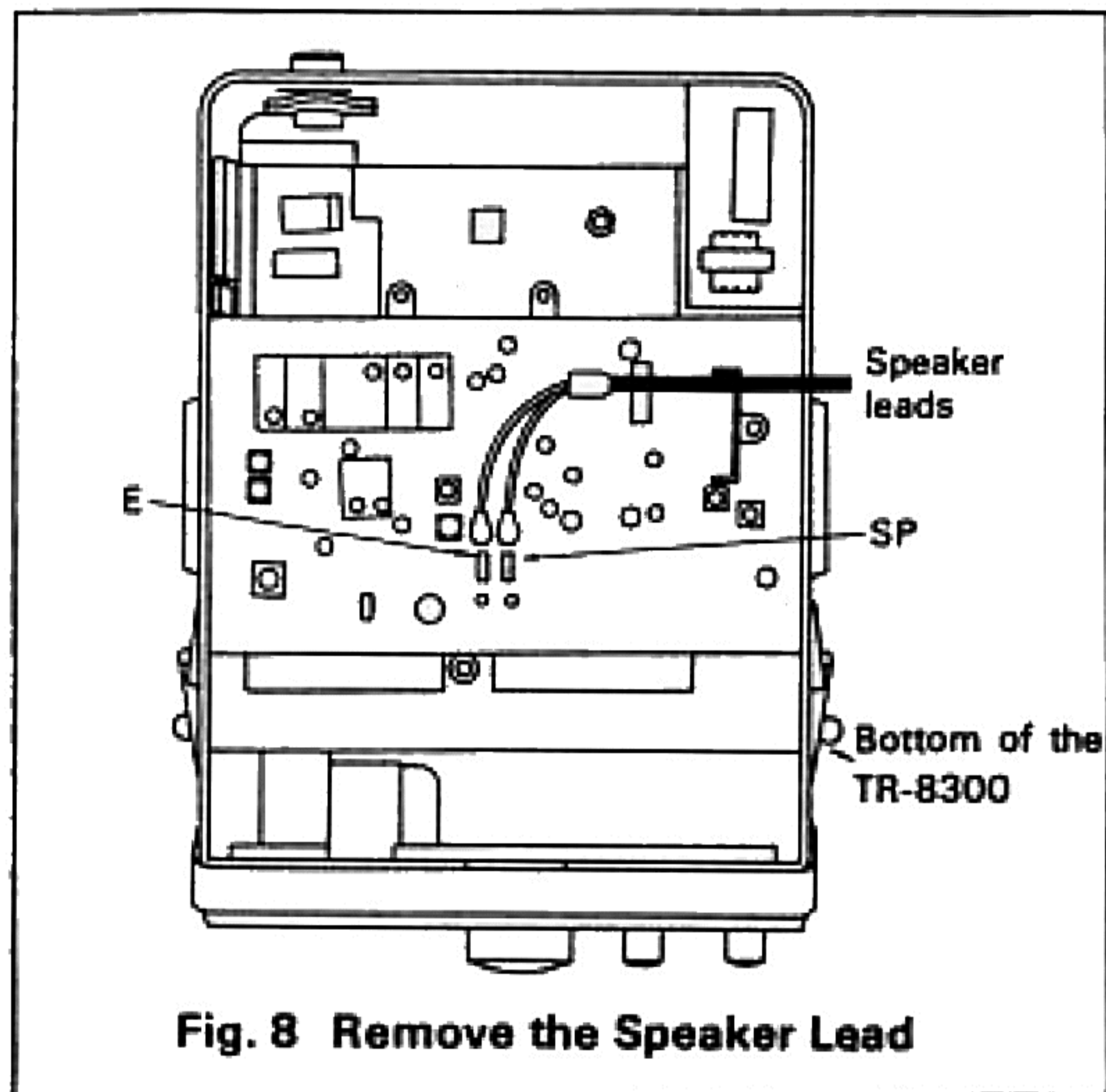
Transmit cannot be made when the MONI switch is in the ON position.



## 4.6 CHANNEL EXPANSION

To increase the number of available operating channels, follow as:

1. Remove the two screws holding the upper and lower casings each.
2. Remove the casings.
3. Disconnect the speaker leads from the PC board (X55-1160-11) (see Fig. 8).



Each transmit unit is marked "T" and the receive crystal unit "R". The upper half of the set is the transmit section. The back of the upper casing is stuck with an identification plate for transmit channel number positions and adjust trimmer positions.

Be careful not to confuse the crystals in installation. The sockets marked ■ are not in use. The lower half of the set is the receive section. Similarly, install the additional receive crystal unit.

The transmit and receive crystal oscillation frequencies may be determined by

**Transmit:**

$$\text{Crystal osc freq (MHz)} = \frac{\text{Desired transmit freq}}{18}$$

**Received:**

$$\text{Crystal osc freq (MHz)} = \frac{\text{Desired receive freq} - 10.7}{12}$$

The crystals used in both transmit and receive modes of operation are the HC-25/U third overtone crystal units.

## 4.7 CRYSTAL OSCILLATOR FREQUENCY ADJUSTMENT

Additional crystal units must be correctly adjusted in the oscillation frequencies. For adjustment, there may be two methods: (1) use of a frequency counter and (2) use of the built-in monitor circuit.

### 1. Adjustment with Frequency Counter

The frequency counter used should be capable of measuring frequencies up to 450 MHz.

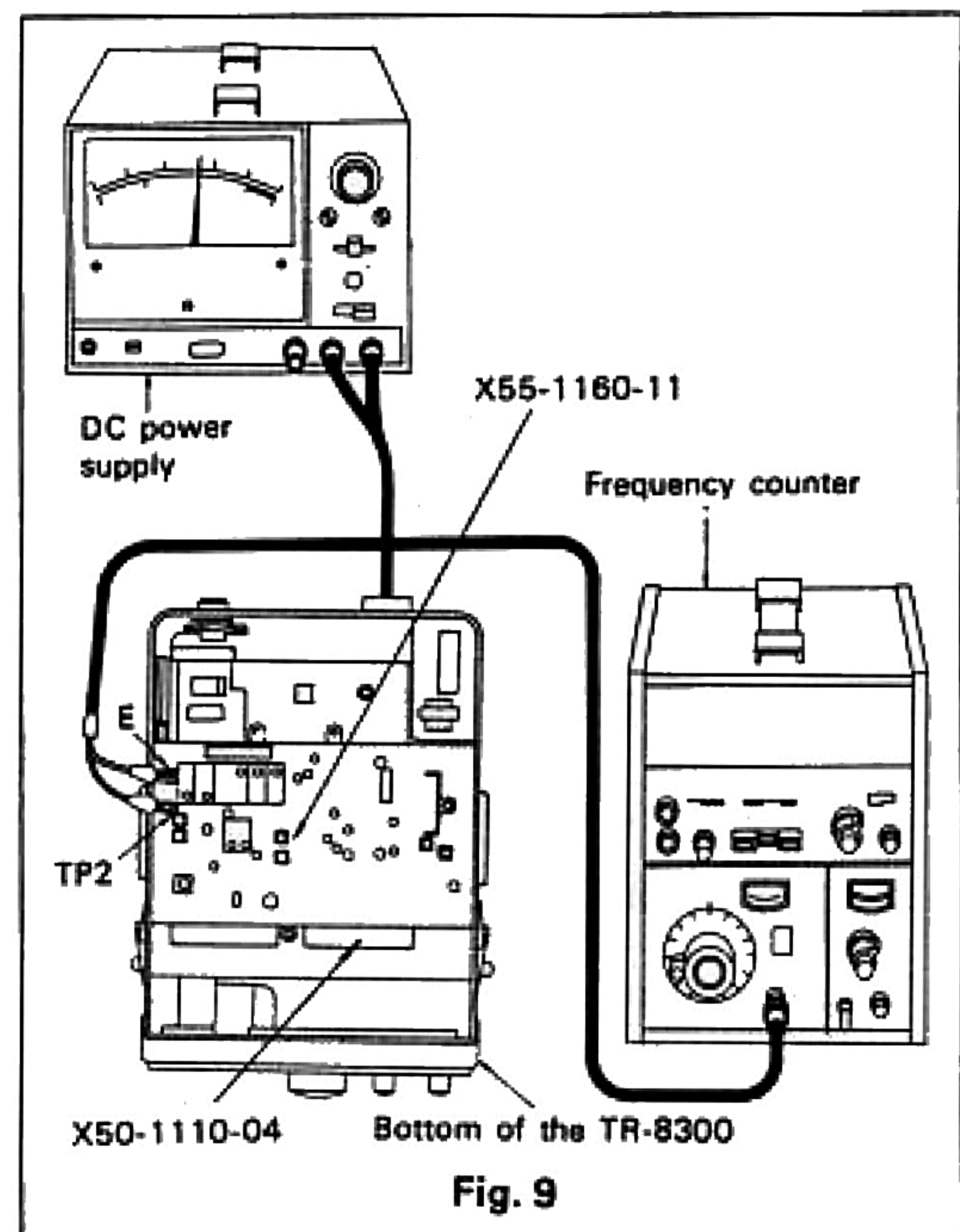
#### a) Receive crystal oscillation frequencies

Connect the frequency counter and a DC power supply to the TR-8300 as shown in Fig. 9. Adjust each adjust trimmer on the receive crystal unit (X50-1110-04) until the frequency counter reads:

$$(\text{Channel frequency} - 10.7)/4, \text{ MHz.}$$

For example, to adjust a crystal oscillation frequency to 446.50 MHz, adjust the trimmer for:

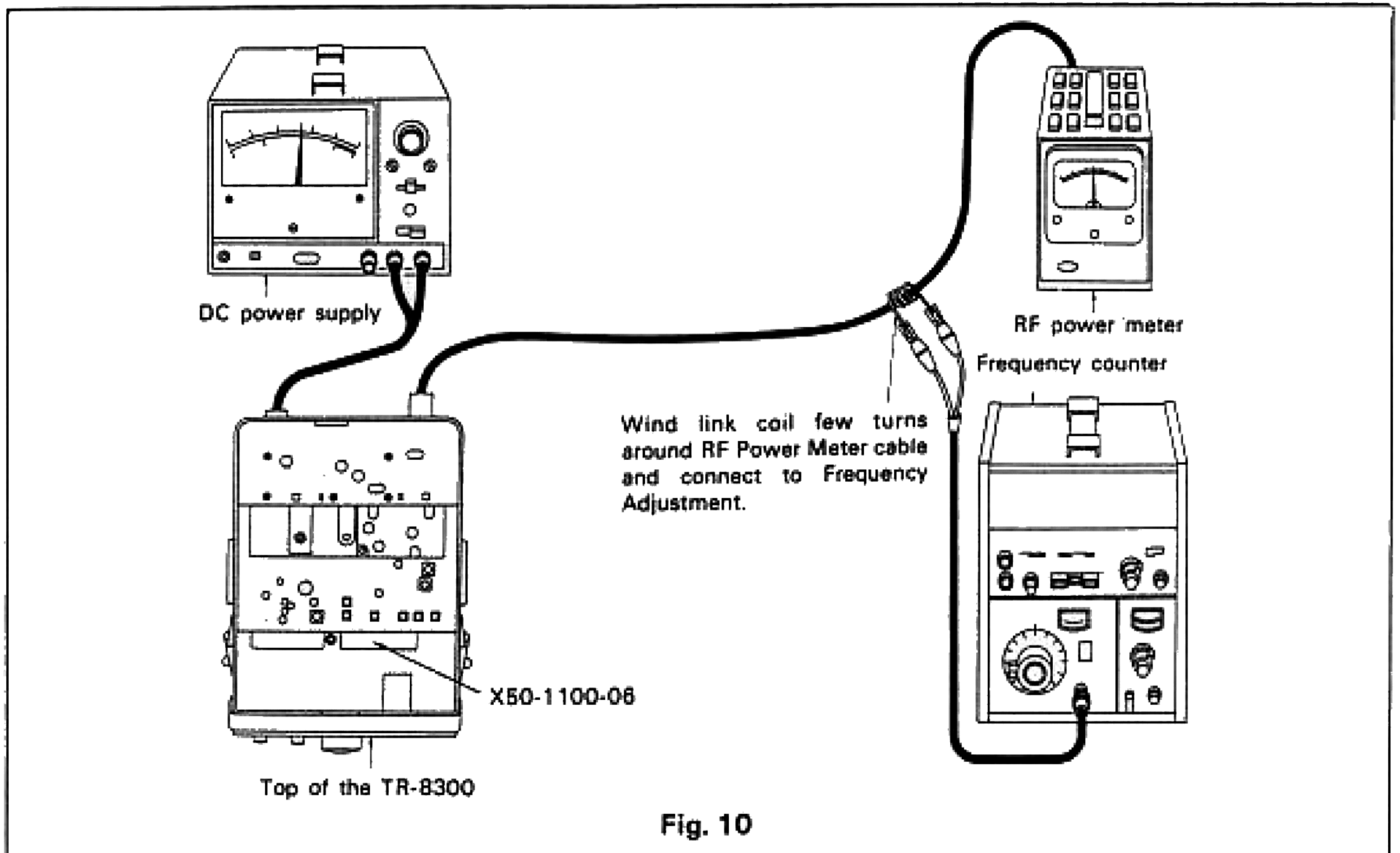
$$108.95 \text{ MHz } [= (446.50 - 10.7)/4].$$





- b) Transmit crystal oscillation frequencies  
 Connect the frequency counter, a DC power supply, and a RF power meter to the TR-8300 as shown in Fig.10. Adjust each adjust

trimmer on the transmit crystal board (X50-1100-06) until the frequency counter reads the precise transmit channel frequency.



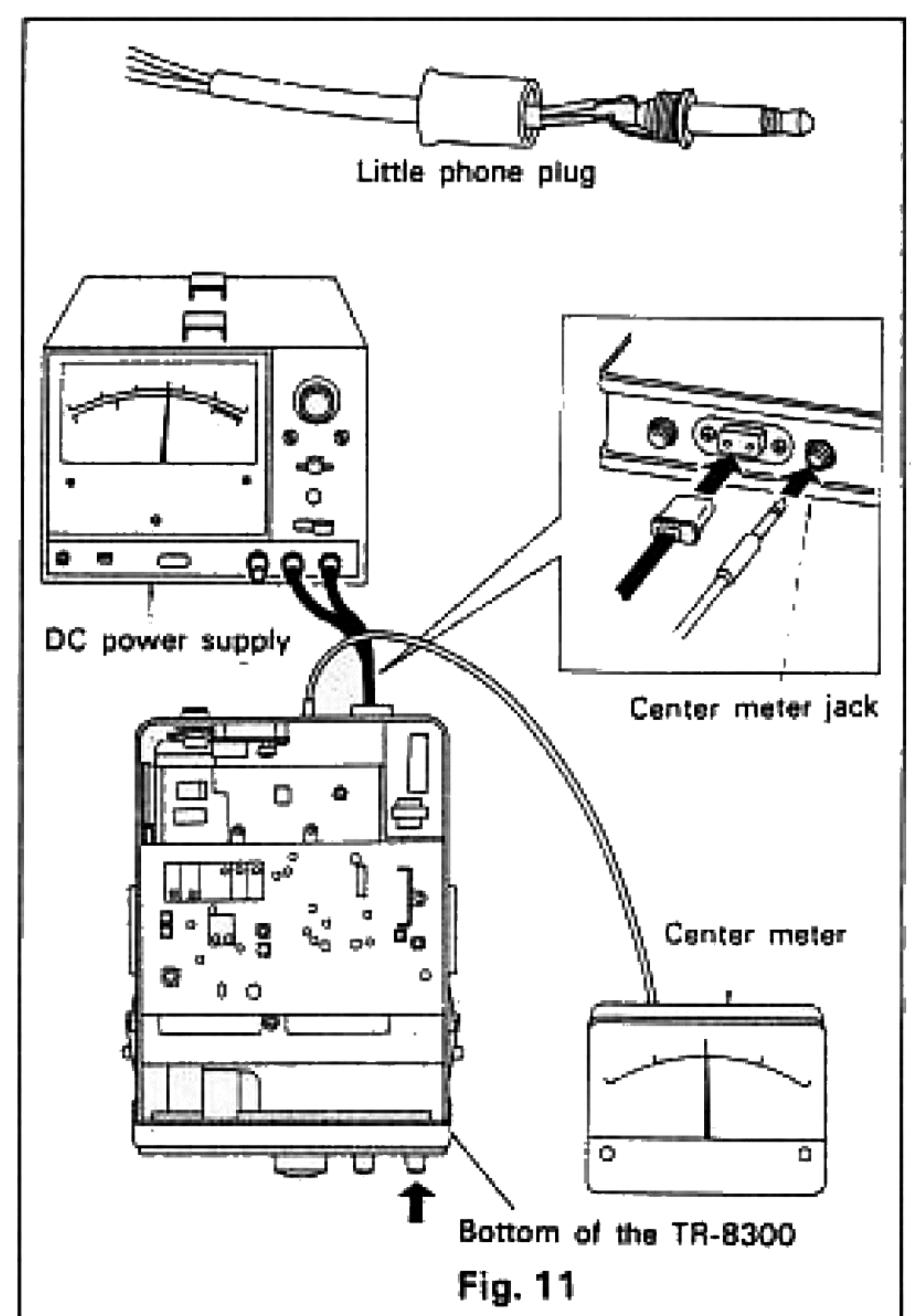
## 2. Adjustment with Monitor Circuit

If the transmit and receiver frequencies you are installing are the same and you do not have a frequency counter, the built-in monitor circuit may be used to adjust the transmit frequency. The receive frequency may be adjusted with an external center meter. Connect the center meter ( $\pm 50 \mu\text{A}$  or  $100 \mu\text{A}$ ) to the CM connector on the rear of the TR-8300 as shown in Fig. 11.

### NOTE:

A multi-meter with a  $100 \mu\text{A}$  range may be used in place of the center meter.

- Listen to a station that is known to be on the frequency desired.
- Adjust the receiver frequency trimmer capacitor until the center meter reads "0".
- Next, disconnect the antenna and press the MONI switch in (on).
- Key the transmitter and adjust the transmit frequency trimmer capacitor until the center meter reads "0".





## SECTION 5. ADDITIONAL INFORMATION

If your transceiver fails to work, contact the authorized dealer from which you purchased it for quick, reliable repair. All adjustable trimmers and coils in your transceiver were preset at the factory and should only be readjusted by a qualified technician with proper test equipment.

### HOW THE TX FINAL TRANSISTORS ARE PROTECTED

The TX unit final transistor protection provided in the TR-8300 is done by sampling the reflected power. As the reflected power is increased (higher

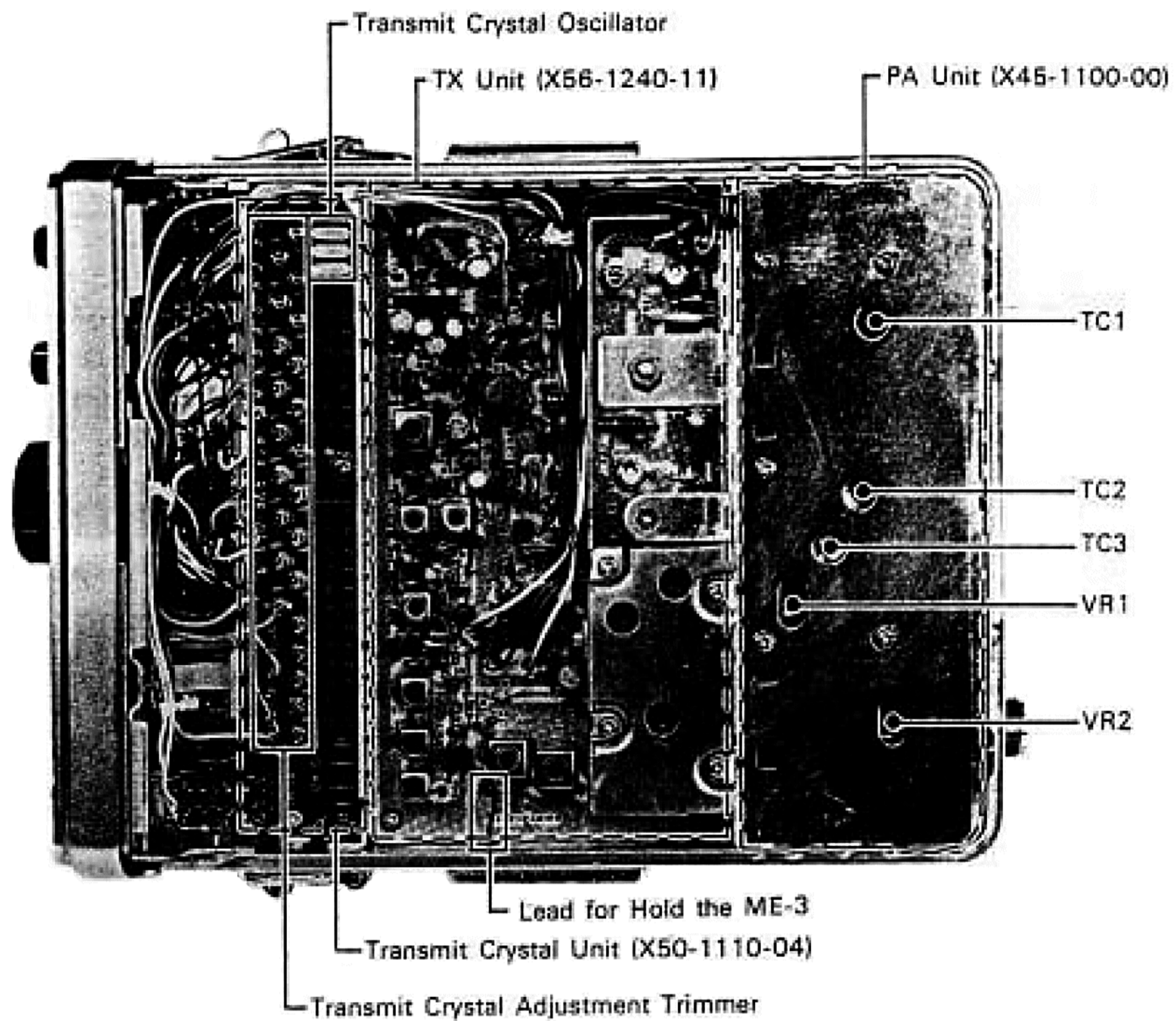
SWR) the voltage to the driver transistors is reduced.

If the transmit signal does not reach an expected distant point, check the antenna system. That is, whether the antenna and coaxial cable is well connected or not. If it is open, or the SWR is infinite, the transmit signal is on the air, but the protection circuit operates such that the driver transistor collector voltage is lowered to decrease the level of the signal input to the final transistors, which in turn reduces collector loss, thus protecting the final transistors.



# TOP AND BOTTOM VIEW OF THE TR-8300

## TOP



## BOTTOM

