KENWOOD

VHF FM TRANSCEIVER

Model TR-7500

OPERATING MANUAL

INTRODUCTION

Your KENWOOD Model TR-7500 is a high-quality 2-meter transceiver for use in amateur radio mobile stations as well as fixed stations.
The TR-7500 offers the following features:

- A wide coverage of 40 channels by the adoption of the PLL circuit.
- Channel indication with LED's.
- +600 kHz shift circuit incroporated.
- Adoption of the ULI circuit for the prevention of misoperation.
- RF ATT switch provided.
- Tone switch for repeater operation provided.
- Transmission output HI-LOW changeover switch provided.
- Receiving sound quality changeover filter incorporated.
- Various indicators with LED's.

CONTENTS

TR-7500 SPECIFICATIONS

GENERAL

Semiconductor	Transistors	44
	FETs	8
	ICs	7
	Diodes	36
Frequency Range	145.000 MHz to 145.975 MHz	
Frequency Synthesizer	Digital control of phase locked VCO	
Synthesizer Stability	Less than ± 750 Hz at 25°C	
Mode	FM	
No. of Channel	40 channel (25 kHz interval)	
Operating Temperature	−20 to +60°C	
Power Voltage	11.5 VDC to 16.0 VDC	
	(13.8 VDC as reference)	
Grounding	Negative grounding	
Antenna Impedance	50 Ω	
DC Current	Less than 0.5A in receive with no input signal	
	Less than 3.0A in transmit (HI)	
	Less than 1.5A in transmit (LOW)	
	(at 13.8 VDC)	
Dimensions	152 mm	width
	60 mm	high
	234 mm	deep
Weight	Approx. 2.2 kg	

TRANSMIT SECTION

RF Output Power	High	10 watts	(min.)
	Low	approx. 1 watt	(adjustable up to 5 watts)
Modulation	Variable reactance direct shift		
Max. Frequency Deviation	±5 kHz		
Spurious Radiation	Less than −60 dB		
Repeater Tone Frequency	1750 Hz		
Microphone	Dynamic microphone with PTT switch, 500Ω		

RECEIVE SECTION

Circuitry	Double superheterodyne	
Intermediate Frequency	1st IF	10.7 MHz
	2nd IF	455 kHz
Sensitivity	Less than 0.4 μV for 20 dB quieting	
	(Less than 1 μV for 30 dB S/N)	
Squelch Sensitivity	Less than 0.25 μV	
Pass Band Width	More than 12 kHz at 6 dB down	
Selectivity (2 Signal)	More than 70 dB at 25 kHz of adjacent channel	
Image Rejection	More than 70 dB	
Spurious Interference	More than 60 dB	
Intermodulation	More than 66 dB	
Audio Output	More than 1.5 watts across 8 Ω load (10% distortion)	

Note: The circuit and ratings may change without notice due to development in technology.

SECTION 1. PREPARATION FOR USE

1.1 ACCESSORIES

Carefully unpack the TR-7500 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 (4A) . . . . . 1 piece
(7) Miniature plug for external speaker 1 piece
(8) Miniature plug for center meter . . . 1 piece
(9) Operating manual . . . . . 1 copy

1.2 ANTENNA

Any 50 ohm 145 MHz band antenna system may be used with your TR-7500. 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 receptable on the transceiver.

1.3 INSTALLATION CAUTION

Your TR-7500 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, the "MOBILE USE", page 7.

SECTION 2. CONTROLS AND WHAT THEY DO

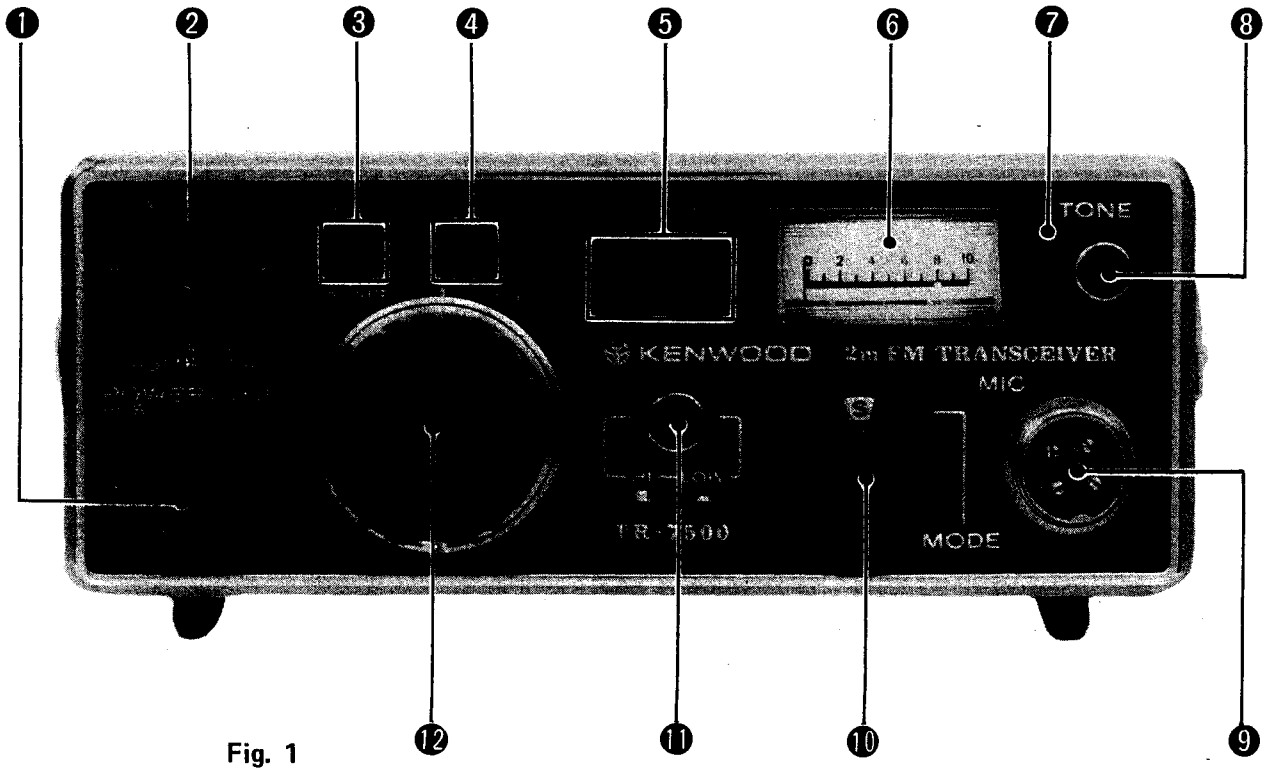

Fig. 1

2.1 FRONT PANEL (Refer to Fig. 1)

❶ **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.

❷ **SQUELCH/RF ATT Control**
This control serves both for squelch control and RF attenuation switching. The SQUELCH control is used to cut off no-signal receiver hiss noise. In general, turn it clockwise until the noise threshold is reached when no signal is coming through the receiver.
The RF ATT switch, when pulled out, reduces the receive sensitivity around 10 dB. (For use of this switch, refer to page 11.)

❸ **ON AIR Indicator**
A light-emitting diode which lights during transmit.

❹ **ULI Indicator**
A light-emitting diode which indicates the unlock state. While this indicator lights, you cannot use the TR-7500 for any of the transmit and receive operations. For details, see page 10.

❺ **Channel Indicator**
Light-emitting diodes display operation channel number. (see Table 1, the "List of Channel Frequencies").

❻ **Meter**
Dual-purpose meter indicates input signal strength and antenna output. Automatic switching.

❼ **TONE Indicator**
A light-emitting diode, which illuminates while the tone oscillator circuit for repeater activation is in operation.

❽ **TONE Switch**
This switch, when pressed in, actuates the tone oscillator circuit (1,750 Hz) for repeater activation to turn on for transmission.

❾ **MIC Connector**
Connect the accessory microphone to this connector.

❿ **MODE Switch**
This switch shifts the operating frequency.

⓫ **HI/LOW Switch**
HIGH or LOW transmit output is selected, by setting the knob in the normal position or pushing the knob in.
The reduced power state (LOW) is indicated by the green light in the meter.

⓬ **Main Knob**
A channel selector knob, turned either clockwise or counterclockwise. This has 40 channel steps.
The knob has a large knotch at the "145.00" position.

2.2 REAR PANEL (Refer to Fig. 2)

⓭ **EXT SP Connector**
External AF output (8 ohm)

⓮ **Center Meter Connector**
This connector allows an external center meter to monitor a frequency deviation of the other station.

⓯ **ANT Connector**
For connection of any 50 ohm 2-meter antenna.

⓰ **Audio Filter Switch**
This switches on or off the high-cut filter to change the receive sound tone. Turning it "ON" makes the sound soft.

⓱ **DC Power Connector**
Accepts normal DC operating voltage through the DC power cord supplied with the TR-7500.

2.3 SIDE PANEL (Refer to Fig. 3)

⑱ Stand-off

Can be attached to your TR-7500 during operation to provide a convenient angle of viewing for operator.

⑲ Snap Lock

Used to lock the transceiver body on the supplied mounting bracket.

⑳ Mounting Rail

Used to install the transceiver on the supplied mounting bracket.

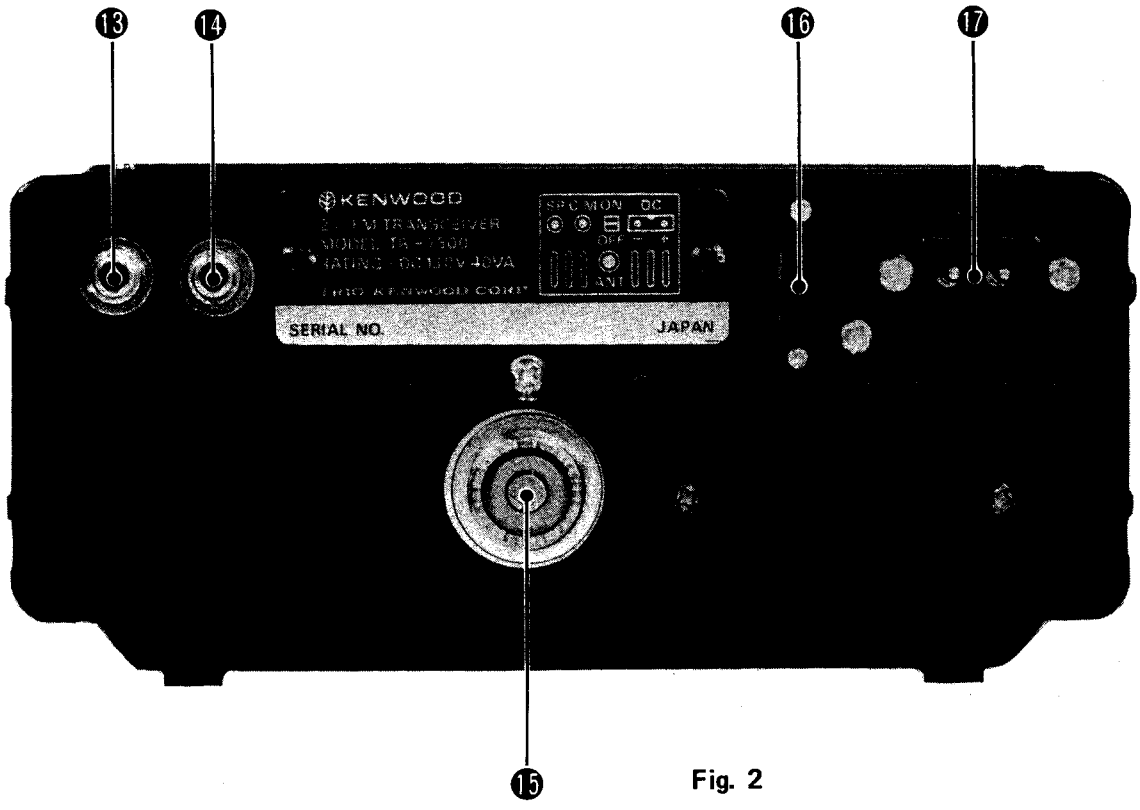

Fig. 2

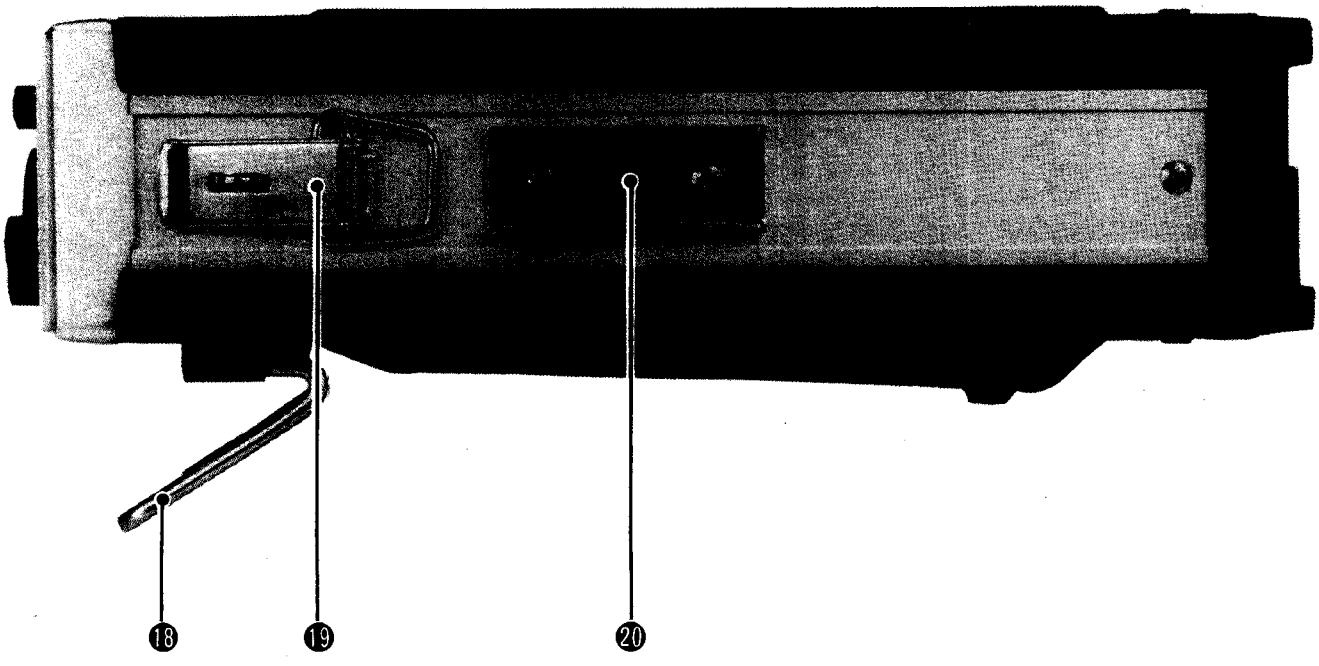

Fig. 3

SECTION 3. GENERAL TIPS ON INSTALLATION

3.1 MOBILE USE

1. Installation Position

Your TR-7500 may be installed under the dash-board 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-7500 is designed for a negative ground installation.

a) Securely install the mounting bracket with the supplied bolts and nuts.

b) Insert the transceiver into the mounting bracket using the mounting rails.

c) Adjust the rail angle for the desired position of the transceiver. This assures operational convenience and safety while driving the vehicle.

d) 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 spring action.

Caution:

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

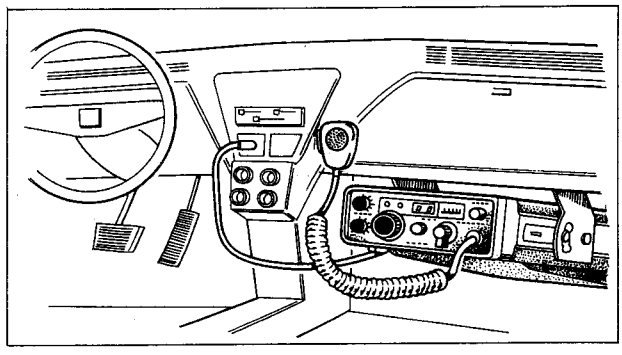

Fig. 4

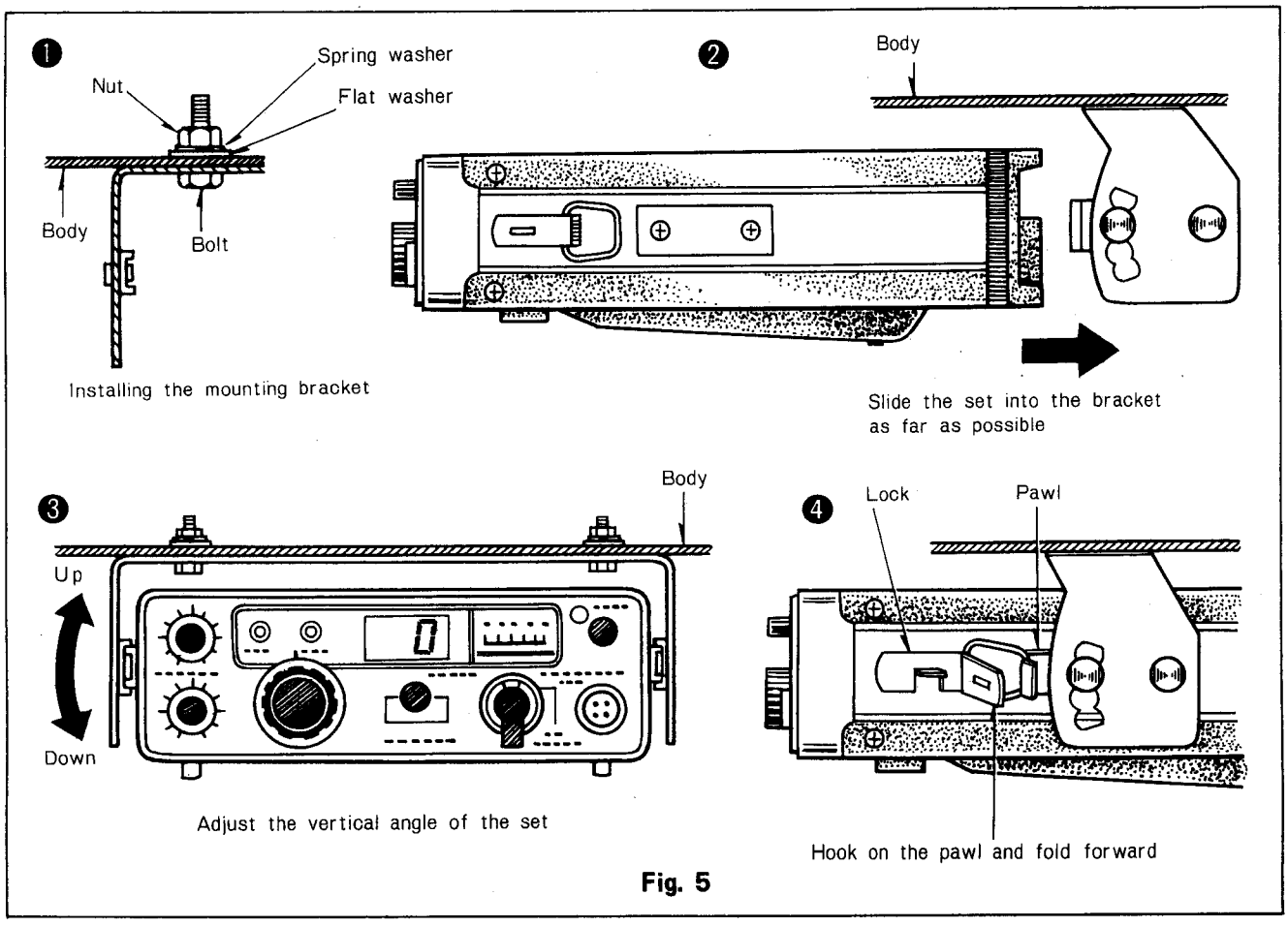

Fig. 5

3. **Connecting the Power Supply**
   Connect the supplied power cable securely from your transceiver to the battery or 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-7500 as a fixed station, attach the supplied Stand-off bracket ⑱ to it as illustrated in Fig. 3. The TR-7500 is designed so as to be used with a DC power supply having a current capacity of around 3.0A at the rated operating voltage of 13.8V.

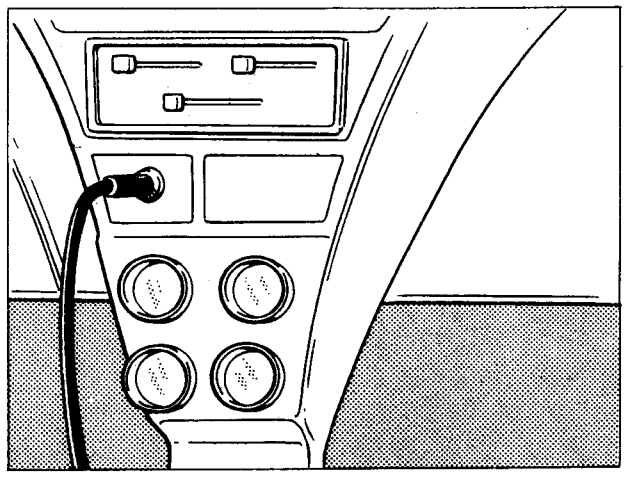

Fig. 6 Use of Cigarette Lighter

SECTION 4. OPERATION

4.1 RECEIVING

1. Connect the supplied power cable to the DC power connector ⓱ and the antenna cable to the ANT connector ⓯ Select a DC power supply or battery pack having 3.0A 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/VOL❶ knob on the front panel. The frequency 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 ⓬ to the appropriate position.
4. Slowly turn the squelch knob ❷ clockwise to effect the squelch until the internal noise disappears from the speaker. This adjustment should be made 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 control.
   The meter ❻ 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 ❾
2. Depress the microphone push-to-talk switch to operate the TR-7500 in the transmit mode.
   The ON AIR Indicator ❸ will light and the meter ❻ pointer will deflect to indicate the RF output power.
3. The proper 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-7500 is designed so that the Meter ❻ 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 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 approx. "3" on the meter.

4.4 HOW TO USE THE MODE SWITCH

This switch has three positions:

S: Set TR-7500 in simplex mode of operation where both transmit and receive operations are at same frequency.

N: Transmit frequency is same as displayed, but receive frequency is 600 kHz higher than it.

R: Reversely, receive frequency is same as displayed, but transmit frequency is 600 kHz higher than it.

Table 1 Channel Table

Pos.	Channel indicator	S		N		R	
		TX	RX	TX	RX	TX	RX
		MHz	MHz	MHz	MHz	MHz	MHz
1	0	145.000	145.000	145.000	145.600	145.600	145.000
2	1	145.025	145.025	145.025	145.625	145.625	145.025
3	2	145.050	145.050	145.050	145.650	145.650	145.050
4	3	145.075	145.075	145.075	145.675	145.675	145.075
5	4	145.100	145.100	145.100	145.700	145.700	145.100
6	5	145.125	145.125	145.125	145.725	145.725	145.125
7	6	145.150	145.150	145.150	145.750	145.750	145.150
8	7	145.175	145.175	145.175	145.775	145.775	145.175
9	8	145.200	145.200	145.200	145.800	145.800	145.200
10	9	145.225	145.225	145.225	145.825	145.825	145.225
11	10	145.250	145.250	145.250	145.850	145.850	145.250
12	11	145.275	145.275	145.275	145.875	145.875	145.275
13	12	145.300	145.300	145.300	145.900	145.900	145.300
14	13	145.325	145.325	145.325	145.925	145.925	145.325
15	14	145.350	145.350	145.350	145.950	145.950	145.350
16	15	145.375	145.375	145.375	145.975	145.975	145.375
17	16	145.400	145.400	145.400	146.000	146.000	145.400
18	17	145.425	145.425	145.425	146.025	146.025	145.425
19	18	145.450	145.450	145.450	146.050	146.050	145.450
20	19	145.475	145.475	145.475	146.075	146.075	145.475
21	20	145.500	145.500	145.500	146.100	146.100	145.500
22	21	145.525	145.525	145.525	146.125	146.125	145.525
23	22	145.550	145.550	145.550	146.150	146.150	145.550
24	23	145.575	145.575	145.575	146.175	146.175	145.575
25	24	145.600	145.600	145.600	146.200	146.200	145.600
26	25	145.625	145.625	145.625	146.225	146.225	145.625
27	26	145.650	145.650	145.650	146.250	146.250	145.650
28	27	145.675	145.675	145.675	146.275	146.275	145.675
29	28	145.700	145.700	145.700	146.300	146.300	145.700
30	29	145.725	145.725	145.725	146.325	146.325	145.725
31	30	145.750	145.750	145.750	146.350	146.350	145.750
32	31	145.775	145.775	145.775	146.375	146.375	145.775
33	32	145.800	145.800	145.800	146.400	146.400	145.800
34	33	145.825	145.825	145.825	146.425	146.425	145.825
35	34	145.850	145.850	145.850	146.450	146.450	145.850
36	35	145.875	145.875	145.875	146.475	146.475	145.875
37	36	145.900	145.900	145.900	146.500	146.500	145.900
38	37	145.925	145.925	145.925	146.525	146.525	145.925
39	38	145.950	145.950	145.950	146.550	146.550	145.950
40	39	145.975	145.975	145.975	146.575	146.575	145.975

S, N, R: Mode switch position
TX: Transmit
RX: Receive

4.5 HOW TO USE THE TONE BURST SWITCH

Use the switch to contact a relay station. Keep the TONE switch switched for some seconds before transmission to transmit the signal modulated by 1,750 Hz with which the relay station is activated.

4.6 NOTES ON THE ULI INDICATOR

Your TR-7500 has a protective circuit that stops the oscillator circuit if this fails to operate normally. This unlock feature therefore prevents possible faulty PLL operation from interferring with other stations. The unlock circuit, when operates, activates the ULI indicator, not allowing transmit nor receive operation. However, note that even if it lights in the following cases, the PLL circuit is normal, or not at fault.

1. The Main knob (rotary switch) is not at the correct click point.
2. The ULI indicator lights momentarily when the POWER switch is switched on or when the Main knob is turned.

4.7 CHANNEL TABLE

Your TR-7500 is a 40 channel FM transceiver for specific use in 145 to 146 MHz, with basic channel intervals being 25 kHz. The TR-7500 has the 40 channel built-in for frequent use (see Table 1).

4.8 REPEATER OPERATION

Your TR-7500 is capable of actuating the repeater, the specifications of which are is follows.

- Frequency shift: 600 kHz.
- Starting system: Carrier controlled type where action is controlled by 1,750 Hz tone signal.

When turning the TONE switch to "ON", the tone oscillator built in your TR-7500 runs and at the same time, it automatically sends out the tone signal which actuates the repeater. In the "N" mode where the receive frequency is 600 kHz higher than the transmit frequency, the frequency of the channel "0" position incoming to the repeater

is 145.00 MHz and that of the send wave is 145.60 MHz. By turning the MODE switch to "R", the receive and transmit frequencies are reversed. You therefore can directly receive the transmit signal of the other station.

If you can directly hear the voice of the other fellow fairly without use the repeater, you may change to the simplex mode of operation after repeater-through operation. You should switch the MODE switch on or off effectively in view of efficient use of the repeater.

Your TR-7500 can be operated at any of 40 channels ranging 145.000 to 145.975 MHz in steps of 25 kHz. In transmission on the mode "R" for channel 16 to 39 position, accordingly, the transmit frequency is 146.000 to 146.575 MHz. In some regions, be careful that it is out of band.

4.9 HOW TO USE THE RF ATT SWITCH

This switch, when pulled out, decreases the receive sensitivity around 10 dB as the RF attenuator is placed in the receive input circuit. It is helpful to reduce undesirable interferences, such as cross talk and overload, due to strong waves generated from a commercial stations operating in the vicinity of the amateur bands. The switch, also, is useful to attenuate desired strong waves in measuring the radiation patterns of beam antennas, in finding the direction of foxhunting and in other similar cases.

4.10 HOW TO USE THE CENTER METER

The TR-7500 transceiver is provided with a center meter connector, it can be monitored a frequency deviation of the other station.

Connect a center meter of ±50μA ~ ±100μA to the center meter connector using provided miniature plug. A multi-meter set to 100μA or more sensitive range may be used in place of the center meter.

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-7500 is done by sampling the reflected power. As the reflected power is increased (higher SWR) the voltage to the drive 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-7500