



2m FM TRANSCEIVER

Model TR-7800



INSTRUCTION MANUAL

INTRODUCTION

You are the owner of our latest product, the new TR7800 transceiver. Please read this instruction manual carefully before placing your transceiver in service. The unit has been carefully engineered and manufactured to rigid quality standard, and should give you satisfactory and dependable operation for many years.

AFTER UNPACKING

- Shipping container:
Save the boxes and packing in the event your unit needs to be transported for remote operation, maintenance, or service.
- The following explicit definitions apply in this manual:
Note: If disregarded, inconvenience only, no risk of equipment damage or personal injury.
Caution: Equipment damage may occur, but not personal injury.

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■ ACCESSORIES

Carefully unpack your TR-7800 and check that it is supplied with the following accessories:

- (1) Dynamic microphone (with U/D switch)
(T90-0313-05) 1 piece
- (2) Mounting Bracket
Mounting parts:
 - Hex wrench (W01-0401-04) 1 piece
 - Nuts (5 mm diameter)
(N14-0510-04) 4 pieces
 - Hex-socket screw
(N09-0008-04) 4 pieces
 - Flat washers (6 mm diameter)
(N15-1060-46) 4 pieces
 - Spring washer (6 mm diameter)
(N16-0060-46) 4 pieces
- (3) Foot
 - Rubber foot (small, rear)
(J02-0069-04) 2 pieces
 - Rubber foot (large, front)
(J02-0070-05) 2 pieces
 - Screw (N30-3006-46) 4 pieces
- (4) DC power cord (with 2P plug and fuse)
(X42-1170-01) 1 piece
- (5) Spare fuse (8A) (F05-8021-05) 1 piece
- (6) Miniature plug (for external speaker)
(E12-0001-05) 1 piece
- (7) Instruction manual 1 copy

FEATURES

- **15 MULTIFUNCTION MEMORY CHANNELS, EASILY SELECTABLE WITH A ROTARY CONTROL**

M0—M12.. memorize frequency and offset (± 600 kHz or simplex)

M13 memorize transmit and receive frequencies independently for nonstandard offset.

M14..... priority channel with simplex, ± 600 kHz, or nonstandard offset operation.

- **INTERNAL BATTERY BACKUP FOR ALL MEMORIES**

All memory channels (including transmit offset) are retained when four AA Ni-Cd batteries (not KENWOOD supplied) are installed in battery holder inside TR-7800. Batteries are automatically charged while transceiver is connected to 12V DC source.

- **PRIORITY ALERT**

M14 memory is priority channel.

- **BUILT-IN TONE SIGNAL GENERATOR**

Repeater control tone signal (1750 Hz) circuit.

- **FRONT-PANEL KEYBOARD**

For frequency selection, transmit offset selection, memory programming, scan control, and selection of autopatch encoder tones:

- **AUTOSCAN**

Entire band (5 kHz or 25 kHz steps) and memories. Automatically locks on busy channel; scan resumes automatically after several seconds unless CLEAR or mic PTT button is pressed to cancel scan.

- **SEPARATE DIGITAL READOUTS**

To display frequency (both receive and transmit) and memory channel.

- **SELECTABLE POWER OUTPUT**

25 watts (Hi)/5 watts (Low).

- **BUILT-IN PIEZO-ELECTRIC BUZZER**

BEFORE USE



Do not adjust coils, trimmers, or pots!
These are factory adjustments.



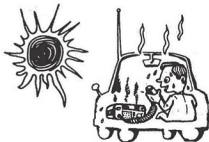
Do not install near heater outlet.



BEFORE connection, check polarity.



This unit is designed for 12V, negative ground ONLY.



After parking in the sun, and inside temperature is HOT,
cool this unit BEFORE transmitting.



Keep equipment away from heat and out of direct sunlight.

SPECIFICATIONS

[General]

Semiconductors	MPU	1
	ICs	18
	Transistors	58
	FETs	9
	Diodes	78
Frequency range	144.000 to 145.995 MHz	
Frequency synthesizer	Digital control, phase locked VCO	
Mode	FM (F3)	
Antenna impedance	50 ohms	
Power requirement	13.8V DC \pm 15%	
Grounding	Negative	
Operating temperature	- 20°C to +50°C	
Current drain	0.4A in receive mode with no input signal	
	6A in HI transmit mode (Approx.)	
	2.5A in LOW transmit mode (Approx.)	
	Less than 3 mA for memory back up (from power supply)	
	Less than 2 mA for memory back up (from battery)	
Dimensions	175mm (6 - 7/8) wide	
	64mm (2 - 1/2) high	
	206mm (8-1/16) deep	
	(projections excluded)	
Weight	2.1 kg (4.63 lbs) (approx.)	

[Transmitter Section]

RF output power (at 13.8V DC, 50Ω load)	HI	25 Watts min.
	LOW	5 Watts approx. (Adjustable)
Modulation	Variable reactance direct shift	
Frequency tolerance	Less than $\pm 20 \times 10^{-6}$	
(- 20°C ~ + 50°C)		
Spurious radiation	HI	Less than - 60 dB
	LOW	Less than - 53 dB
Maximum frequency deviation (FM)	± 5 kHz	
RPT. Tone Frequency	1,750 Hz	
Microphone	Dynamic microphone with PTT switch, 500 Ω	

[Receiver Section]

Circuitry	Double conversion superheterodyne	
Intermediate frequency	1st F	10.695MHz
	2nd F	455kHz
Receiver sensitivity	Better than 0.5 μ V for 30 dB S/N	
	Better than 0.2 μ V for 12dB SINAD	
Receiver selectivity	More than 12kHz (-6dB)	
	Less than 24 kHz (-60dB)	
Spurious response	Better than 60 dB	
Squelch sensitivity	0.16 μ V (threshold)	
Auto scan stop level	Less than 0.2 μ V (threshold)	
Audio output	More than 2.0 watts across 8 ohm load (10% dist.)	

Note: Circuit and ratings are subject to change without notice due to developments in technology.

SECTION 1 INSTALLATION

1-1 Interconnection

Connect the antenna and power supply as shown in Fig. 1-1 for fixed station.

1-2. MOBILE Installation, [general]

• Installation location

Using the supplied mounting bracket, install the transceiver under the dashboard or on the side of the console in your car.

Refer to Fig. 1-2A and Fig. 1-2B.

If your car is equipped with an electronic fuel injector, the transceiver should be as far from the control equipment as possible.

Antenna installation

Various types of antenna for 2 meter mobile operation are available. (See Fig. 1-2C)

NOTE:

For gutter-mount installation, the antenna bracket must be grounded to the car body as shown in Fig. 1-2C. Affix the antenna securely, referring to the antenna instruction.

• Power supply

Connect the supplied power cord with fuse directly to the battery terminals. Connecting to the cigarette lighter socket can cause a poor connection, and excessive voltage drop.

• Ignition noise

The transceiver is designed to suppress ignition noise; however, if excessive noise is present, it may be necessary to use suppressor spark plugs (with resistors).

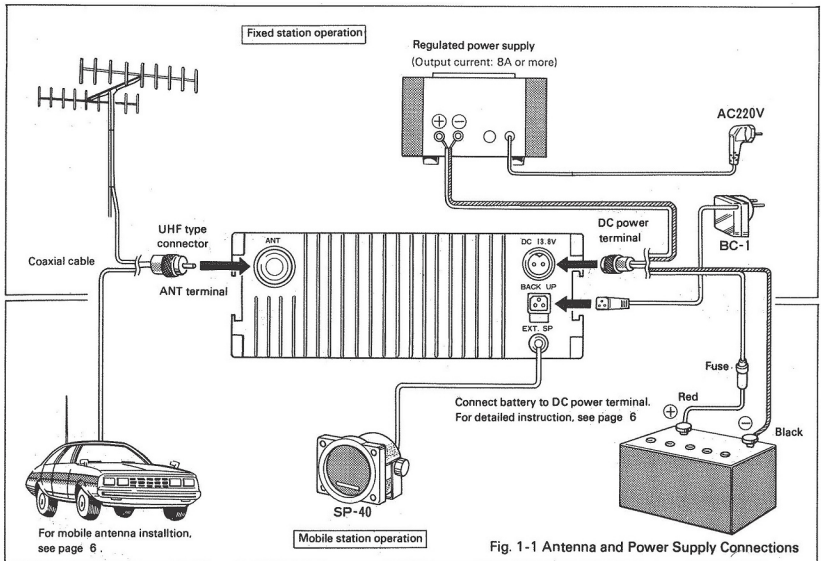


Fig. 1-1 Antenna and Power Supply Connections

1-3. FIXED STATION Installation, [general]

- Power supply (Fig. 1-3)
 - A power supply (output current: 8A or more) is required.
 - Antenna (Fig. 1-3)
- Various types of fixed station antennas are commercially

available. Select your desired antenna according to your installation space and application.
 Note that the SWR of your antenna should be less than 1.5. A high SWR will cause the TR-7800 protective circuit to operate, reducing the transmit output power.

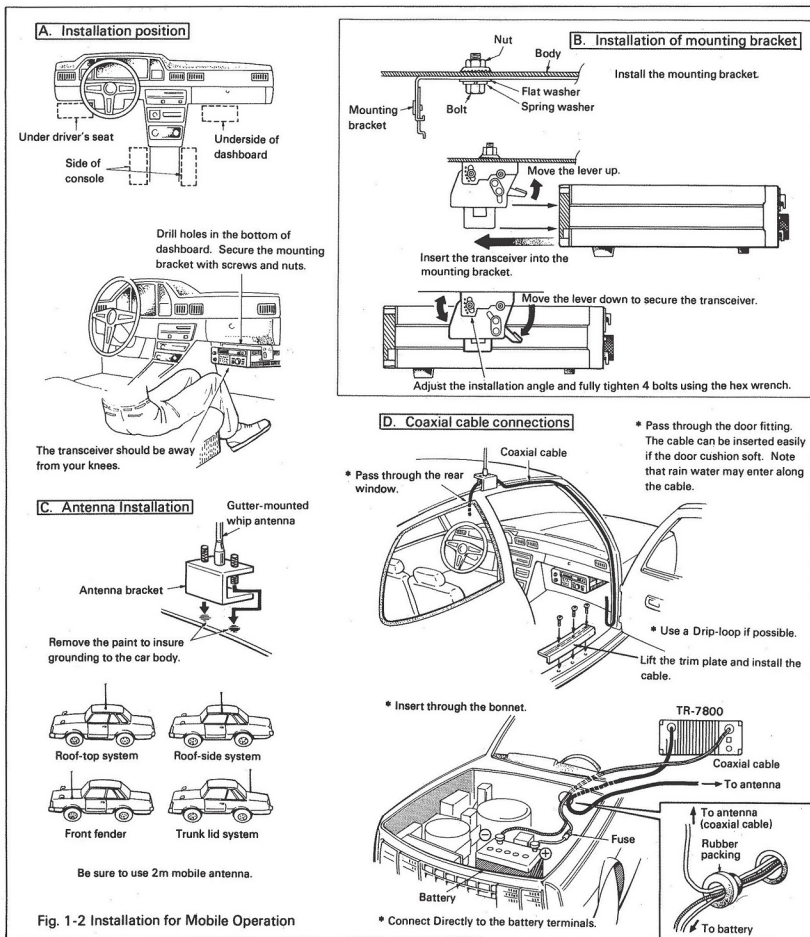


Fig. 1-2 Installation for Mobile Operation

1-4. Back-up Power

1. With power supplied directly from the car battery, the micro computer continues operating even when the power switch is OFF. Current drain is very low, approximately 2.5 mA.
2. If you wish to retain the memories even when moving the unit between the car and the fixed station, utilize a battery back-up system. Otherwise, all the memories are cleared when the power cord is disconnected.

[Battery Back-up]

- (1) Use four AA NiCd batteries, available Locally.
 - (2) Open the lower cover of the transceiver.
 - (3) Install the batteries into the battery case located on the left side, making sure that polarity is correct.
 - (4) The batteries are charged when the power switch is turned ON. Charging current is about 30 mA. The battery back-up function operates only when the power cord is disconnected.
3. Back-up is available for about 3 to 5 days. To extend the back-up period, connect the (optional) BC-1 to the external back-up terminal.

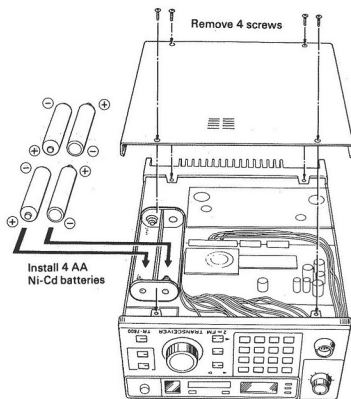


Fig. 1-4 Battery Back-up

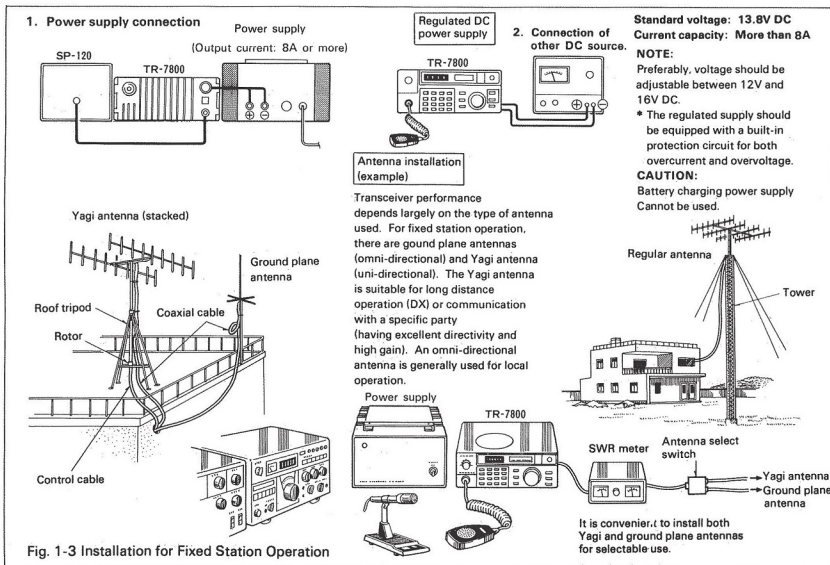
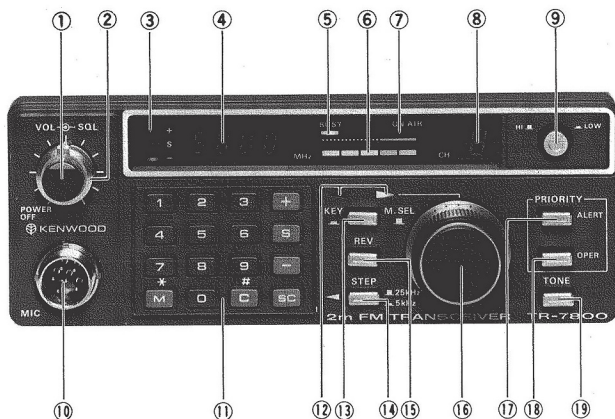


Fig. 1-3 Installation for Fixed Station Operation

SECTION 2. CONTROLS AND TERMINALS



2-1. Front Panel

1. VOL/POWER

Power ON-OFF switch and volume control are combined. Turning the control fully counter clockwise will turn the power OFF. Clockwise rotation will increase the volume. In the power OFF position, about 2.5mA current is drawn to back-up the micro-computer, provided the power cable is connected to a constant power source. To completely disable the transceiver, disconnect the power cable.

2. SQUELCH

The squelch control is used to eliminate noise during no-signal time. Normally, this control is adjusted clockwise until the noise disappears and the BUSY indicator goes off (threshold level). For scan operation, this control must be set to the threshold point.

3. TX Shift Indicator

+ (RED): By pressing the **[+]** key on the keyboard (11), the indicator will light, indicating that transmit frequency is switched up 600 kHz from the receive frequency. (Refer to the item **[+]** key)

S (YELLOW): By pressing the **[S]** key on the keyboard # (11), the indicator will light, indicating that the transceiver is operating in the simplex mode. (Refer to the item **[S]** key)

- (RED): by pressing the **[-]** key on the keyboard # (11), the indicator will light, indicating that transmit frequency is switched down 600 kHz from the receive frequency. (Refer to the item **[-]** key)

4. Frequency Display

This LED frequency display indicates the operating frequency in 4 digits (MHz-kHz).

Example: 145.950 MHz is indicated as "5.950".

5. BUSY Indicator

This lamp will light when the squelch is open in receive mode.

6. S/Rf Level meter

This LED level meter indicates receive input signal strength (S) or transmit output (RF).

7. ON AIR Indicator

A light emitting diode (L.E.D) will light in the transmit mode.

8. CH Indicator

This LED indicator indicates the channel No. (0 through 14) in 2 digits.

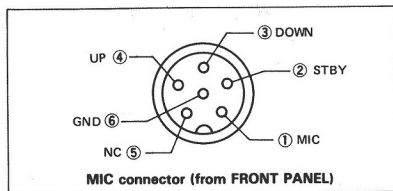
9. HI/LOW Switch

This switch is used to set transmit output power to either 25W (high) or 5W (low).

Power is high at the normal out position (▲), and is low at the position (▼).

10. MIC Connector (6-pin)

For connection of the supplied microphone.



11. Keyboard

The keyboard has the following functions (Refer to "SECTION 3. OPERATION"):

① - ④ (Number key):

Depress four keys to set the desired operating frequency.

Example: Depress the keys, ⑤, ⑥, ⑦ and ④
The frequency display will indicate "5.950"
(145.950 MHz).

⊕ (+ shift key):

After setting the operating frequency, depress this key. The transmit frequency will be switched up 600 kHz from the receive frequency.

Ⓢ (Simplex key):

Depress this key and the transceiver will be set in simplex mode (transmit and receive frequencies are the same).

⊖ (- shift key):

After setting the operating frequency, depress this key. The transmit frequency will be switched down 600 kHz from the receive frequency.

Ⓜ (Memory key):

This is used to input desired frequencies (including ±600 kHz shift) to each channel for memory.

Press the key and a check tone will be heard.

Ⓢ (Clear key):

By pressing this key, the frequency set by the number keys is cleared. In this case, the frequency display indicates the frequency that was displayed before the number keys were pressed. Use this key you have mistakenly entered setting this key is also used to release

the scan operation.

Ⓢ (Scan key):

This is used for scan operation. Press the key when the SQUELCH (2) is ON. Auto-scan or memory-scan starts according to the position of the KEY/M. SEL switch and STEP switches.

12. KEY/M. SEL Indicator

This indicates the position of the KEY/M. SEL switch. The KEY indicator will light when the switch is depressed (▲), and the M. indicator will light in the out position (▼).

13. KEY/M. SEL Switch

This switch is used to select the method of setting frequency, either by the keyboard or the memory. In the position (▲), the operating frequency can be set by the keyboard; in the normal out position (▼), the operating frequency can be set by using the MEMORY channel selector (16).

14. STEP Switch

Use this switch to select the steps (▲: 25kHz, ▼: 5kHz) during frequency scan or microphone UP/DOWN operation.

15. REV Switch

This switch is used to reverse the repeater shift (±600 kHz) and other transmit/receive frequencies (CH 13, 14). It is a momentary non-lock type switch and returns to the normal out position when released.

16. MEMORY Channel Selector

This switch is used to select the desired memory channel. There are 15 memory channels. Of these, channels 0 ~ 12 store frequencies including ±600 kHz shift. The other two channels, 13 and 14 are "ODD split" channels, storing transmit and receive frequencies individually. Channel "14" is the priority channel.

17. PRIORITY ALERT Switch

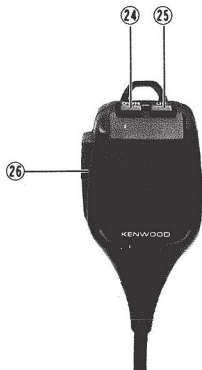
This switch is used to check the priority "14" channel. Depress the switch and the priority channel can be checked at about 6 second intervals regardless of the KEY/M. SEL switch position. Tone sounds when the priority channel is in use.

18. PRIORITY OPER Switch

This switch is used to call up the priority ("14") channel. By depressing the switch, the operating frequency is switched to the priority channel.

19. TONE Switch

When this switch is pressed, the repeater control tone signal (1.750 Hz) circuit is activated and the unit is set in the transmit mode.



2-2 Rear Panel

20. ANT Terminal

Antenna terminal. Connect an antenna of 50 ohms impedance.

21. DC Power Terminal

DC power input terminal. Connect the supplied power cord with plug. Input voltage is 13.8V DC. Observe plus (+) and minus (-) polarity!

22. EXT. BACK-UP

External power back-up terminal to retain the memories. For internal back-up operation, install four AA NiCd batteries in the built-in battery case. Use this terminal to retain the memories for a long period of time (more than 1 week), or with the power cord disconnected.

23. EXT. SP Terminal

External speaker terminal. Connect an 8 ohms speaker using the supplied plug.

24. DWN Switch

This switch is used to step the operating frequency down during both keyboard and MEMORY Channel operation. When pressing the switch, a tone will sound. When the DWN or UP switch is held, the frequency shifts rapidly.

Pressing both the UP and DWN switches simultaneously results in stopping the frequency control operation.

25. UP Switch.

This switch is used to step up the operating frequency in both keyboard and MEMORY channel operation. When pressing the switch, a tone will sound.

26. PTT Switch

Press-to-talk switch used for transmission. This will also release scan operation.

SECTION 3 OPERATION

3-1 General

1. This transceiver uses a PLL synthesizer controlled by micro-computer. The operating frequency can be shifted in either 5 kHz or 25 kHz steps.
2. Operating frequencies can be set by simply pressing the keys on the keyboard. Frequencies can also be stored in the memory channels (15 channels).
3. Transmitter precautions
 - (1) The TR-7800 antenna impedance is 50 ohms. Be sure to connect an antenna of 50 ohms impedance.
 - (2) Check the transmit frequency before operating to insure that you do not interfere with other stations.
 - (3) By pressing the microphone PTT switch, the TR-7800 is set in transmit mode; the ON AIR indicator will light and the meter indicates transmit power. Hold the microphone about 5 cm from your mouth and speak.
4. MICRO-COMPUTER Reset (At first power-up)

If, at initial TURN-ON, an erroneous or incorrect readout is displayed, reset the MICRO-COMPUTER. This is not an equipment malfunction.

 - (1) Disconnect the power plug from the DC power terminal (21) and after about five seconds reconnect the power plug. Turn on the power switch (1).
 - (2) BACK-UP BATTERIES INSTALLED
First remove the batteries, and reset the MICRO-COMPUTER as previously described. Reinstall the batteries.

3-2 Memory Input

The TR-7800 has two different memories: normal memory and split channel memory (including priority memory channel).

1. Normal memory (CH 1-13)

Example: To store 145.950 MHz (- 600 kHz shift) in CH 5.

1. Set the KEY/M.SEL switch to the KEY position (KEY).
2. Set the MEMORY channel selector (16) to the CH 5 position.
3. Input the frequency.

[DISPLAY]

Frequency before input:

- a) Press the key (MHz digit) 5.
 - b) Press the key (100 KHz digit) 59
 - c) Press the key (10 kHz digit) 595
 - d) Press the key (1 kHz digit) 5950
- (Simplex operation)

Note:

- a. To input MHz digit, use the and keys.

- b. When a wrong frequency is input by mistake, press the key to clear the frequency. The frequency display will indicate the frequency before input. Reenter the correct frequency by pressing the keys once again starting with the MHz digit.
 - c. When the 1 kHz digit key (-) is pressed, the frequency display indicates 0. When the (-) key is pressed, the display indicates 5.
 - d. Do not press any other key until the correct frequency is input. The transceiver holds the previous frequency until the new frequency is input.
4. Input the shift mode.
Press the key (the indication changes from "S" to " - ").
 5. Store the frequency in the memory.
Press the key.

A tone will sound, indication data entry.
Change the channel and input other frequencies in the same manner.

Notes:

1. If you wish to change the shift mode from simplex, press the shift key of the desired mode.
 2. When the transmit frequency is shifted ± 600 kHz and it is outside the amateur band (144.000 ~ 145.995 MHz), the transceiver operates in simplex mode.
2. Split channel memory (CH 13, 14)

Example: To store a receive frequency of 144.550 MHz and transmit frequency of 145.625 MHz in CH 14, proceed as follows:

1. Set the KEY/M.SEL switch (13) to the KEY position (KEY).
2. Set the memory channel selector (16) to CH 14.
3. Input the receive frequency.

Frequency before input:

- a) Press the key (MHz digit) 4.
- b) Press the key (100 KHz digit) 45
- c) Press the key (10 kHz digit) 455
- d) Press the key (1 kHz digit) 4550

Note:

For frequency input precautions, refer to "Notes" in normal memory.

4. Store the receive frequency in memory.
Press the key.

A continuous tone will sound, indicating transmit frequency is ready to be accepted.

Note:

1. The tone will sound intermittently until the transmit frequency is stored in memory.
2. When the receive frequency is stored, transmit frequency before the split (CH 14) is indicated.

5. Input the transmit frequency.
 - a) Press the **[5]** key (MHz digit).....5
 - b) Press the **[6]** key (100 kHz digit)..... 56
 - c) Press the **[2]** key (10 kHz digit).....562
 - d) Press the **[5]** key (1kHz digit) 5625
6. Store the transmit frequency in memory.
Press the **[M]** key (tone stops.)..... 4550

The transceiver is now ready for split frequency operation.

Set the KEY/M. switch (13) to the M. position (**[M]**).

NOTE:

When the transmit frequency is stored, the frequency display indicates the receive frequency set by step (3).

3. Memory channel operation

With the KEY/M.SEL switch in the M. position (**[M]**), the transceiver operates on the frequency set by the MEMORY channel selector (16).

4. Changing memory frequencies.

If you wish to change memory frequency, store a new frequency using the above procedures. The old frequency is erased when the new frequency is stored.

3-3 SCAN (Busy stop) Operation

The SCAN operation is classified into keyboard scan, memory scan and priority channel scan. For SCAN operation, the squelch control should be advanced to the threshold point. See 3.8 Squelch.

• KEYBOARD SCAN

1. Set the KEY/M.SEL switch (13) to the KEY position (**[K]**).
2. Depress the **[SC]** key. Scan starts automatically in 25 kHz or 5 kHz steps according to the position of the STEP switch (14).
3. When a signal is present, scanning stops. Scan restarts automatically about 5 seconds later.
4. To release the scan, press the **[C]** key (or the microphone PTT (push-to-talk) switch).

• MEMORY SCAN

1. Set the KEY/M. SEL switch (13) to the M. SEL position.
 2. Depress the **[SC]** key. The memory channels are scanned.
- Scan stops and restarts the same as in the keyboard scan.

• PRIORITY CHANNEL SCAN

Depress the PRIORITY ALERT switch (17). A tone will sound and the BUSY indicator (5) will light at about 6 seconds intervals (regardless of the KEY/M. SEL switch position) if the priority channel is in use.

3-4 PRIORITY OPER Switch

To call up the frequency stored in the priority "14" channel depress the PRIORITY OPER switch (19).

3-5 TX OFFSET and REVERSE

After setting channels by the number keys on the keyboard, press the **[+]** or **[-]** key. The transmit frequency will be switched up or down 600 kHz from the receive frequency and the TX shift indicator (3) will illuminate.

By pressing the REV switch (15), the transmit and receive frequencies will be reversed. If, at this time, the transmit frequency is beyond the amateur band frequency, A tone will sound and the transceiver is automatically set in simplex mode.

When the REV switch is pressed, the frequency indicated on the display is also reversed, but the TX shift indicator (3) does not alter the indication.

3-6 SQUELCH

To eliminate the noise at no-signal condition, turn the squelch slowly clockwise until the noise disappears and the BUSY indicator goes off (threshold point).

Turn to an empty channel. The BUSY indicator will light and the speaker will operate when a signal is received.

The squelch control is also used for scan operation control. If the signal is weak or fades during mobile operation, readjust the squelch for the clearest reception.

3-7 HI/LOW Switch

For local communication, it is recommended that power be reduced to eliminate interference to other stations and to minimize power consumption. By pressing the HI/LOW switch, transmit power is reduced from 25W to about 5W.

3-8 Meter

The LED level meter functions as an "S" meter during reception and as an RF meter during transmission.

3-9 Adjustments

Refer to Fig. 3-1.

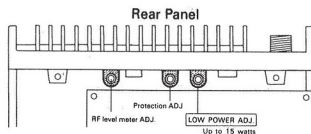


Fig. 3-1 [BOTTOM VIEW]

SECTION 4. ADDITIONAL INFORMATION

4-1 General Information

Your TR-7800 has been factory aligned and tested to specification before shipment. Under normal circumstances, the transceiver will operate in accordance with these operating instructions.

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.

Attempting service or alignment without factory authorization can void the transceiver's warranty.

4-2 How the TX Final Module are Protected

Final module protection is provided by sampling the reflected power. As the reflected power is increased (higher SWR) transmitter drive is reduced, thus decreasing input to the final module. This in turn reduces collector loss, protecting the final transistors.

4-3 Battery Precaution

When charging your vehicle battery, or when jump-starting a dead battery ALWAYS disconnect the power lead from the back of the transceiver.

4-4 Ordering Spare Parts

When ordering replacement or spare parts for your equipment, be sure to specify the following:

- Model and serial number of your transceiver. Schematic number of the part. Printed circuit board number on which the part is located. Part number and name, if known, and Quantity desired.

NOTE: _____

A full service manual is available as a separate publication.

4-5 Service

Should it ever become necessary to return the equipment for repair, pack in its original boxes and packing, and include a full description of the problems involved. Also include your telephone number. You need not return accessory items unless directly related to the service problem. Tag all returned items with your call for easy I.D.

Please mention the model and serial number of your radio in any correspondence, whether phone or written. For future reference, record this information in the space provided on the back cover of this manual.

NOTE: _____

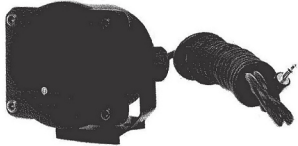
When claiming warranty service, please include a photocopy of the bill of sale, or other proof of purchase showing the date of sale.

SECTION 5. OPTIONAL ACCESSORIES

The following accessories are available for more sophisticated operation of the TR-7800

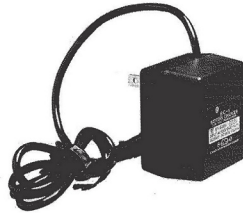
5-1 External Speaker SP-40

Designed for mobile operation. Styling and tone quality match the TR-7800 perfectly.

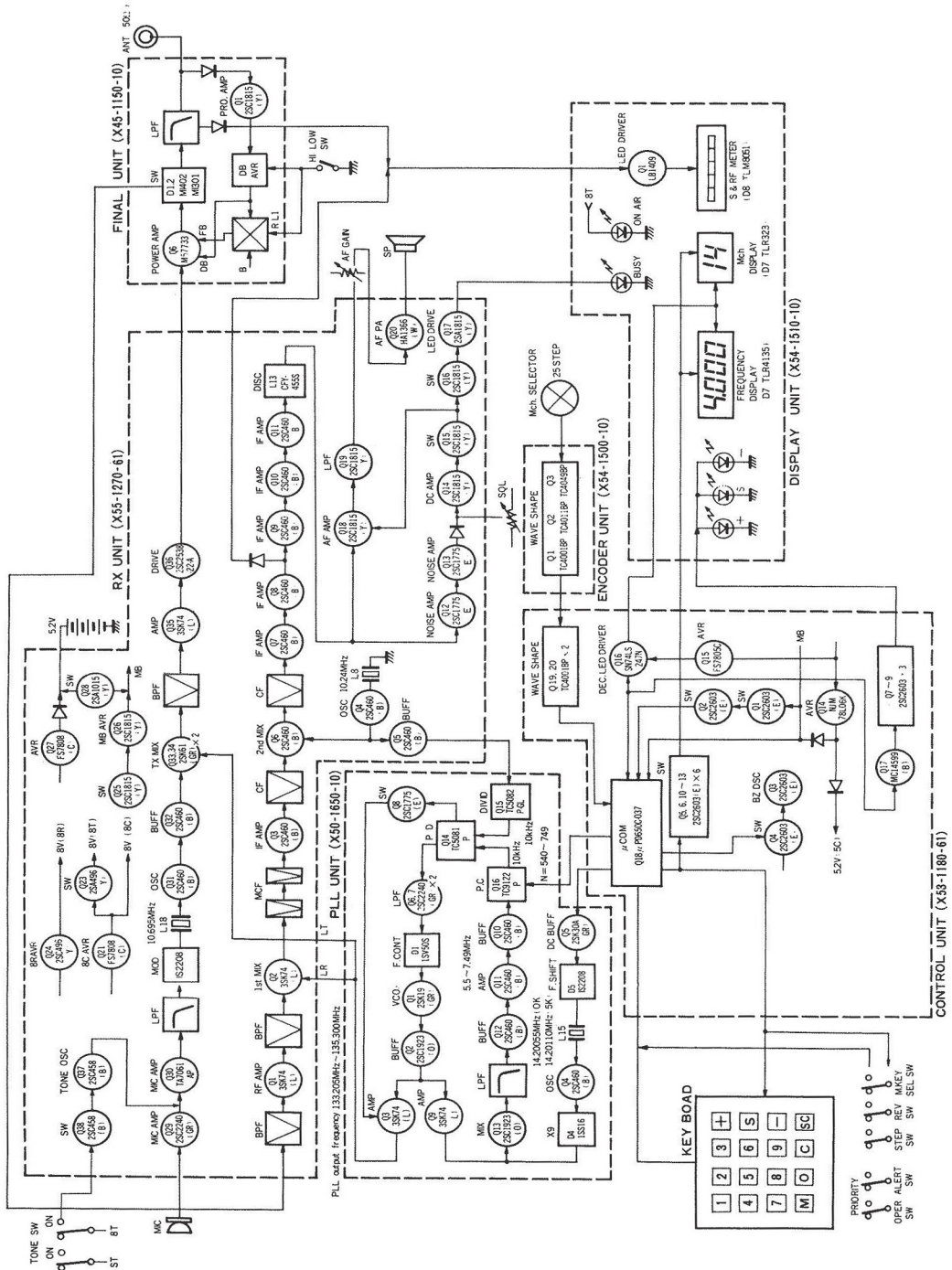


5-2 Charger BC-1

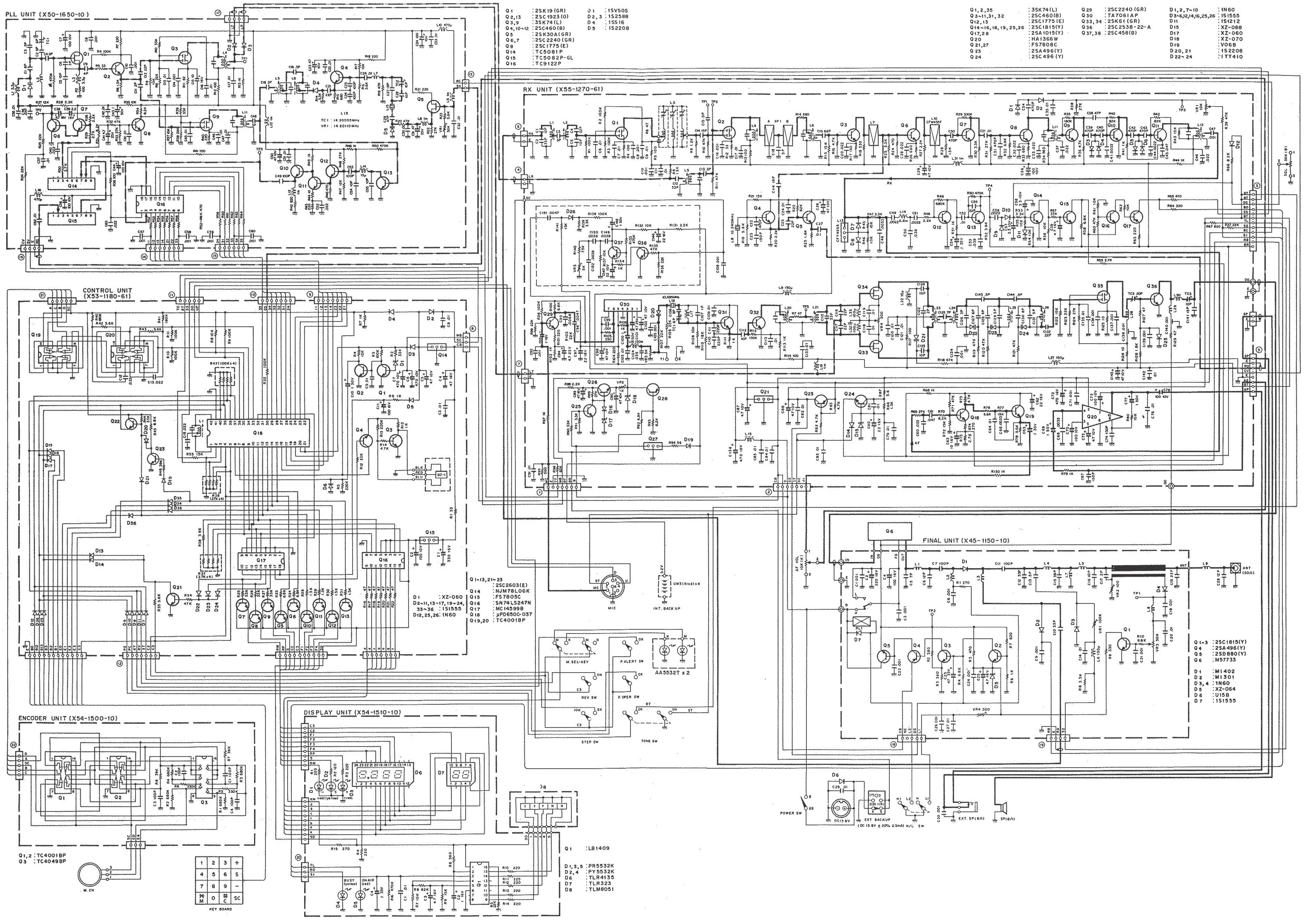
This charger is used as a Back-up power supply when the main power supply is off for extended periods.



BLOCK DIAGRAM



TR-7800 SCHEMATIC DIAGRAM



- Q1 : 25K19 (GR)
- Q2,13 : 25C1923 (O)
- Q3,9 : 35K74 (L)
- Q4,10-12 : 25C460 (B)
- Q5 : 25K30A (GR)
- Q6,7 : 25C2240 (GR)
- Q8 : 25C1775 (E)
- Q14 : TC5081 P
- Q15 : TC5082 P-GL
- Q16 : TC9122 P
- Q1 : 15V505
- Q2,4 : 152536
- Q3 : 15S16
- Q5 : 152208

- Q1,2,35 : 35K74 (L)
- Q3,11,31,32 : 25C460 (B)
- Q12,13 : 25C1775 (E)
- Q14-16,18,19,25,26 : 25C1815 (Y)
- Q17,28 : 25A1015 (Y)
- Q20 : 2A1355 W
- Q21,27 : F57808 C
- Q23 : 25A496 (Y)
- Q24 : 25C496 (Y)
- Q25 : 25C2540 (GR)
- Q30 : TA7061 A P
- Q33,34 : 25K61 (GR)
- Q36 : 25C2538-22-A
- Q37,38 : 25C458 (B)
- D1,2,7-10 : 1N60
- D3,12,14,16,25,26 : 151555
- D11 : 151212
- D15 : XZ-088
- D17 : XZ-060
- D18 : XZ-070
- D19 : V06B
- D20,21 : 152208
- D22-24 : 1T7410

- Q1-13,21-23 : 25C2603 (E)
- Q14 : NJM78106 K
- Q15 : F57808 C
- Q16 : 5N78LS247 N
- Q17 : MC14599 B
- Q18 : PD650C-037
- Q19,20 : TC4001 B P

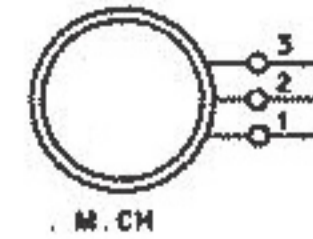
- D1 : XZ-060
- D2-11,13-17,19-24 : 151555
- D25-36 : 1N60

- Q1-3 : 25C1815 (Y)
- Q4 : 25A496 (Y)
- Q5 : 25D880 (Y)
- Q6 : M57733
- D1 : M1402
- D2 : M1301
- D3,4 : 1N60
- D5 : XZ-064
- D6 : U158
- D7 : 151555

- Q1,2 : TC4001 B P
- Q3 : TC4049 B P

- Q1 : LB1409
- D1,3,5 : PR5532 K
- D2,4 : PY5522 K
- D6 : TL4133
- D7 : TL323
- D8 : TLM8051

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Model TR-7800

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6-17, 3-chome, Aobadai, Meguro-ku, Tokyo 153, Japan

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