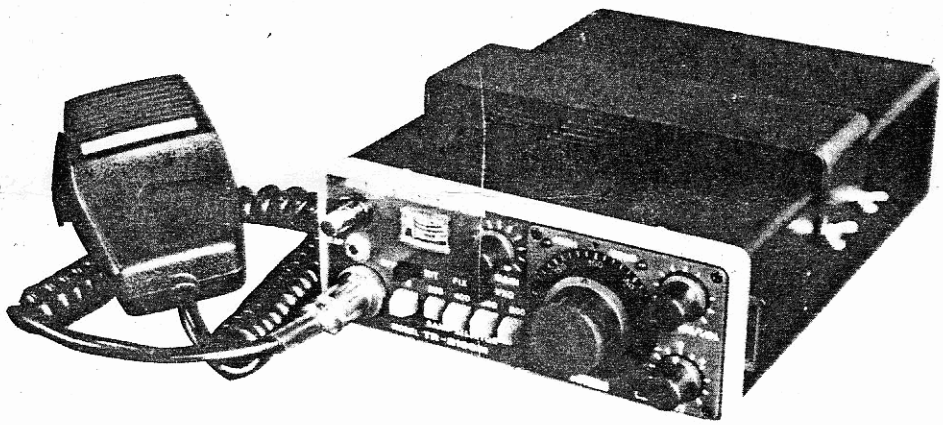
2M SSB TRANSCEIVER
1 3 5 7 9 +OVER
POWER
10
EAR
RF GAIN
OFF
RIT
FIX
VXO
0
200
400
600
800
BAND SELECTOR
MODEL TR-2100M
HIGH
SEND
150
100
50
200
0
POWER/VOL
0
+
−
TOTSUKO
RIT

144MHz SSB · CW TRANSCEIVER

MODEL TR-2100M

INSTRUCTION MANUAL



TOTSUKO CORPORATION

TOKYO, JAPAN

1. GENERAL SPECIFICATION

1) Number of Semi-conductors :
   Transistor × 20
   FET × 7
   IC × 3
   Diode × 43
   LED × 3
2) Frequency range :
   144.00 — 145.00 MHz .
3) Installed frequency range :
   144.00 — 144.40 MHz .
   (Constantly by VXO).
4) Capacity of Fixed channel :
   1 channel.
5) Standard power supply :
   13.8 V/DC.
6) Operation voltage range :
   11.5 — 15.0 V/DC.
7) Type of ground :
   Negative ground.
8) Antenna impedance :
   50 ohms.
9) Power consumption :
   28 VA at 13.8 V/DC.
   Receive : 180 mA at no signal.
   (Lamp off 120 mA).
   Transmit : 560 mA at Low output.
   (Lamp off 500mA).
   2060 mA at High output.
   (Lamp off 2000mA).
10) Dimensions :
   147 (W) × 58 (H) × 198 (D) mm.
11) Weight :
   2.3 Kgs. (Included Microphone).
12) Battery (at low output power) :
   10 pcs Ni-Cd N-450AA or
   9 pcs Pen light battery (Dry).
13) Standard accessories :
   Shoulder straps × 1.
   Microphone × 1.
   DC power cord × 1.
   Dummy battery × 1.
   Microphone hunger × 1.
   Bracket for Mobile × 1.
14) Optional accessories :
   Leather case for Portable operation.

2. TRANSMITTER

1) Type of Emission :
   A1, A3j (USB).
2) Input power :
   3W at low.
   20W at high.
3) Output power :
   1W PEP (±20%) at low.
   10W PEP (±20%) at high.
4) Modulation :
   Balanced modulation.
5) Spurious :
   Less than −60 dB at high output.
6) Carrier suppression ratio :
   More than 40dB.
7) Side band suppression ratio :
   More than 40dB.
8) Microphone :
   Dynamic microphone with PTT Sw.
9) Microphone impedance :
   600 ohms.
10) Microphone sensitivity :
   −68 dB (±3dB) (1 KHz).

3. RECEIVER

1) Type of Emission :
   A1, A3j (USB).
2) Method :
   Single superheterodyne type.
3) Sensitivity :
   S/N more than 15dB at input 0.5 uV.
4) Intermediate frequency :
   9 MHz.
5) Image ratio :
   More than 60 dB.
6) Selectivity :
   Less than 4.8 KHz at −60 dB.
7) Pass band width :
   More than 2.4 KHz at −6 dB.
8) Frequency stability :
   Within 300 Hz per 30 minutes, after 60 minutes warming-up.
   (25 ℃ settled).
9) Audio output power :
   1 W at 8 ohms load.

FEATURES

★ You can transmit and receive on the 2-meters band from 144 to 144.40 MHz constantly by two installed Band Selector and VXO (Variable Crystal Oscillator).

★ Power sources are Car battery for high/low output power, or Pen light battery for low output power.

★ Frequency stability is high quality by using VXO.

★ The use of advanced dual gate MOS FET devices in the receiver stages guarantees high sensitivity and first class AGC characteristics.

5. PRECAUTIONS

Be sure to observe the following instructions in operation.

★ Do not transmit without an antenna.

★ Continuous transmission (for more than 30 minutes) should be avoided as much as possible.

★ Use DC 13.8V as the power supplly for vehicle operation.

★ Do not open the set. All the cores and trimmers have already been adjusted, so no further adjustment is required.

★ In vehicle operation, avoid installing the set at the hot air exhaust outlet. When the set is too hot, wait for a second until cooling off a bit.

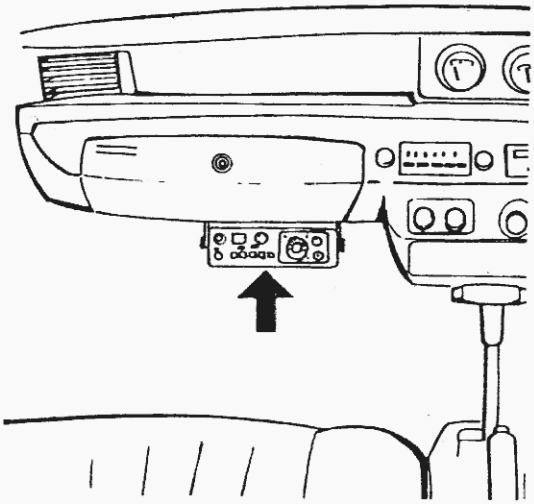


Fig. 1 An example showing mounting position

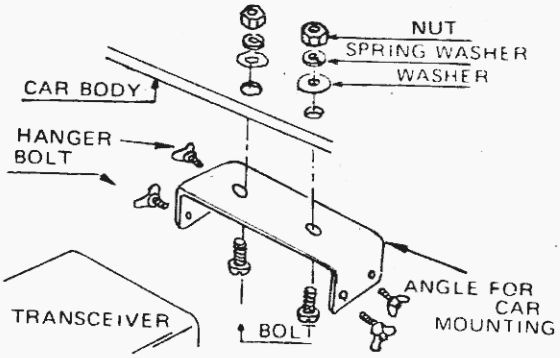


Fig. 2 Mounting method

6. OPERATION

1) Vehicle operation

a) Mounting position

The best possible positions for the mounting are shown in Fig. 1. Do not expose the set to direct sunlight.
Be careful mot to keep the set too warm during summer.

b) Mounting

Be sure that your car is negative grounded. If your car is positive grounded, you must absolutely insulate the set from the body. So, consult your dealer in that case.

DC power can be obtained from the cigarette lighter. However, the direct wirings from the battery are recommended for noise elimination.

c) Antenna

As the output impedance of the set is 50 ohms, use 50-ohm coaxial cables. The cables should be short as much as possible. When using external antenna, shut the internal antenna.

2) Fixed operation

Avoid using the set in hot, humid, dusty places. An airy, dry place is ideal for its operation. Do not expose the set to the direct sunlight. DC 13.8V (2.5 A or more, regulated) is required as the power supply.

3) Portable operation

For 1-watt output operation either on outside DC power supply (13.8 V at more than 0.5 A) or batteries can be used.

For battery operation, use nine SUM-3 batteries (1.5V × 9) or ten N-450AA rechargeable Ni-Cad batteries. Because the battery compartment is designed for accommodating ten batteries, use a space adaptor (provided) as a dummy when using SUM-3 batteries.

For battery installation, pull the four catches on the rear panel until you hear it click, remove the cover and install the batteries in the battery compartment. Be sure to arrange the battery polarity correctly. (Fig. 3)

The slide switch on the rear panel is used for High/Low output selection (10 or 1 watt). If the slide switch is set to the 10-watt position it will automatically shut off transmit/receive operation to protect the batteries from damage. Batteries can be used for 1-watt output only.

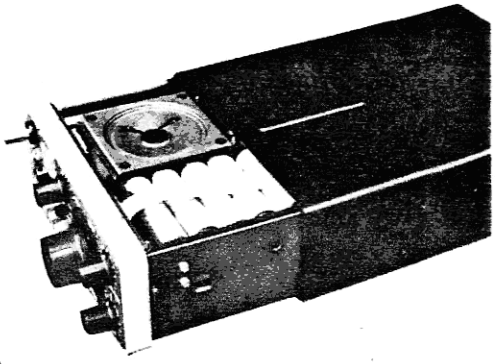


Fig. 3

The equipment incorporates a telescoping whip antenna for 1-watt output operation. When using this antenna, always extend it fully.

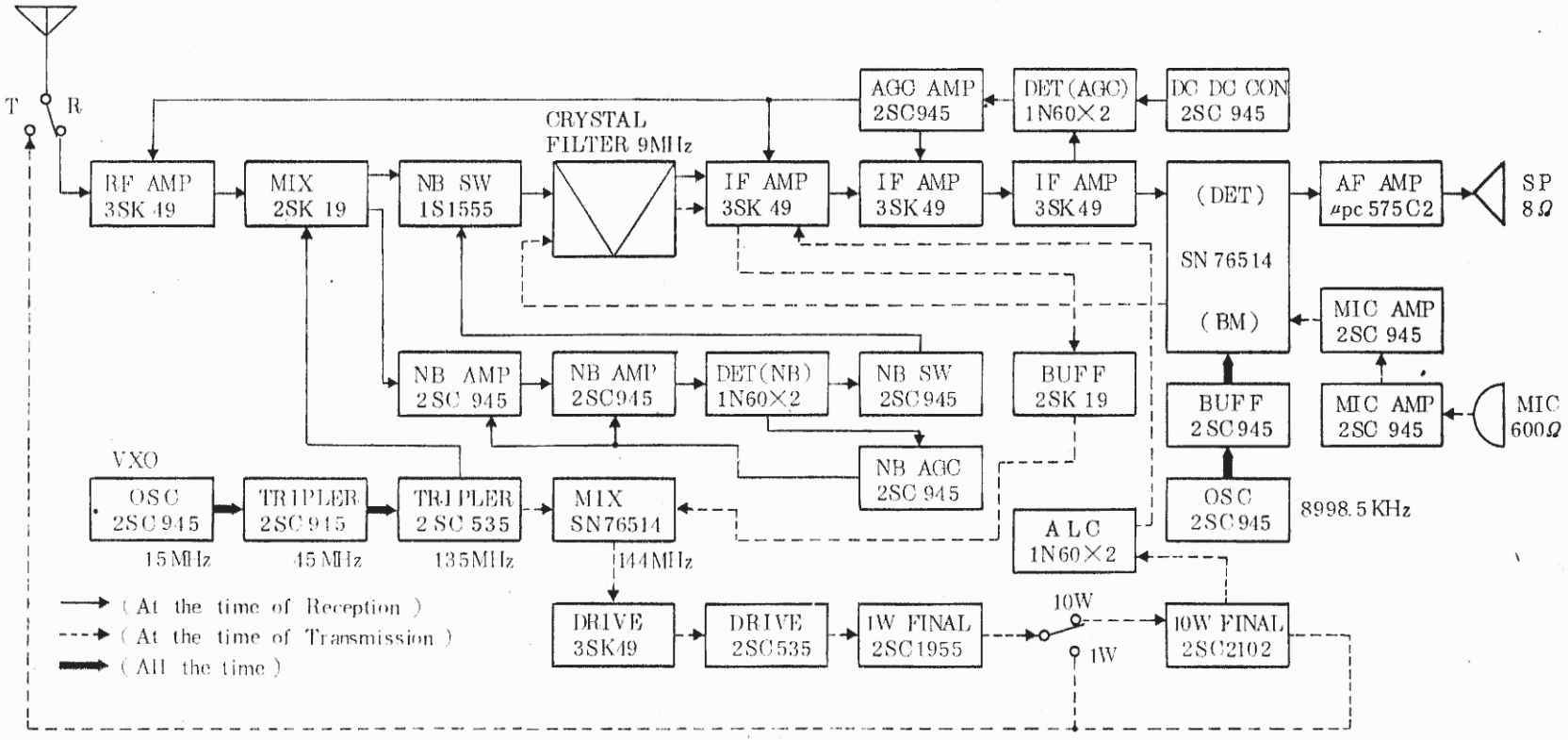
For 10-watt output operation, always use an external antenna having an impedance of 50 ohms with the whip antenna fully collapsed.

For battery operation, set the pilot lamp switch to the OFF position except when necessary (current consumption of the pilot lamp is approximately 60 mA).

4) SSB operation

a) Plug in microphone and turn on power switch.
b) Select the required band switch position. The set is supplied with crystals fitted as follows :—
   0 ····· 144.000 — 144.200 MHz
   200 ····· 144.200 — 144.400 MHz
   400 ····· 144.400 — 144.600 MHz
   600 ····· 144.600 — 144.800 MHz
   800 ····· 144.800 — 145.000 MHz
c) Turn mode switch on rear panel to SSB.
d) The transceiver can now be operated using PTT switch on the microphone.

10. TR-2100M BLOCK DIAGRAM



8. TRACKING ADJUSTMENT

When fitting a different oscillator crystal or if the VXO frequency has drifted, adjust using an accurate frequency counter as follows :—

a) Remove transceiver case.

b) Connect counter to P1(live) and P2 (ground). The counter should be capable of reading to more than 136 MHz.

c) Turn on the transceiver and adjust the tracking using the coils and trimmers listed.

Band Selector	Coil	Trimmer	Crystal	Crystal No.
0	L2	T3	X3	10
200	L3	T4	X4	14
400	L4	T5	X5	18
600	L5	T6	X6	22
800	L6	T7	X7	26

d) Adjust the appropriate coil at the '0' end of dial scale to the frequency calculated as follows :—

Signal frequency + 1.5KHz − 9 MHz

e.g. 144.000 MHz + 1.5KHz − 9 MHz
= 135.0015 MHz

Then adjust the appropriate trimmer at the '200' end of dial scale to the frequency 200 KHz higher than calculated above.

e.g. 135.0015 MHz + 200 KHz
= 135.2015 MHz

Continue to adjust at each end until tracking is correct.

As a further example, suppose you fit a crystal to give coverage from 144.00 − 144.200 the adjustment frequencies will be :—

L2 Coil at 135.0015 MHz
T3 Trimmer at 135.2015 MHz
Band Selector 0

L3 Coil at 135.2015 MHz
T4 Trimmer at 135.4015 MHz
Band Selector 200

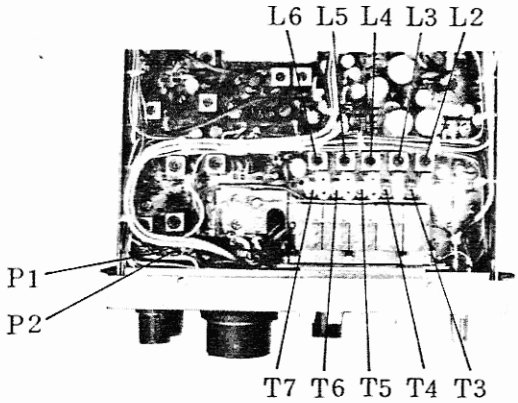
L4 Coil at 135.4015 MHz
T5 Trimmer at 135.6015 MHz
Band Selector 400

L5 Coil at 135.6015 MHz
T6 Trimmer at 135.8015 MHz
Band Selector 600

L6 Coil at 135.8015 MHz
T7 Trimmer at 136.0015 MHz
Band Selector 800

} Optional accessories.

Fig. 5



9. OPTIONAL CRYSTAL

BAND SELECTOR NO.	TRANSMITTING & RECEIVING FREQUENCY (MHz)	CRYSTAL OSC FREQUENCY (MHz)
※ 0	144.00 ~ 144.20	15.05572 (VXO SPECIFICATION)
※ 200	144.20 ~ 144.40	15.07794 (〃)
400	144.40 ~ 144.60	15.10016 (〃)
600	144.60 ~ 144.80	15.12238 (〃)
800	144.80 ~ 145.00	15.14461 (〃)

※ Standard accessories.

5) CW operation

a) Tum mode switch to CW position and plug in key at rear panel socket. (Fig. 4)

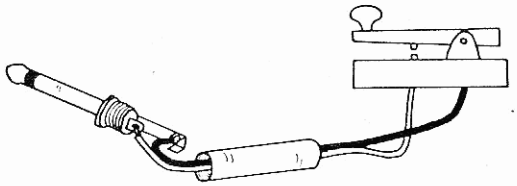
b) When listening to a station with a beat note of 700—800Hz, your transmit signal is automatically zero beat when sending.

c) The key plug must be removed for SSB operation.

d) The transceiver can now be operated using PTT switch on the microphone.

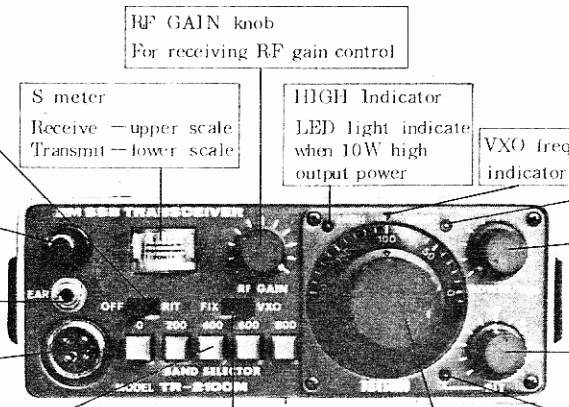
e) The key plug must be removed for SSB operation.

Fig. 4



7. NAMES OF PARTS AND DESCRIPTION

1) Front panel



RF GAIN knob
For receiving RF gain control

RIT SWITCH
RIT circuit on-off switch

S meter
Receive — upper scale
Transmit — lower scale

HIGH Indicator
LED light indicate when 10W high output power

SEND Indicator
LED light indicate when transmission

VXO frequency indicator

Whip antenna

Earphone jack

Microphone jack

Power Switch/Volume
Fully counterclockwise — power off

RIT knob
For a fine adjustment of only the receiving frequency

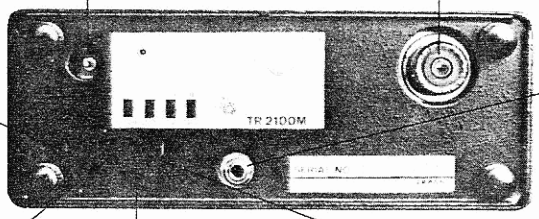
RIT Indicator
LED light indicate when RIT circuit ON

BAND SELECTOR (200 KHz step)
0 ·····144.00 — 144.20 MHz
200 ·····144.20 — 144.40 MHz
400 ·····144.40 — 144.60 MHz (Extra)
600 ·····144.60 — 144.80 MHz (〃)
800 ·····144.80 — 145.00 MHz (〃)
Each band cover with VXO knob
(Ex. 1) Band selector — 0, VXO — 50 — 144.050 MHz
2) Band selector — 200, VXO — 150 — 144.350 MHz)

FIX/VXO
For changing fixed channel and VXO operation

VXO knob
For final adjustment of transmitting and receiving frequency 0 — 200 KHz adding for Band Selector by turning the knob clockwise or counter-clockwise

2) Rear panel



External power supply jack
Supply DC 13.8V with the black/red code attached to this jack. Red for the positive, and black for the negative.

External Antenna Jack
For the antenna connector (50 ohms)

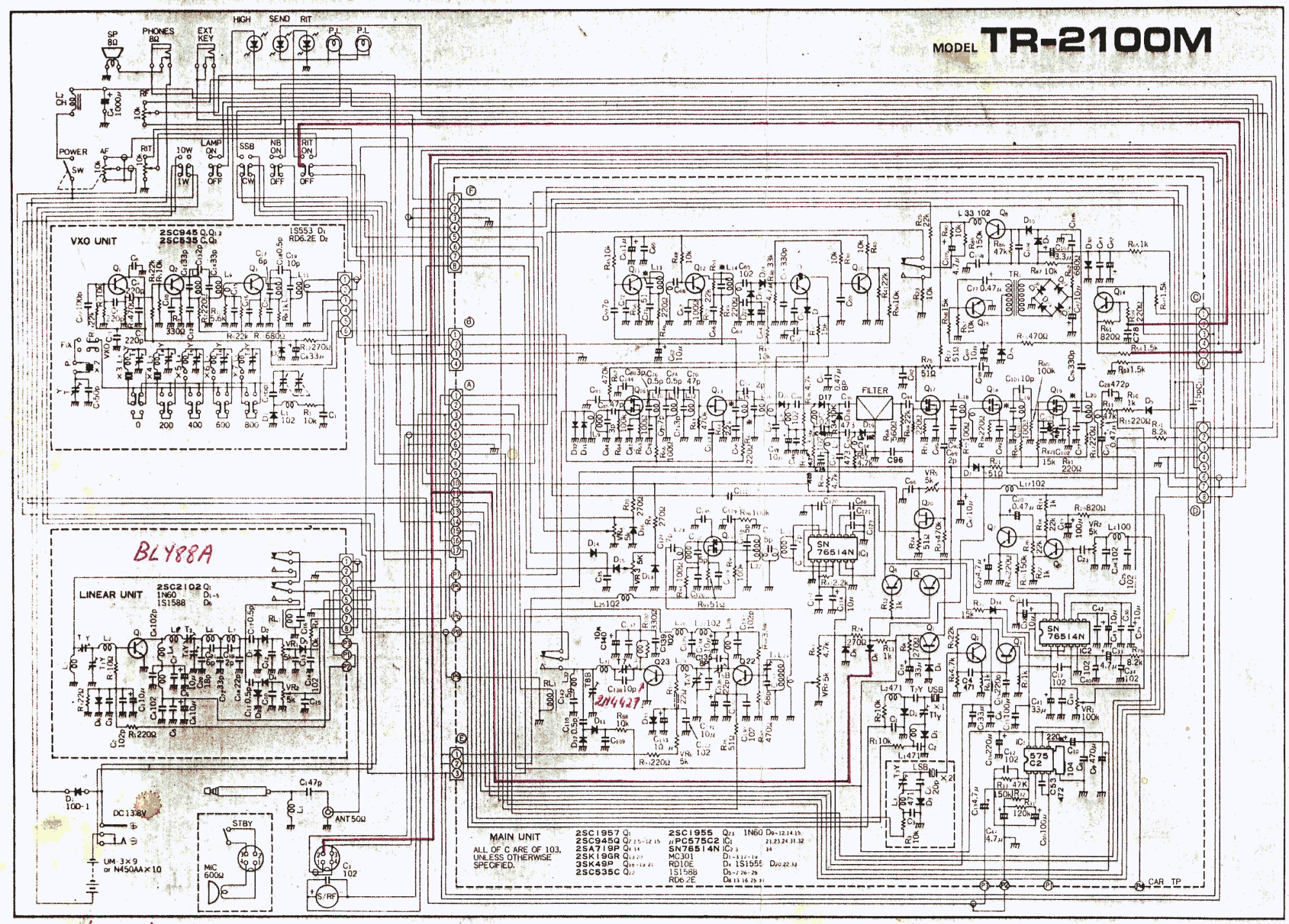
OUTPUT POWER
Upper — high 10W
Lower — low 1W
For the portable use internal battery — low 1W position only

KEY jack
For CW transmission, insert the key plug into the jack

LIGHTING SWITCH
Upper — the light illuminating for S meter and VXO indicator
Lower — light off for saving the internal battery consumption on the portable operation

MODE SELECTOR
Upper — SSB operation
Lower — CW operation

NOISE BLANKER ON/OFF Switch
Upper — on
Lower — off



by driver 2N3866 : output = ± 3watt HF

" " 2N4427 : " = ± 4,5watt HF.