INSTRUCTION MANUAL

HF Transverter

Model HX-240/640

TOKYO HY-POWER LABS., INC.

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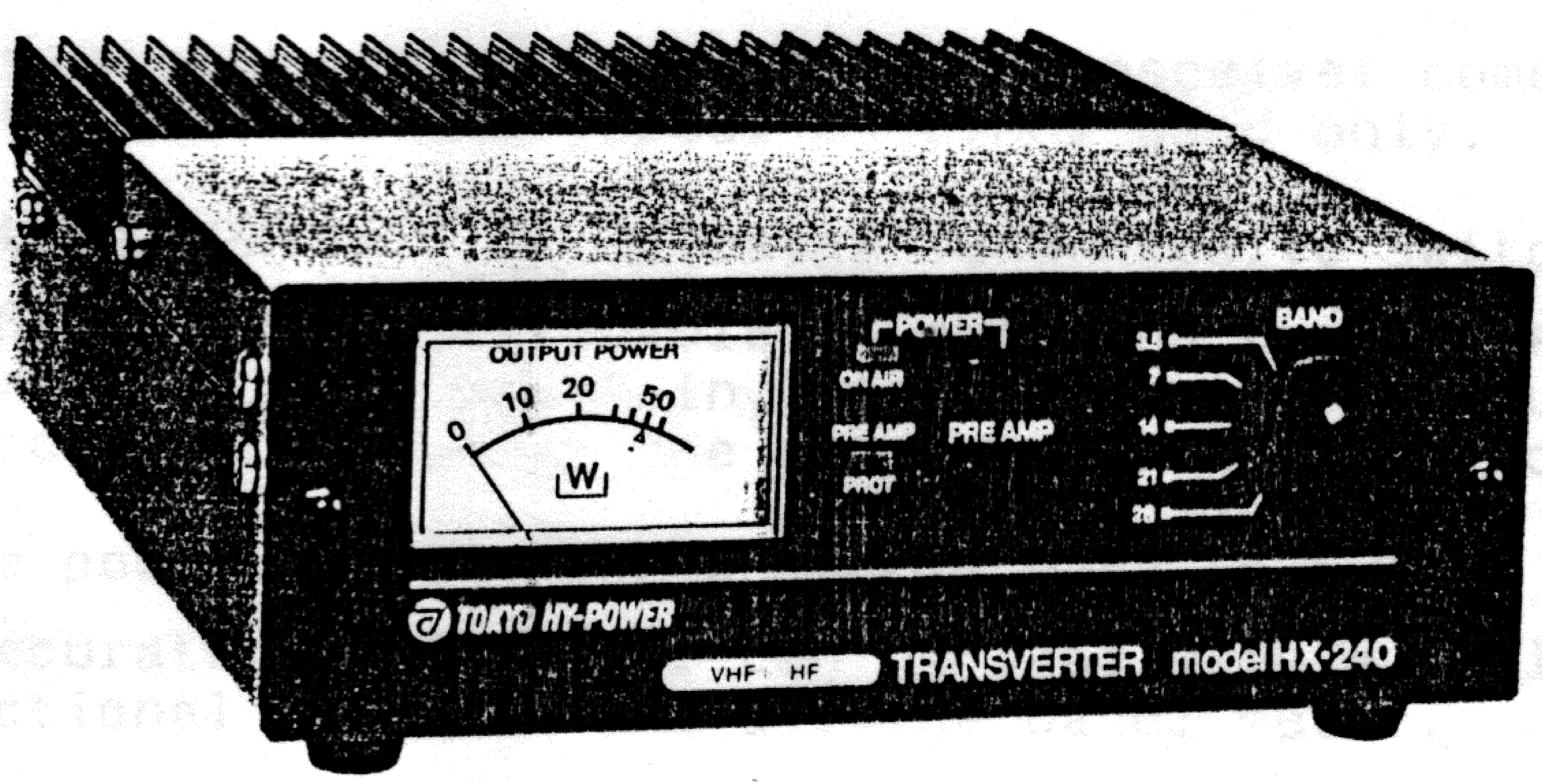


Tokyo Hy-Power Labs., Inc.

1. FEATURES

HX-240/640 series is a send-receive converter (or called TRANSVERTER) which enables an extended operation on HF 3.5/3.8/7/14/21/28MHz bands of 3.5/3.8/7/14/21/28MHz when connected with a VHF 144MHz band (for HX-240)/50MHz band (for HX-640) SSB/CW transceiver respectively.
Combined with 144MHz band (50MHz band) transceiver on hand, a world-wide HF band communication can be enjoyed.

- RF input power 2.5W/10W selectable

  Any transceiver with 10W or less output power can be connected to the transverter.
  Setting the RF input select switch inside, even a handy type VHF SSB/CW transceiver with 1-2.5W output as well as a portable type can accompany HX-240/640.
  Also, QRP transceiver with 0.2W output can be connected as well.

- 40W (PEP) of output power

  40W PEP output for 3.5-21MHz bands and 30W PEP for 28MHz.
  Compact HX-240/640 enables you to enjoy a comfortable DX QSO.

- All mode compatibility

  The same mode as your combining transceiver comes out on HF bands. FM mode can appear on 29MHz band only.

- Built-in COX(Carrier Operated Send-Receive Switch) circuit

  As the COX circuit capable of changing over send-receive automatically is built-in, you can connect the unit to transceiver with only one piece coaxial jumper cable.

- Large power level meter which is easy to read

  An accurate output power can be read with a built-in precision directional coupler, and a large panel meter.

- Built-in RX preamp

  RX preamp using J-FET (2SK125) which withstands a heavy cross-modulation is built in. The preamp accompanied with DBM Mixer circuit can achieve high performance of reception.

- Antenna mis-match protection circuit

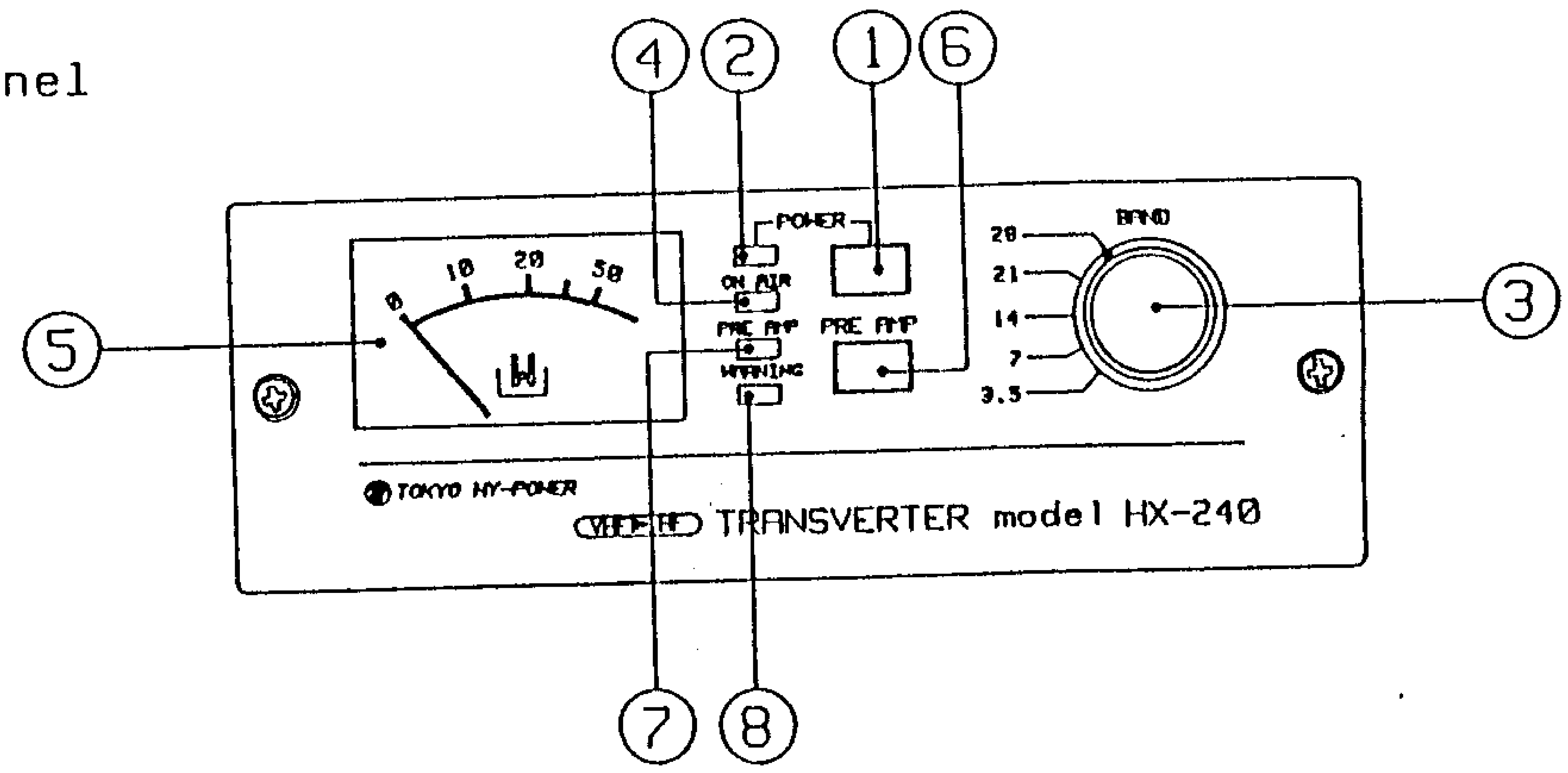
  For high SWR value (over 2.0) condition of the antenna, the WARNING LAMP lights and indicates "WARNING". Then, this circuit protects PA stage RF transistor from the damage by reducing the output power level.

2. SPECIFICATIONS

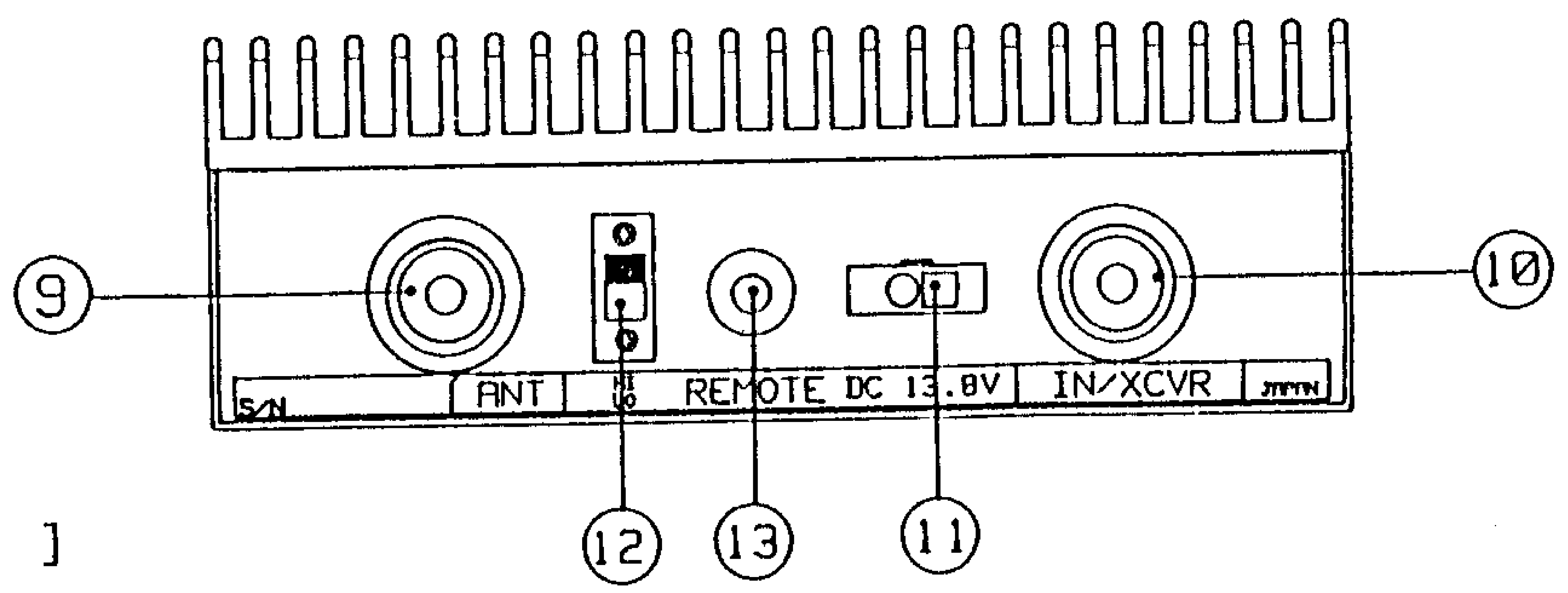
Frequency range	: 3.5/3.8/7/14/21/28MHz Amateur band
Output power	: 30-40W PEP(SSB/CW), 30W max. (FM,29MHz band only)
RF input power	: 2.5W/10W selectable
Spurious level	: -40dB or less
RX preamp gain	: 8-10dB
In/Out connector	: M type (SO-239)
Supply voltage	: DC+13.8V, 7A max.
Dimension	: 146(W) x 50(H) x 192(D) mm
Accessory circuit	: ① COX(Carrier Operated Send-Receive switch) circuit ② Terminal for remote Send-Receive control ③ Large power level meter ④ RX preamp ⑤ ANT mis-match protection circuit ⑥ Reverse DC power polarity protection circuit ⑦ Output level (HI/LO) select
Semiconductor compliments	: RF Power transistor x 4 J-FET x 2, IC x 2 Transistor x 16 Diode x 46, LED x 4
Accessories	: M-M jumper cable x 1 DC power lead x 1 Spare fuse x 1

3. EXPLANATION OF FEATURES

Front Panel



Rear Panel



[Fig. 1]

① POWER (Power switch)

The power switch of transverter section.
By pushing the switch, the power turns ON. Then, the circuit of RX converter section starts working and the unit is in the receiving state.

② POWER (LED)

At the ON postion of the POWER switch, the LED lights and indicates the power is applied to the unit.

③ BAND

The knob to select operating frequency band.
The BAND display indicates each frequency band.

④ ON AIR (LED)

LED lights and indicates the unit is transmitting.

⑤ Power meter

Indicates output power level.

⑥ PRE AMP

The switch of built-in RX preamp.

⑦ PRE AMP (LED)

At the ON position of RX preamp switch ⑥, LED lights and indicates the preamp is working. During transmission, the preamp is turned off automatically.

⑧ WARNING (LED)

When output terminal of the PA amplifier is open or shorted, or SWR value is too high (over 2), LED lights and indicates the load for the amp is not in good condition. At the same time, the circuitry functions to reduce transmitting output level and protect RF power transistors from damage.

⑨ ANT (output connector)

Connect a coaxial jumper cable to HF antenna.

⑩ IN/XCVR

Connect a coaxial jumper cable from ANT connector of transceiver.

⑪ DC 13.8V IN

Install accessory DC adapter plug to the terminal.

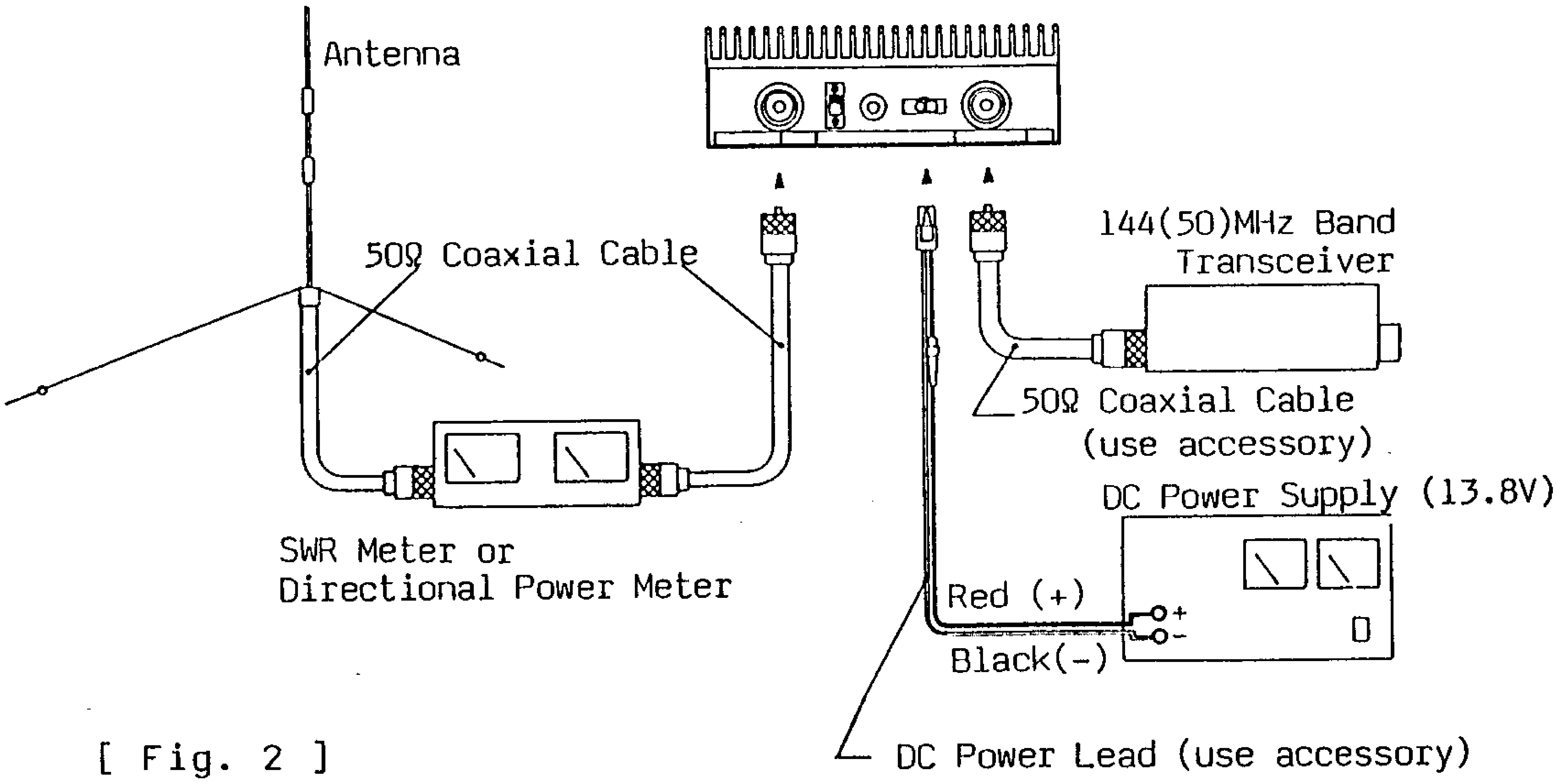
⑫ HI/LO (Output power level select switch)

The switch to select output power level. High position of switch indicates HI(max. power) and low position, LO(half of full power).

⑬ REMOTE (Remote control terminal)

The terminal to connect the "stand-by" terminal etc. of transceiver for remote control operation from transceiver. (Please refer to 5. PREPARATIONS BEFORE OPERATION on connection.)

4. INSTALLATION



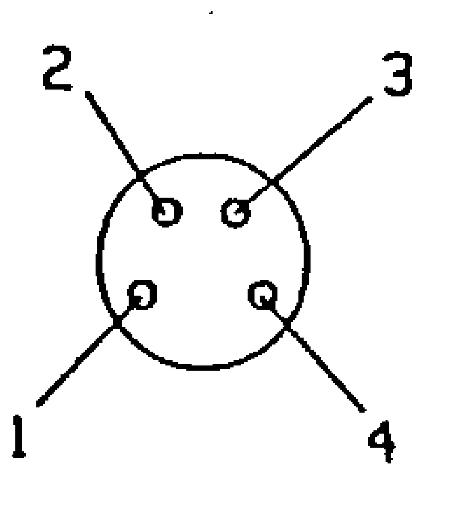
[Fig. 2]

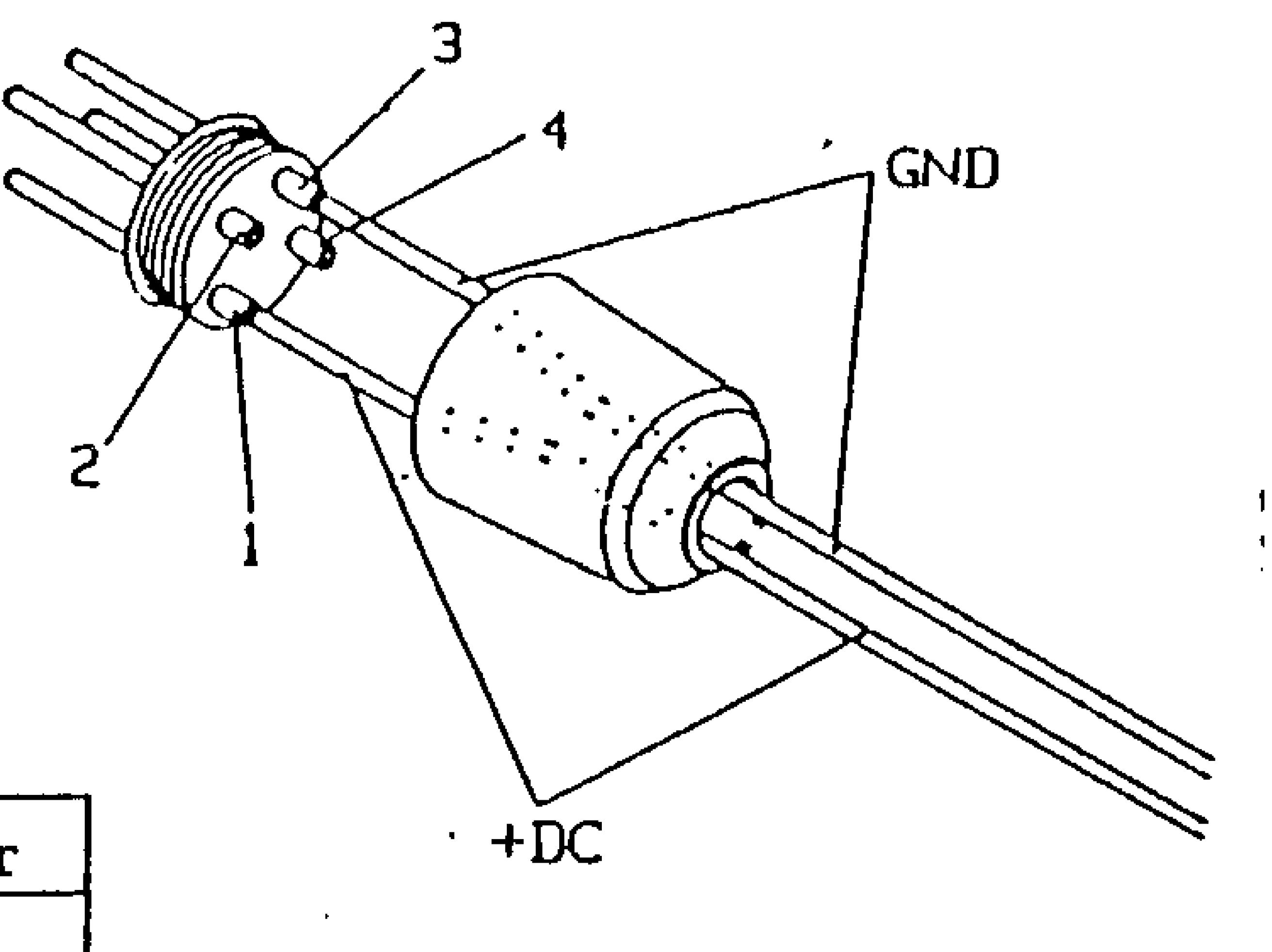
5. PREPARATIONS BEFORE OPERATIONS

① Connect cables as required according to 4.INSTALLATION.

② The unit has a COX circuit capable of automatic Send-Receive change-over. Also, the remote Send-Receive control from transceiver can be achieved. For wiring, remove the plug from the remote terminal on the rear panel.
According to Fig. 3, solder vinyl coated wires to accessory terminals of transceiver.

Rear view, the cover of being removed.





NO	Designation	Connecting point at transceiver
1	+DC	Terminal or circuitry which produce DC+3-9V, on transmission
2	GND	Ground at transceiver (GND)
3	GND	
4		

(* Either of No.1 or 2 available)

[Fig. 3]

6. OPERATION

① Turn the power switchs of both transceiver and transverter ON.

② Select a desired frequency band by turning the BAND switch.

③ Turn the VFO dial of the transceiver and confirm if the receiving signal appears clearly.

④ As example, the relation chart of frequencies for the display of transceiver and converted HF band signal is shown as follows.

HF Band	HF Freq. Range	VHF Band converted Freq. 144MHz (HX-240) / 50MHz (HX-640)
3.5MHz Band	3.500- 3.575MHz	144.000 - 144.075MHz
		50.000 - 50.075MHz
3.8MHz Band	3.791- 3.805MHz	144.291 - 144.305MHz
		50.291 - 50.305MHz
7MHz Band	7.000- 7.100MHz	144.000 - 144.100MHz
		50.000 - 50.100MHz
14MHz Band	14.000-14.350MHz	144.000 - 144.350MHz
		50.000 - 50.350MHz
21MHz Band	21.000-21.450MHz	144.000 - 144.450MHz
		50.000 - 50.450MHz
28MHz Band	28.000-29.700MHz	144.000 - 145.700MHz
		50.000 - 51.700MHz

ex. 3.5MHz Band 3.545MHz ⟶ 144.045MHz, 21MHz Band 21.275MHz ⟶ 144.275MHz

CAUTION

The FM mode is not permitted on HF bands except on 29MHz.
To work the LSB mode operation on 3.5/3.8/7MHz with the unit, the VHF transceiver with LSB mode function is needed.
Choose HF band antenna suitable for your operating frequency band.

⑤ In case the receiving signals are weak, noisy and hard to copy, turn ⑥ RX AMP switch on. Then, LED ⑦ lights and the receiving signal is amplified by the RX preamp with approx. 10dB gain.

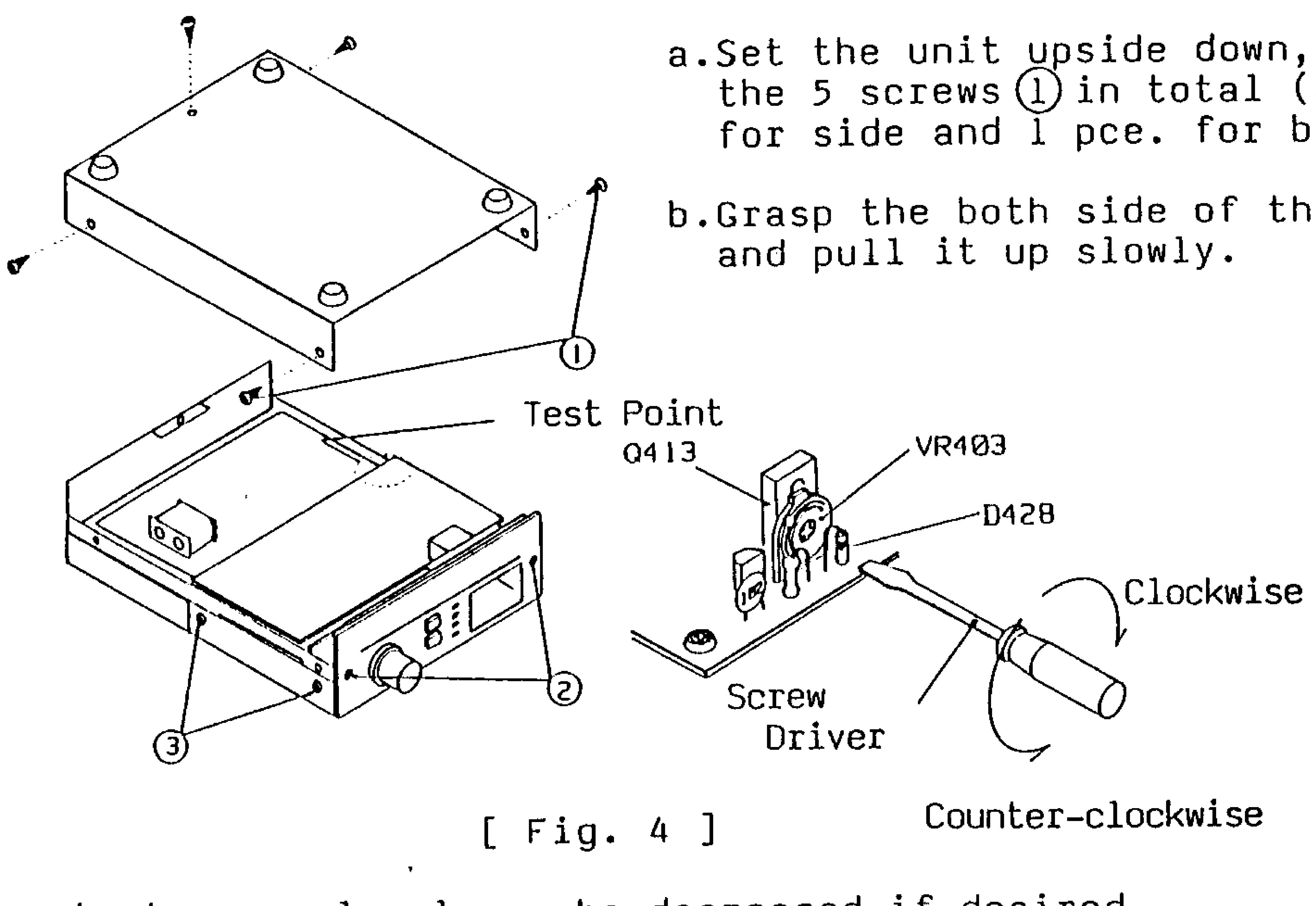
⑥ Set the transceiver in transmitting state. In case of FM mode of transceiver, the unit becomes carrier transmitting state, and the power level meter deflects instantly. HF signal is emitted at the moment ON AIR LED ④ lights.
In case of SSB mode, the needle of meter deflects in response to the audio signal level from mic.

⑦ At SSB mode, the time constant of COX (Carrier Operated Send-Receive Switch), which is set 0.3-0.5 sec for change-over from transmission to reception, can be adjusted by the user.
Remove the bottom cover from the unit as Fig. 4 and turn the semi-fixed potentiometer VR-403 to adjust the time constant. Turning the potentiometer clockwise, the time constant increases, and if counter-clockwise, it decreases. For connection of the remote control terminal of the unit and transceiver, turn the potentiometer counter-clockwise fully.
(cuation: for adjustment, please use the screw driver with good RF insulation and/or turn the power switch off, first.)

[How to remove the bottom cover]

a. Set the unit upside down, remove the 5 screws ① in total (4 pcs. for side and 1 pce. for bottom).

b. Grasp the both side of the cover and pull it up slowly.



[Fig. 4]

⑧ The output power level can be decreased if desired.
Set the output power level select switch to the "LO" position.

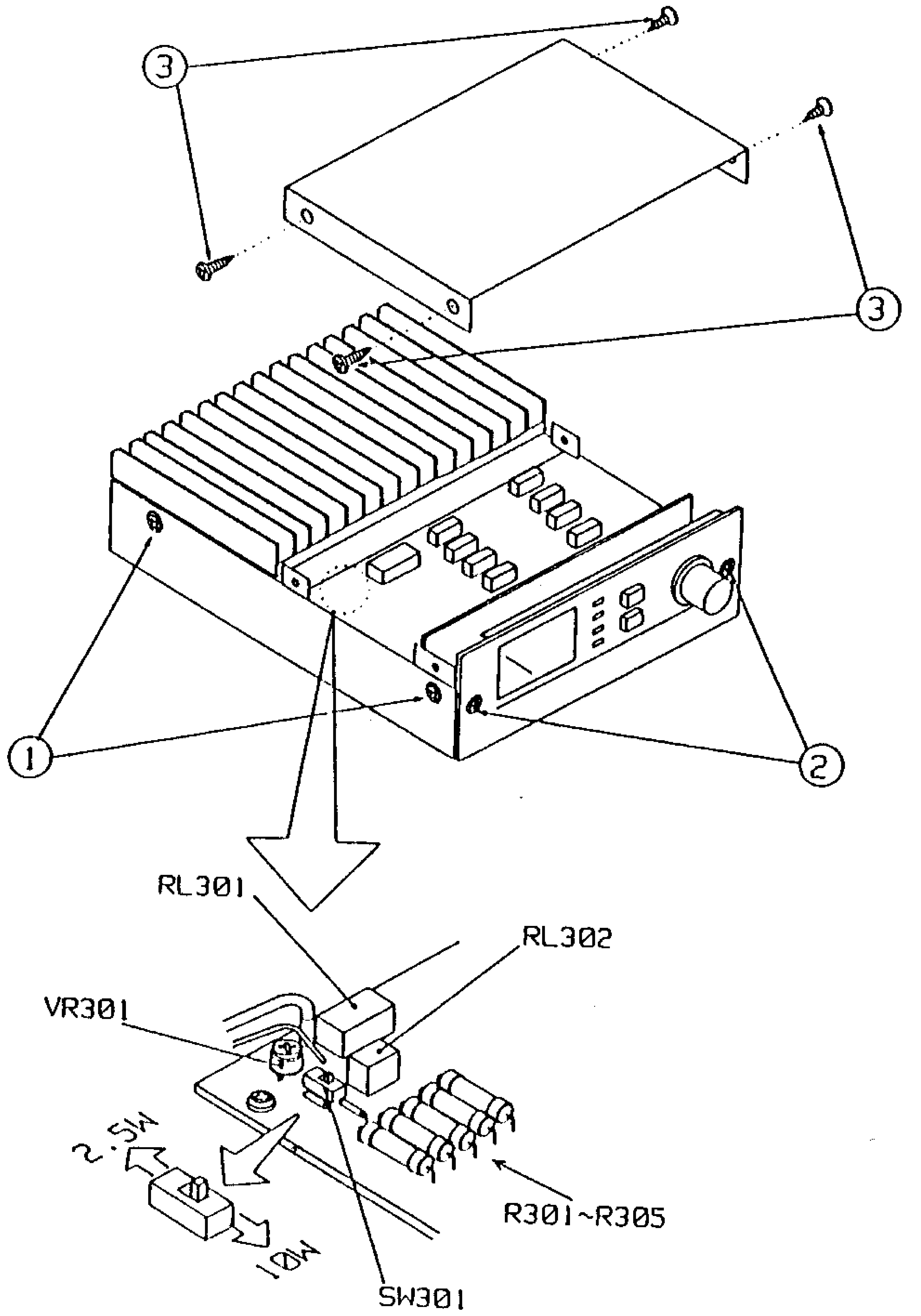
⑨ If you have a portable or handy type transceiver with 0.2W output, the unit can obtain the sufficient output power by setting the input select switch SW301 inside to "2.5W" position.

[How to remove the upper cover]

a. Remove the screws ③ (4 pcs.) from upper cover.

b. And, pull it up.

c. When it is hard to remove it, loose fixed screws ② on the front panel.



[Fig. 5]

7. CAUTION

Be careful of the following items which may become the cause of troubles.

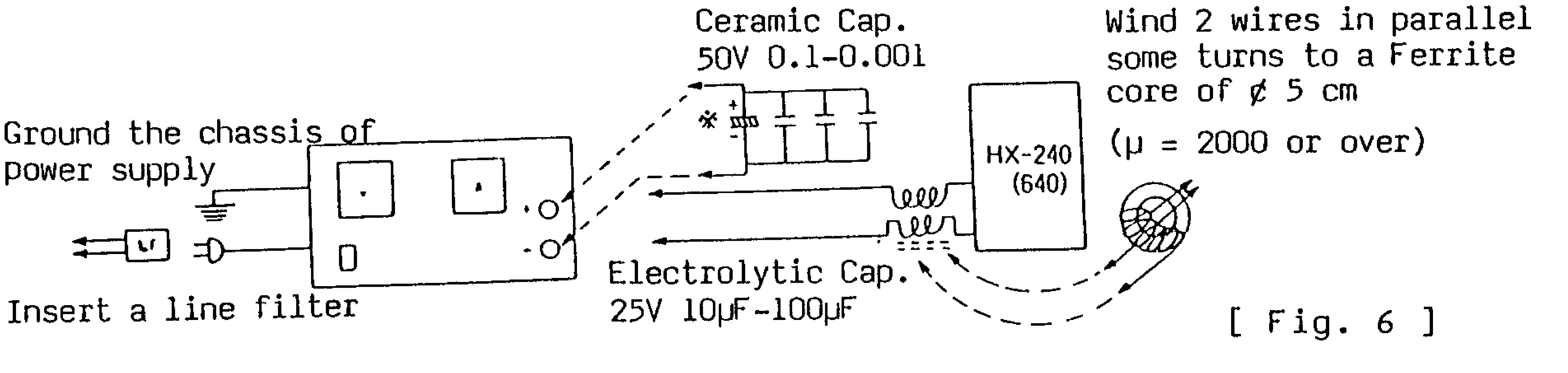
① Set the amp in a well ventilated place.
DO NOT cover heat sink of the unit.

② In the same way, DO NOT operate the unit at places where it is exposed to the direct heat of the sun, or near a heater.

③ Be sure to check the "Matching" or VSWR of antenna before operation. Measure the SWR value by using an SWR meter according to the installation on Page 5. If SWR value is too high, adjust your antenna to obtain a lower SWR value.
You should obtain an SWR of less than 2.0:1 or hopefully as low as 1.5:1.

④ Be careful that the DC power voltage is kept no higher that 13.8V(12-14V). Although supplying about 15V will not kill the amp immediately, it is dangerous to the transistors if such other undesirable conditions occur, as antenna mismatch or over drive, simultaneously.

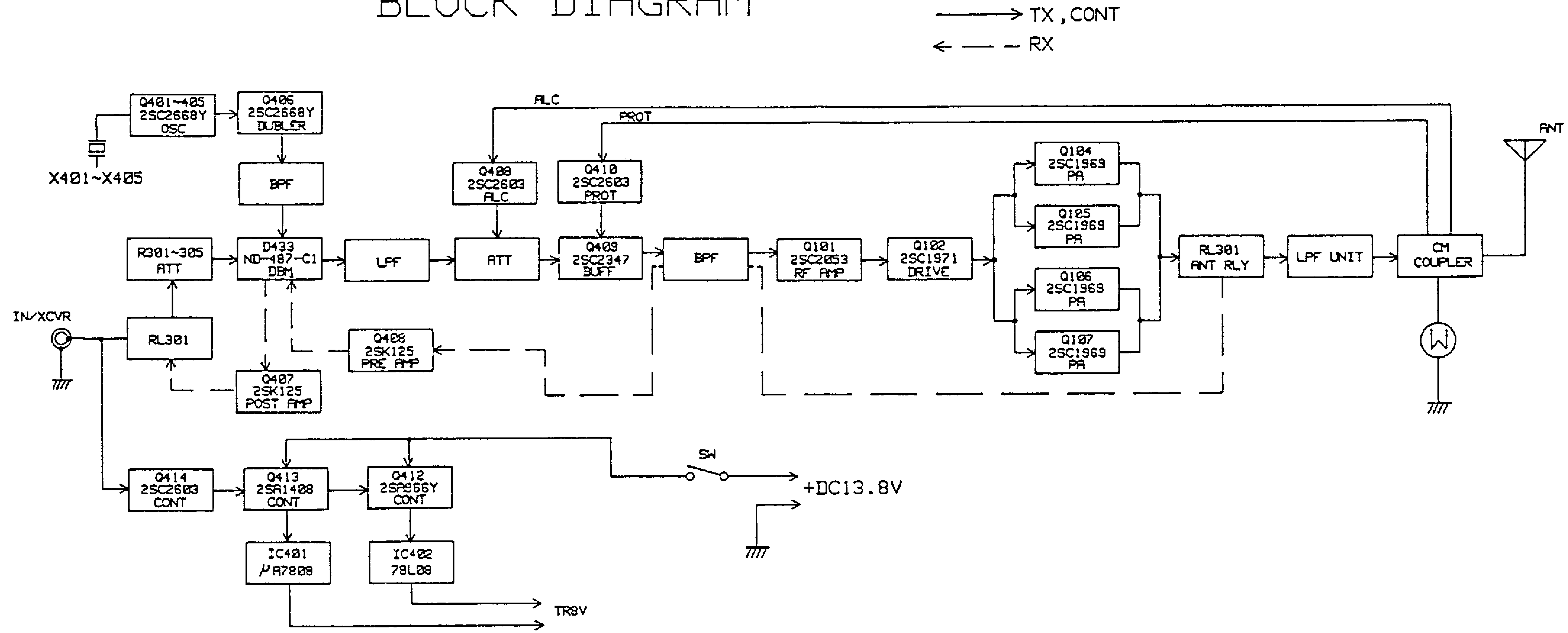
⑤ In case that AC to DC converter (voltage stabilized DC power supply) is used at home station, some DC power supplies produce abnormally high output voltage due to high frequency RF intrusion, which will kill the RF power transistor of the amp.
USE OVP (Over Voltage Protected) SUPPLY ONLY!
Use a DC power supply fully protected against high frequency intrusion.

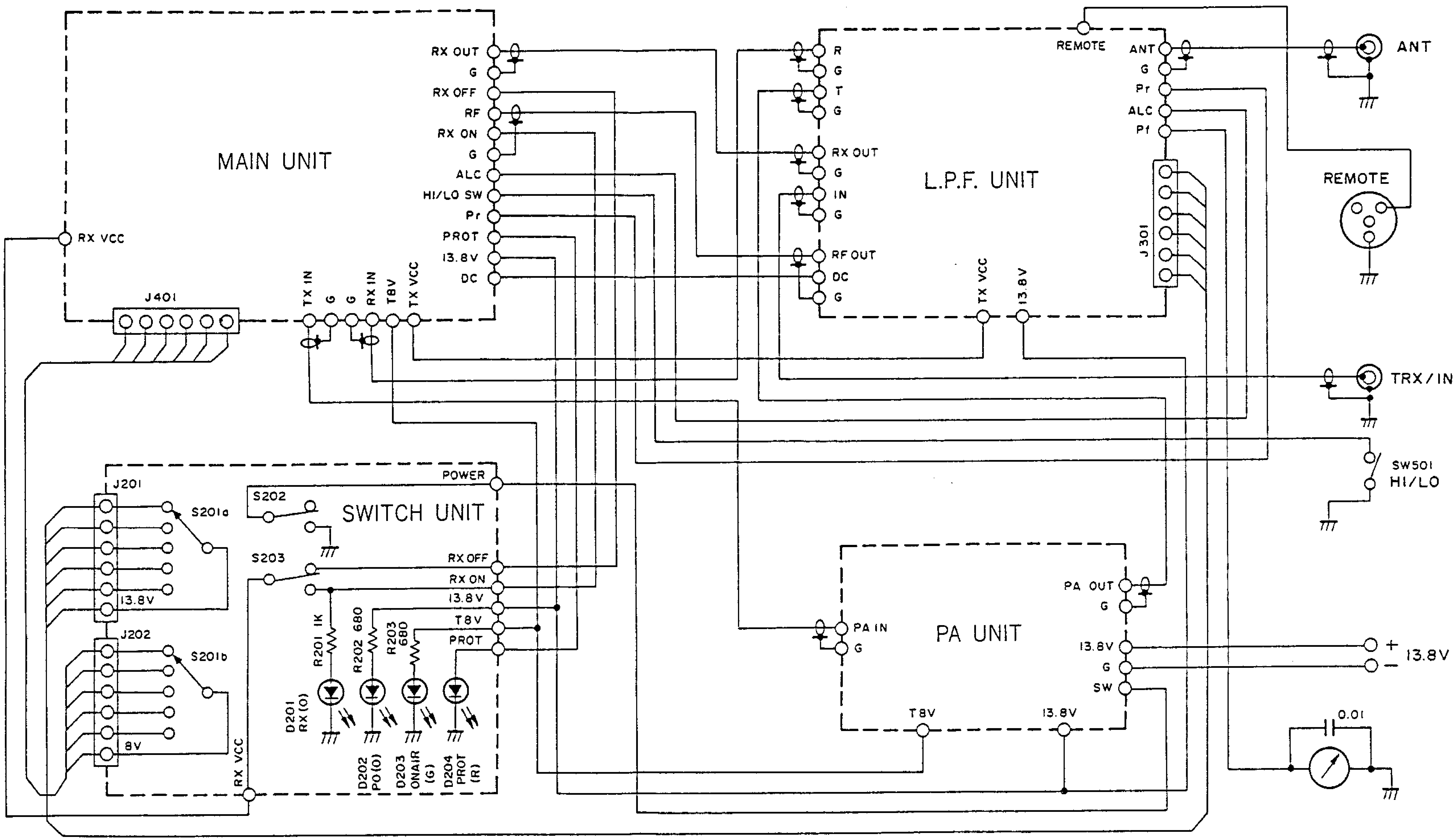


[Fig. 6]

⑥ If the power switch is turned off, 144MHz(50MHz) band operation can not be worked, as there is no by-pass circuit supplied in the transverter.

BLOCK DIAGRAM



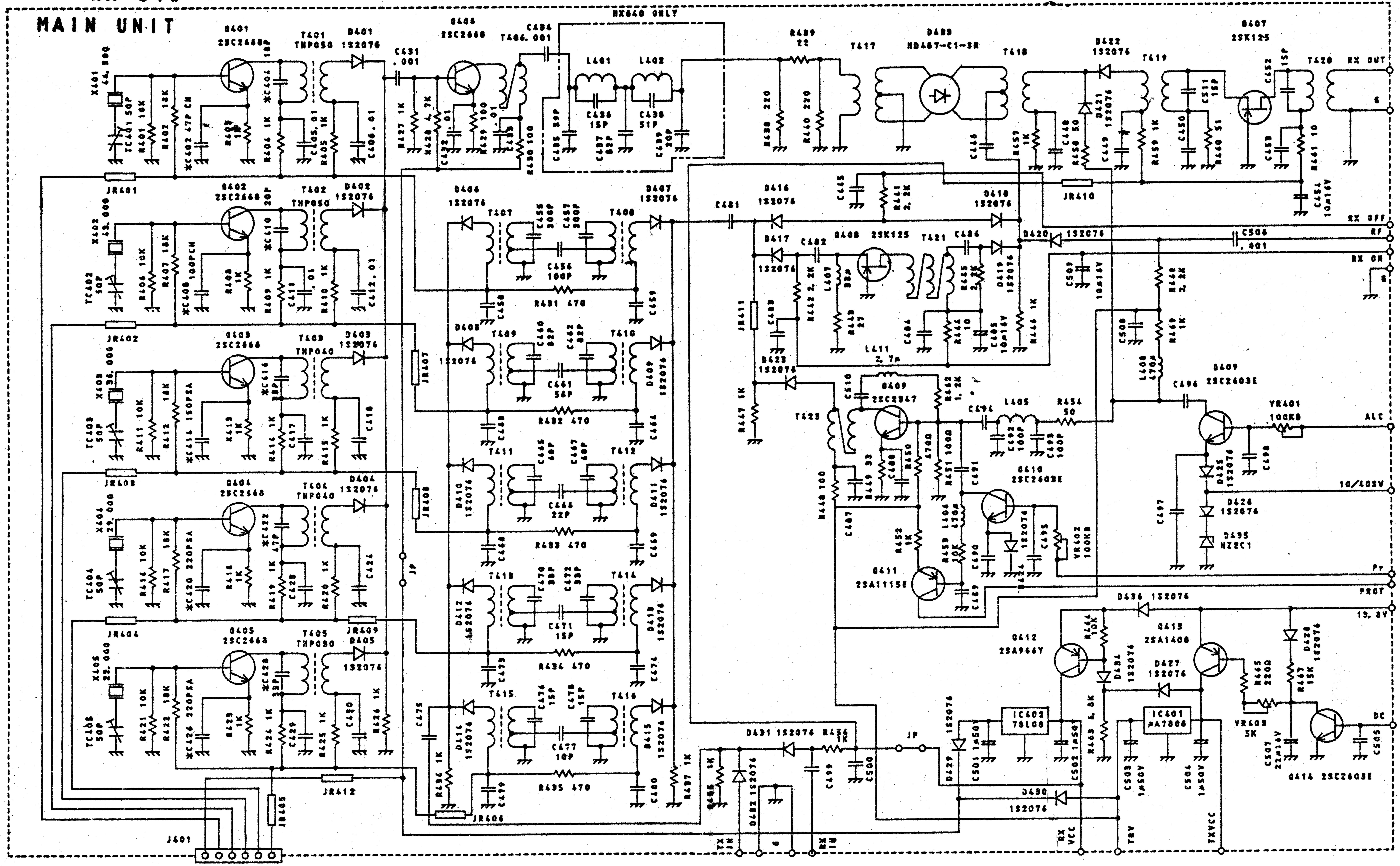


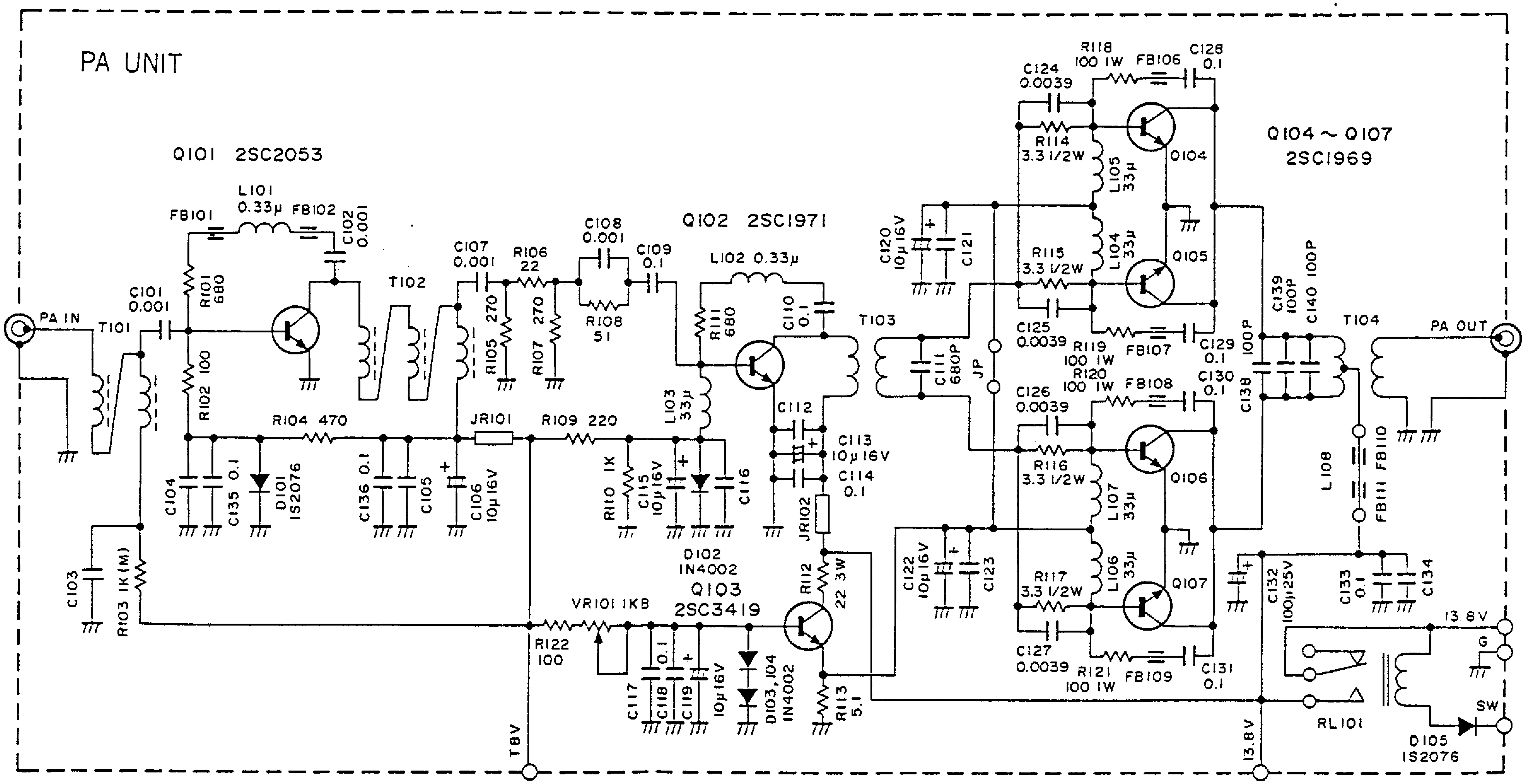
* THE DIAGRAM IS SUBJECT TO CHANGE WITHOUT NOTICE.

HX-240 CIRCUIT DIAGRAM

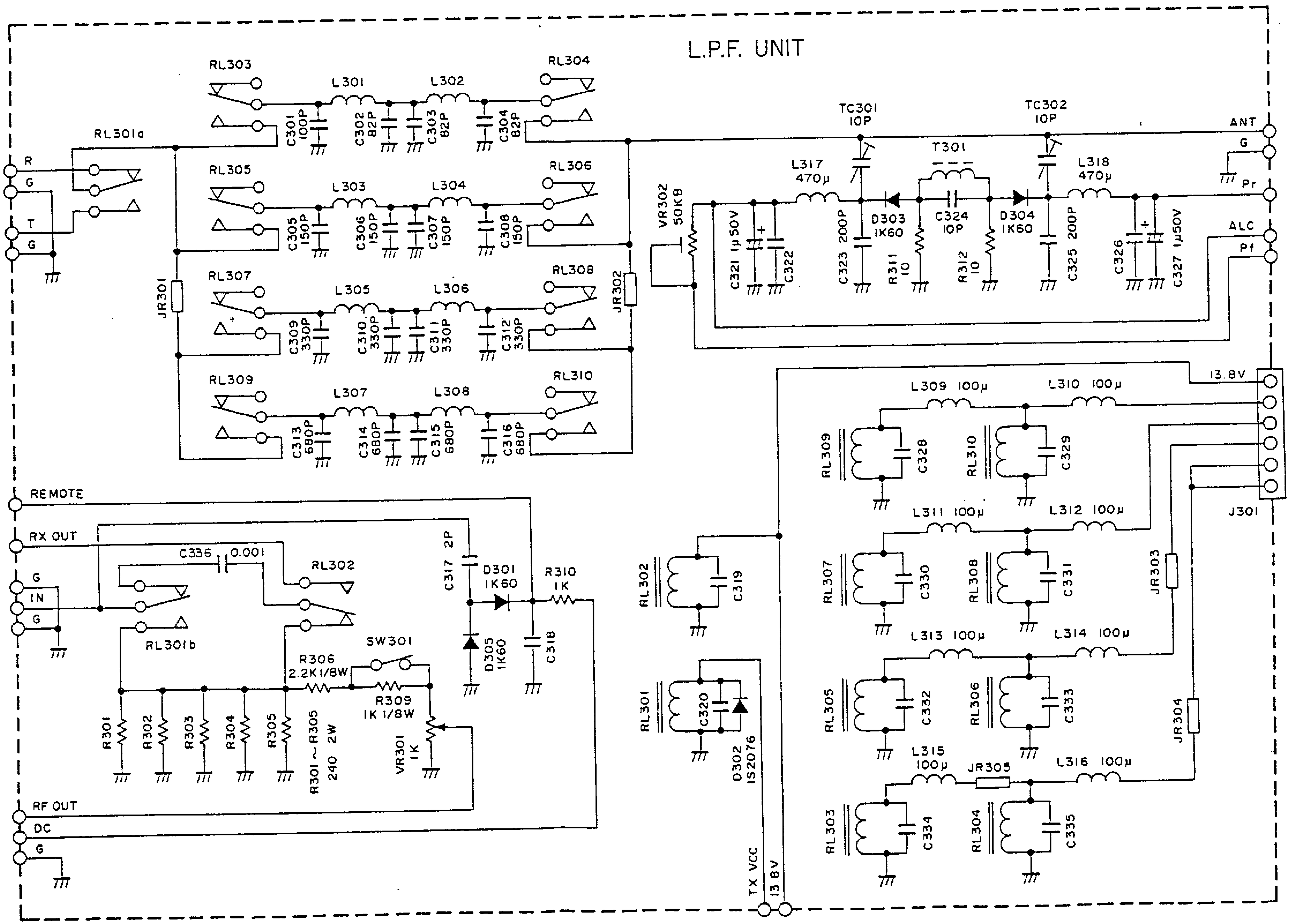
TOKYO HY-POWER

HX-640


MAIN UNIT
HX640 ONLY
RX OUT
RX OFF
RF
RX ON
ALC
10/40SV
Pr
PROT
13.8V
DC
J401
RX VCC
TBV
TXVCC
TX IN
RX IN



* ALL CAPACITORS WITHOUT NOTES : 0.01μF 25V, CERAMIC



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