

# INSTRUCTION MANUAL

All Mode Power Amplifier

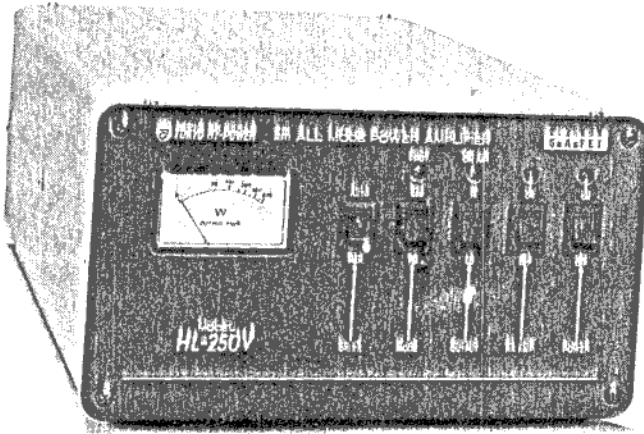
Model HL-250V

 **TOKYO HY-POWER LABS., INC.**

\* I N S T R U C T I O N   M A N U A L \*  
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All Mode Power Amplifier

Model HL-250V



Tokyo Hy-Power Labs., Inc.

HL-250V is a high power linear amplifier designed for 144MHz band all mode operation. It provides a maximum output power of 250W when driven by any 10W radio as well as 25W radio. Using the built-in low noise GaAs FET receive pre-amp, the HL-250V enables you to enjoy a more comfortable VHF DX QSO. Due to the effective forced-air cooling, the HL-250V is reliable and stable even in continuous operation.

## FEATURES

### \*Selectable RF Input 10W/25W

You can operate the amp with both 10W and 25W output transceivers.

### \*Power Level Meter

You can monitor the output power level at all times. Accurate output power can be read with the built-in precision micro-strip type directional coupler and a 50 ohm load with low VSWR.

### \*Protection Circuit

When the connector at the output side is open or shorted, protection circuits will operate to prevent the power amplifier from reaching full output and thus prevents the transistors from being damaged.

### \*All Mode Compatibility(SSB/FM/CW)

In the SSB mode, the time constant of the COX(automatic send receive switch) is set to be approximately one second. Consequently, the relay rarely chatters during conversation, and smooth SSB operation is the result.

### \*Remote Send-Receive Control

"+DC or SHORT" remote control lead wires are incorporated. This enables a smooth and instant changeover especially on SSB mode and CW mode when two leads are properly wired to the remote control terminals of the transceiver.

### \*Variable Fan-Motor Speed

When the temperature in the heat sink exceeds 60 degrees C(140°F), motor speed will increase rapidly to enhance the cooling of the heatsink and transistors.

### \*Terminal for Remote Controller is accommodated.

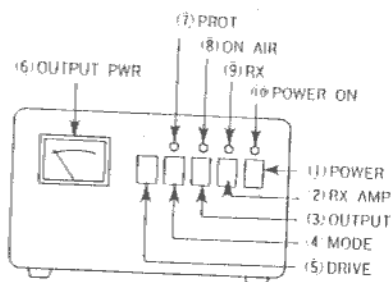
You can operate the amp remotely by connecting a remote controller to this terminal.

## SPECIFICATIONS

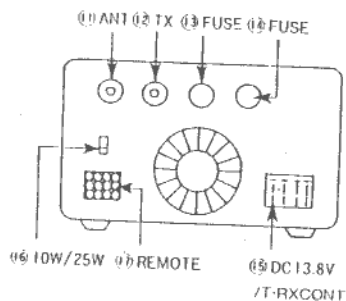
Frequency	: 144MHz Band
Mode	: FM/SSB/CW
DC Power	: DC 13.8V(negative ground)
Power Consumption	: 43A Approx.
Output Power	: HI = 250W LO = 90 - 140W
RF Input Power	: 10W/25W, Automatic/Manual selectable
Input/Output Impedance	: 50 ohm
Input/Output Connector	: SO-239
Accessory Circuit.	: COX(Carrier Operated T/R switch), Remote control Terminal, Cooling Fan, Mode select switch, Power Meter, GaAs FET low noise RX pre-amp., Output power level select(HI/LO), Driving power auto-select, Load open/short protection, Reverse DC power polarity protection, Remote controller terminal
Semiconductors	: RF Power Transistor x 5, IC x 2, GaAs FET x 1, Transistor x 9, Diode x 25, LED x 4
Accessories	: Coaxial jumper cable(M-M), DC power cord, Fuse x 2
Dimensions	: 220(W) x 120(H) x 350(D) mm
Weight	: 4.90 Kg(approx.)

## EXPLANATION OF FEATURES

\*Front panel



\*Rear panel

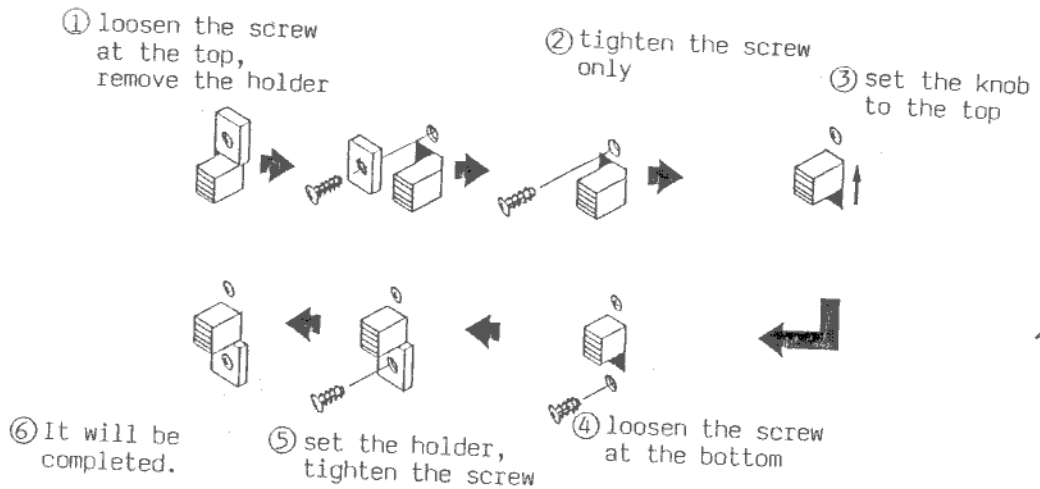


- ① POWER(DC power switch)  
In the off position, the amp is in the "THRU" state.  
The transmitted and received signals will bypass the active internal part of the HL-250V.
- ② RX AMP(RX receive pre-amp switch)  
In the "ON" position, the received signal is amplified by a low noise GaAs FET device.
- ③ OUTPUT(Output power level select switch)  
Select either high or low output level.  
At "HI", full power is delivered and at "LO", approximately half of the full output is available.
- ④ MODE(FM/SSB mode select)  
When changing from TX(send) to RX(receive) in the "SSB" mode, relay change-over is made with a delay of approximately one second. This change is made instantly at "FM".
- ⑤ DRIVE(AUTO/MAN. select switch)  
Driving power can be selected manually or automatically.  
At "AUTO" position, RF input is selected to 10W or 25W automatically depending on the power from the transceiver.  
At "MAN.", RF input should be either 10W or 25W by selecting  
⑥ 10W/25W switch.
- ⑥ OUTPUT PWR(Power meter)  
Indicates transmitting output power.
- ⑦ PROT.(Protection pilot lamp)  
When output of the amplifier is open or shorted, DC power is disconnected automatically to protect the power transistors.  
At this time, this lamp lights to indicate the amplifier is off. Also, this protection may function when SWR on the antenna is extremely high.
- ⑧ ON AIR pilot lamp  
Lights when the amp is transmitting or on air.

- ⑨ RX pilot lamp  
Lights when the RX pre-amp is ready, even if DC power switch is off. The pre-amp may be used when the power amplifier is off.
- ⑩ POWER ON pilot lamp  
Lights when DC power is supplied to TX amp and power switch is "ON".
- ⑪ ANT(output connector)  
connects a coaxial cable to antenna.
- ⑫ TX(RX input connector)  
Connects a coaxial jumper cable from ANT connector of transceiver.
- ⑬, ⑭ Fuse holder  
25A fuse in each holder.
- ⑮ DC13.8V/T.RX CONT (DC power/remote connector)  
Connector for DC power lead and remote control cable.  
For the connection of remote control cable, please refer to "PREPARATION BEFORE OPERATION" on page 5.
- ⑯ 10W-25W/DRIVE LVL(Driving level select switch)  
With ⑤ DRIVE switch at "MAN.", driving level is selected to either 10W or 25W by this switch.
- ⑰ REMOTE(External remote control terminal)  
Connects an external remote controller of optional parts.

## PREPARATION BEFORE OPERATION

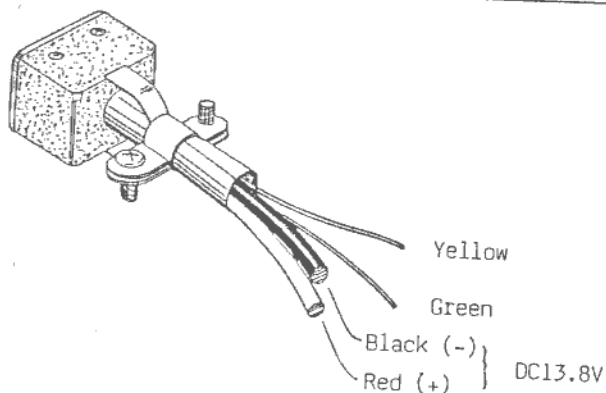
1. In case you connect the transceiver of 10W output, set ①6 LOW-25W/DRIVE LVL. switch to "10W" on the rear panel and lock it again.



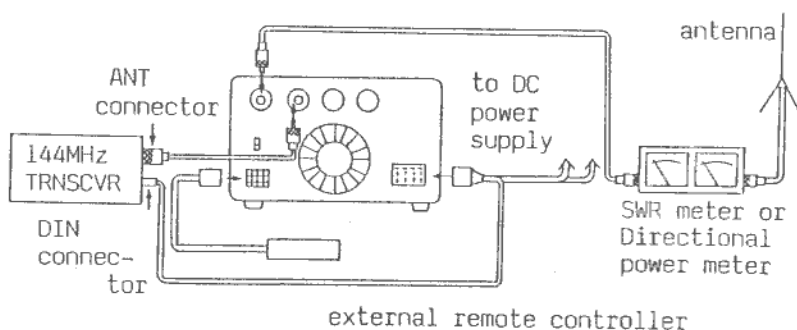
2. Connect cables as required according to the installation on page 6.

3. For remote control operation from the transceiver, connect remote control lead wire from remote control connector (DC 13.8V REM) to "STAND-BY" terminal (remote control) at the transceiver. Connect the green lead to a terminal that grounds for TX or the yellow lead to one that supplies voltage on transmit.

LEAD COLOUR	DESIGNATION	CONNECTING POINT AT TRANSCEIVER
Yellow	+ DC	Terminal or circuitry which produces DC +1 to +12V on transmit.
Green	OPEN-SHORT	Terminal or circuitry which is grounded on transmitting and in an "OPEN" state on receiving.



## INSTALLATION



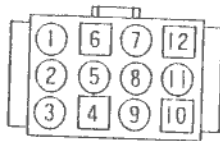
## OPEATION

1. Before operation, keep ① POWER switch and ② RX AMP switch off.
2. Turn the power switch of transceiver on and receive.
3. Signals to and from the antenna will bypass the internal part of the device. In that case, you can hear signals on the transceiver.
4. Turn ① POWER switch on, and ⑩ POWER ON pilot lamp lights.
5. Select ④ MODE switch to the operating mode. when you operate by remote control, this switch must be always set to "FM", not to the actual mode.
6. By using the transceiver to "transmit", the HL-250V will provide "transmitting power amplification" and a high power signal is emitted from amplifier. At the same time, ⑧ ON AIR pilot lamp lights to indicate that the amp is transmitting or on air.
7. Protection circuit for SHORT or OPEN state at output side is included. When the connector at output side is open or shorted, DC power is disconnected automatically, and ⑦ PROT pilot lamp lights. To release the protection, turn ① POWER switch and ② RX AMP switch off. Please begin from the beginning after the trouble is cleared.



8. In case the receiving signals are weak, noisy and hard to receive, turn (2) RX AMP switch on. You can hear signals clearly with the low noise pre-amplifier, and (8) RX pilot lamp lights. If you use Rx preamp in a strong electric field, the pre-amplifier GaAs FET may be destroyed.
9. If lower power is needed or if the power supply capacity cannot handle the full amplifier power, switch to "LO" output.
10. In the case of a local QSO and the amp is not needed, just set (1) POWER and (2) RX AMP switches off.
11. In case of RX preamp operation only, set (2) RX AMP switch on with (1) POWER switch off.
12. Driving power is selected either 10W or 25W. When (5) DRIVE switch is at "AUTO", driving power is selected automatically by the power from the transceiver. And at "MAN.", it is selected by the setting of (6) 10W-25W/DRIVE LVL switch.

\* HOW TO CONNECT THE EXTERNAL REMOTE CONTROLLER(option) \*



Pin No.	Designation	
(1)	GND	connect ground
(2)	RX LED	connect RX LED
(3)	ON AIR LED	connect ON AIR LED
(4)	PROT LED	connect PROT LED
(5)	OUTPUT	connect OUTPUT circuit. OUTPUT of this amp is made "LO" when this terminal is shorted with (1) POWER.
(6)	MODE	connect MODE circuit. Mode of this amp is made into "SSB" when this terminal is shorted with (2) MODE.
(7)	RX AMP	connect RX AMP circuit. RX AMP is made into "ON" when this terminal is shorted with (1) +DC13.8V.
(8)	OUTPUT POWER	connect OUTPUT POWER meter circuit.
(9)	POWER LED	connect POWER LED.
(10)	+13.8V	connect +13.8V at all times.
(11)	POWER	connect power supply circuit. POWER of this amp is made into "ON" when this terminal is shorted with (10) +13.8V.
(12)	MODE	connect MODE circuit.

## CAUTION

Be careful of the following items which may cause troubles.

1. Set the amp in a well ventilated place.  
DO NOT cover ventilation holes of the amp.
2. In the same way, DO NOT operate the amp 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 6. If SWR value is too high, adjust your antenna to obtain a lower SWR value. You should obtain an SWR of less than 1.3:1 or hopefully as low as 1.0:1.
4. Choose a good antenna which withstands high power, or the SWR will be degraded within a few minutes after starting transmission, due to the heating of the antenna. In some cases, the antenna may be damaged or destroyed.
5. DO NOT try to drive over the rated level.  
When (5) DRIVE is at "MAN." with "10W" of (6) 10W/25W switch on the rear panel, you must keep the driving level not to exceed 10W.
6. Be careful that the DC power voltage is kept no higher than 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, such as antenna mismatch or over drive, simultaneously. In case the battery is 24V, use 24V to 13.8V DC/DC converter. Supplying over 15V WILL KILL the amp immediately!
7. In case that AC to DC converter(Voltage stabilized 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, and capable of supplying high current.
8. DO NOT open and touch the internal part of the amp.  
The device is fully adjusted at the factory.

## TROUBLESHOOTING

The following symptoms are minor troubles, which can be solved rather easily.

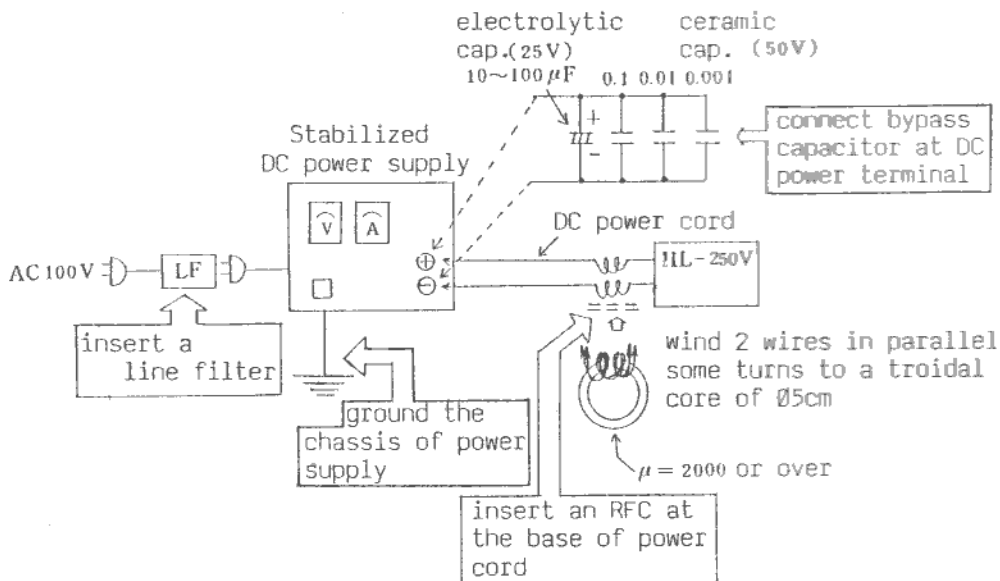
Please check each cause of trouble carefully.

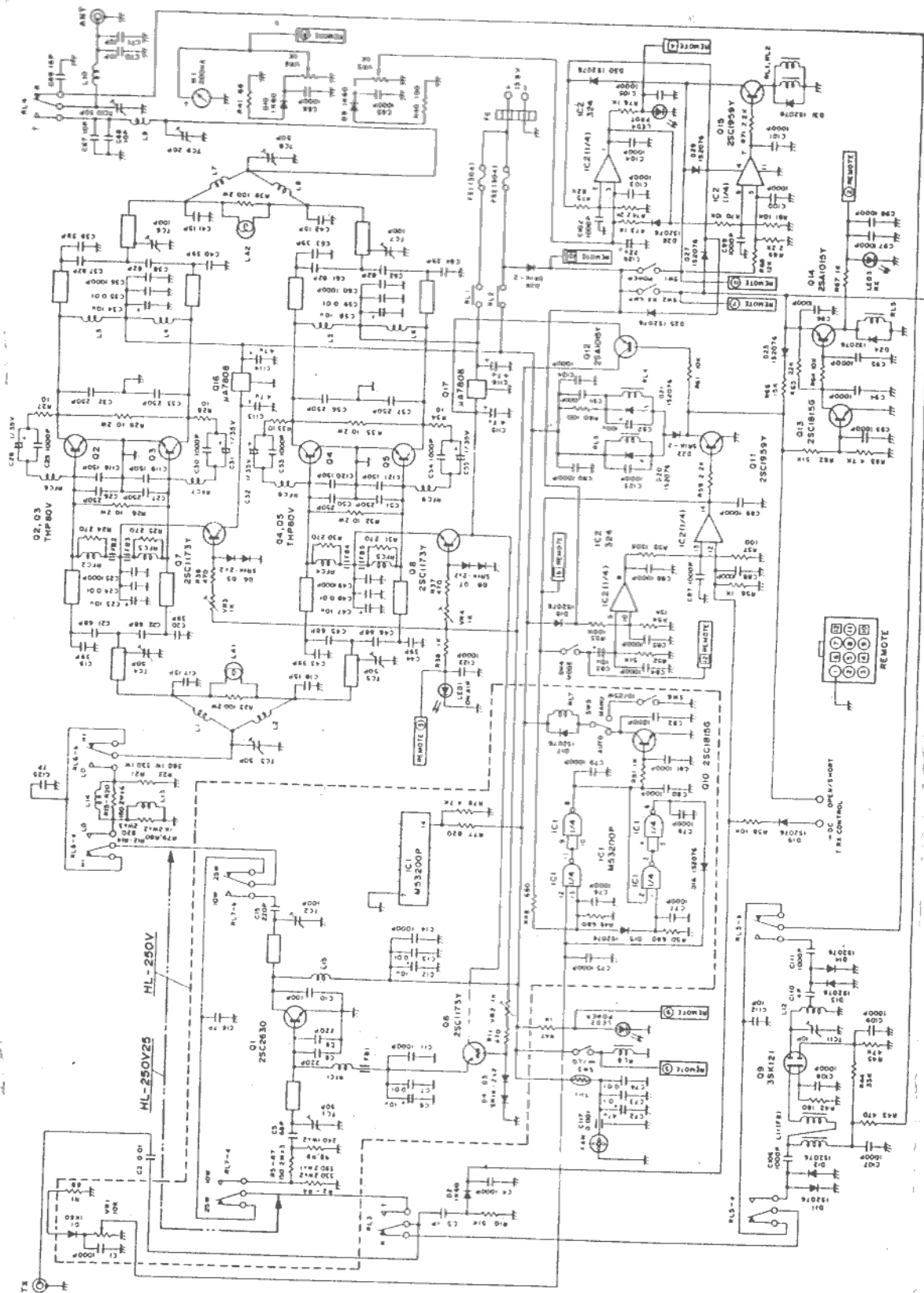
Symptoms	Cause	Treatment
DC power can not be turned on.	<ol style="list-style-type: none"> <li>1.DC power cord is not connected.</li> <li>2.Mis-wiring of the polarity(+/-).</li> <li>3.Two fuses are not set, or blown.</li> </ol>	<ol style="list-style-type: none"> <li>1.Connect DC power cord surely.</li> <li>2.Wire correctly.</li> <li>3.Set two fuses correctly.</li> </ol>
Fuse blown repeatedly.	<ol style="list-style-type: none"> <li>1.Only one of two fuses has been set.</li> <li>2.One or both of fuses are not proper(less than 30A).</li> </ol>	<ol style="list-style-type: none"> <li>1.2.Set two of 30A fuses.</li> </ol>
Can not transmit and receive.	<ol style="list-style-type: none"> <li>1.Trouble of each coaxial jumper cable.</li> </ol>	<ol style="list-style-type: none"> <li>1.Check each cable which is not connected or which has a trouble of short/open.</li> </ol>
Output power is not amplified.	<ol style="list-style-type: none"> <li>1.Connectors of input and output is connected reversely. (Relay chatters.)</li> <li>2.PROT(protection circuit) works and the amp is made into the locked state.(DC power is made into off.)</li> </ol>	<ol style="list-style-type: none"> <li>1.Connect cables correctly.</li> <li>2.Remove the cause of PROT, and then release the protection. (Please refer to "OPERATION - 7".)</li> </ol>
Output power is less than the rated level.	<ol style="list-style-type: none"> <li>1.When the driving power is LOW, ⑤ DRIVE switch is MAN with "25W" of ⑩ DRIVE LVL switch.</li> <li>2.③ OUTPUT switch is set "LO".</li> <li>3.DC power voltage is less than the rated level.</li> <li>4.Driving power from the transceiver is less than the rated level (10W or 25W).</li> </ol>	<ol style="list-style-type: none"> <li>1.Set ⑤ and ⑩ correctly. (Please refer to "PREPARATION BEFORE OPERATION-1" and "OPERATION-10")</li> <li>2.Set ③ to "HI".</li> <li>3.Make the DC power voltage to the correct level.</li> <li>4.Readjust the transceiver or use it under that condition.</li> </ol>
Cooling fan turns slowly.	<ol style="list-style-type: none"> <li>1.Soon after the POWER switch on, the internal part is still cool. So the fan turns automatically slow.</li> </ol>	<ol style="list-style-type: none"> <li>1.This is normal. Keep operating. When internal temperature increases, the fan turns faster.</li> </ol>

Symptoms	Cause	Treatment
Output voltage of the stabilized DC Power Supply decreases while transmitting.	1. Insufficient of current capacity and DC power protection is operated.	1. Replace the DC Power Supply to a larger capacity (Ampere), or operate with "LO" output.
Output voltage of the stabilized DC Power Supply is increased while transmitting.	1. Mis-operation of DC power control circuit due to the RF intrusion.	1. Make a protection for DC power line referring to the following "HOW TO MAKE A PROTECTION AGAINST THE RF INTRUSION TO A STABILIZED DC POWER SUPPLY".

### HOW TO MAKE A PROTECTION AGAINST THE RF INTRUSION

#### TO A STABILIZED DC POWER SUPPLY





\* THE DIAGRAM IS SUBJECT TO CHANGE WITHOUT NOTICE.

TOKYO HY-POWER HL-250V/HL-250V25  
CIRCUIT DIAGRAM

 **TOKYO HY-POWER LABS., INC.**

TOKYO HY-POWER LABS., INC. 1-1 Hatano 3-1 Ichino Niya, Saitama 352 JAPAN  
Phone 0484-81-1211

FAX 0484-79-6949 T.X. 2962887 THPWR J