

INSTRUCTION MANUAL

User Manual

Solid-State HF/50MHz Band
50W Linear Power Amplifier

Model HL-50B

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

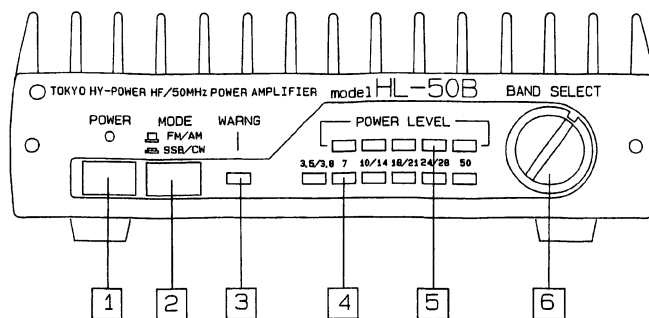
(1) HL-50B (for Yaesu FT-817) / FEATURES

- HL-50B is a solid-state HF/50MHz band linear amplifier with the maximum output power of 50W. RF driving power is 5W (Standard model is 10W.) A pair of 2SC1946A power transistors by Mitsubishi are used in a broad band, push-pull form.
- Output low-pass filters are furnished for entire bands covering 3.5 through 50MHz. These filters suppress the undesired harmonics effectively.
- RF keying circuit (or carrier operated send-receive switch) is equipped. Consequently if you connect your transceiver and antenna to HL-50B, and supply DC power, you are on the air with mighty 50W output power. Also HL-50B has a socket for switching signal from transceiver to make combined send-receive switching with transceiver (master/slave T/R switching). The operation modes are SSB, CW, FM and AM.
- WARNING circuit is provided. When the improper band-setting and antenna short are detected, protection circuit works to avoid troubles. Reverse DC power polarity is also protected. WARNING lamp on front panel will light to indicate that protection has worked..
- Optional remote controller (remote head) can be connected for remote controlled operation. With the remote head, you can turn on/off DC power, and check whether or not "WARNING" has worked.
- LED power level meter will always indicate the output power level.
- ALC socket is available at the rear panel, from which negative DC voltage (0 to - 10V) can be fed back to the transceiver ALC pin in order to keep the peak power within the maximum rating and or to limit to certain level. This function is effective for obtaining a clean SSB/CW signal without the splatter.

(2) SPECIFICATIONS

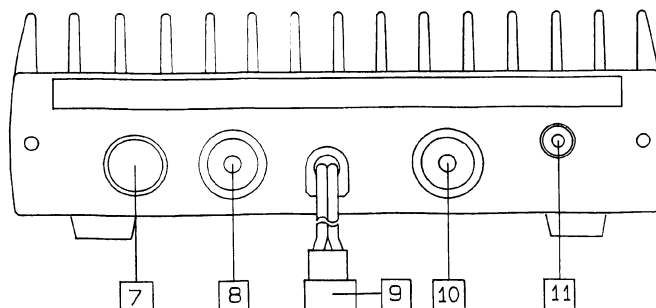
Frequency	:	HF Band (3.5 ~ 28 MHz and 50MHz.. Amateur Bands)
Mode	:	SSB , CW , FM (*AM)
RF Drive Power	:	5W (to best meet FT-817) (Standard model : 10W)
RF Output Power	:	50W p.e.p. (25W for AM with 2.5W drive.)
In/Out Impedance (Zin/out)	:	50 ohms (unbalanced)
Final RF Power Transistor	:	2SC1946A x 2 (by Mitsubishi)
Amp. Circuitry	:	Class AB Push-pull
Major Circuits and Functions	:	① Output low-pass filters (band switch selected) ② RF key circuit (Carrier operated send/receive switch) ③ WARNING (Protection circuit for antenna open/short, band set error , DC power polarity error)
DC Power	:	DC 13.8V , 10A max.
In / Out connectors	:	Type SO – 239 (or M – J)
Dimensions	:	148 x 55 x 190 mm (WxHxD)
Weight	:	Approx. 1.4 kgs. (3.1 lbs.)
Accessory Parts	:	Mounting bracket with screws, DC power cord (Red/Black 1.2m or 4 feet , Coax jumper cable with “M-male” connectors 60cm (24 inches), RCA plug, 8 pin DIN plug, Fuse 10A x 2 .
Cooling Method	:	Natural Air Flow

(3) Front and Rear Panels



FRONT PANEL

- ① **POWER** : ON/OFF switch for DC power. When it is once pushed, the switch is locked for "ON".
If it is pushed again, the lock will be reset for "OFF".
- ② **MODE** (Select switch for SSB/CW, FM/AM) : This switch selects the time lag of rf keying circuit , when the amp changes from TX to RX. When pushed to "SSB/CW", lag is about one second, and at FM/AM position, there is no time lag.
- ③ **WARNG** (Warning) : Warning circuit will work to protect the amp in such cases when the band switch is not selected properly, and antenna is short etc. Correct the trouble and turn on the power switch again.
- ④ **BAND** : LED indicator for band in operation.
- ⑤ **POWER LEVEL** : Five LED's indicate approximate transmitting power level. When all LED lights , it means power out is approx. 45W or more.
- ⑥ **BAND SELECT** : To select the proper output low-pass filter for desired frequency band of operation.



- ⑦ **ACC** (Socket for Remote controller and/ or for connection with ACC/ Remote of transceiver)

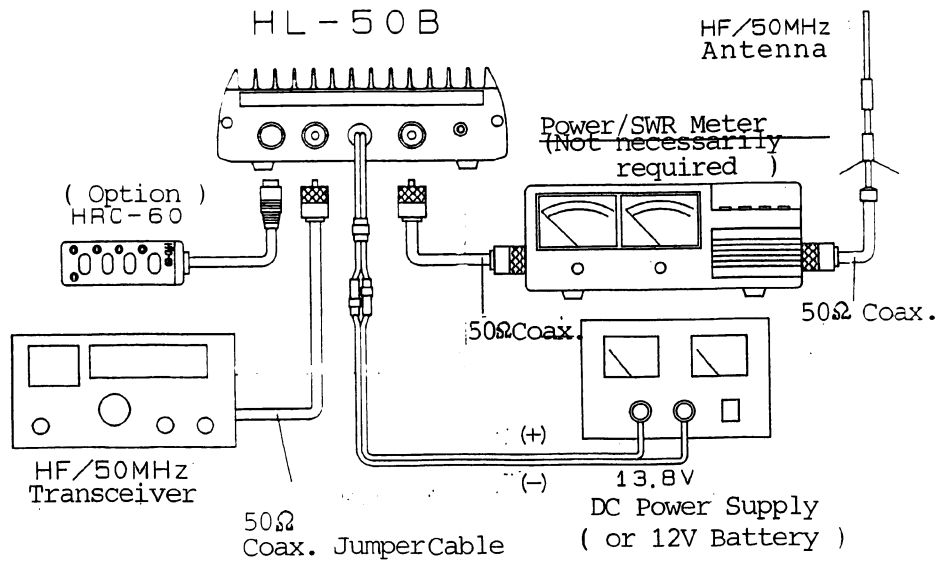
Optional remote controller (HRC-60) is connected here for operation of HL-50B set at the remote location such as in the mobile. Also, if connected properly with "ACC"/"REMOTE" pin of the transceiver, forced TX keying will be made in

conjunction with transceiver (master/slave).

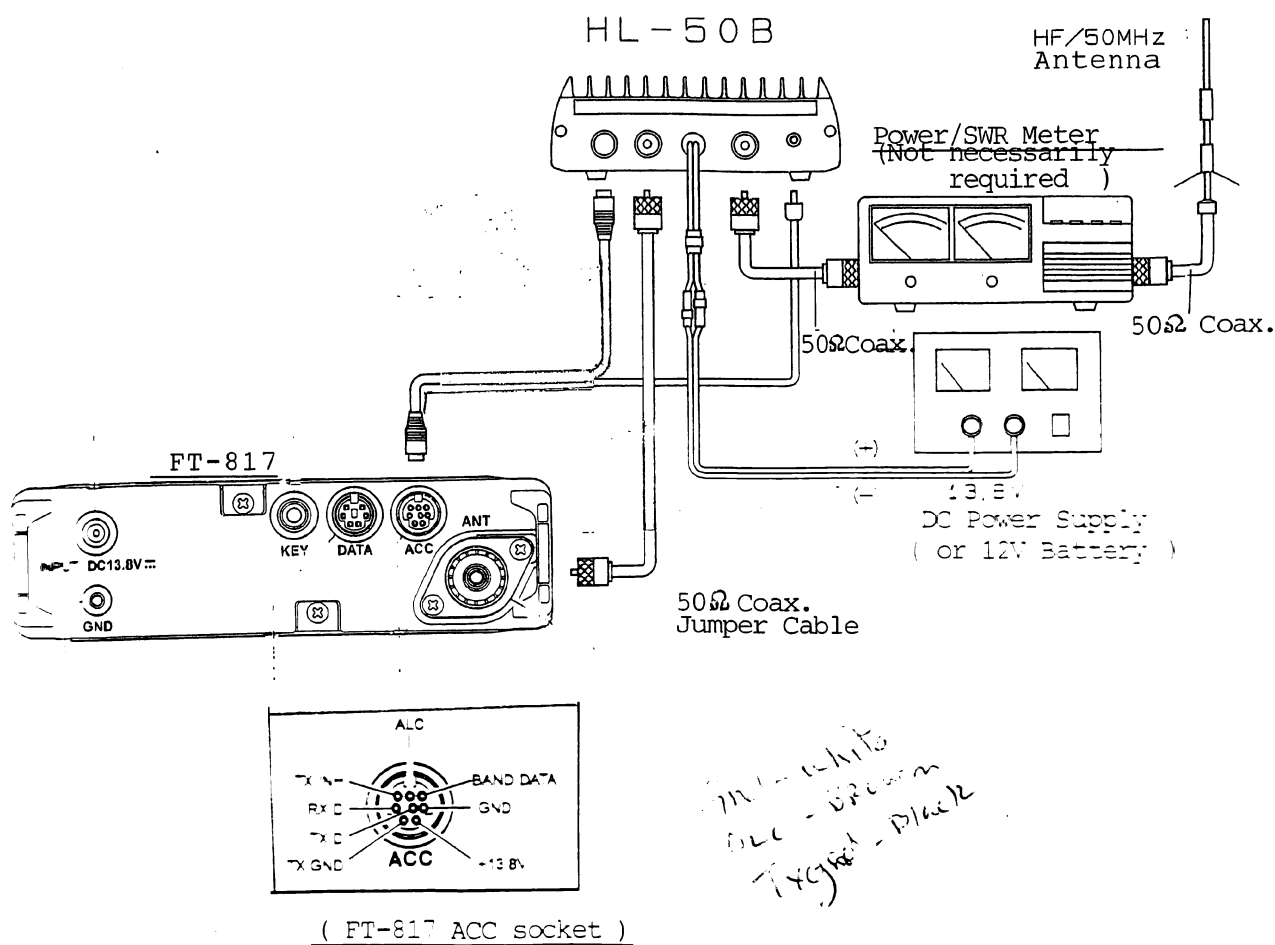
- ⑧ **TX (RF Input Connector)** : Connect the coaxial jumper cable from the transceiver "ANT".
- ⑨ **DC 13.8V TERMINAL** : Using the DC power cord supplied, connect to either regulated DC power supply, or DC 12V battery. Red is positive , and black is for negative. Current capacity should be 10A or more
- ⑩ **ANT (RF Out Connector)** : Connect the antenna cable.
- ⑪ **ALC (ALC socket)** : Connecting to ALC socket pin of the transceiver , over-driving of the amp will be avoided. Also, output level can be kept within the maximum limit. Negative DC voltage of 0 to - 10V will appear at the socket pin. Check that the transceiver will accept this negative ALC DC signal. For the proper output level, it is needed to adjust the ALC adj. variable resistor at certain point in order to limit the output power level. (See the illustration appearing later.)

(4) Typical Setting and Connection

a. A Simple Method.



b. Perfect Method with Useful Functions



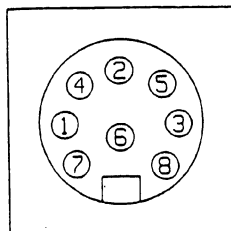
Remote Stand-BY and ALC Hook-Up for FT-817 & HL-50B		
FT-817 "ACC"	HL-50B DIN Socket	50B RCA Jack
TX GND	←-----→	Pin 8 (Remote)
GND	←-----→	Pin 6 (Gnd)
ALC	←-----→	Center Pin
*** GND and Pin 6 (Gnd) connection may be omitted. ***		

(5) OPERATION

- ① Referring to the illustration, connect your transceiver, amp., and power supply (or battery),
SWR/Power meter, antenna etc. properly. It is recommended that antenna is well adjusted for a good SWR value such as 1.5 or lower.
- ② Set the Band Select Switch ⑥ correctly to the desired operating frequency band.
- ③ Checking that antenna is correctly connected, turn on the DC POWER switch ① .
- ④ If you key (transmit) the transceiver, HL-50B amplifier will also be automatically keyed to transmit with the function of rf key circuit . Then the amplified signal is emitted from antenna. At this time, LED's of POWER LEVEL INDICATOR will light according to the transmitting signal level.
- ⑤ Depending on the transmission mode, set the MODE SELECT SWITCH to either SSB/CW or FM/AM. When HL-50B is operated with rf key circuit (carrier operated send-receive switching) for ssb , TX state will be switched to RX , if you stop talking.
- ⑥ For the smooth and fast TX/RX switching, it is recommended that you will utilize ACC⑦ to connect to "Remote" or "ACC" socket of the transceiver. (In the case of FT-817, "TX Gnd" of ACC) In this case, please set MODE switch to FM AM position.
- ⑦ When the amp. works heavily for a long time, heat sink may get heated. It is recommended that external cooling fan is applied over the heat sink.
(For information, external cooling fan with bracket "HBK-110F" is available as an optional parts.)
- ⑧ If you are going to operate without HL-50B amplifier (or "on bare-foot"), leave the coaxial jumper cable connections as they are, and just turn off the power switch. And all the signals coming in and out of the antenna will by-pass the amplifier.
- ⑨ HL-50B has a power gain of 10 (times), that means 10W output will be achieved if you connect a 1W output QRP transceiver. (5 times gain for standard 50B model.)
- ⑩ If you would like to emit a very clean ssb/cw signal as well as keeping output within 50W limit, it is recommended to utilize "ALC" by feeding ALC signal (negative DC voltage varying with relation to voice or CW carrier) back to "ALC pin" of FT-817 ACC socket. Details of connection and how to adjust ALC level will follow.

(6) ACC SOCKET (Accessory Socket)

Pin assignment of ACC socket is shown in the following table. You can connect HRC-60 ,remote controller to this ACC socket. Also, by connecting "REMOTE" pin to "TX-Gnd" pin of FT-817, HL-50B can be keyed to TX state in combination with your transceiver (master/slave send-receive).



(Viewed from outside
of the rearpanel.)

Pin #	SIGN	Description
①	Nc	NO connection
②	Vcc	DC 13.8V appearing. Connected to positive line of DC power cord.
③	Nc	No connection.
④	WARNING LED	DC voltage will appear to light WARNING LED lamp.
⑤	ON AIR	DC 13.8V will appear at TX.
⑥	GND	Ground terminal.
⑦	POWER SW	Connected to DC power switch. When DC 13.8V is applied, DC power will be turned on.
⑧	REMOTE	When grounded, the amp will be "TX state".

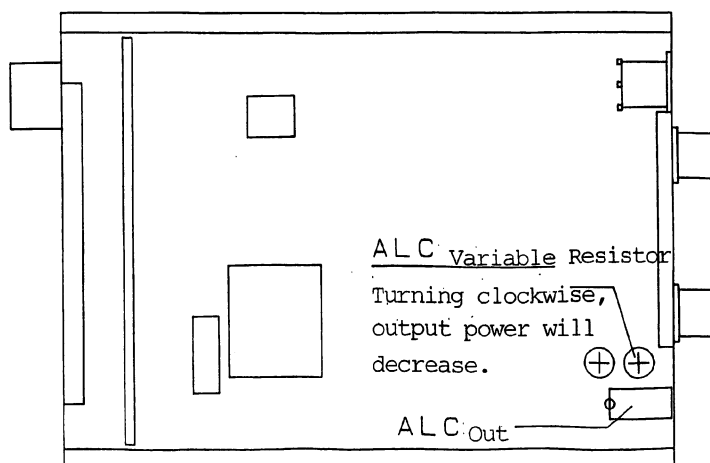
(7) ALC Socket ⑪ (RCA Jack)

Negative DC voltage will appear according to the output signal level.

To adjust ALC level, open the bottom plate and adjust the ALC adj. pot (variable resistor).

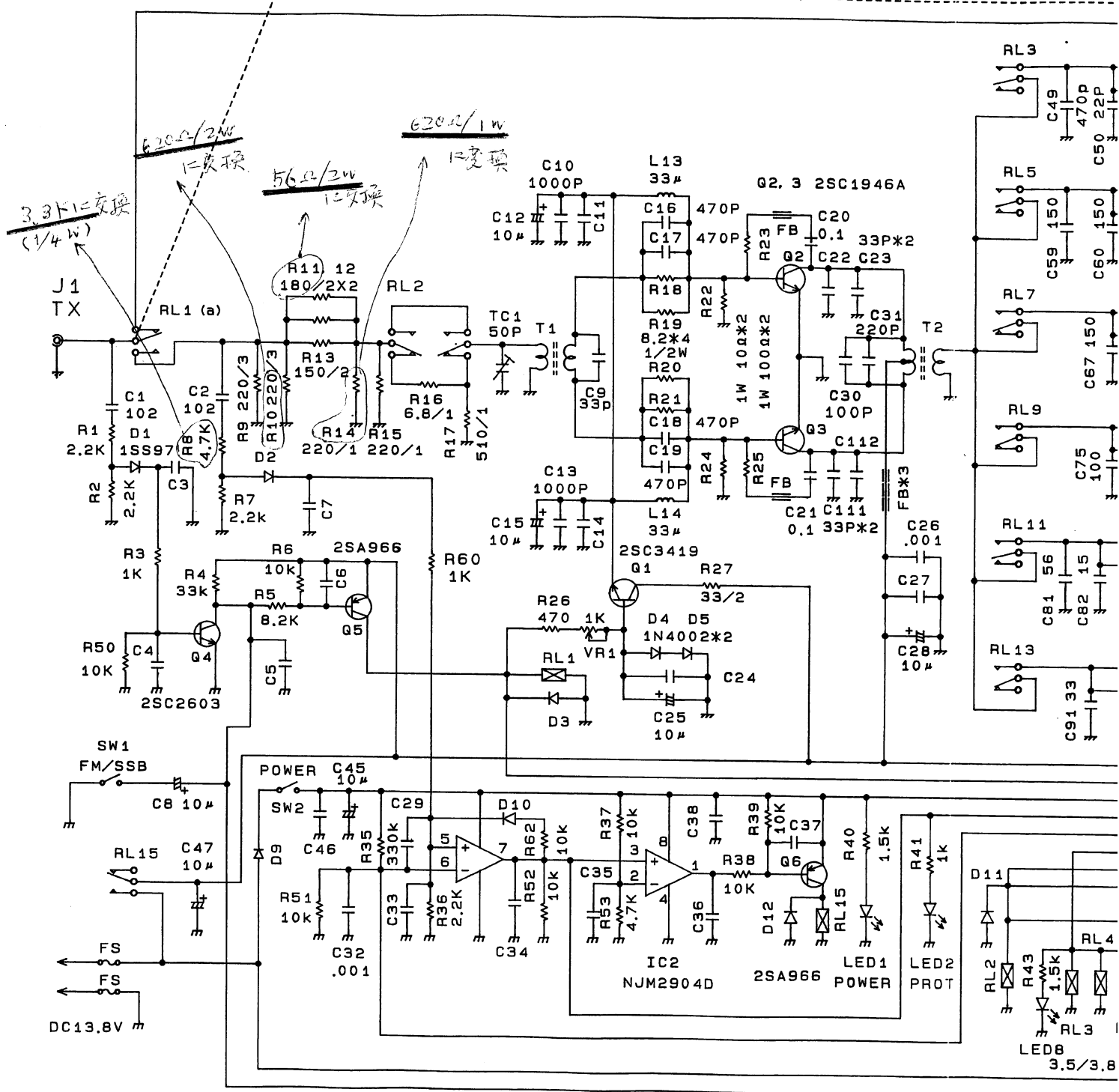
Power output will decrease when this pot is turned clockwise.

To set the ALC pot, try to find the point where output level will start to decline. Referring to RF power meter (if available) , adjust the pot for 50W output . Or set the pot at the point where the output is just about to decrease.



** Original resistor values are for 10W drive, standard model.

** Four resistor values below with underlines (hand-written) are for 5W drive model for FT-817.



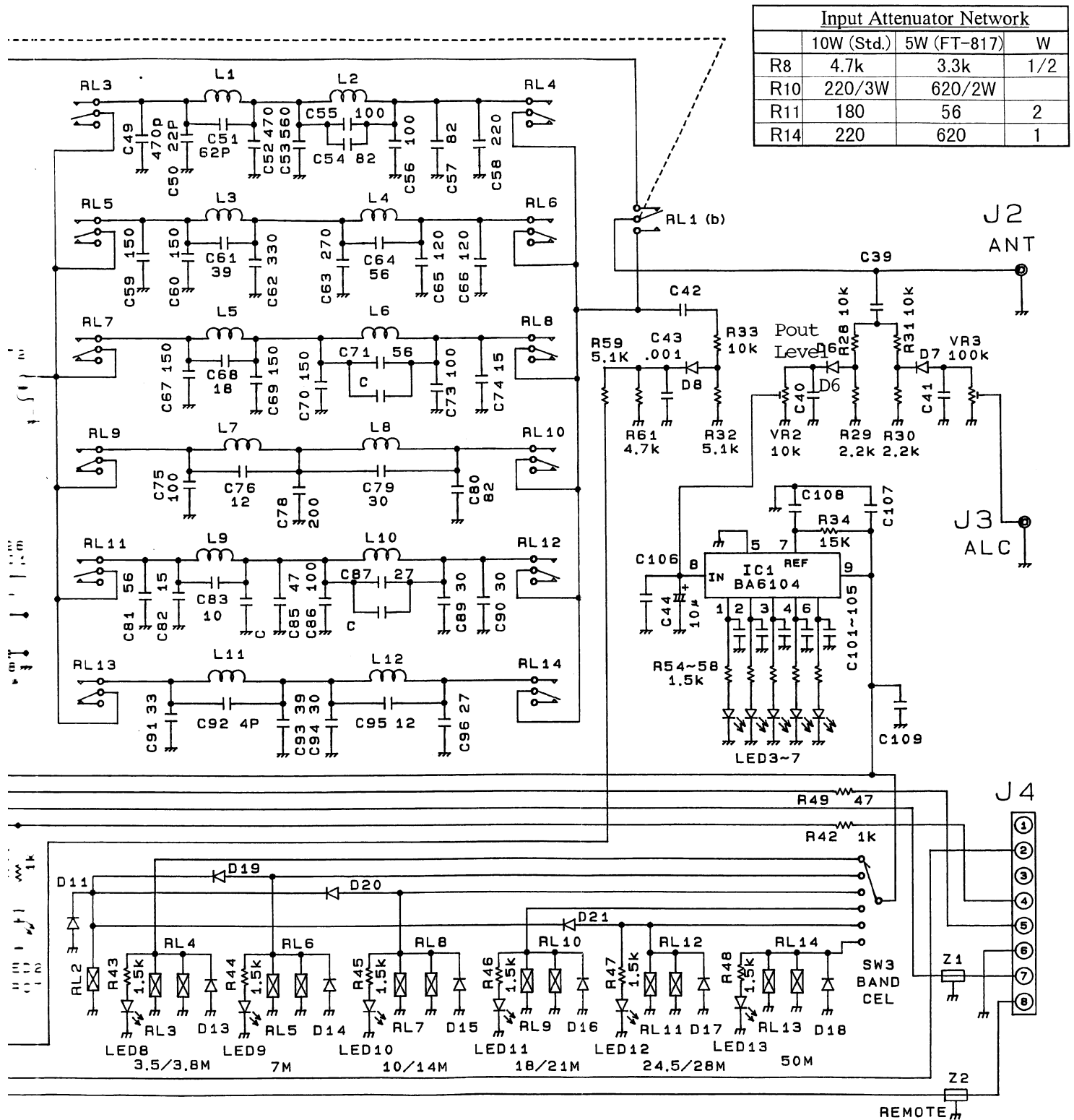
○ 指定なきダイオードは1S2076A

○ 容量指定なきコンデンサは0.01μF 25Vセラミック

* All diodes without notes are 1S2076A.

* All Capacitors without notes are 0.01uF/25V ceramic.

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HL-50B CIRCUIT DIAGRAM