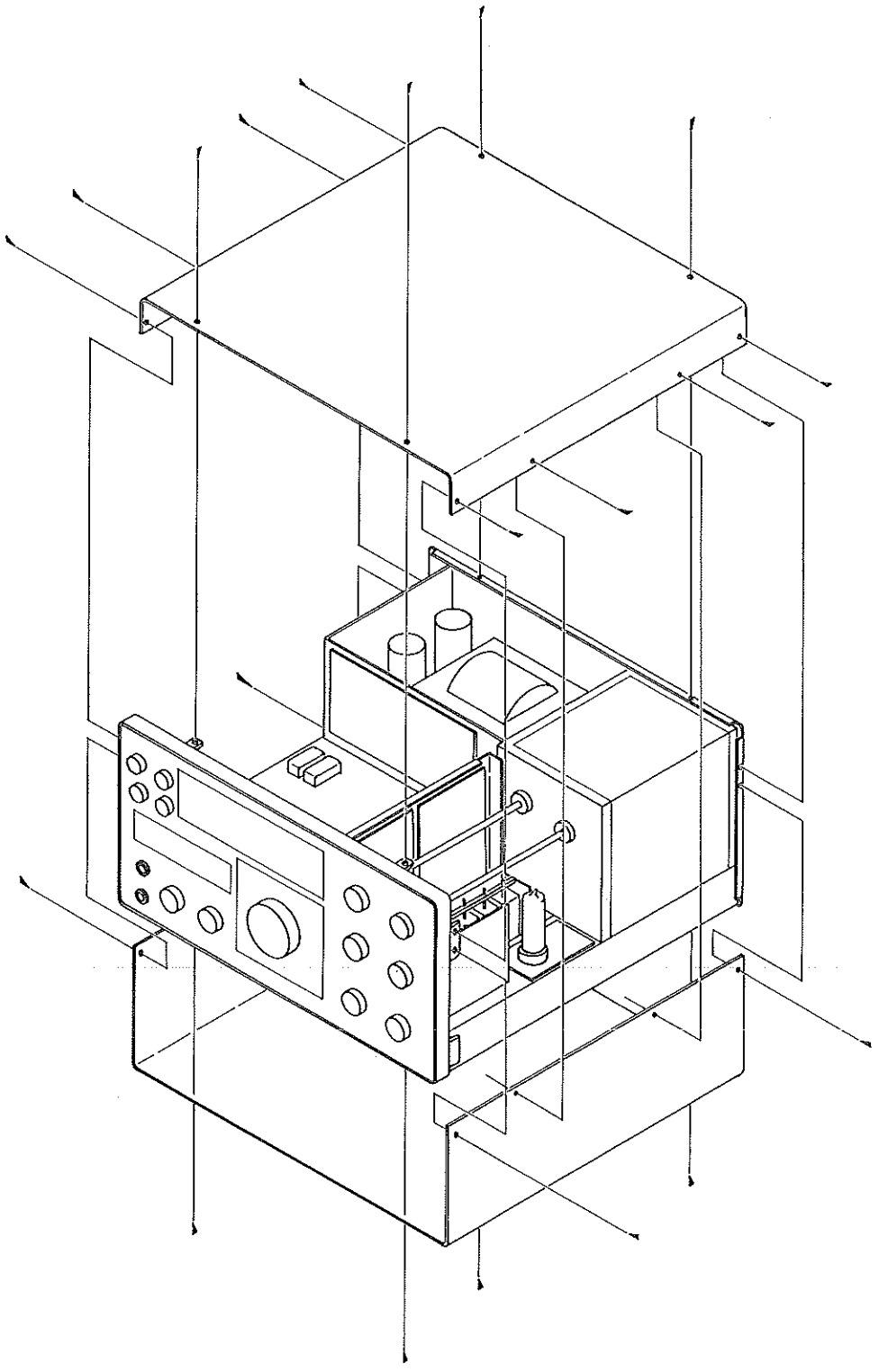
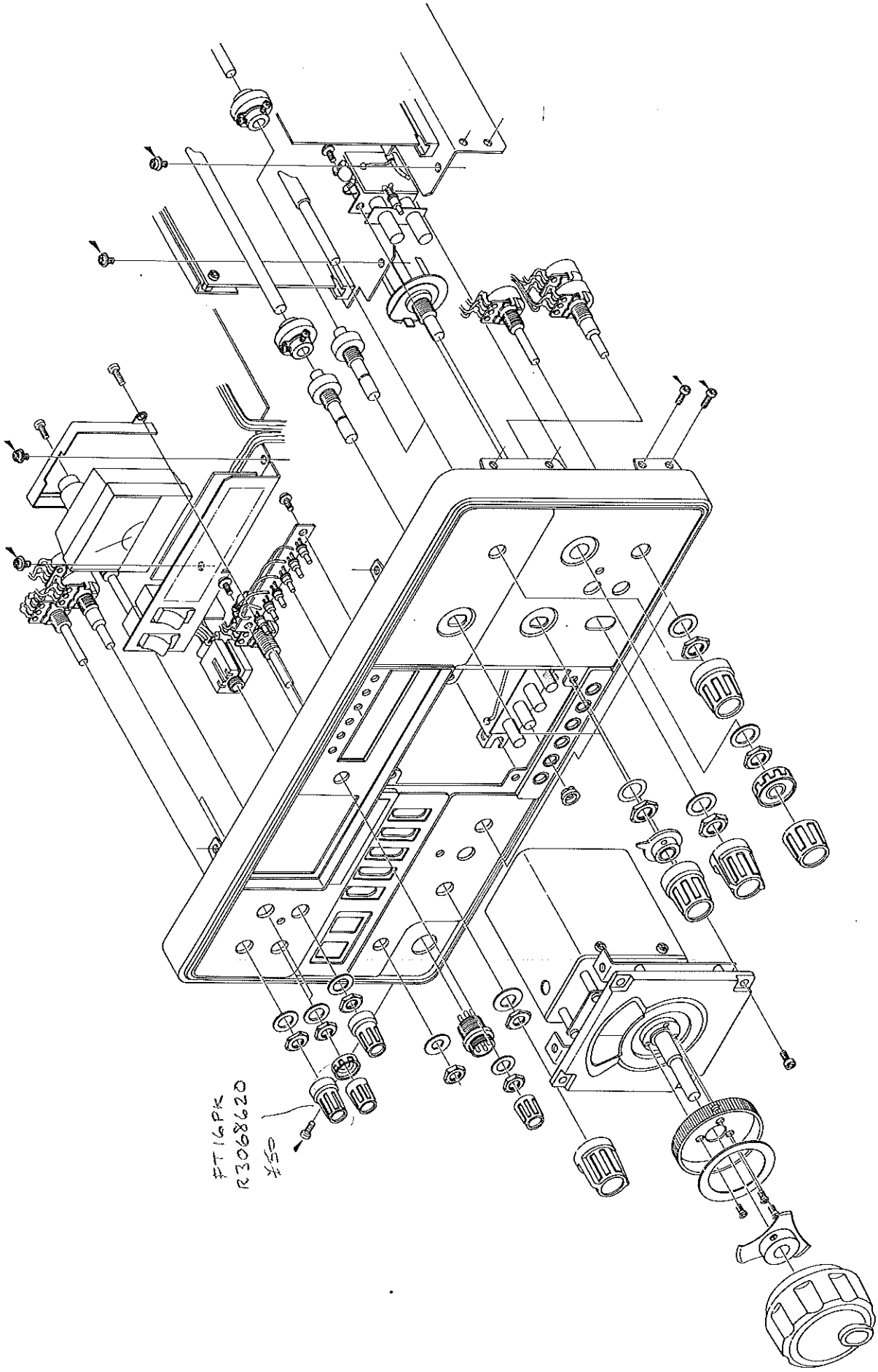
SECTION 3 – SERVICING

CIRCUIT BOARD LAYOUTS AND TEST VOLTAGES

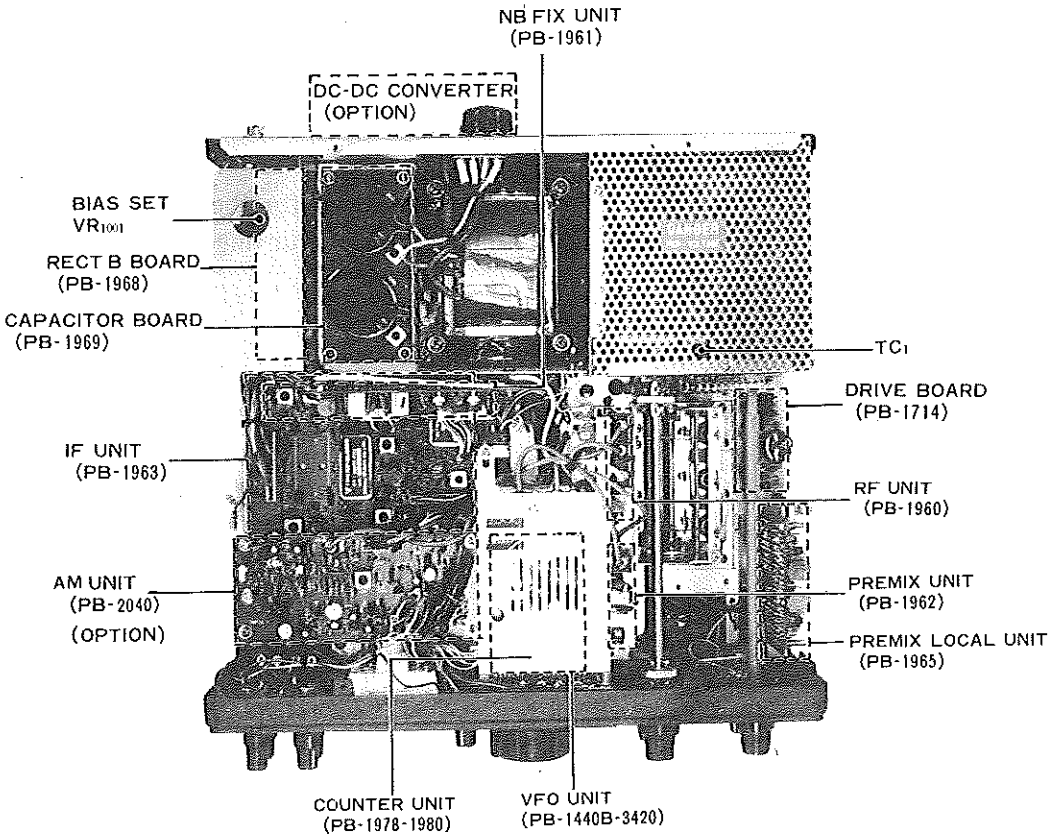
OUTER COVER REMOVAL



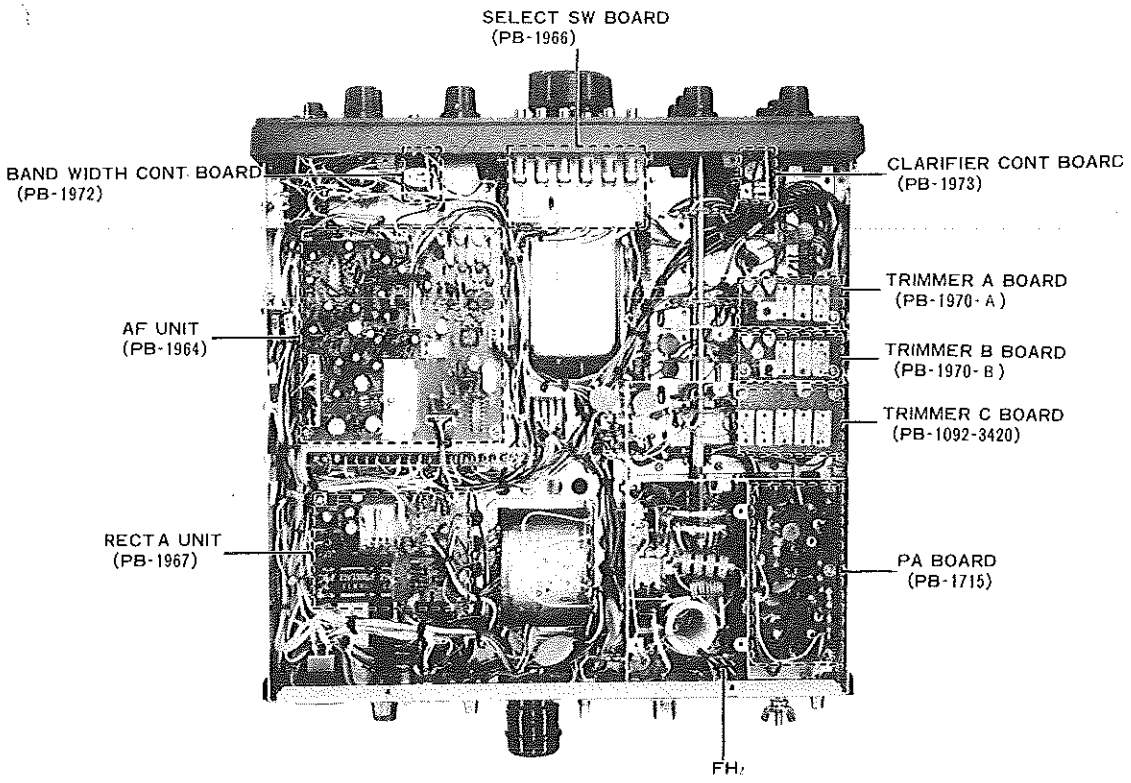
FRONT PANEL REMOVAL



BOARD LAYOUT

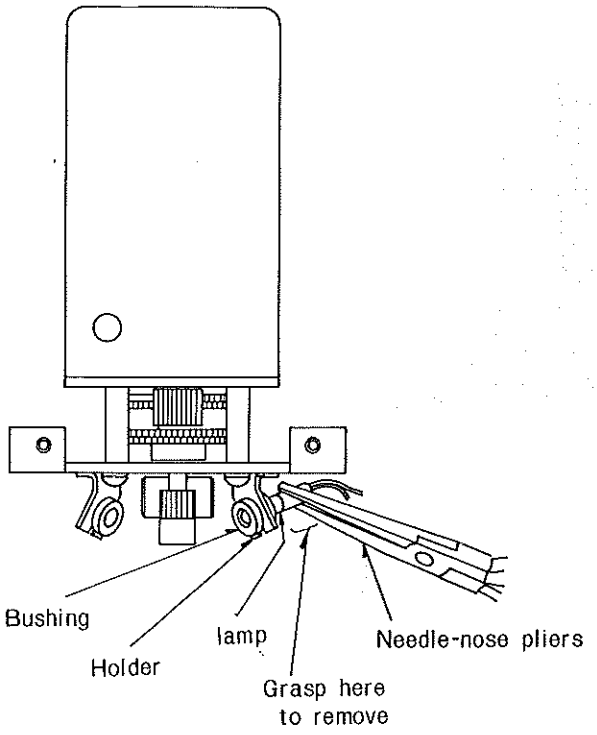


TOP VIEW



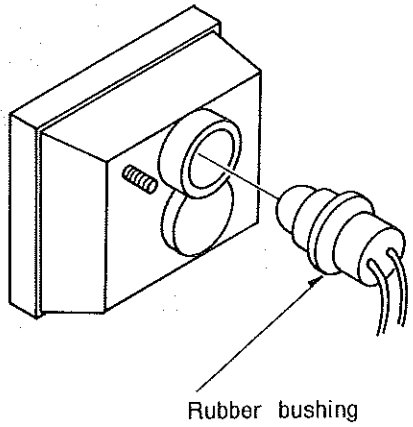
BOTTOM VIEW

PILOT LIGHT REPLACEMENT



The VFO pilot lamps are easily removed, but a little caution is called for. Carefully grasp the rear portion of the shaft with needle nose pliers and ease the lamp out of its mounting holder.

The pilot lamp for the front panel meter may be removed with your fingers.

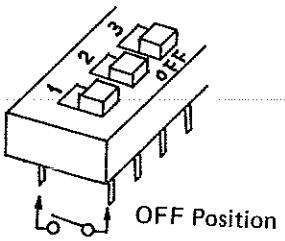


COUNTER PRESET SWITCH REPLACEMENT

Two types of counter presetting switches are used in the FT-101ZD, and you should take care to install new switches correctly.

The two switches are the DSS208 type (Yaesu part #N7090016) and the A10040-008 type (Yaesu part #66000005). Referring to the drawing, note that when the switch modules are installed so that the numbering is on the same physical side of the switch lever (although reversed in order and upside down), the lever ON/OFF direction will be the same.

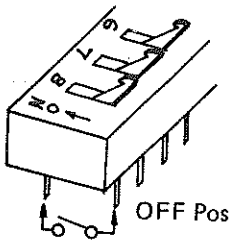
Or if you install the switch so that the numbering is in the same direction as the other switch (1-2-3-4-5-6-7-8), the physical direction of the lever action will be reversed.



OFF Position

DSS208

P.N. (N7090016)



OFF Position

A10040-008

P.N. (66000005)

CW FILTER INSTALLATION(OPTION)

(1) Remove the top cover of the transceiver case, as shown in Fig. 1.

(2) Refer to Fig. 2, and locate the NB-FIX circuit board. Remove its mounting screws, because this board is obstructing the removal of the IF unit.

(3) Remove the 12-pin, 13-pin, and 15-pin plugs from their sockets on the IF unit. Remove the IF unit mounting screws, and remove the IF unit from the transceiver case.

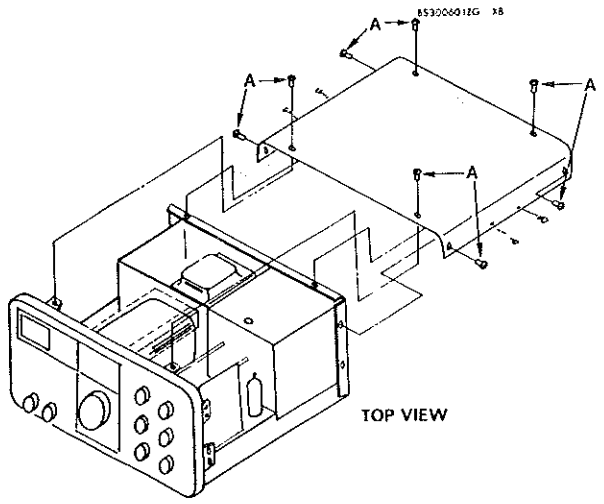


Figure 1

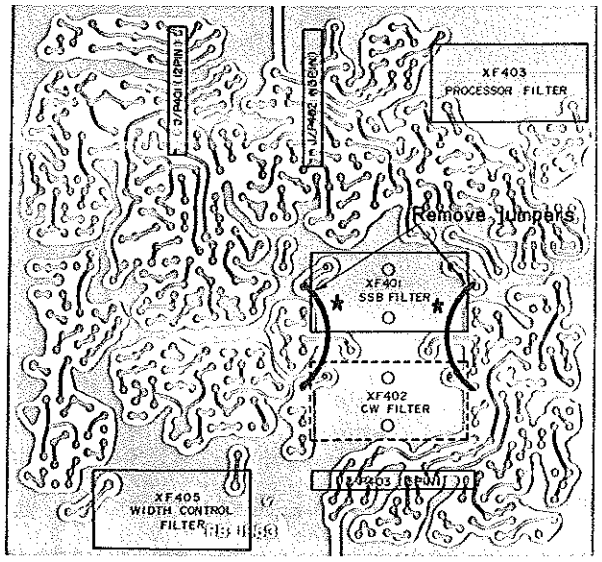


Figure 3

(4) Install the optional CW filter as shown in the foil side view of the IF unit (Fig. 3). Make the fastening nuts snug, and solder the pins of the filter to the circuit board, and remove the 2 jumper wires shown in Figure 3.

(5) Re-install the IF unit, being careful to connect the 12-pin, 13-pin, and 15-pin plugs in the correct sockets. Refer to Fig. 3 to be sure. Re-install the NB-FIX unit, and replace the top cover of the transceiver.

(6) When the optional CW filter is installed, the CW-N position of the mode switch will activate this filter. In the CW-W position, the SSB 2.4 kHz filter will be in use. The WIDTH control is usable in all modes.

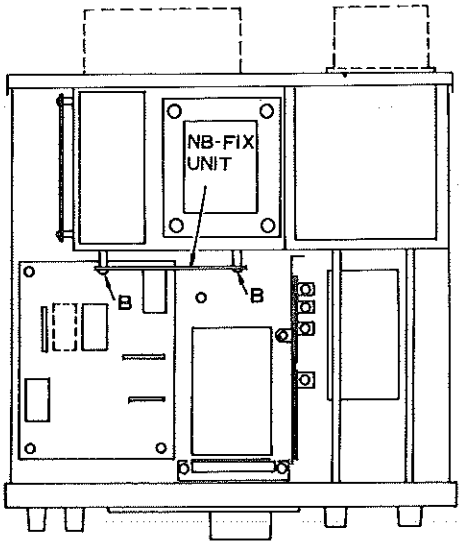


Figure 2

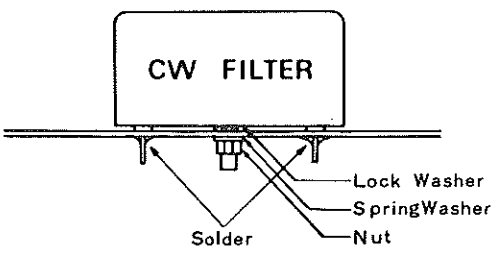


Figure 4

COUNTER UNIT INSTALLATION ON FT-101Z

This section will deal with the installation of the COUNTER UNIT and digital display, which are optional equipment for the economy FT-101Z model.

PARTS NEEDED

Optical Filter with double-face tape	(1)
Counter Module	(1)
Guide Pins	(2)
Support Tower	(1)
Vinyl Tubes	(2)

(1) Remove the top cover of the transceiver, according to the drawing on page 3-5.

(2) Remove the screws marked "A" in Figure 5. These screws support the LED board.

(3) Remove the screws marked "B" in Figure 5, as well as the tension spring, and remove the analog display panel.

(4) Locate the analog display lamp. Cut the leads to this lamp, insert 1 lead each into the vinyl tube supplied with the counter kit, and position these leads out of the way of the VFO gears, etc.

(5) Install the orange optical filter on the inside of the front panel of the transceiver, in the position formerly occupied by the analog display panel. Be sure that it is correctly centered. The filter is held in place by the double-face tape included with the filter.

(6) Install the two guide pins into the holes previously occupied by the "A" screws. When doing this, install the LED board in its previous position. Install the support tower into the hole marked "C" in Figure 5.

(7) Remove the 820 ohm (Gray-Red-Brown) resistor from the terminal strip marked "E" in Figures 5 and 6.

(8) Install the COUNTER UNIT. The connection to the guide pins should not be forced. Use the screws previously installed at "A" for securing the counter module at points "C" (support) and "D" in Figure 5. Connect the COUNTER UNIT 9-pin plug into the 9-pin socket on the transceiver at point "G" in the drawing. The coaxial cable from the COUNTER UNIT is connected to point "F" in Figure 5.

(9) Close the transceiver. No alignment of the unit is necessary, unless some change in the preset carrier frequencies is required for a special application. In this case, refer to the section on the COUNTER UNIT in the "ALIGNMENT" chapter of this manual.

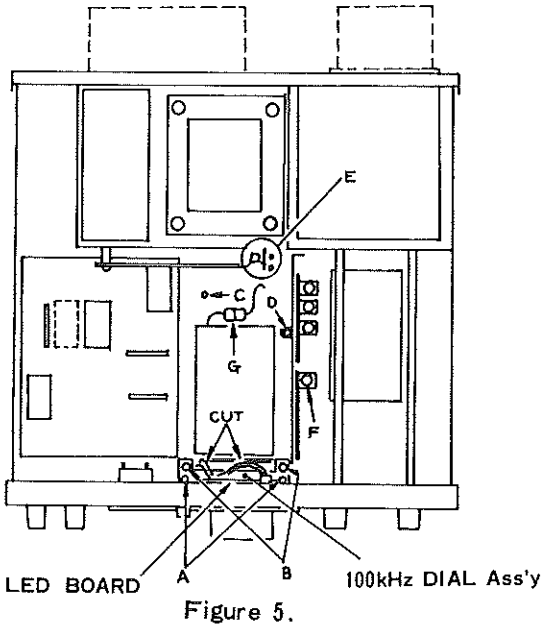
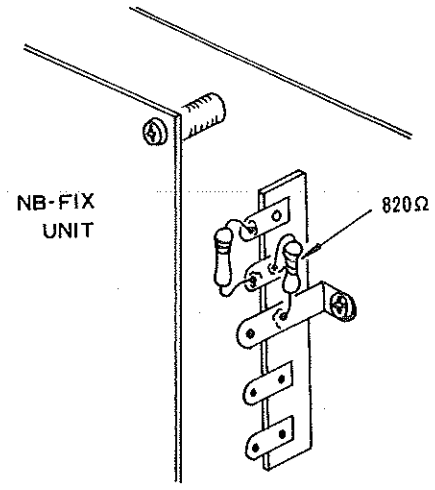


Figure 5.



(Enlarged) Part E

Figure 6.

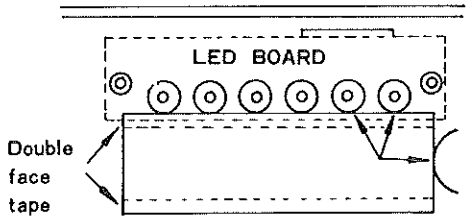


Figure 7.

FT-101Z/ZD AUX BAND INSTALLATION

The installation of a non-standard frequency band may be accomplished in an hour or two, using the AUX position on the bandswitch. Some alignment is required, but this is not a difficult procedure.

However, please be advised that AUX band installations by someone other than an authorized Yaesu representative will void any warranties in force. As well, Yaesu cannot guarantee that published specifications for operation on the amateur bands will be met during operation on a non-standard band. Of special note are those bands containing, and immediately adjacent to, the IF and VFO frequencies.

The modification process begins with the insertion of the required parts on the PREMIX and PREMIX LOCAL circuit boards, as the AUX band parts were not factory installed. Then the necessary wiring changes are performed, and then the new band is aligned for peak performance on transmit and receive.

PARTS NEEDED

For PREMIX UNIT (PB-1962)

Silicon diodes, type 1S1555, 2 ea. (D_{315}/D_{316}))
Carbon film resistor, 2.2 K ohms, ¼ watt, 1 ea. (R_{319})
Disc ceramic capacitors, 0.01 μF, 50 WV, 3 ea. (C_{344}/C_{345}/C_{347})
Disc ceramic capacitor, 50 WV, 1 ea. (C_{346} – see Table 6 on page 3-9.)
Micro inductors, 270 μH, 2 ea. (L_{320}/L_{321})
Bandpass coil, see Table 6 on page 3-9 for desired BPF coil among T_{301}–T_{314} (for T_{316}/T_{317}).

For PREMIX LOCAL (XTAL) UNIT (PB-1965)

Transistor, type 2SC372Y, 1 ea. (Q_{611})
Silicon diode, type 1S1555, 1 ea. (D_{611})
Carbon film resistor, 56K ohms, ¼ watt, 1 ea. (R_{644})
Carbon film resistor, 18 K ohms, ¼ watt, 1 ea. (R_{645}) (28 MHz: 33 K)
Carbon film resitor, 1 K ohm, ¼ watt, 1 ea. (R_{646}).
Carbon film resistor, 100 ohms, ¼ watt, 1 ea. (R_{647})
Disc ceramic capacitors, 0.01 μF, 50 WV, 3 ea. (C_{642}/C_{643}/C_{644})
Disc ceramic capacitor, 50 WV, 1 ea. (C_{645} – see Table 6)
Local crystal, 1 ea. (X_{611} – see Table 6)
Oscillator transformer, #220017, 1 ea. (T_{611})

MODIFICATION PROCEDURE

(1) Refer to Figures 8 and 9, and install the above parts on PB-1962 and PB-1965.

(2) Refer to Figure10, and locate the bandswitch wafers S1B and S1C. Cut the lead from AUX to COMMON, and re-install the lead so as to run from AUX to the post corresponding to column 6 of Table 6, "BAND." For example, for 2.0–2.5 MHz operation, the lead goes from AUX to 160. Do this on both wafers S1B and S1C.

(3) Refer to Figure 11 and install the jumper wire shown, between the AUX terminal and the terminal of the "BAND" column in Table 6, on bandswitch wafer S2D. Note that this is a "double" wafer; S2C is the side facing the front of the transceiver, while S2D is the rear face of this wafer.

(4) Normally, no change in the tank coil tap will be required, as inspection of Table 6 will verify. However, if harmonics or other non-satisfactory transmitter performance characteristics result, use linear interpolation of the values in Table 6, "Tank Coil Tap" column.

Note that this will affect the performance in the original amateur band, so beware.

ALIGNMENT AFTER MODIFICATION

(1) Connect an RF VTVM to pin 1 of MJ_3. Adjust T_{611} for maximum indication on the VTVM (Nom. 300 mV).

(2) Temporarily remove the plug from output jack J_{301} of the PREMIX Unit, PB-1962. Connect the RF VTVM to J301. Set the VFO to 250 (band center), and peak the bandpass filter coils for maximum deflection on the VTVM (nom. 100–150 mV). Now check the response from 000 on the VFO to 500. If the response is not flat within 3 dB across the band, retune the bandpass filter coils for a somewhat staggered response.

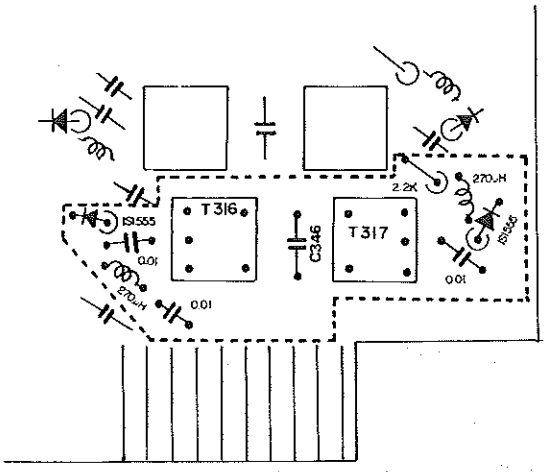


Figure 8.

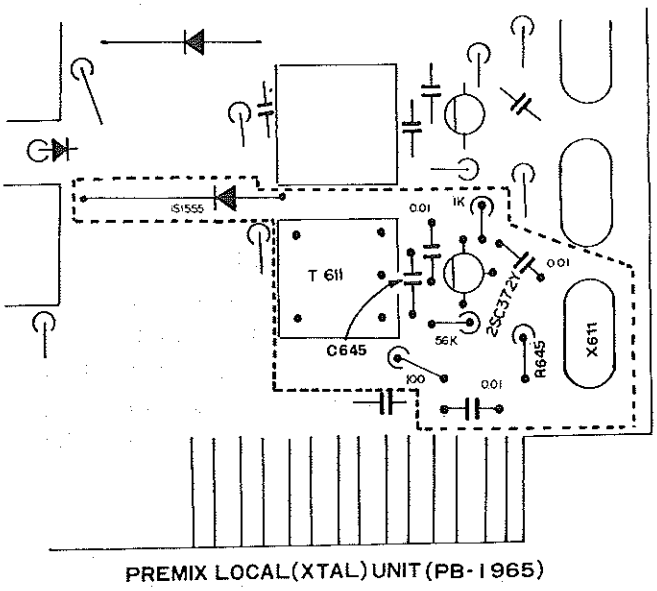
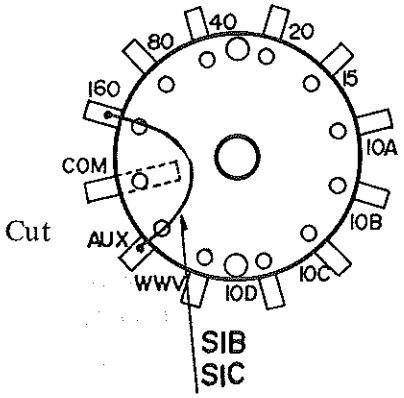


Figure 9



Example for 2.0–2.5 MHz wiring

Figure 10.

Example for 2.0–2.5 MHz wiring

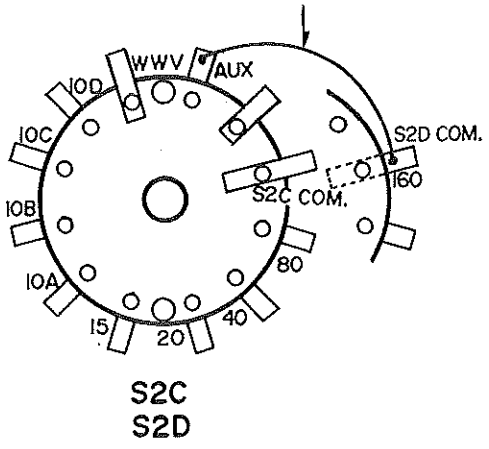


Figure 11.

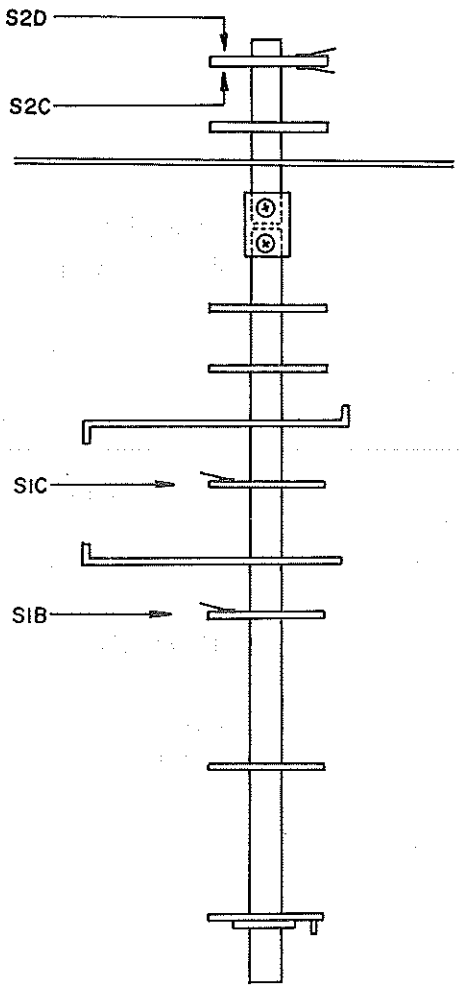


Figure 12.

FT101Z AUX BAND

FREQ(MHz)	XTAL(MHz)	OSC CAP(pF)	BPF COIL NUMBER	PREMIX OUT FREQ(MHz)	BAND	PRESELECT	TANK COIL TAP	LOAD CAP(pF)	PLATE CONTROL	LOAD CONTROL	REMARKS
1.8— 2.0	15.9875	330	T301,302	10.4875—10.9875	160	0—2.0	38	3000	3.0	0	
2.0— 2.5	16.4875		T303,304	10.9875—11.4875	〃	2.0—4.5					
2.5— 3.0	16.9875		〃	11.4875—11.9875	〃	4.5—6.5					
3.0— 3.5	17.4875		〃	11.9875—12.4875	80	0.5—2.5					
3.5— 4.0	17.9875	270	〃	12.4875—12.9875	〃	2.5—4.0	26	1100	2.8	0	
4.0— 4.5	18.4875		〃	12.9875—13.4875	〃	4.0—5.5					
4.5— 5.0	18.9875		T313,314	13.4875—13.9875	40	1.2—2.8					
5.0— 5.5	19.4875	240	〃	13.9875—14.4875	〃	2.8—3.8					※(VFO RANGE)
5.5— 6.0	19.9875		〃	14.4875—14.9875	〃	3.8—4.8					
6.0— 6.5	20.4875		T305,306	14.9875—15.4875	〃	4.8—5.5					
6.5— 7.0	20.9875		〃	15.4875—15.9875	〃	5.5—6.0					
7.0— 7.5	21.4875	180	〃	15.9875—16.4875	〃	6.0—7.0	16	620	3.9	4.5	
7.5— 8.0	21.9875		〃	16.4875—16.9875	〃	7.0—7.5					
8.0— 8.5	22.4875		〃	16.9875—17.4875	〃	7.5—8.0					※(IF)
8.5— 9.0	—	—	—	—	—	—	—	—	—	—	※(IF)
9.0— 9.5	—	—	—	—	—	—	—	—	—	—	※(IF)
9.5—10.0	23.9875		T307,308	18.4875—18.9875	20	4.0—4.7					※(IF)
10.0—10.5	24.4875		〃	18.9875—19.4875	〃	4.7—5.1					※(IF)
10.5—11.0	24.9875		〃	19.4875—19.9875	〃	5.1—5.5					※(WIDTH IF)
11.0—11.5	25.4875		〃	19.9875—20.4875	〃	5.5—6.0					
11.5—12.0	25.9875		〃	20.4875—20.9875	〃	6.0—6.4					
12.0—12.5	26.4875		〃	20.9875—21.4875	〃	6.4—6.9					
12.5—13.0	26.9875		〃	21.4875—21.9875	〃	6.9—7.2					
13.0—13.5	27.4875		〃	21.9875—22.4875	〃	7.2—7.5					
13.5—14.0	27.9875		〃	22.4875—22.9875	〃	7.5—7.9					
14.0—14.5	28.4875	100	〃	22.9875—23.4875	〃	7.9—8.1	10	330	6.6	3.3	
14.5—15.0	28.9875		〃	23.4875—23.9875	〃	8.1—8.3					
15.0—15.5	29.4875		T307,308	23.9875—24.4875	15	5.5—5.8					
15.5—16.0	29.9875		〃	24.4875—24.9875	〃	5.8—6.0					
16.0—16.5	30.4875		〃	24.9875—25.4875	〃	6.0—6.3					
16.5—17.0	30.9875		〃	25.4875—25.9875	〃	6.3—6.7					
17.0—17.5	31.4875		〃	25.9875—26.4875	〃	6.7—7.0					
17.5—18.0	31.9875		T309,310	26.4875—26.9875	〃	7.0—7.2					※(IF HARMONIC)
18.0—18.5	32.4875		〃	26.9875—27.4875	〃	7.2—7.4					※(〃)
18.5—19.0	32.9875		〃	27.4875—27.9875	〃	7.4—7.6					※(〃)
19.0—19.5	33.4875		〃	27.9875—28.4875	〃	7.6—7.8					
19.5—20.0	33.9875		〃	28.4875—28.9875	〃	7.8—8.0					※(WIDTH CARRIER)
20.0—20.5	34.4875		〃	28.9875—29.4875	〃	8.0—8.3					
20.5—21.0	34.9875		〃	29.4875—29.9875	〃	8.3—8.5					
21.0—21.5	35.4875	68	〃	29.9875—30.4875	〃	8.5—8.7	7	—	7.5	2.0	
21.5—22.0	35.9875		〃	30.4875—30.9875	〃	8.7—9.0					
22.0—22.5	36.4875		〃	30.9875—31.4875	10	7.0—7.3					
22.5—23.0	36.9875		〃	31.4875—31.9875	〃	7.3—7.5					
23.0—23.5	37.4875		〃	31.9875—32.4875	〃	7.5—7.6					
23.5—24.0	37.9875		T311,312	32.4875—32.9875	〃	7.6—7.8					
24.0—24.5	38.4875		〃	32.9875—33.4875	〃	7.8—8.0					
24.5—25.0	38.9875		〃	33.4875—33.9875	〃	8.0—8.2					
25.0—25.5	39.4875		〃	33.9875—34.4875	〃	8.2—8.3					
25.5—26.0	39.9875		〃	34.4875—34.9875	〃	8.3—8.4					
26.0—26.5	40.4875		〃	34.9875—35.4875	〃	8.4—8.6					
28.0—28.5	42.4875	47	〃	36.9875—37.4875	〃	9.0—9.2	5		8.1	1.5	
28.5—29.0	42.9875	47	〃	37.4875—37.9875	〃	9.2—9.4	5		8.2	1.5	
29.0—29.5	43.4875	47	〃	37.9875—38.4875	〃	9.4—9.6	5		8.5	1.5	
29.5—30.0	43.9875	47	〃	38.4875—39.4875	〃	9.6—9.8	5		8.8	1.7	

※ QUESTIONABLE PERFORMANCE
(Modifications to be provided for possible WARC expansion at 10 and 18 MHz)

Table 6

DC-DC CONVERTER INSTALLATION (OPTION)

The optional DC-DC converter is easy to install in a matter of minutes. Please follow the instructions carefully, in order to make the proper connections.

(1) Install the DC-DC converter module as shown in the drawing. Use the four screws supplied with the kit. Do not force the plug into the socket, as the connection should be smooth, yet solid.

(2) Check the DC cable fuse socket, located in the positive (red) lead, to be certain that a 20 amp fuse is installed.

(3) When making connections to the battery, be absolutely certain that the proper polarity is observed. The RED lead should be connected to the POSITIVE (+) battery terminal, and the BLACK lead should be connected to the NEGATIVE (–) terminal. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY REVERSED POLARITY CONNECTIONS.

(4) Before connecting the DC power cable to the transceiver, check the automobile voltage regulator level with the engine running (battery charging). The maximum charging rate should be 15 volts or less. If the voltage is higher than this level, please adjust the voltage regulator for a maximum of 15 volts. This precaution applies, as well, to bench power supplies, which should be adjusted in the same fashion. Also, the transceiver should not be operated from a supply voltage of less than 12 volts.

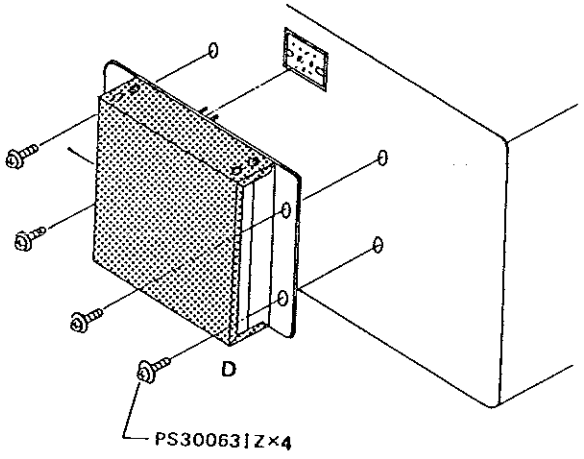
(5) Connect the DC cable to the transceiver. Power connections are made automatically when the DC cable is connected to the POWER jack.

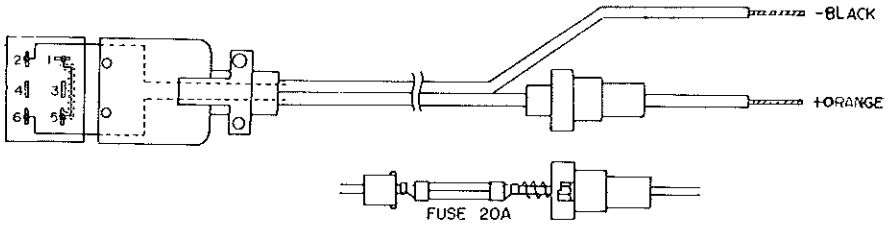
NOTES ON MOBILE INSTALLATION

Be certain that sufficient room is provided for free air circulation around the transceiver. If the transceiver must be placed on the car seat, set it on a board or other rigid object, in order to provide the necessary air circulation (and to avoid possible heat damage to the uphoulstery.

A special mobile mounting bracket is available from your YAESU dealer.

The DC supply should be capable of providing 20 amps on voice peaks, 14 amps continuous. The HEATER switch may be turned off during long periods of reception, for energy conservation.



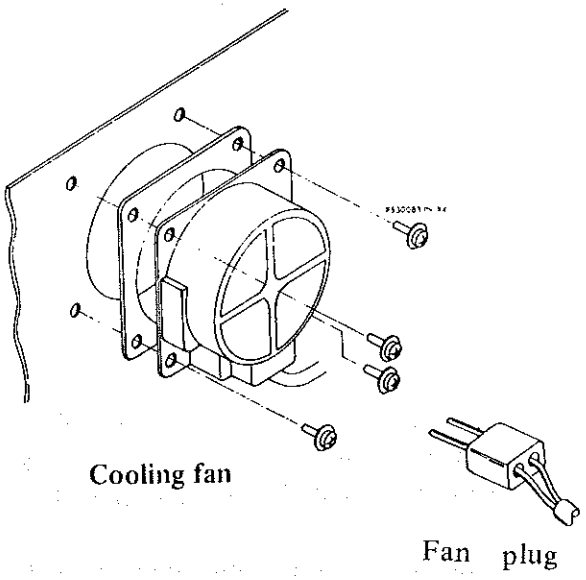


COOLING FAN INSTALLATION (OPTION)

The FT-101ZD cooling fan may be used with other models of Yaesu equipment. Installation is easily accomplished in minutes.

Hold the fan up to the rear panel in its proper location. Determine the proper length of the two-wire power lead to the motor. Solder the leads to the 2-pin plug supplied with the fan. The 4-pin plug is not needed for FT-101ZD installation.

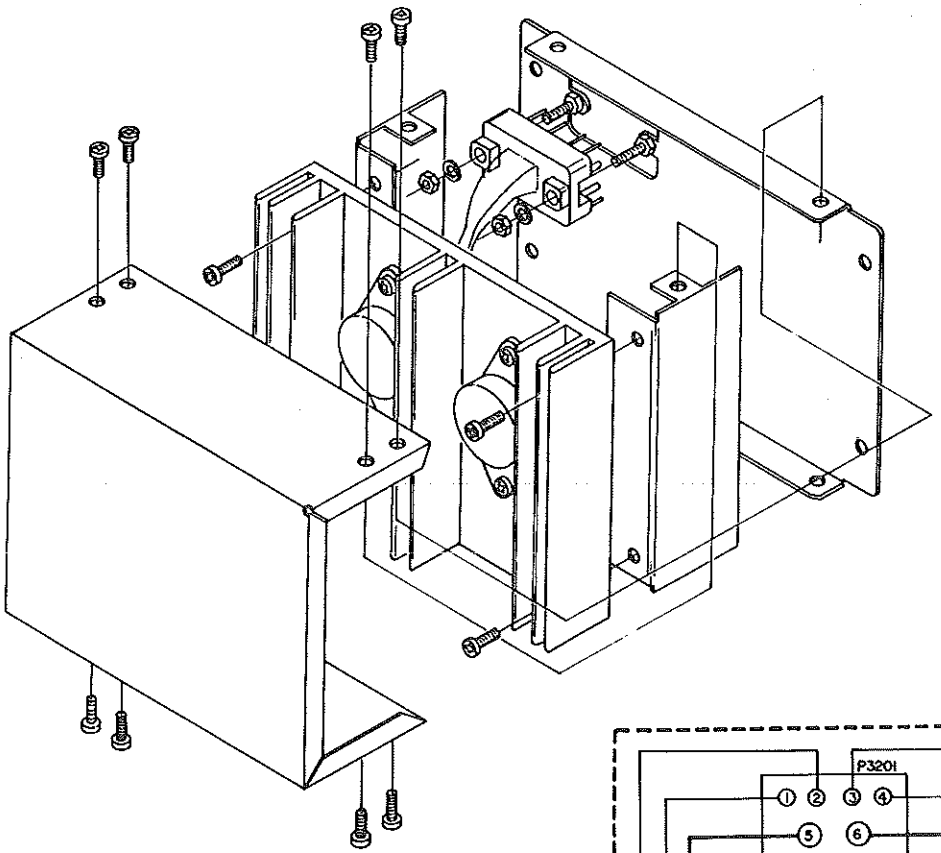
Install the fan onto the rear panel of the transceiver, as shown in the drawing. Insert the power lead from the fan into the fan socket on the rear panel.

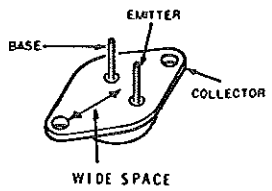


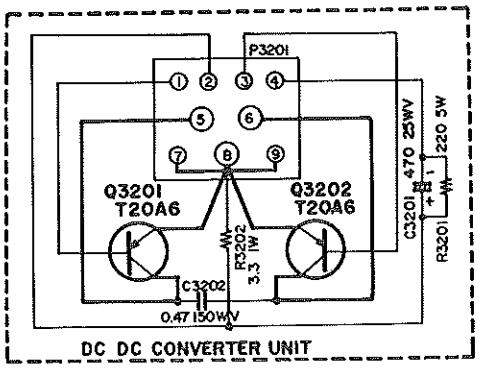
Cooling fan

Fan plug

DC-DC CONVERTER (EXPLODED VIEW)







SOLDERING AND DESOLDERING TECHNIQUE ON PRINTED CIRCUIT BOARDS

The FT-101Z circuit boards are tough, but mishandling during soldering can cause circuit traces to "lift." While this does no permanent damage to the board, much servicing trouble can result, because of the tendency for this lifted trace to break. A few simple precautions will keep your circuit boards in A-1 condition.

1. Use only a 12 to 30 watt chisel-tip soldering iron. Yes, some "repairmen" have been known to use small blowtorches on cards.

2. Use only a soldering iron equipped with a three-wire cord, with the tip grounded. Also acceptable is a soldering iron isolated through a transformer. An old soldering iron or gun may have 117 volts on the tip, and will certainly cause more damage than it repairs!

3. USE ONLY 60/40 ROSIN CORE SOLDER. Acid core solder should be thrown away if you find it in your radio shop!

4. Use a solder sucker and solder tape to ensure a professional repair job.

5. If you do lift a trace, don't worry! Read on to find out how to repair traces like a pro.

NOTES ON USE OF CMOS IC's:

As CMOS devices are extremely sensitive to damage from static electricity, special precautions must be observed.

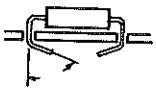
In storage, use only a non-inductive sponge.

When installing a CMOS IC in a socket, or on a circuit board, be certain that the power is off. In addition, the technician should rest his hand on the chassis as the component is inserted, so as to place his hand at the same level as the chassis (better to discharge small amounts of static electricity through your fingers than through a $5 IC !).

When soldering a CMOS IC onto a circuit board, use a low wattage iron, and be sure to ground the tip with a clip lead, if the tip is not grounded through a three-wire power cord.

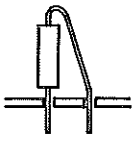
INSERTION OF PARTS ON CIRCUIT BOARDS

All of the below are acceptable ways of inserting components into circuit board mounting holes.

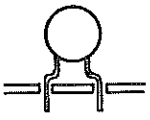


(a) Bend leads slightly

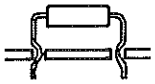
(b) Straight-in mounting



(c) Vertical mounting

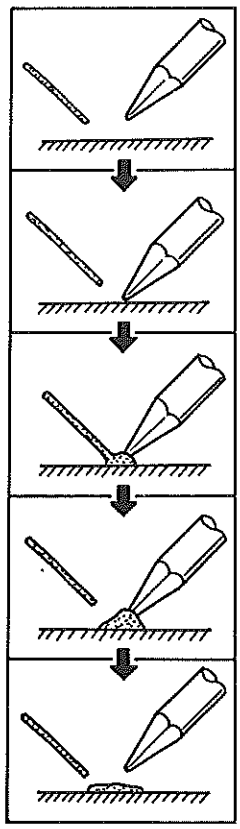


(d) Preformed disc ceramic capacitor



(e) Preformed resistor, diode, etc.

BASIC SOLDERING PRACTICE



(1) Prepare soldering iron and solder.

(2) Apply soldering iron to surface to be soldered.

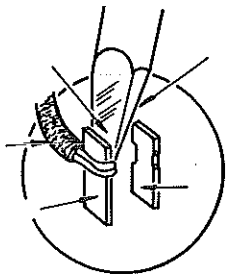
(3) Apply solder to heated surface.

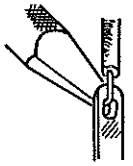
(4) When enough solder is applied, remove solder. Continue to apply heat until solder flows cleanly.

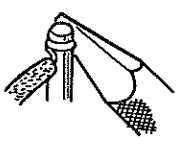
(5) Remove iron from work. Do not apply more heat than necessary for good solder flow.

Soldering to terminal posts:

(Be certain to apply heat to both post and wire.)

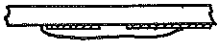




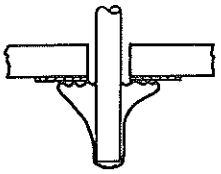


EXAMPLES OF POOR SOLDERING PRACTICE

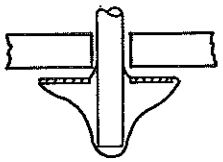
Solder bridge (caused by use of too much solder)



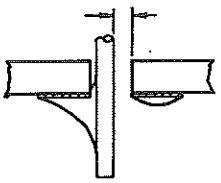
"Cold joint" (caused by insufficient heat to part of work, resulting in poor solder flow)



Lifted trace (caused by too much heat on circuit board foil)

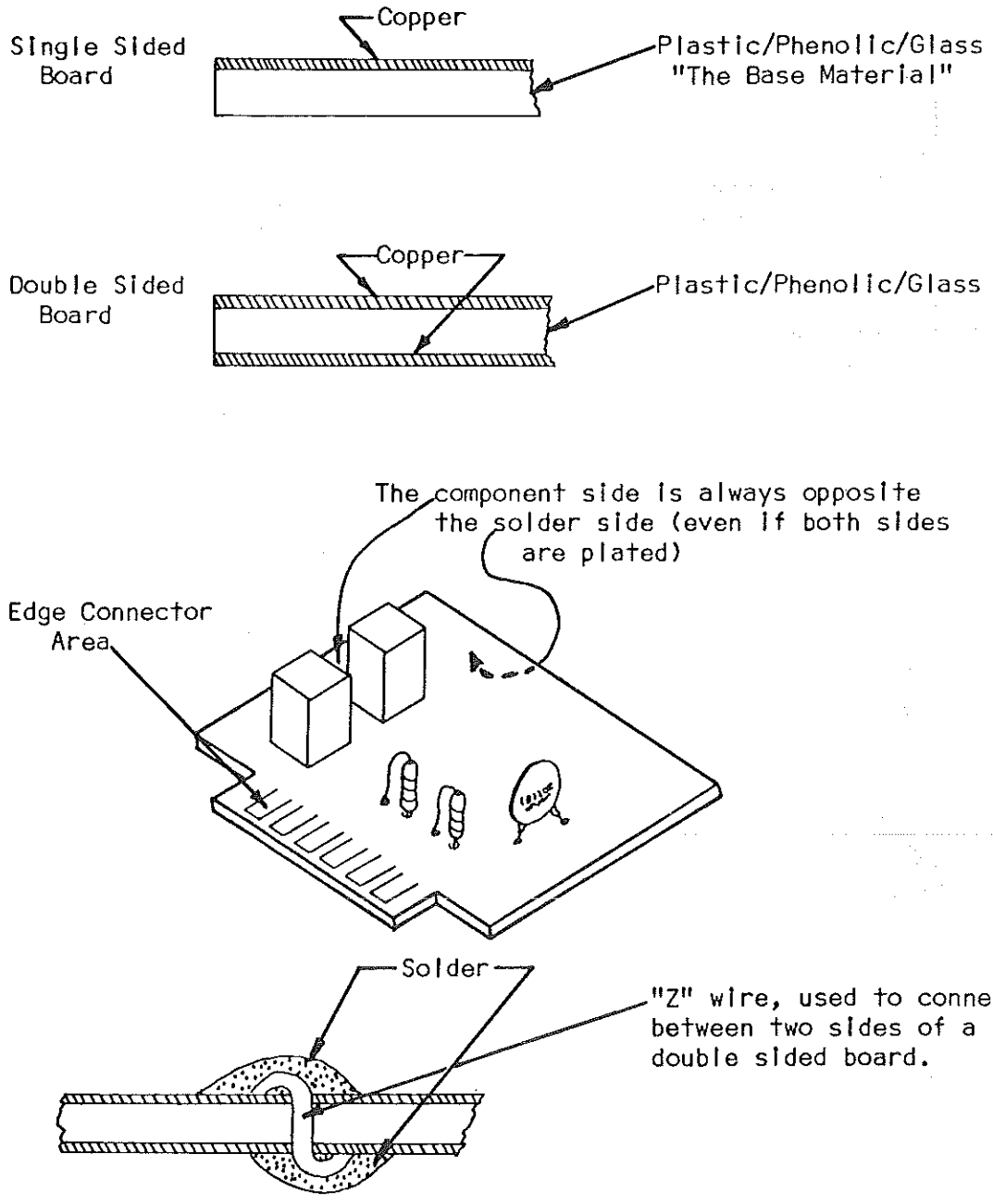


Unstable joint (caused by insufficient heat or solder)



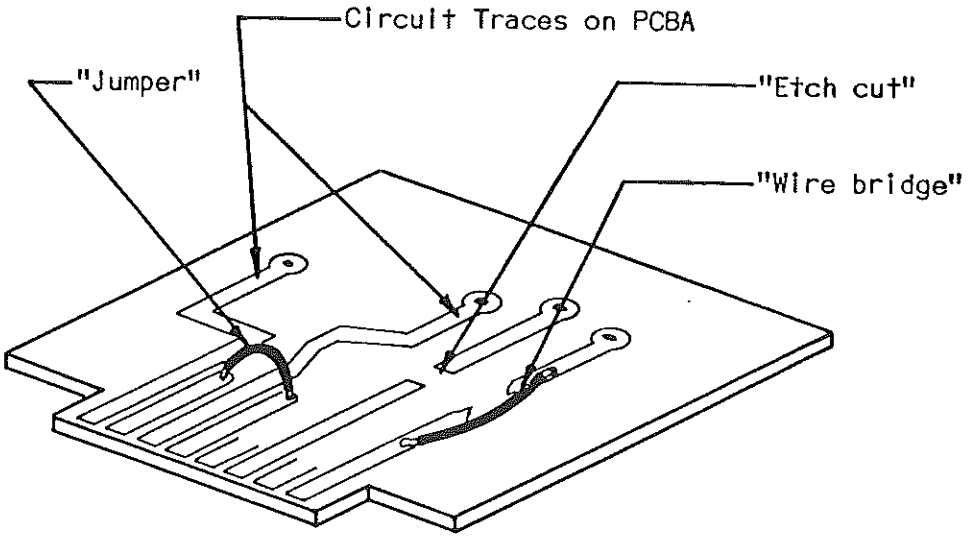
CIRCUIT TRACE REPAIR

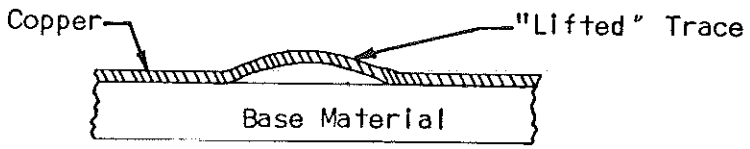
Most of the printed circuit boards used in the FT-101Zare single sided boards. However, occasionally a double-sided board is used, in situations where high shielding is required. A comparison of the two types is shown below.



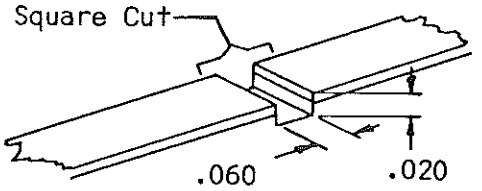
Sometimes, after the design and drafting of a board are completed, a board is produced with an error in it. Though non-technical managers sometimes suffer a stroke at hearing of this situation, it is not unheard of in engineering circles. Thus, should you encounter etch cuts and jumpers on a board, be assured that the modifications were made in the interest of securing optimum performance. Unless you consider your expertise to be superior to that of the design engineer, please leave these mods in place.

However, in service work the occasion does arise when a trace must be cut. Proceed as follows.





If you have previously lifted a trace, make an etch cut on each side of the lifted trace, and install a wire bridge as shown in the drawing.



Coat Cut Area With Eastman 910

MODIFICATIONS

MODIFICATION OF FV-901DM FOR USE WITH FT-101ZD

The tuning dial for the FT-101ZD turns in reversed sense with respect to the FV-901DM synthesized scanning VFO main dial. If it is desired to have both dials rotate in the same direction for a given change in frequency, the modification below will allow this facility. It should be noted that this modification is not required to achieve full functioning of the FV-901DM; however, clockwise rotation of the FV-901DM will correspond with counterclockwise rotation of the FT-101ZD dial.

Modification Procedure:

(1) Remove the top and bottom covers of the FV-901DM, removing the screws as shown in Figure 13.

(2) Locate PB-1848 and PB-1849, which can be seen at "A" in Figure 14.

(3) Referring to Figure 15, locate the white/green wire connected between pin 4 of P_1 and PB-1848; also locate the green wire connected between pin 5 of P_1 and PB-1849. Reverse these wires by unsoldering them from the circuit boards and installing the green wire to PB-1848, the white/green wire to PB-1849. The corrected schematic is shown in Figure 16.

(4) Locate the CLARIFIER potentiometer inside the front panel of the case. Refer to Figure 17, and locate the yellow and green wires, as well as the 1.5 K ohm resistor. Rewire the connections as shown in Figure 18 for proper CLARIFIER operation. Modification is now complete.

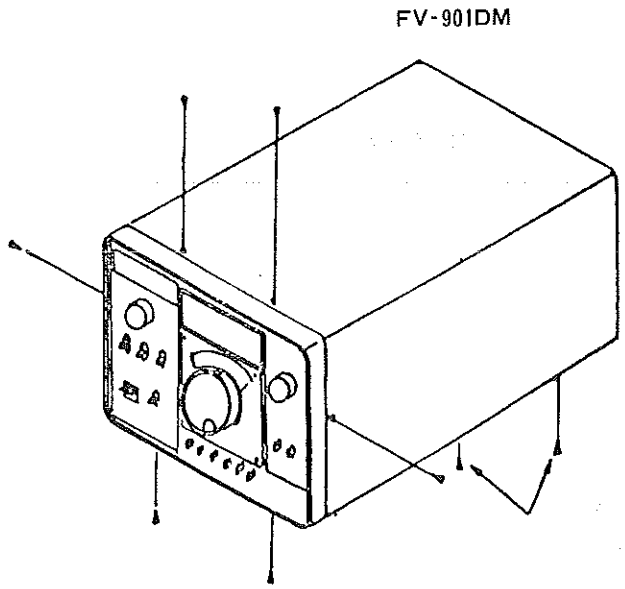


Figure 13.

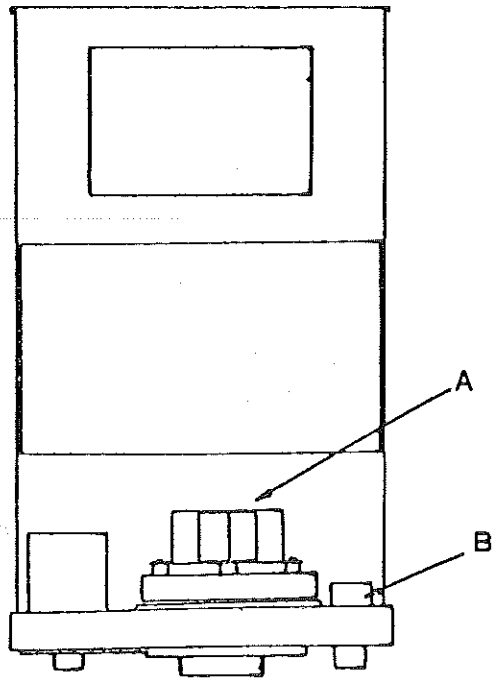


Figure 14

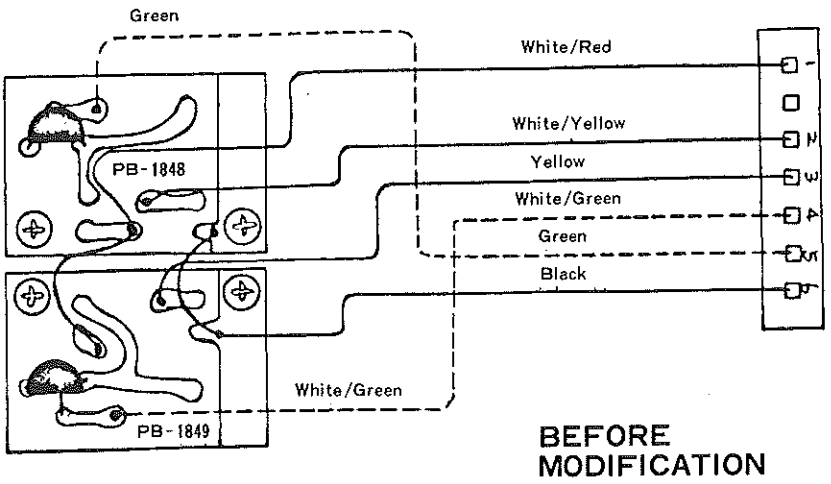


Figure 15.

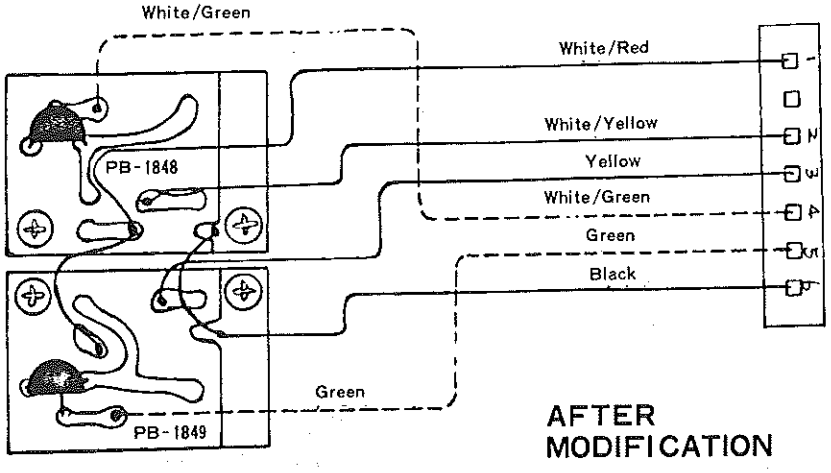


Figure 16.

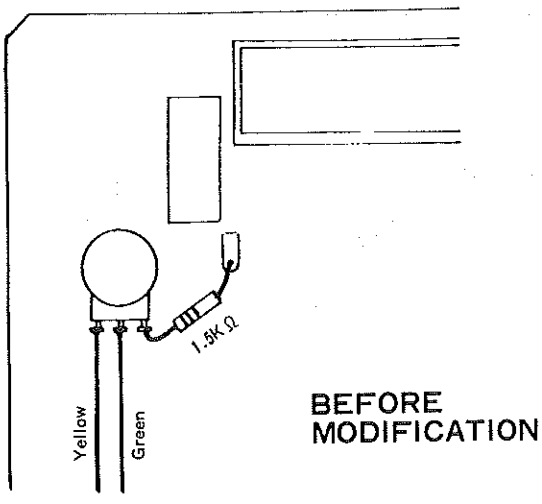


Figure 17.

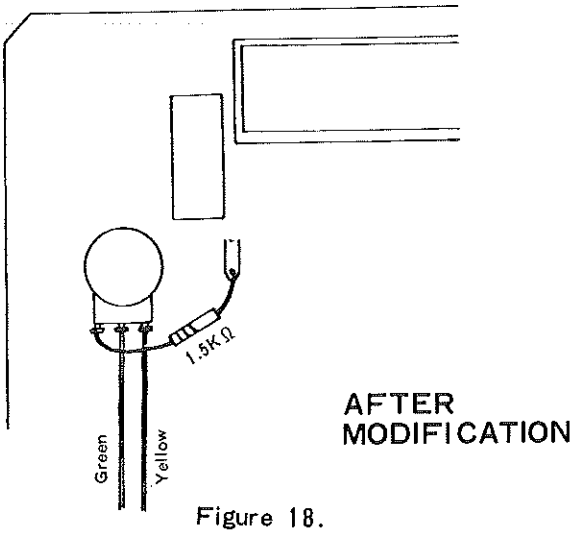


Figure 18.

RECTIFIER B UNIT MODIFICATIONS

In order to provide additional protection for the power supply circuitry, several changes were adopted in the RECTIFIER B Unit circuit. At A in the schematics is the circuit used for production lots 1 through 4. At B is the circuit modification used for production lots 5 and 6. The modification procedure is described below.

(1) Add a 270 k ohm, ½ watt resistor in parallel with each of the following: R_{1001}, R_{1002}, R_{1003}, and R_{1004}.
Alternatively, you may change each of the above resistors to a value of 180 k ohms, ½ watt.

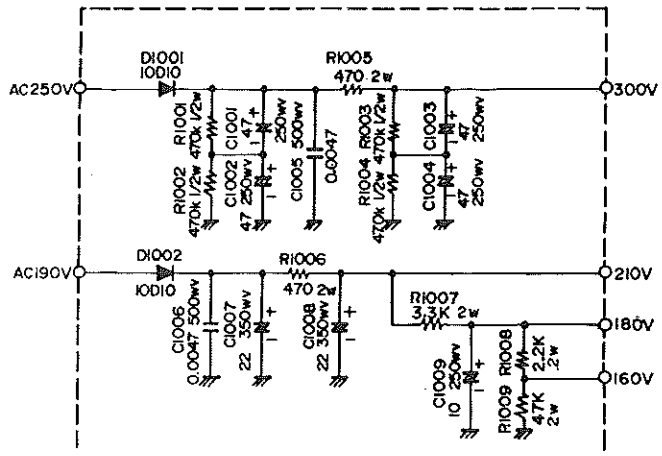
(2) Change R_{1005} to 390 ohms, 2 watts.

(3) Add a new R_{1022} (39 ohms, 1 watt) in series with D_{1001}, as shown.

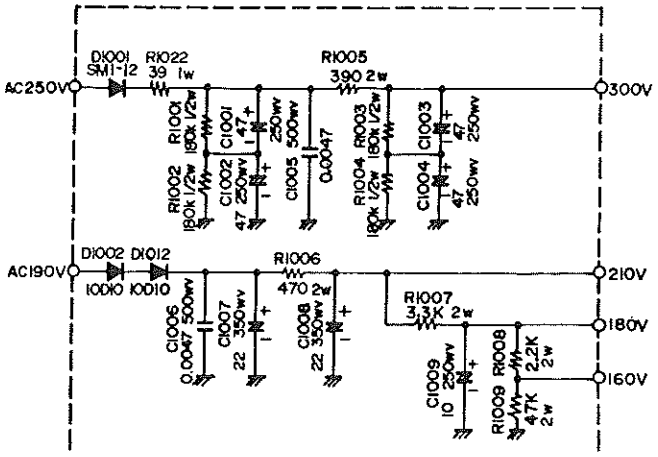
(4) Add a new 10D10 diode in series with D_{1002}.

(5) D_{1001} is being changed in production to type SM1–12, but field modification is not required.

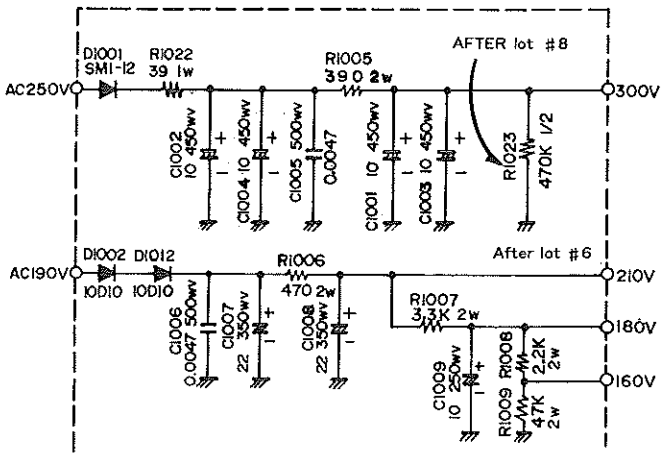
Beginning with production lot 6, the circuit was consolidated. The circuit used after lot 6 is shown at C, with the following exception: R_{1023} was not installed in lots 6 and 7, and we recommend that it be installed in the field the next time you perform service. The purpose of R_{1023} is to provide a bleeder path for the filter capacitors.



A: BEFORE MODIFICATION

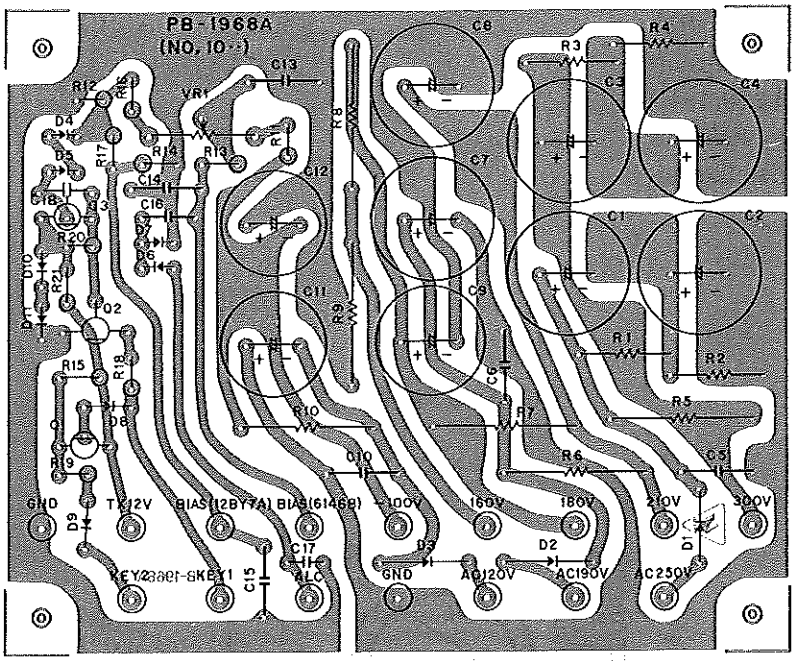


B: AFTER MODIFICATION

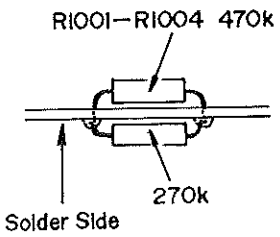


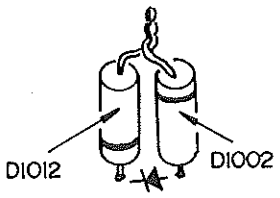
C: AFTER LOT #6

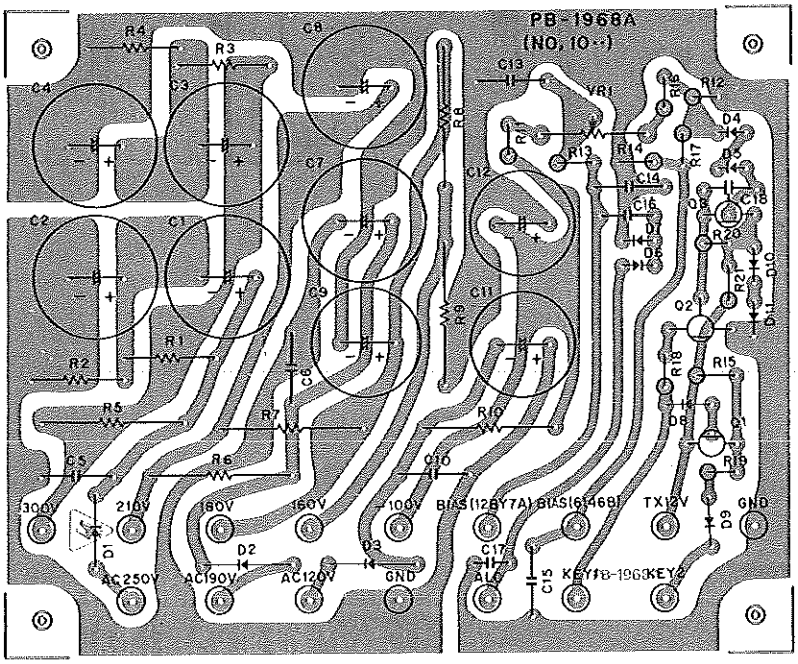
RECT B UNIT PARTS LAYOUT



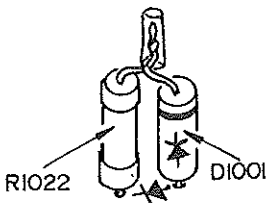
Viewed from component side





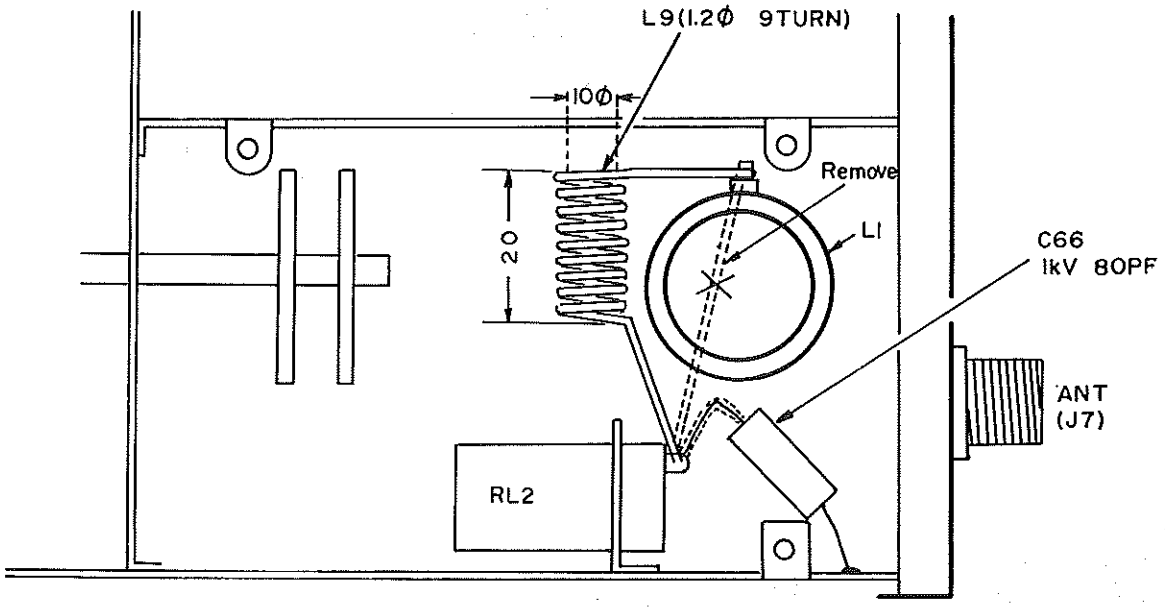


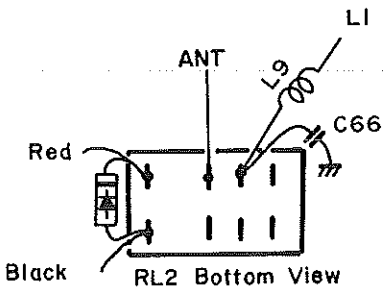
Viewed from solder side



LOW-PASS FILTER ADDITION

The FT-101Z and FT-101ZD transceivers were modified, beginning with the production lot #04, with the inclusion of the low-pass filter circuit shown below. The parts to be added are L_9 (0.4μH) and C_{66} (mica, 80 pF, 1 kV). The drawing below is an underside view, showing the correct installation.





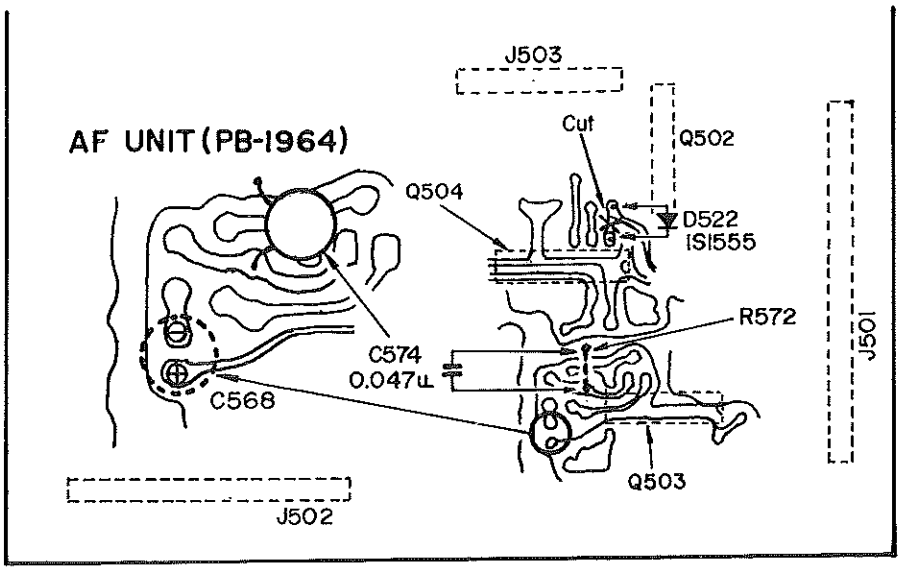
VOX CIRCUIT MODIFICATION

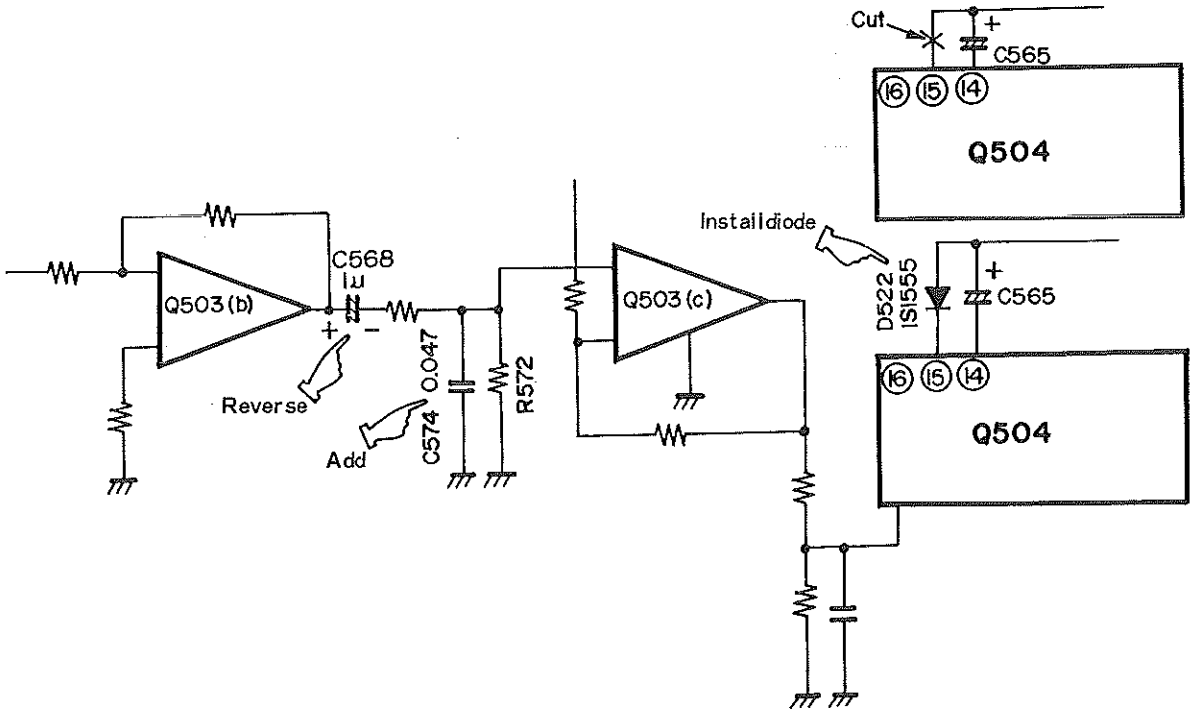
In order to ensure reliable VOX operation, the following modifications were adopted as of production lot number 7, and may be of help if you have a problem with inconsistent VOX timing.

(1) Cut the lead to pin 15 of Q_{504}. Install a silicon switching diode (1S1555) in its place, as shown in the drawing.

(2) Add a new disc ceramic capacitor (C_{574}), 0.047 μF, in parallel with R_{572}.

(3) Reverse the polarity of C_{568}, as it was installed in reverse order for the intended purpose. The correct installation is shown in the drawing, and a new capacitor is probably called for. See also page 3-25.





COUNTER CIRCUIT MODIFICATIONS

In order to eliminate an occasional low-level counter beat, the following modifications may be of help.

(1) In sets from production lots 1 through 4:

(a) Solder a three-pin (one grounded) solder lug to the Counter Support Board, as shown in Figure 19.

(b) Solder new C_{68} (0.047 μF) and C_{69} (0.047 μF) disc ceramic capacitors, as well as the new C_{70} electrolytic (10 μF) to the terminal, per the schematic.

(2) In sets from production lots 1 through 5:

(a) Install the three bypass capacitors C_{2324}, C_{2325}, and C_{2326} from the CW, USB, and LSB terminals of the COUNTER MAIN BOARD, respectively, to ground. Refer also to the schematic for details (these are shown installed in the schematic on page 2-17).

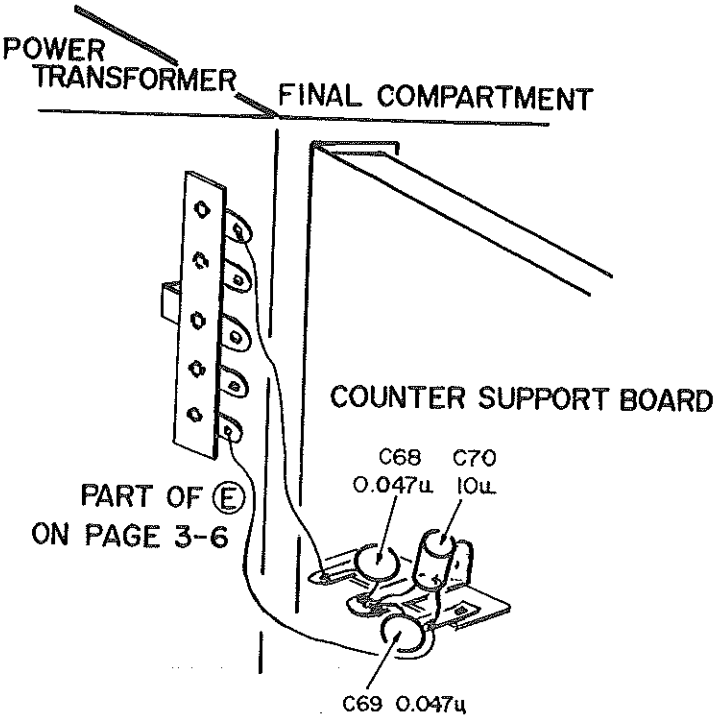
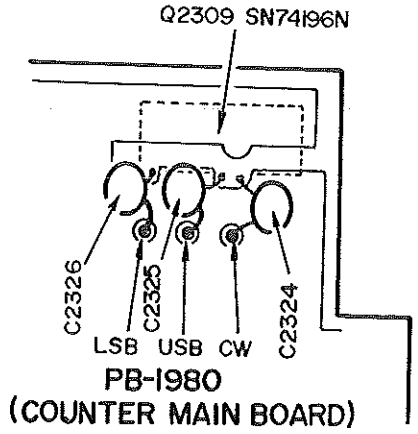


Figure 19.



(C2324/2325/2326 0.047μf)

Figure 20

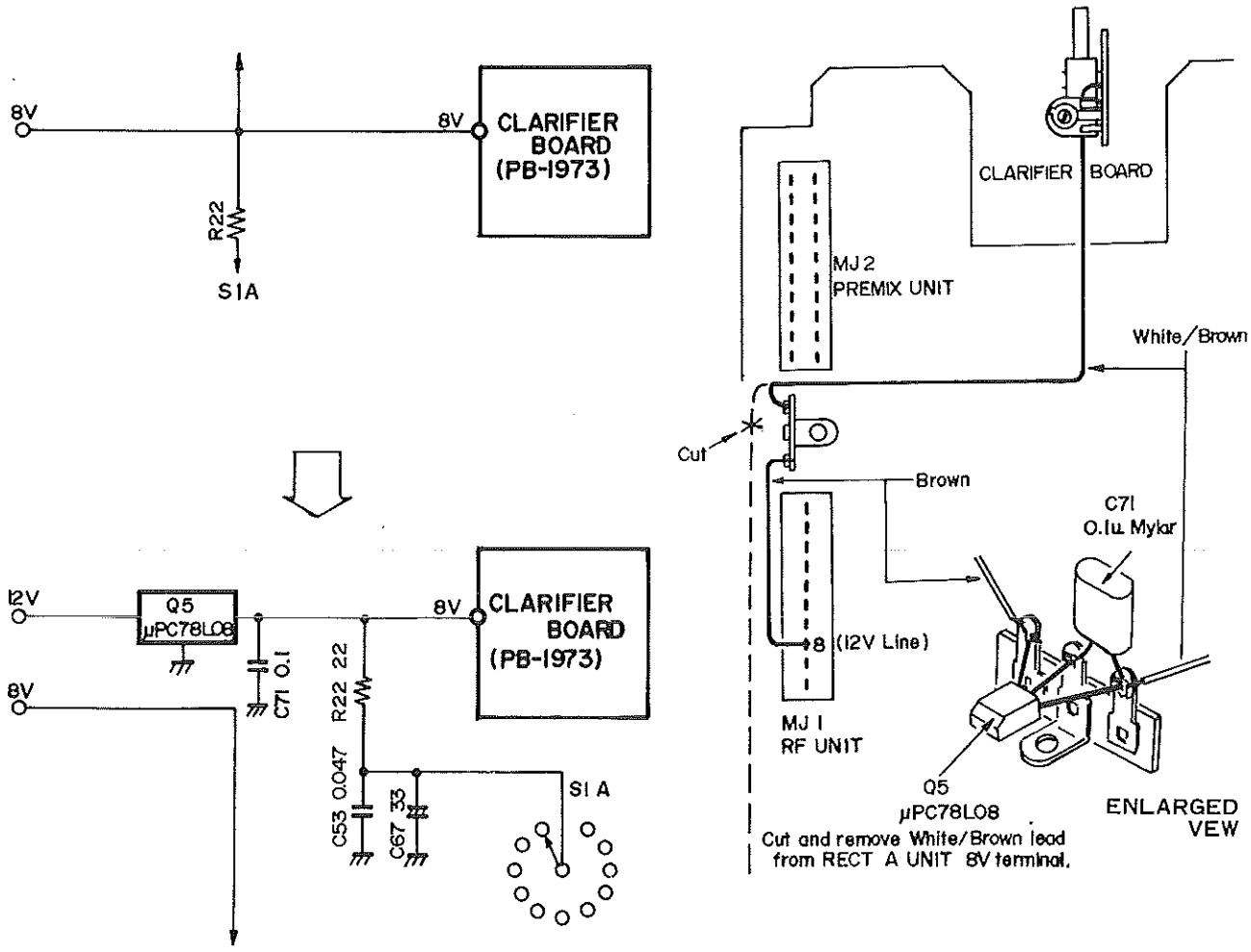
VFO DRIFT IN CONJUNCTION WITH DIMMER CONTROL

Some FT-101ZD transceivers from the first 6 production lots displayed a slight drift of the VFO when the dimmer control was rotated. In order to clear up this problem, the 8 volt line for the clarifier board was separated from the other 8 volt lines, and the following section will describe the correct procedure.

(1) Locate the white/brown lead between the CLARIFIER board and the 8 V terminal on the RECT A Unit. Cut this lead at the RECT A Unit.

(2) Install a three-pin (one grounded) terminal strip adjacent to MJ_1, one the bottom side of the chassis, as shown in the drawing. Connect the white/brown wire to one side, and install the μPC78L08 regulator so that the output side is connected to the white/brown wire. Then install the 0.1 μF mylar capacitor as shown, and connect the input side of the μPC78L08 to the (brown) wire shown. The other end of the brown wire connects to pin 8 of MJ_1, the 12 volt line terminal.

(3) A comparison of the old and new circuits is shown below.

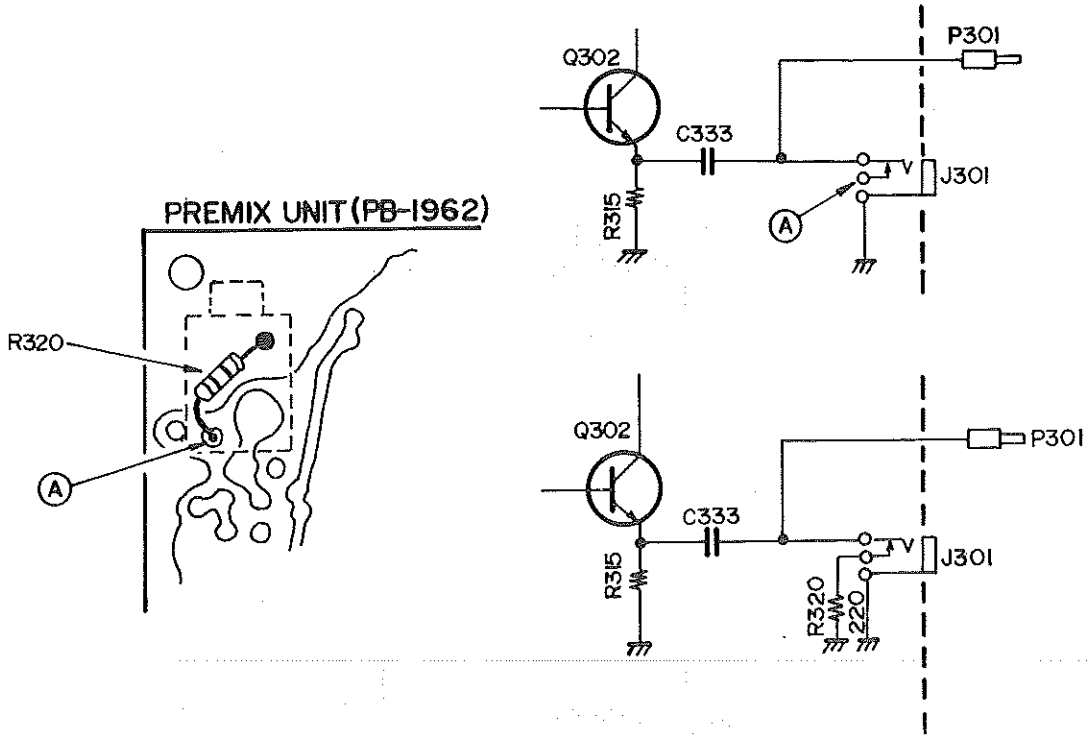


21.2 MHz SPURIOUS SUPPRESSION ON FT-101Z(ANALOG DIAL)

On the analog FT-101Z, a lingering spurious signal could sometimes be heard at 21.2 MHz. With the counter unit installed, the beat is inaudible, and the following modification will eliminate this weak spur in analog versions.

Refer to the drawing below, and install a new 220 ohm ¼ watt resistor (R_{320}) on the PREMIX Unit as shown.

No further modification is required.



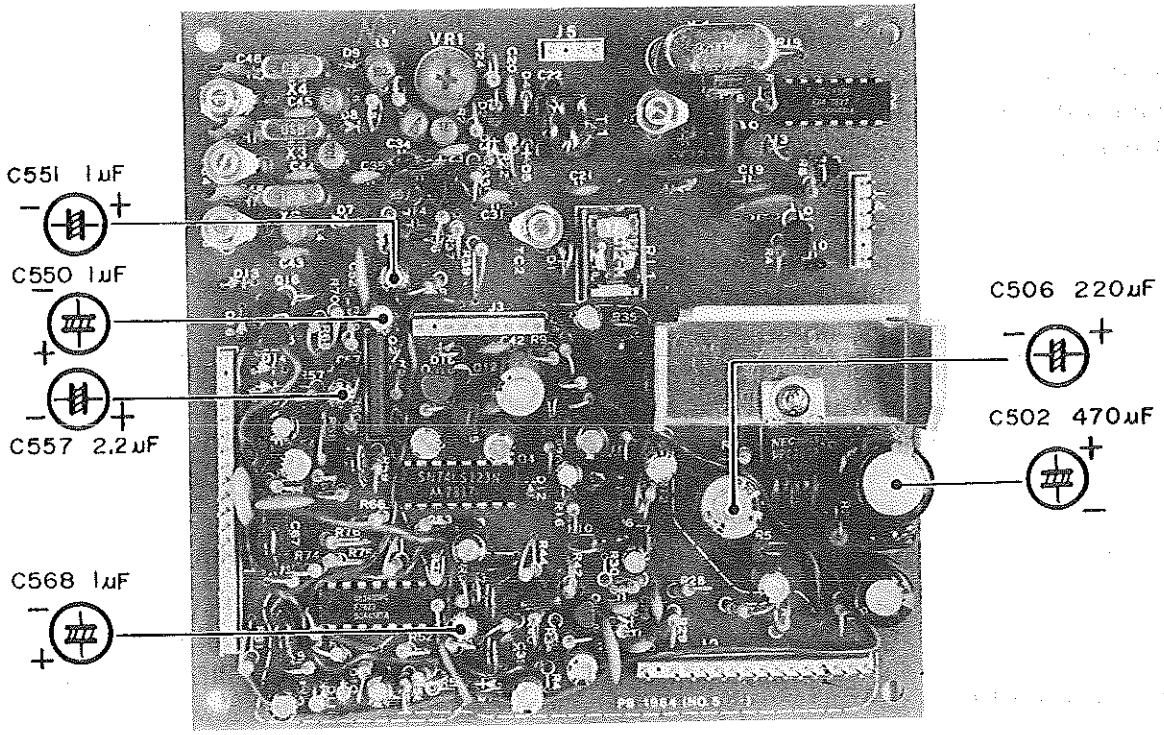
AF UNIT CAPACITOR POLARITY CHECK

In FT-101Z/ZD transceivers bearing serial numbers from the first six production lots, a mistake in the printing on the AF Unit caused several capacitors to be installed in reverse order for their intended purpose, although they were correct according to the printing. In many sets no serious deterioration in performance is noted at all; however, if you get a set for servicing which displays AF oscillation, distortion, or low output, this may be a good place to check. The reversed capacitors should be replaced with new ones installed in the proper position.

The capacitors affected are:

C_{502} (470 μF)
C_{506} (220 μF)
C_{550} (1 μF)
C_{551} (1 μF)
C_{557} (2.2 μF)
C_{568} (1 μF)

In sets from production lots 7 through 10, the printing is not correct, but the capacitors have been correctly installed. The prints on pages 3-60 and 3-61 are correct, as is the schematic diagram.



MAINTENANCE AND ALIGNMENT

WARNING

DANGEROUS VOLTAGES ARE PRESENT WITHIN THIS TRANSCEIVER. USE EXTREME CAUTION WHEN WORKING ON THE TRANSCEIVER WITH THE COVERS REMOVED. DISCHARGE ALL CAPACITORS BY SHORTING THEM TO GROUND WITH AN INSULATED SCREWDRIVER AFTER POWER HAS BEEN REMOVED. OBSERVE NORMAL SAFETY PRECAUTIONS AT ALL TIMES.

CAUTION

Never operate this transceiver in the transmit mode without a matched antenna or dummy load connected to the antenna receptacle on the rear panel. It is possible to damage the final amplifier tubes and the pi network components if the transmitter is operated without the proper load termination.

GENERAL

This transceiver has been carefully aligned and tested at the factory. With normal use, it should not require other than the usual attention given to electronic equipment. Service or realignment of a major component may require substantial adjustment; under no circumstances, though, should realignment be attempted unless the operation of the transceiver is fully understood, the malfunction has been carefully analyzed, and the fault has definitely been traced to misalignment. Sudden difficulties are almost always caused by component failure rather than misalignment.

Service work should only be performed by experienced personnel, using the proper test equipment.

EQUIPMENT REQUIRED

(1) RF Signal Generator: Hewlett-Packard Model 606A or equivalent, with one volt output at 50 ohms, and frequency coverage to 30 MHz.
(2) Vacuum Tube Voltmeter (VTVM): Hewlett-Packard Model 410B or equivalent, with an RF probe good to 40 MHz.
(3) Dummy Load: Yaesu Model YP-150 or equivalent, with 50 ohm non-reactive load impedance, rated to 150 watts average power.
(4) AF Signal Generator: Hewlett-Packard Model 200AB or equivalent.
(5) A general coverage receiver covering 3 to 30 MHz, with a 100 kHz crystal calibrator.
(6) A frequency counter, Yaesu Model YC-500 or equivalent, with resolution to 0.01 kHz and frequency coverage to 30 MHz.
(7) An oscilloscope, Hewlett-Packard Model 1740A or equivalent.

AF UNIT ALIGNMENT

VOX Circuit

A. **Antitrip level setting**

1. Tune in a signal on the FT-101ZD receiver, and adjust the AF GAIN control for a normal listening level. Position the microphone near the speaker, with the MODE switch in the SSB mode. Increase the VOX GAIN control on the front panel until the speaker output causes the VOX relay to switch the transceiver to transmit. Set the ANTITRIP control VR_9, located on the rear apron, to the point that will just prevent the speaker output from tripping the VOX relay.
2. Now place the microphone in the normal operating position, and speak into the microphone to see if your voice will activate the VOX relay. If not, VR_9 may be advanced too far.

B. **VOX relay delay setting**

1. Adjust the DELAY control VR_{2b}, located on the front panel, for the desired delay time. This may require a different setting for phone and CW operation, owing to differing operating techniques. For CW or phone operation using a footswitch, the VOX GAIN control may be rotated fully counter-clockwise to the PTT position.

CW Sidetone

1. The CW sidetone level may be adjusted by means of VR_{10}, located on the rear apron.

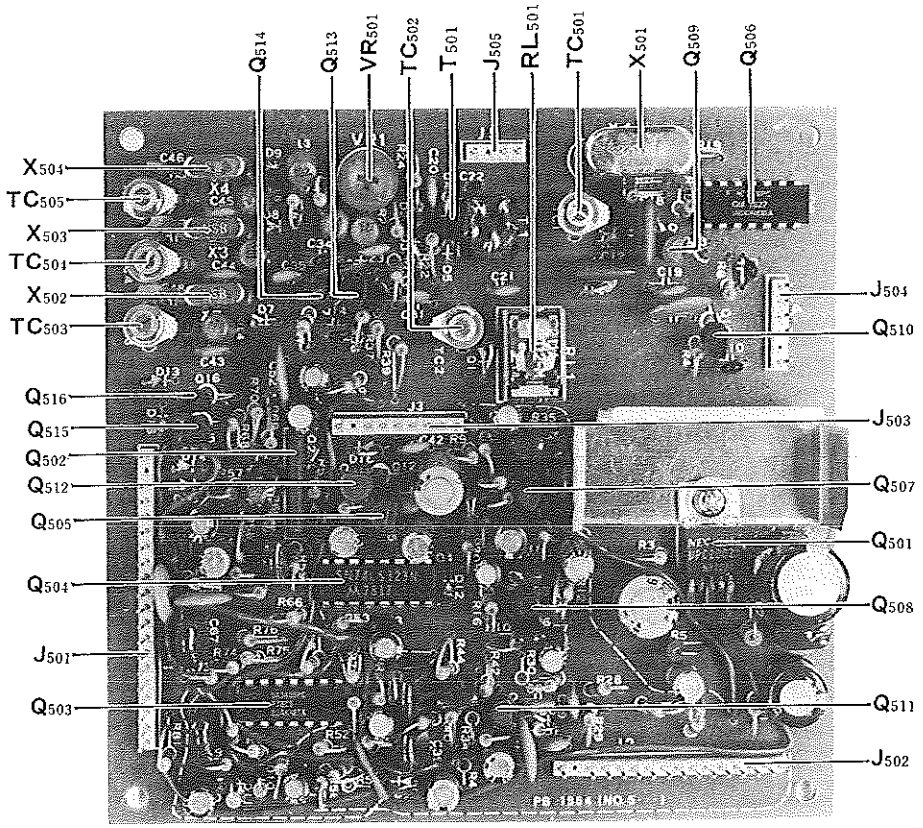
Marker Frequency setting

1. Preset the controls as follows:
   BAND . . . . . JJY/WWV
   DIAL . . . . . 5000.0 kHz
   PRESELECT . Peaked for maximum response
   MODE . . . . . TUNE
2. Place the NB/MARK switch in the MARK position. Tune in the WWV or JJY signal, and adjust TC_{501} for an exact zero beat with the carrier of the incoming signal.

Carrier Frequency Adjustment

A. SSB Carrier Point

1. Tune up the transmitter on 20 meters, LSB mode, into a dummy load. Apply a 1 kHz audio signal to the microphone input, and adjust the audio generator output until the transmitter power output is 60 watts, as indicated on the dummy load wattmeter.
2. Shift the audio generator output frequency to 300 Hz, without changing the output level. Adjust TC_{503} for a power output reading of 15 watts on the wattmeter.
3. Shift the MODE switch to USB. Adjust TC_{504} for an identical 15 watt reading on the wattmeter.



AF UNIT(PB-1964)

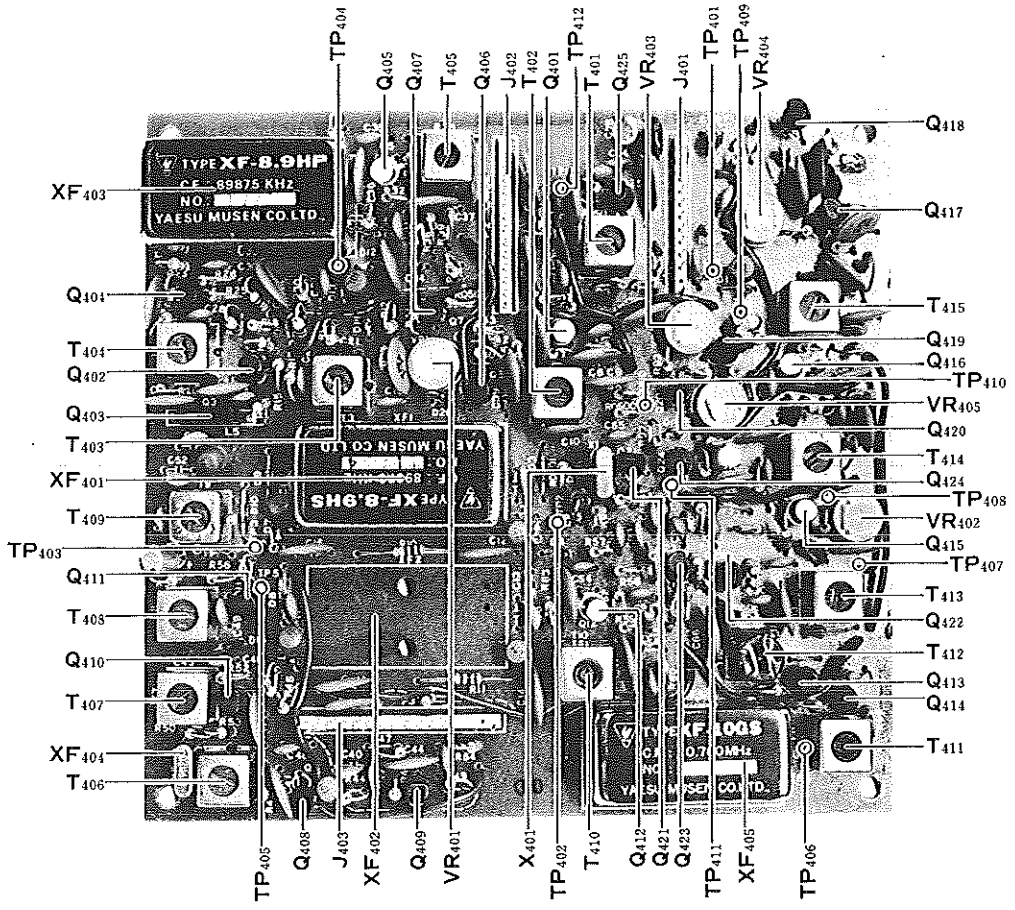
4. Recheck the LSB adjustment, as well as the carrier balance adjustment, after performing the carrier point alignment. The background noise, when switching between USB and LSB, should not change.

B. Carrier Balance

1. Tune up the transceiver on 20 meters, USB mode, into a dummy load. Set the main tuning dial to 14.250 MHz. Connect the RF probe of the VTVM to the antenna jack. Disconnect all microphones, etc., from the microphone jack.
2. Activate the transmitter by placing the VOX GAIN control into the MOX position. Adjust VR_{501} and TC_{502} for a minimum VTVM reading.
3. If a VTVM is unavailable, use an external monitor receiver, tuned to the transmitter frequency, and adjust VR_{501} and TC_{502} for a minimum S-meter reading on the external receiver.
4. This adjustment should be repeated several times on LSB and USB, in order to ensure complete carrier nulling.

C. CW Carrier Point

1. Connect a frequency counter to TP_{402}, located on the IF UNIT. Place the MODE switch in the TUNE position.
2. Adjust TC_{505} for a frequency counter reading of exactly 8988.3 kHz.
3. When using the optional CW filter, a substantial loss on transmit, when in the CW-N position, may indicate the need for adjustment as indicated in steps 1 and 2.



IF UNIT(PB-1963)

IF UNIT ALIGNMENT

S-Meter Sensitivity Adjustment

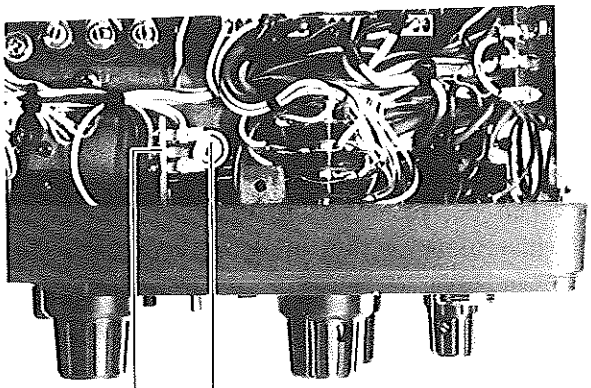
1. Set the BAND switch to 20 meters, the main dial to 14.250 MHz, and set the RF GAIN fully clockwise.
2. Set the signal generator to 14.250 MHz, and set its output to 6 dB. Tune the signal generator signal on the receiver, and peak the preselector for maximum signal strength. The S-meter should just begin to move with the 6 dB input.
3. Adjust VR_{403} for a reading of 0 on the S-meter.
4. Set the generator output to 100 dB, and adjust VR_{405} for a reading of S9 + 60 dB on the S-meter. Confirm that the preselector is peaked.
5. Return the signal generator output to 6 dB, and recheck the adjustment of VR_{403} .

Variable IF Bandwidth Alignment

1. Set the controls as follows:
   BAND . . . . . 20 m
   DIAL . . . . . 14.200 MHz
   RF GAIN . . . . . Fully clockwise
   WIDTH switch . . OFF
   MODE . . . . . USB
   Peak the preselector for maximum response against the marker signal or background noise.
2. Connect the frequency counter to TP_{411}. Adjust VR_{1501} for a reading of exactly 19.7475 MHz.
3. Place the WIDTH switch ON. Make sure that the WIDTH control is exactly in the 12 o'clock position. Adjust VR_{404} for a reading of exactly 19.7475 MHz on the frequency counter.
4. Switch between USB and LSB, and observe the background noise. If there is any difference, adjust VR_{1501} until the background noise is the same.

ALC Meter Alignment

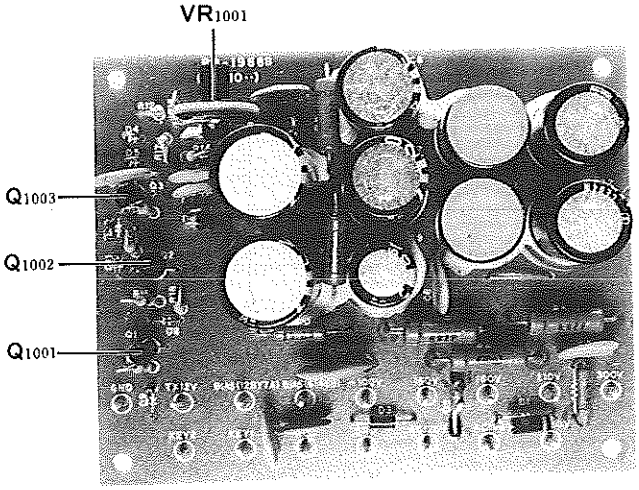
1. On any band, set the MODE switch to USB. Set the meter switch to ALC.
2. With no speech input, activate the transmitter. Adjust VR_{401} for a 0 reading on the ALC meter scale.



RECTIFIER B UNIT

Bias Adjustment

1. Set the MODE switch to USB or LSB, and set the MIC GAIN control fully counterclockwise.
2. Place the METER switch in the IC position, and set the VOX GAIN control to VOX. Adjust the **PB-1968** BIAS control, VR_{1001}, for a reading of 50 mA. For 10 watt models, the correct meter reading is 25 mA.



RECT.B UNIT(PB-1968)

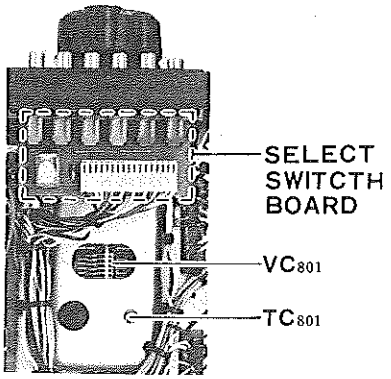
VFO UNIT

The VFO UNIT is very critical in its adjustment. As well, this is not an area which should ever require alignment. Questions regarding drift, etc., usually can be traced to other areas of the transceiver (instability in the supply voltage, etc.). For this reason, all cases regarding VFO repair should be referred to an experienced service technician.

The following components are of interest from a service standpoint:

TC_{801} is the band set trimmer.
TC_{802} is the VFO level set trimmer.

To confirm proper VFO injection, connect the VTVM to the VFO output. Adjust TC_{802} for a reading of 100 mV.



BAND	CRYSTAL	FREQUENCY	TRANSFORMER
160m	X_{601}	15.9875MHz	T601
80m	X_{602}	17.9875	T602
40m	X_{603}	21.4875	T603
20m	X_{604}	28.4875	T604
15m	X_{605}	35.4875	T605
10mA	X_{606}	42.4875	T606
10mB	X_{607}	42.9875	T607
10mC	X_{608}	43.4875	T608
10mD	X_{609}	43.9875	T609
JJY/WWY	X_{610}	19.4875	T610

Table 7

NB-FIX UNIT

Fixed Channel Frequency Alignment

When the optional fixed channel crystals are being used, they may be placed exactly on the correct frequency by adjusting TC_{201} (for channel 1) and TC_{202} (for channel 2). Confirmation of the correct frequency may be made with an external receiver or by loosely coupling a probe from the frequency counter to the transmitter output. A 1-turn loop is usually sufficient to provide indication on the counter.

PREMIX LOCAL UNIT

Premix Local Alignment .

1. Connect the RF probe of the VTVM to pin 1 of MJ_3.
2. Refer to Table 7 , and adjust the appropriate transformer for a level of 300 mV for each band and crystal, as shown in the table.

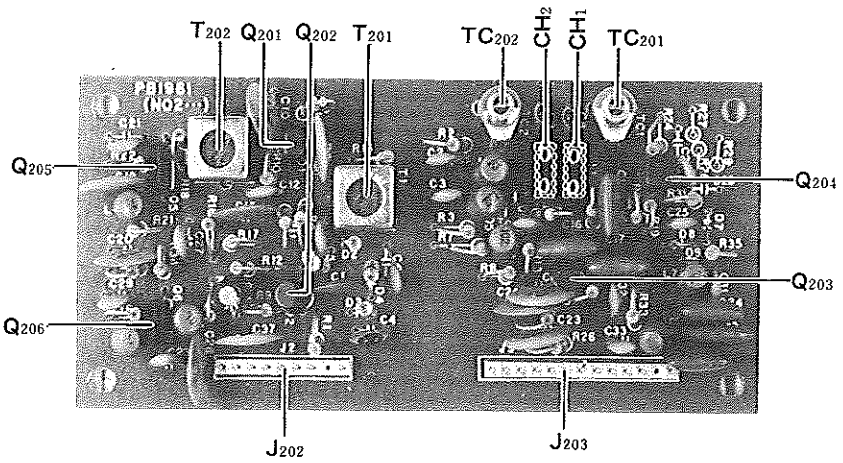
PREMIX UNIT

For this alignment, a wideband (not peak) sweep generator, as well as an oscilloscope, should be used.

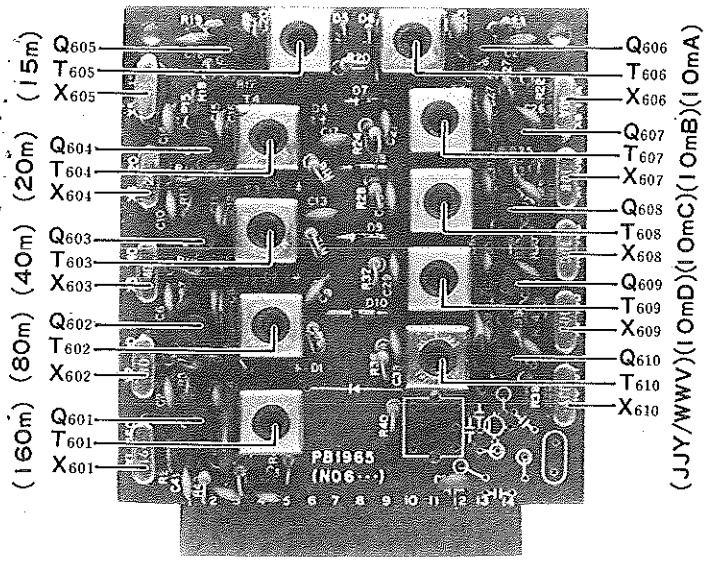
1. Press the EXT select switch. Apply 5.0 - 5.5 MHz sweep output to the VFO output terminal at the rear apron external VFO jack. Connect a high-impedance probe of an oscilloscope to J_{301}.
2. Adjust the transformers shown in Table 8 for a flat response across the entire passband. If you have never adjusted a bandpass filter previously, this may take some practice. Perform the adjustments on each band, according to the chart.

BAND	TRANSFORMER	PASSBAND
160m	T_{301}, T_{302}	10.4—11.0(MHz)
80m	T_{303}, T_{304}	12.4—13.0
40m	T_{305}, T_{306}	15.9—16.5
20m	T_{307}, T_{308}	22.9—23.5
15m	T_{309}, T_{310}	29.9—30.5
10mA	T_{311}, T_{332}	36.9—39.0
JJY/WWV	T_{313}, T_{314}	13.9—14.5

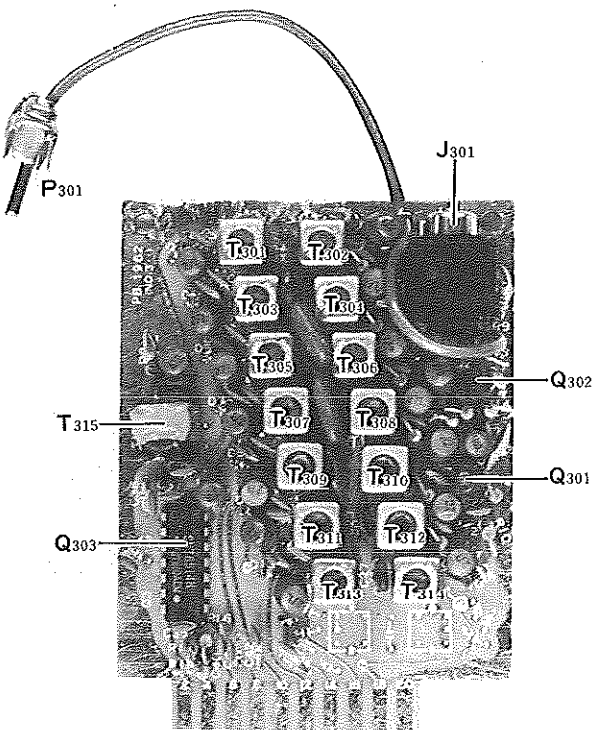
Table 8



NB·FIX UNIT(PB-1961)



PREMIX LOCAL(XTAL)UNIT(PB-1965)



PREMIX UNIT(PB-1962)

AM UNIT (After production lot #8)

1. Set the BAND switch to 40, the MODE switch to AM, and the DRIVE control to the 3 o'clock position. Tune up the transmitter in the usual fashion. Now adjust the core of T_{2401} for maximum power output into the dummy load/wattmeter.
2. Connect a frequency counter to TP_{2402}. Adjust TC_{2401} for a counter reading of exactly 8988.3 kHz while transmitting.
3. Connect the RF probe of the VTVM to TP_{2401}, and adjust TC_{2402} for a reading of 50 mV while transmitting.

TRANSMIT RF/IF TRANSFORMER ALIGNMENT

(1) Connect a dummy load to the antenna jack, and connect an audio signal generator to the microphone input. Tune up the transmitter at 14.2 MHz, and adjust the audio generator output for approximately 50 watts output into the dummy load, single-tone, SSB mode.

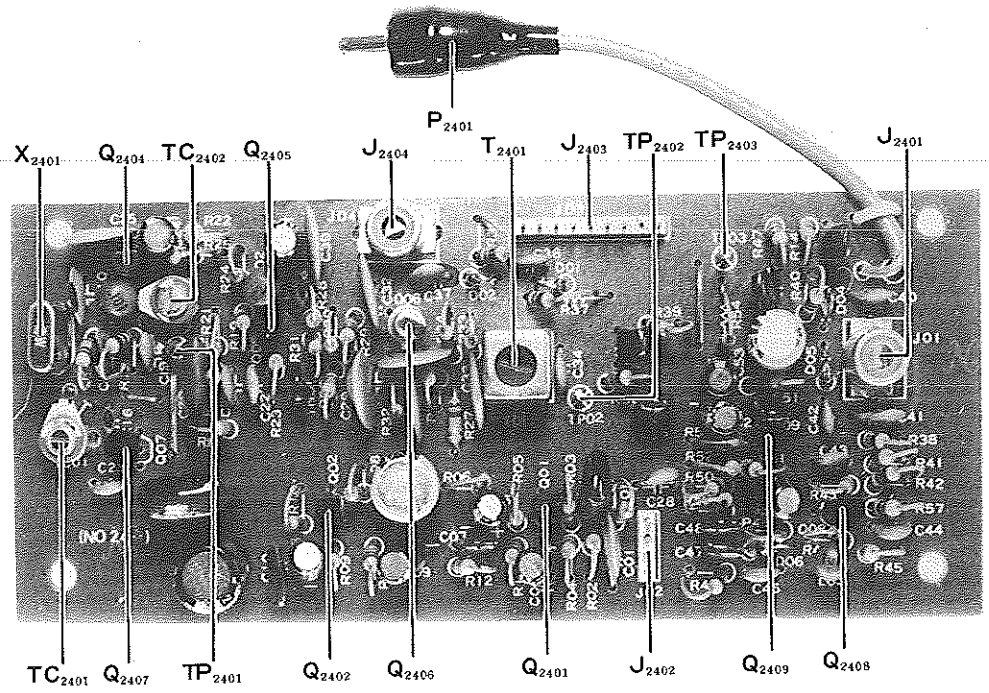
(2) Peak T_{104} (RF UNIT) for maximum power output.

(3) Peak T_{401} - T_{403} and T_{405} (IF UNIT) for maximum power output. Switch the RF processor on, and adjust the COMP LEVEL control for approximately 50 watts output. Peak T_{404} for maximum power output.

RECEIVER RF/IF/NB TRANSFORMER ALIGNMENT

(1) Tune in the marker generator signal at 14.2 MHz, with a dummy load connected to the antenna jack. Peak the preselector for maximum S-meter indication.

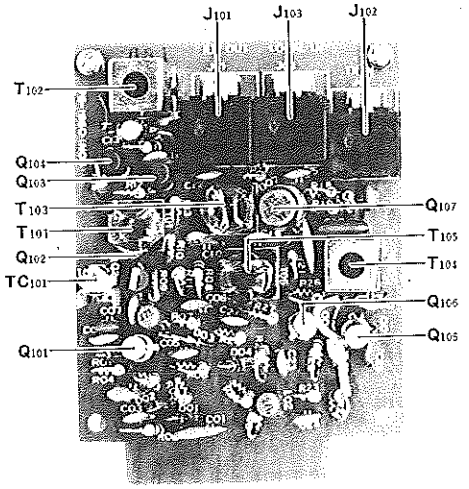
(2) Peak T_{102} (RF UNIT) for maximum S-meter indication.



AM UNIT (PB-2040)

(3) Peak T_{406} - T_{411} and T_{413} - T_{415} for maximum S-meter indication.

(4) Connect ~~the RF probe of a VTVM~~ DC voltmeter to the collector of Q_{202} (NB-FIX UNIT). Reduce the RF GAIN control somewhat, and tune T_{201} and T_{202} for a dip in the VTVM indication. If no dip is observed, reduce the RF GAIN control further.



RF UNIT(PB-1960)

ALIGNMENT OF TRANSMITTER MIXER/ DRIVER AND RECEIVER FRONT END STAGES

CAUTION

Be certain not to exceed the recommended 10 seconds of key down time while performing the alignment of the transmitter mixer and driver stages, as described below. Always dip the PLATE control to establish resonance before proceeding with any adjustments. Off-resonance operation will shorten tube life dramatically.

(1) Connect a dummy load/wattmeter to the rear panel ANT jack.

(2) Set the MODE switch to TUNE, the BAND switch to 40, the VFO dial to 000, the PRESELECTOR control to 6 (on the scale of 1-10), and the DRIVE control fully clockwise. Connect a dummy load/wattmeter to the antenna jack, and set the neutralization trimmer TC_1 to the ½ position shown in Figure 2.

(3) Close the PTT switch, and dip the PLATE control for a minimum IC reading on the transceiver meter (the LOAD control should be set to the nominal setting shown in the "operation" section of this manual). Now adjust TC_{1403} for maximum power output into the wattmeter.

(4) Set the BAND switch to 10D, the PRESELECTOR control to 10 (on the scale of 1-10), and reduce the setting of the DRIVE CONTROL. Preset TC_{1206} to the ½ position, and TC_{1306} to the 1/3 position, as shown in Figure21. Set the LOAD control to the correct position, and close the PTT switch. Dip the PLATE control for minimum IC reading on the transceiver meter. Now advance the DRIVE control to the point where maximum power output is obtained (do not go beyond the maximum PO point). Adjust the cores of T_2 and T_3 for maximum power output. Do not exceed the 10 second key down limitation during this adjustment.

(5) On receive, set the RF GAIN control fully clockwise, and turn the marker on. Tune in the marker signal at 30.000 MHz, and adjust T_2 and T_3 slightly for maximum deflection on the S-meter. Now recheck the peaking on transmit; several repetitions may be necessary to secure the proper ratio.

(6) Locate T_1, and set its core to the same physical level as the cores of T_2 and T_3 were set in step (5).

(7) Set the BAND switch to 10A, the VFO dial to 000, and tune up the transmitter. Peak the PRESELECTOR control for maximum power output. Now adjust TC_{1306} for maximum power output into the wattmeter. On receive, tune to the marker signal at 28.000 MHz, and adjust TC_{1206} (and TC_{101} on the RF UNIT) for maximum deflection of the S-meter.

(8) As there may be some interaction of adjustments, please repeat steps (3) through (7), so as to be sure of proper tracking.

(9) Adjust the final amplifier neutralization, as described on page 3-35

(10) Again recheck steps (3) through (7).

(11) Now you are ready to align the other bands. Set the BAND switch to 15, the VFO dial to 000, and the PRESELECTOR control to 8.5 (on the scale of 1-10). Set the LOAD control to the proper position. Close the PTT switch, and dip the PLATE control for minimum IC indication on the transceiver meter. Now adjust TC_{1405} and TC_{1305} for maximum power output into the wattmeter. On receive, tune to the marker signal at 21.000 MHz, and peak TC_{1205} for maximum S-meter deflection on the marker signal.

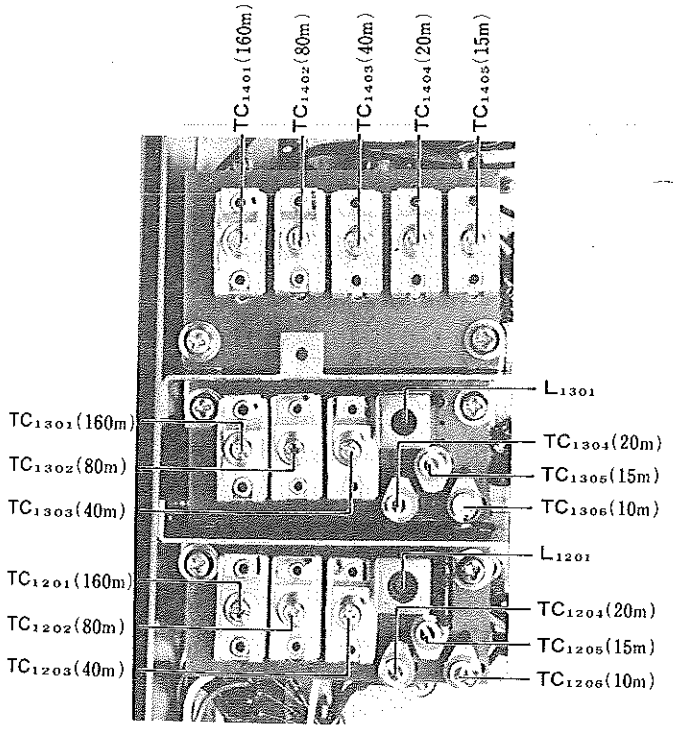
(12) Set the BAND switch to 20, the VFO dial to 000, and the PRESELECTOR control to 8 (on the scale of 1-10). Set the LOAD control to the proper position. Close the PTT switch, and dip the PLATE control for minimum IC indication on the transceiver meter. Now adjust TC_{1404} and TC_{1304} for maximum power output into the wattmeter. On receive, tune to the marker signal at 14.000 MHz, and adjust TC_{1204} for maximum S-meter deflection on the marker signal.

(13) Set the BAND switch to 40, the VFO dial to 000, and the PRESELECTOR control to 6 (on the scale of 1-10). Set the LOAD control to the correct position. Close the PTT switch, and dip the PLATE control for minimum IC reading on the transceiver meter. Now adjust TC_{1403} and TC_{1303} for maximum power output into the wattmeter. On receive, tune to the marker signal at 7.000 MHz, and adjust TC_{1203} for maximum S-meter deflection on the marker signal.

(14) To adjust the trap tuning, leave the VFO dial at 000, and the PRESELECTOR at 6. Remove the dummy load/wattmeter from the antenna jack, and connect a signal generator to the antenna jack. Inject a 90 dB signal at 9.9875 MHz. Adjust L_{1201} and L_{1301} for minimum S-meter deflection. Remove the signal generator, and reconnect the dummy load/wattmeter.

(15) Set the BAND switch to 80, the VFO dial to 000, and the PRESELECTOR control to 2.5 (on the scale of 1-10). Set the LOAD control to the correct position. Close the PTT switch, and dip the PLATE control for minimum IC indication on the transceiver meter. Now adjust TC_{1402} and TC_{1302} for maximum power output into the wattmeter. On receive, tune to the marker signal at 3.500 MHz , and adjust TC_{1202} for maximum S-meter deflection on the marker signal.

(16) Set the BAND switch to 160, the VFO dial to 400 (1.900 MHz), and the PRESELECTOR control to 1.2 (on the scale of 1-10). Set the LOAD control to the correct position. Close the PTT switch, and dip the PLATE control for minimum IC indication on the transceiver meter. Now adjust TC_{1401} and TC_{1301} for maximum power output into the dummy load. On receive, tune to the marker signal at 1.900 MHz, and adjust TC_{1201} for maximum S-meter deflection on the marker signal.



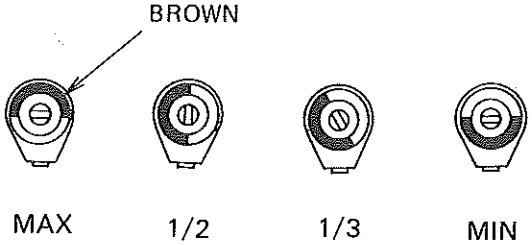


Figure 21

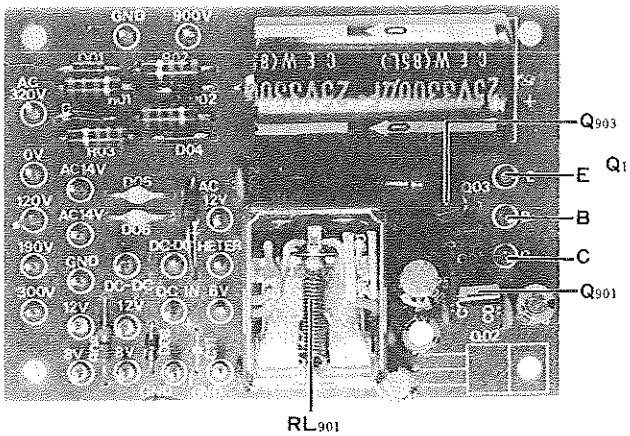
ADVICE ON TROUBLESHOOTING THE DRIVER/FINAL AMPLIFIER STAGES

Three tubes are used in the FT-101ZD: a 12BY7A driver, and two 6146Bs in the final amplifier.

Because not all service personnel are as familiar with tubes as they are with semiconductors, we would begin by cautioning you that tubes are voltage devices. To produce power in useful amounts, they require voltages well in excess of that needed for solid state devices. Take care, lest you develop "serviceman's elbow," a malady well known to old timers. It occurs when your arm jerks back from the +800 volts right into some immovable object. Accompanied by a few colorful phrases, it is not an experience one knowingly encourages, though it is seldom fatal.

The old adage of "keep one hand in your hip pocket" should be heeded whenever working in areas of exposed high voltage. If you **should** come into contact with the high voltage, it is best to call it quits for the service day. Alert your colleagues to what happened, and do not hesitate for even 5 minutes to seek medical attention should **any** signs of shock (trauma) develop. Trauma following contact with high voltage is sometimes more dangerous than the high voltage itself. IT CAN BE FATAL!

Never work on high voltage circuits while alone. You may need someone to turn off the power in an emergency. SAFETY FIRST!



RECT A UNIT(PB-1967)

FINAL AMPLIFIER NEUTRALIZATION

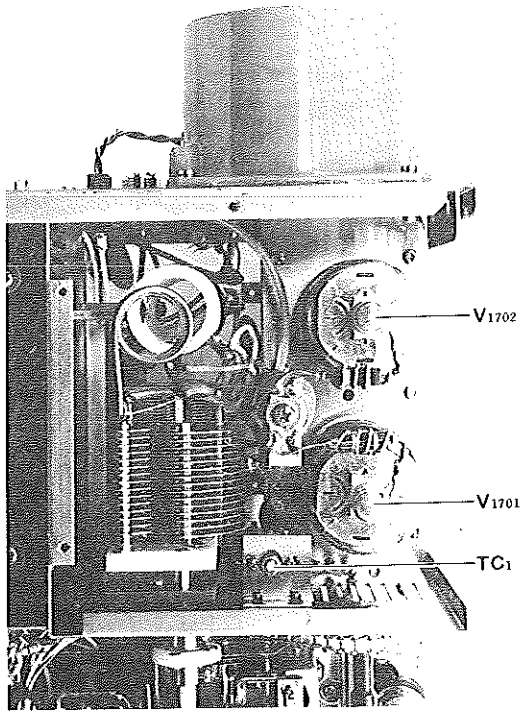
Important Note: For this alignment, use a NON-METALLIC tuning wand.

(1) Set the BAND switch to 10C, set the tuning dial to 29 MHz, and tune into a dummy load for approximately 70% full output power.

(2) Set the METER switch to IC, and observe the dip in the cathode current. The dip should occur at the same point that maximum power output (measured on the dummy load wattmeter) occurs. If this is not the case, adjust TC_1, located inside the final amplifier cage, for the required coincidence of maximum power output and dip on the IC meter.

CAUTION: HIGH VOLTAGES ARE PRESENT ON THE UNDERSIDE OF THE CHASSIS AND INSIDE THE FINAL AMPLIFIER COMPARTMENT. USE GREAT CARE WHILE MAKING ADJUSTMENTS IN AREAS OF EXPOSED WIRING.

Note: The final amplifier enclosure must be in place to provide the required RF shielding during the neutralization procedure.



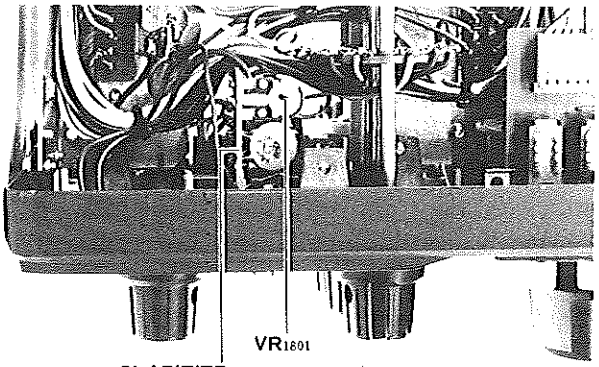
Final Amplifier Compartment

CLARIFIER ALIGNMENT

(1) Tune in the marker generator signal on any band, and peak the preselector on the marker signal.

(2) With the CLARIFIER control OFF, make sure that the CLARIFIER knob is exactly at the 12 o'clock position. Note the tone of the marker signal.

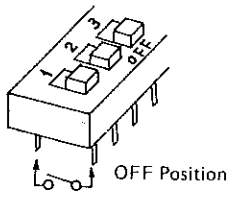
(3) Switch the RX CLARIFIER to ON, and observe the tone of the marker signal. If it is different from when the clarifier was turned off, adjust VR_{1801} for an identical tone with the CLARIFIER knob exactly on the zero mark.



CLARIFIER
CONTROL UNIT
(PB-1973)

COUNTER UNIT

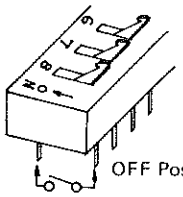
The carrier points for USB, LSB, and CW are preset as follows: USB = 91.011.0; LSB = 91.014.0; CW or AM = 91.011.7. If, for some reason, it is desired to set these frequencies elsewhere, refer to the "Frequency Counter Preset Switch Position" drawing and chart. Adjustment of ±200 Hz is possible as shown. The adjustment is carried out on the miniature switch shown in the drawing.



OFF Position

DSS208

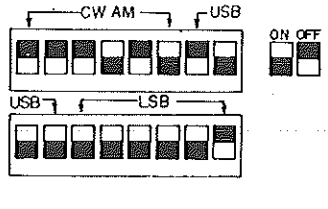
P.N. (N7090016)

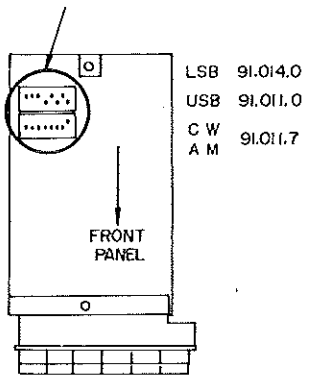


OFF Position

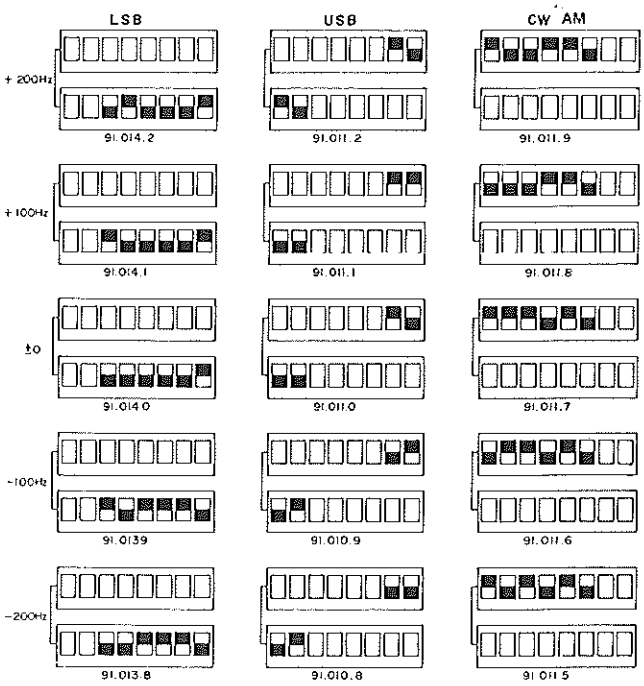
A10040-008

P.N. (66000005)





FREQUENCY COUNTER PRESET SWITCH POSITION



FAULT LOCALIZATION

The process of troubleshooting is highly individualistic. Fundamentally, though, the process is one of logical elimination.

Begin with a visual inspection of the transceiver, looking for broken, discolored, or charred components. Smell the unit, as burnt transformers smell differently than resistors, etc. If you do find a component that is cooked, remember that another fault may well have caused the destruction of the part you have located.

Set up the unit for test using a dummy load and wattmeter. Never shoot trouble using an antenna.

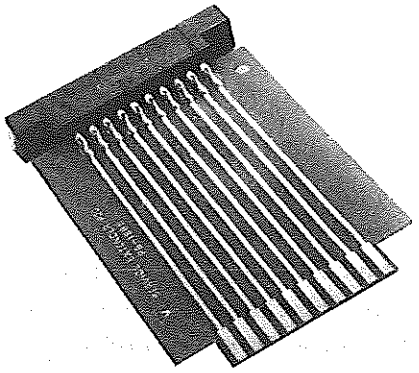
Initially, turn on the receiver, and check out only the RX side. Any malfunctions you detect on the receiver side should be repaired before you check out the transmitter. In doing this, you may well cure the entire problem, as much circuitry is shared on TX and RX.

The logical process of fault identification involves determination of the missing function (no RX on LSB), then the board at fault (AF UNIT), then the band circuit (LSB oscillator), then the malfunctioning part (X_{502}).

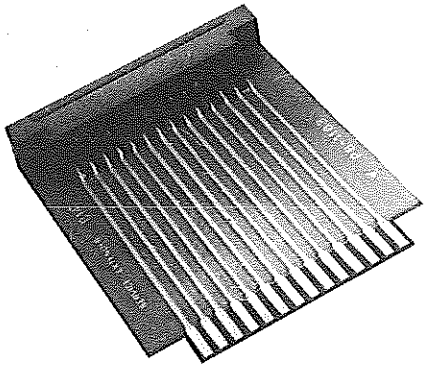
If, after the receiver inspection is completed, all is OK, switch to the transmit side, following the same logical procedure (function-board-circuit-component). Concentrate on those sections unique to the transmit side, as you have already performed a thorough checkout of all receiver and shared circuits (hopefully).

In this section, we will provide troubleshooting advice which leads you directly to suspect components. As the FT-101ZD is a complex electronic instrument, though, it is obviously impossible for us to trace the path of every possible malfunction in the radio. Therefore, if these tips do not lead you to identification of the trouble, the logical elimination process is the way to go.

For troubleshooting, an "extender board" is a valuable tool for quick and easy voltage testing. A double-sided 10-pin extended board will allow tests on the RF and PREMIX boards, and a 14 pin single-face extender will do for the PREMIX LOCAL board. The other boards in the FT-101ZD are not of the plug-in variety, but test points are provided for easy servicing.



10 PIN EXTENDER BOARD



14 PIN EXTENDER BOARD

TROUBLESHOOTING

A FUNDAMENTAL ANALYSIS OF THE TROUBLE

The failure may be caused by one of the following:

1) Mechanical defect
2) Electrical defect
3) Others (Murphy's Law, etc.)

1. MECHANICAL DEFECTS

Typical mechanical defects encountered by the technician are:

a) Damage from shock during transportation (remember the unit was probably subjected both to sea and truck shipment).
b) Damage caused by vibration in service.
c) Damage caused by forcing stubborn knobs or switches. This difficulty is usually proceded by one of the above two defects.

2. ELECTRICAL DEFECTS

Typical electrical defects encountered are:

a) Part(s) failure(s) caused by aging.
b) Failures caused by improper application of supply voltage, or by voltage spikes. An improper fuse in use could cause extensive damage to be sustained.
c) Improper operation (e.g. transistors without load – this usually points to failure elsewhere, in addition to the damaged transistor of IC).
d) Loose connections at the power connector or elsewhere caused by cold solder joints, etc.

3. OTHERS

Among the miscellaneous types of failures or difficulties encountered are:

a) Antenna troubles – poor connectors, use of cheap coax not made to withstand weather, and sabotage by neighbors (nail driven through coax, etc.).
b) "Cockpit error:" including mislabeled coax lines to coax switch, or attempt to use transceiver on frequencies other than those it was designed for.
c) Murphy's Law: use of a non-Yaesu microphone with different connections, for example (See page1-11)

TYPICAL PART FAILURES, CAUSES, AND SYMPTOMS

PARTS	CAUSE OF TROUBLE	SYMPTOMS
Semiconductors (IC, FET, TR)	High supply voltage Open circuit Excessive drive High temperature	Short or open circuit Output decreases to 1/2 at 80°C Internal noise Instability
MOS FET MOS IC	Static electricity	Total failure
Crystal Crystal filter	Shock High temperature	Crystal destroyed Frequency drift Filter bandpass change
Resistor	Excessive power Aging High temperature	Component burned Value changed Open circuit
Potentiometer	Excessive power Shock	Component burned Open circuit Noise Unsmooth rotation
Capacitor	Excess voltage High temperature Excess power	Shorted Leakage Open/decreased capacitance
Variable capacitor Trimmer capacitor	Ratings exceeded Dust between plates Shock, forced rotation	Shorted Leakage Unsmooth rotation
Coils	Ratings exceeded Variation	Open or short circuit Leakage or shorted turns Detuned
Switch	Ratings exceeded Aging	Poor contact Unsmooth operation Open circuit
Relay	Ratings exceeded Humidity	Poor contact Noise Coil open

RECEIVE MODE

TROUBLESHOOTING CHART

Problem	Condition	Probable Cause(s)
(1) No AC Power applied	(a) Fuse OK	* Defective power switch * Defective AC line cord * Cold solder joint to AC cord * Loose contact at power jack
	(b) Fuse blows	* Defective DC-DC Converter (check w/o DC-DC Converter) * Defective D_{901} –D_{904} * High voltage line shorted * Short in 6146B electrodes * Defective D_{905}, D_{906} in 13.6 VDC line * Defective D_{1001}–D_{1003} in DC 300 and 210 V line * Short in pilot lamp supply * Improper transformer connections
	(c) Fuse blows after tubes warm up	* Defective 6146B * Defective R_{1013}, R_{1703}, L_{1701} * Cold solder joint to pin 5 of 6146B socket * Defective bypass capacitor in control grid circuit * Check for –130 volts bias on 6146B * Leakage or short at C_{1701} * Leakage or short at C_1
	(d) Tube heaters do not light up.	* Defective heater switch * Cold soldering in heater supply line * Defective tube * ACC plug not installed * Loose connection at tube socket or ACC jack
	(e) No DC operation, OK on AC	* Defective DC cord
	(f) OK on AC, fuse blows on DC with heater switch on	* Defective T20A6 transistor in DC-DC Converter * Defective D_{1001}–D_{1003}, D_{905}, D_{906}
	(g) OK on AC, fuse OK, but no DC operation	* Defective T20A6 transistor * Cold solder joint in DC-DC converter
(2) No reception	(a) S-meter OK, but no audio output from speaker	* Defective speaker * Defective μPC2002H or 2SC1000GR on PB-1964 * Defective audio circuit around above transistor/IC * Defective EXT SP jack

	(b) No audio output on some mode:	
	LSB	* Defective X_{502}, D_{2404}
	USB/CW	* Defective X_{503}, D_{2404}
	AM	* Defective Q_{2408}, Q_{2409}, D_{2405}, D_{2406}
	Some mode	* Defective mode switch or cold solder joint on switch
	(c) No audio output, S-meter off scale	* Defective RF GAIN control * Defective Q_{419}, Q_{420} (PB-1963)
	(d) Speaker appears OK, no S-meter deflection	* Defective RL_1, Q_{419}, Q_{420}, VR_{405} * Defective 19.7475 MHz xtal * Defective Q_{421}, Q_{422}, Q_{423} * Defective Q_{411} * Defective Q_{101}–Q_{104} (PB-1960) * Defective Q_{408} * Defective Q_{412}–Q_{418}
	(e) MARKER ON, only slight S-meter deflection on the marker signal	* Low PREMIX output (see section on COMMON CIRCUITS) * Defective T_1, L_{1201}, or C_{1207} * Check tuning or T_{102}, T_{406}–T_{415} * Tracking error in RF coils * Defective XF_{401}–XF_{402} or XF_{405}
	(f) Normal S-meter deflection against marker signal (S9 +10 dB nominal)	* Defective FH_2 (lamp fuse) * Defective RL_2 (Antenna Relay) * Defective S_{2004} (ATT)
(3) Partial reception	(a) Poor reception on one or more bands (some bands OK)	* Low PREMIX output (see section on COMMON CIRCUITS) * Defective band switch * Defective TC_{1201} (160 m)–TC_{1206} (10 m), C_{1201} (160 m)–C_{1206} (10 m)
(4) Self-oscillation	(a) Oscillation with HEATER switch on	* Defective 6146B, R_{1013}, R_{1703}, L_{1701} * Defective L_{1701}, C_1 * Defective R_{1014}, R_{1017}, R_{1601}, R_{1602}, C_{1015} * Defective Q_{1002}, Q_{1003} (PB-1968)
	(b) Oscillation with HEATER switch either on or off	* TX 12 V line shorted to RX 12 V line. Check at each board, TX/RX switching diodes and switches.

(5) Marker inoperative	(a) RX OK, no marker signal heard	* Defective NB/MARK switch Check voltage at pin 4 of J_{504} in PB-1964. Should be 8 volts nominally * Defective X_{501} * Defective Q_{606}, Q_{609} and Q_{610}

TRANSMITTER

Problem	Condition	Probable Cause(s)
(1) No power output	(a) IC OK, but no power output	* Defective L_1, L_2, L_9 * Shorted VC_1, VC_2 Defective C_{66} * Low bands only: Defective C_5–C_8 * Defective RL_2
	(b) IC OK, but no output on a particular band	* Cold solder joint between band switch and tank coil * Defective band switch
	(c) No IC indication	* Defective 6146B * ACC plug not correctly wired or improperly seated * No screen voltage at 6146B because of defective L_{1804}, band switch
	(d) Idling IC OK, but no drive	* Defective 12BY7A * No screen voltage because of defective R_{1603}, C_{1009}, R_{1007}–R_{1009} * Defective Q_{105}, Q_{106} or Q_{405}
(2) Poor TX	(a) No power output on LSB only	* Defective X_{502}
	(b) No power output on USB only	* Defective X_{503}
	(c) No power output on both USB/LSB	* Defective RL_{501}, Q_{502}, D_{2402} * No vox operation: defective or grounded MIC or PATCH jack * Defective Q_{503}, Q_{504} or Q_{512}
	(d) No power output on CW/TUNE	* Defective X_{504}, Q_{401}, D_{2402}
	(e) No CW keying	* Defective mode switch, Q_{1001}, and associated circuit * Defective D_{506} if carrier hangs up
	(f) No modulation on AM	* Defective Q_{2401}–Q_{2407}, D_{2401}, X_{2401}
(3) Abnormal meter	(a) Cannot set ALC meter	* Defective C_{1016} * Defective Q_{405}, VR_{401} * Defective meter switch or RL_1

	(b) ALC meter does not function	* Defective 12BY7A * ALC line shorted to ground * Defective D_{1006}, D_{1007} * Driver, IF stages require realignment.
	(c) Power output OK, no IC meter indication	* Defective R_{1706} or meter switch * Defective RL_1
	(d) Power output OK, PO meter does not function	* Improper setting of VR_8 * Defective C_{10}–C_{12}, C_{50}, L_7, D_1, VR_8, or mode switch
(4) No changeover from RX to TX	(a) TX OK in MOX position	* Failure in MIC or PTT line * Loose MIC jack or plug connection
	(b) No TX in MOX position	* Defective VR_1 * Defective RL_1, D_7
	(c) VOX inoperative	* If no CW semi-break-in, check Q_{503}, Q_{504}, Q_{512}.
(5) No return to RX from TX		* PTT line grounded * Defective Q_{512} * Defective Q_{503}, Q_{504}
(6) Fuse blows on transmit	(a) OK on RX	* Insufficient bias voltage on 6146B
(7) TX self-oscillation	(a) OK on receive	* Neutralization of final tubes required * Defective C_{16}, C_{18}, C_{15}, C_{1605} * RX 12 V line shorted to TX 12 V or TX 8 V line only on TX
(8) RF processor trouble	(a) Low or no output with processor on	* Processor switch defective * Defective XF_{403} * Defective Q_{402}–Q_{404}

COMMON CIRCUITS

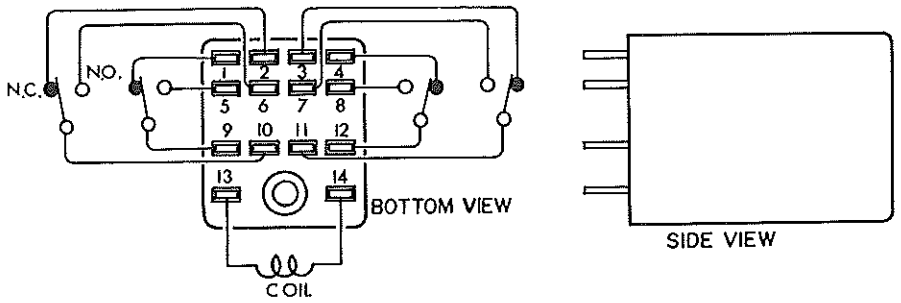
Problem	Condition	Probable Cause(s)
(1) Counter circuit	(a) Digital display does not work	* Defective Q_{2310} * 5 V line in Counter Unit grounded * Defective display LED * Defective Q_{2208}–Q_{2213} * Defective R_{2204}–R_{2245}
	(b) Six digits to the right read below: LSB "91.014.0" USB "91.011.0" CW "91.011.7"	* VFO input not connected or is grounded * Defective Q_{2301}–Q_{2304}, Q_{2309} * Defective 655.36 kHz crystal * Defective Q_{2305}
	(c) Display unstable, all digits working OK	* Defective 655.36 MHz crystal * Low PREMIX input (80–120 mV RMS OK)
(2) PREMIX LOCAL UNIT	(a) No oscillation on all bands	* Defective BAND switch S1A * Open R_{22} * Shorted C_{53} * Defective Q_3
	(b) No oscillation on particular band	* Switching diode for that band defective (check D_{601}–D_{610}) * Defective output coil for that band (check T_{601}–T_{610}) * Defective oscillator transistor for that band (check Q_{601}–Q_{610}) * Defective crystal for that band (check X_{601}–X_{610}) * Defective resistor or capacitor in oscillator circuit for that band
(3) PREMIX UNIT	(a) Output not correct on all bands (nom. output of 100 mV is OK.)	* Defective Q_{301}–Q_{303} * Check for 12 V at pin 9 of PREMIX UNIT * Check for local input at pin 7 * Defective R_{308}, R_{309}, L_{314}, L_{315} * Defective Q_3 * Defective R_{22}, C_{53}
	(b) Output not correct on a particular band	* Defective BAND switch S1A * Defective diodes D_2–D_5 * Defective bandpass filter output diode for that band (check D_{301}–D_{314}) * Defective bandpass filter coil for that band (check T_{301}–T_{314}) * Defective RF choke for that band (check L_{301}–L_{314})

(4) Indicators	(a) WIDTH LED does not work	* Defective LED D_{1501} or R_{1501}, S_{1501}
	(b) CLARIFIER LED does not work	* Defective LED D_{1802} or S_{1801}, S_{1802}, R_{1804}
	(c) PROCESSOR LED does not work	* Defective LED D_9 or R_{17}, S_{2005}
	(d) CH_1, CH_2 does not work	* Defective LED D_{1905}, D_{1906} or S_{701} (e, f), R_{1902}
	(e) TX EXT LED does not work	* Defective LED D_{1902} or RL_{701}, S_{701} (a–f), R_{1902}
	(f) RX EXT LED does not work	* Defective LED D_{1903} or RL_{701}, S_{701} (a–f), R_{1902}
	(g) VFO LED does not work	* Defective LED D_{1904} or S_{701} (a–f), R_{1901}
	(h) EXT LED does not work	* Defective LED D_{1901} or S_{701} (a–f), R_{1901}
(5) Clarifier	(a) Frequency jumps with clarifier on	* Defective VR_6, R_{1801}, R_{1802}, S_{1801}, S_{1802}, RL_{1801}
	(b) OFF and "0" condition do not coincide in frequency	* Defective VR_{1801}, R_{1803}, R_{1805}, RL_{1801}
	(c) Frequency jumps with clarifier off, OK with clarifier on	* Defective VR_{1801}, R_{1803}, R_{1805}, S_{1801}
	(d) Frequency jumps regardless of clarifier position	* Unstable 8 V REG supply, check Q_3. * Check VFO unit

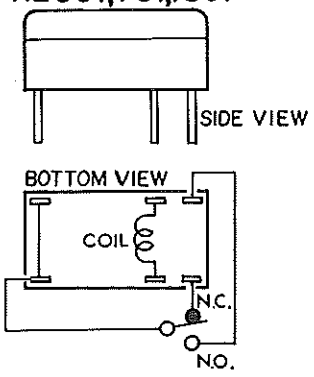
RELAY CONNECTION INFORMATION

Should the need for replacement of relays become necessary, or if you are trying to verify proper relay operation, the diagrams below should help you.

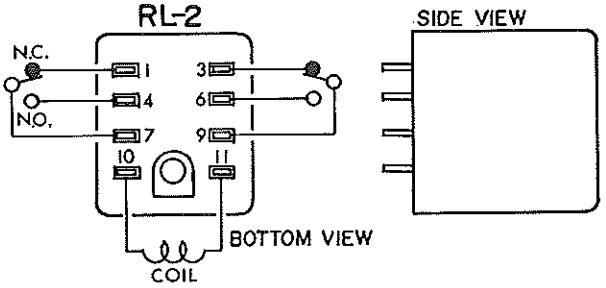
RL-1,901



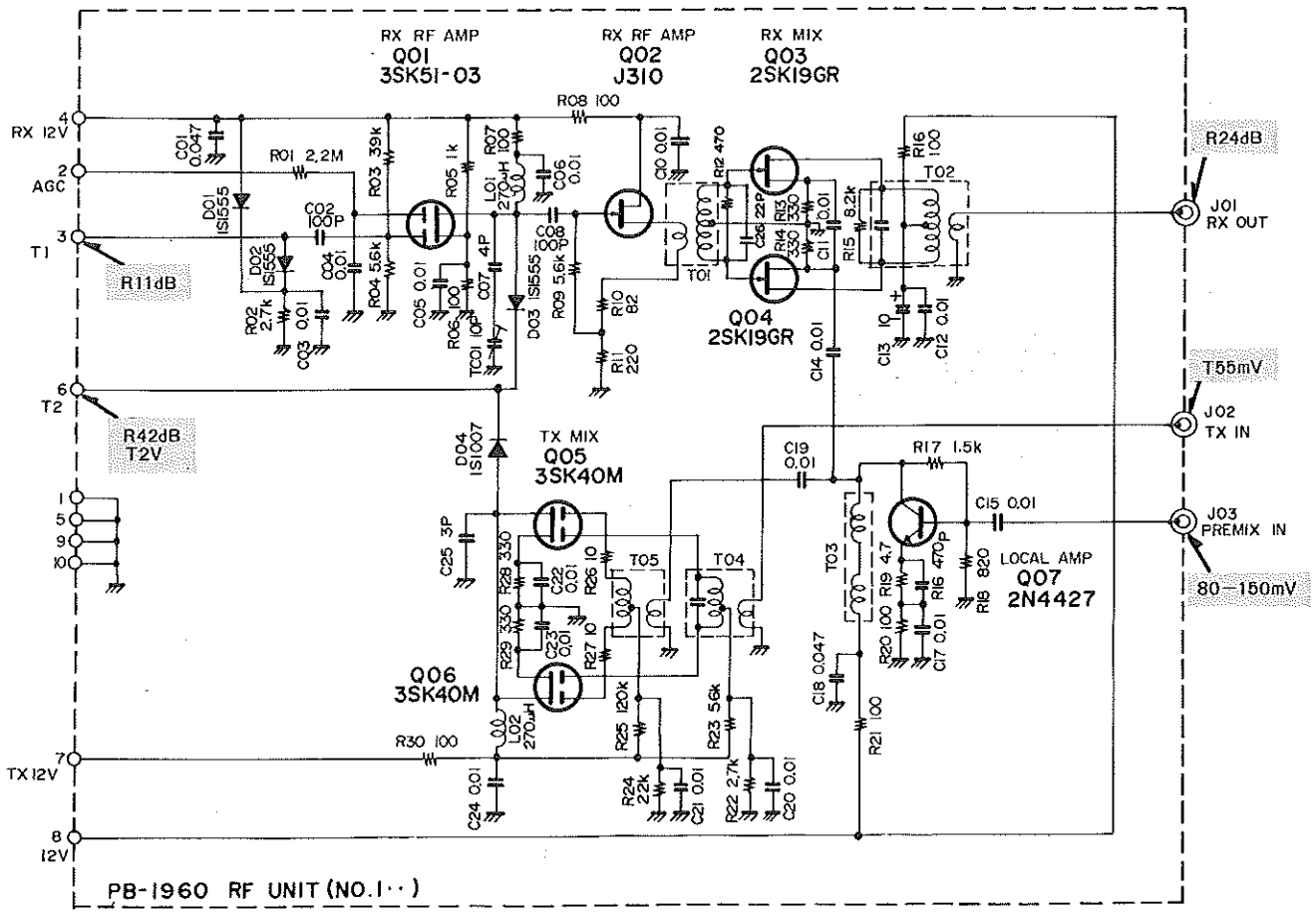
RL-501,701,1801



RL-2



RF UNIT (PB-1960A)

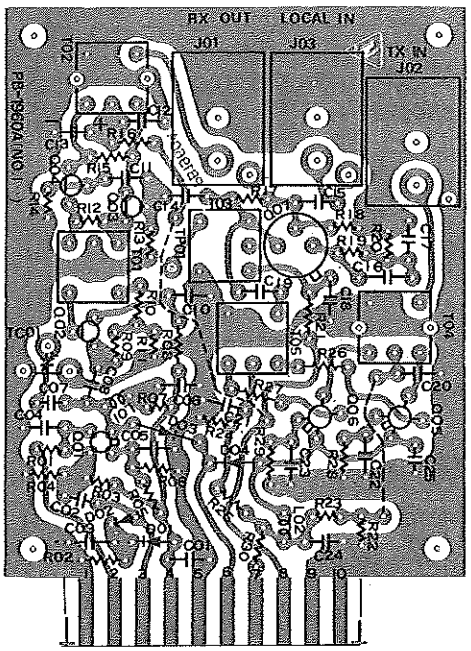


DC VOLTAGES

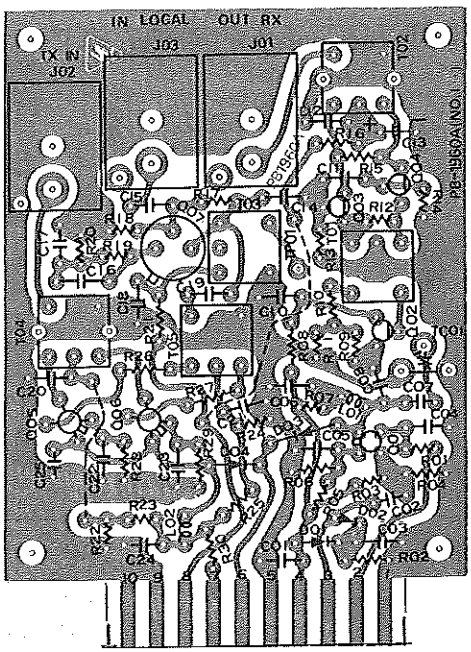
(V)

	E(S)		C(D)		B(G_1)		(G_2)	
	R	T	R	T	R	T	R	T
Q_{101}	1.6	0	10.6	0	1.5	0	0.5	0.5
Q_{102}	3.9	0	10.9	0	2.8	0	—	—
Q_{103}	1.0	0	11.6	0	0	0	—	—
Q_{104}	1.0	0	11.6	0	0	0	—	—
Q_{105}	0	0.7	0	10.6	0	0.5	0	1.6
Q_{106}	0	0.7	0	10.6	0	0.5	0	1.6
Q_{107}	2.4	2.4	9.5	9.5	3.1	3.1	—	—

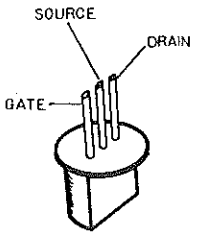
RF UNIT PARTS LAYOUT



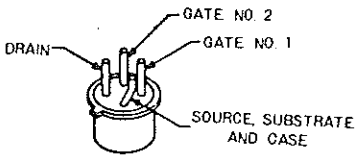
Viewed from component side



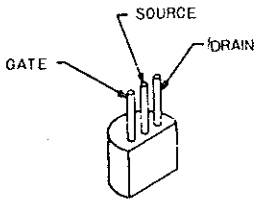
Viewed from solder side



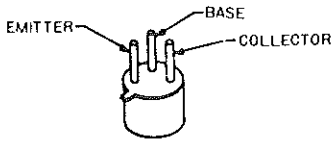
2SK19GR



3SK40M
3SK51-03

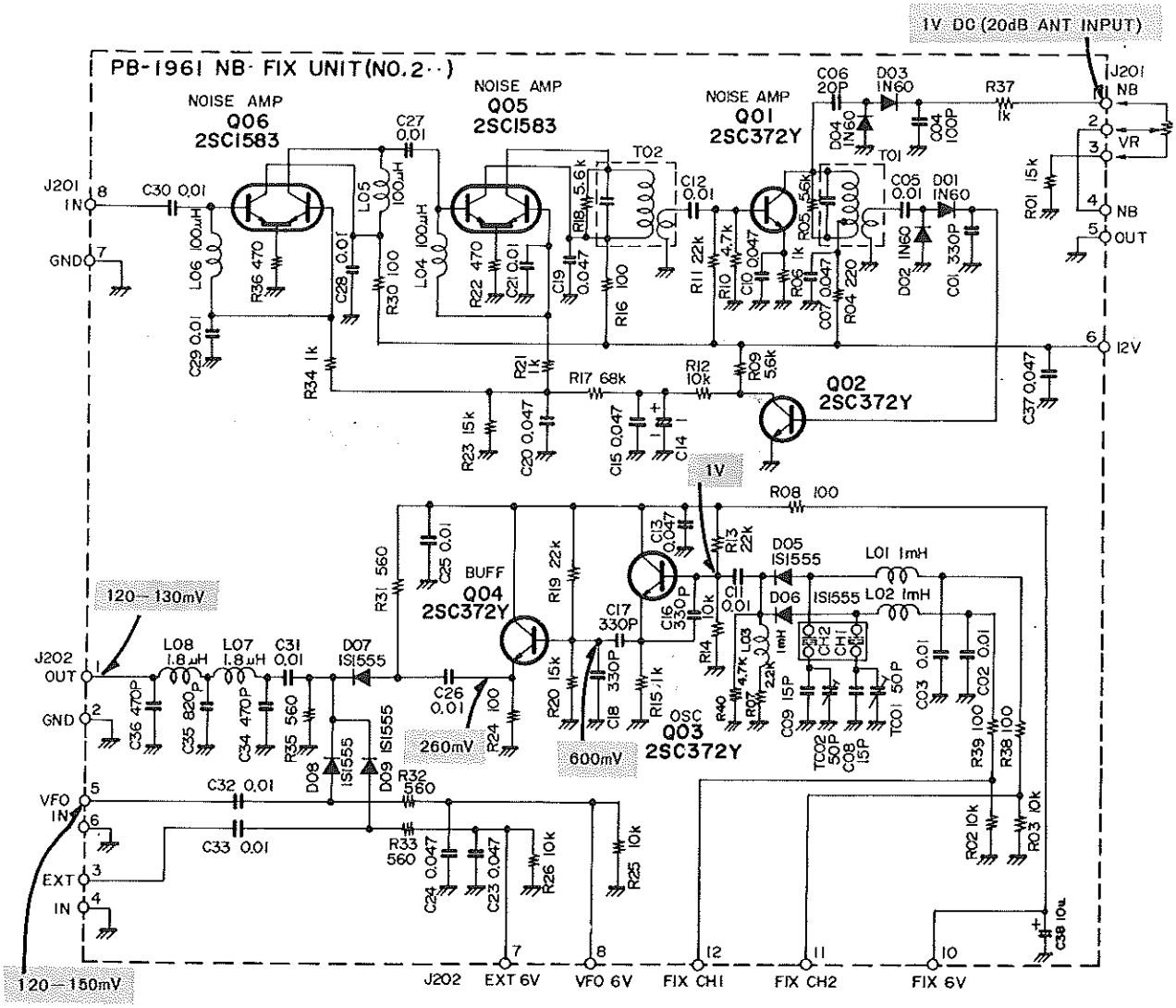


J310



2N4427

NB/FIX UNIT (PB1961B)



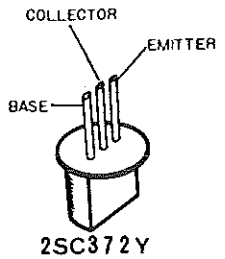
DC VOLTAGES

(V)

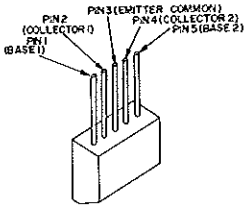
	E	C	B	
Q_{201}	1.5	11.9	2.1	NB ON (NB OFF 0V)
Q_{202}	0	11.4	0.2	
Q_{203}	0.8	4.7	1.4	FIX ON (FIX OFF 0V)
Q_{204}	1.0	4.7	1.5	

(V)

	1(B_1)	2(C_1)	3(E)	4(C_2)	5(B_2)	
Q_{205}	1.7	12.0	1.1	12.0	1.7	NB ON (NB OFF 0V)
Q_{206}	1.7	12.0	1.1	12.0	1.7	

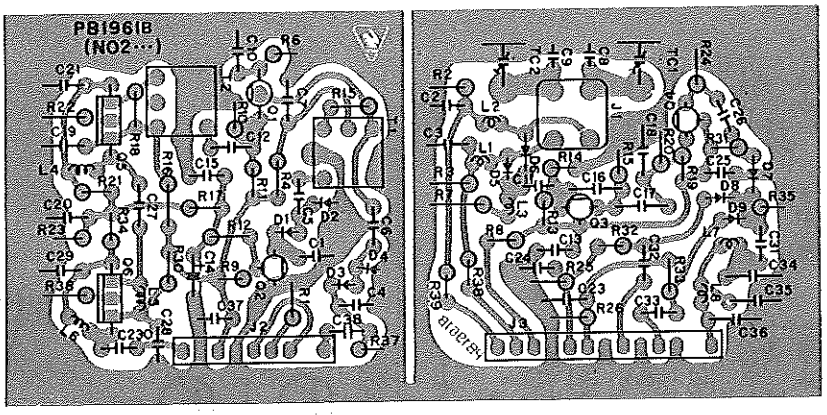


2SC372Y

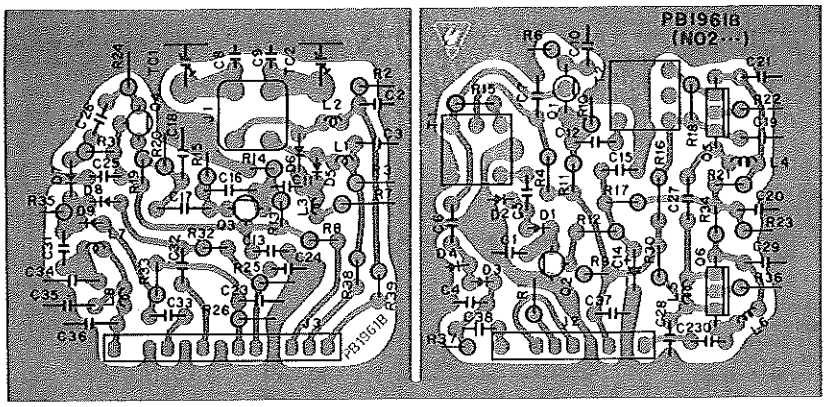


2SC1583

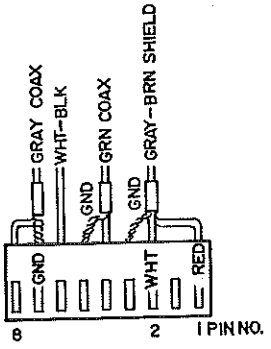
NB / FIX UNIT PARTS LAYOUT



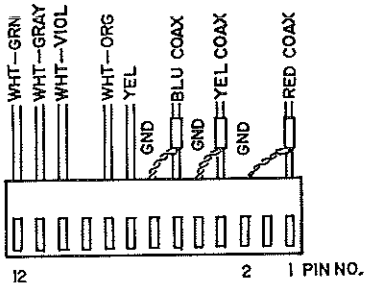
Viewed from component side



Viewed from solder side

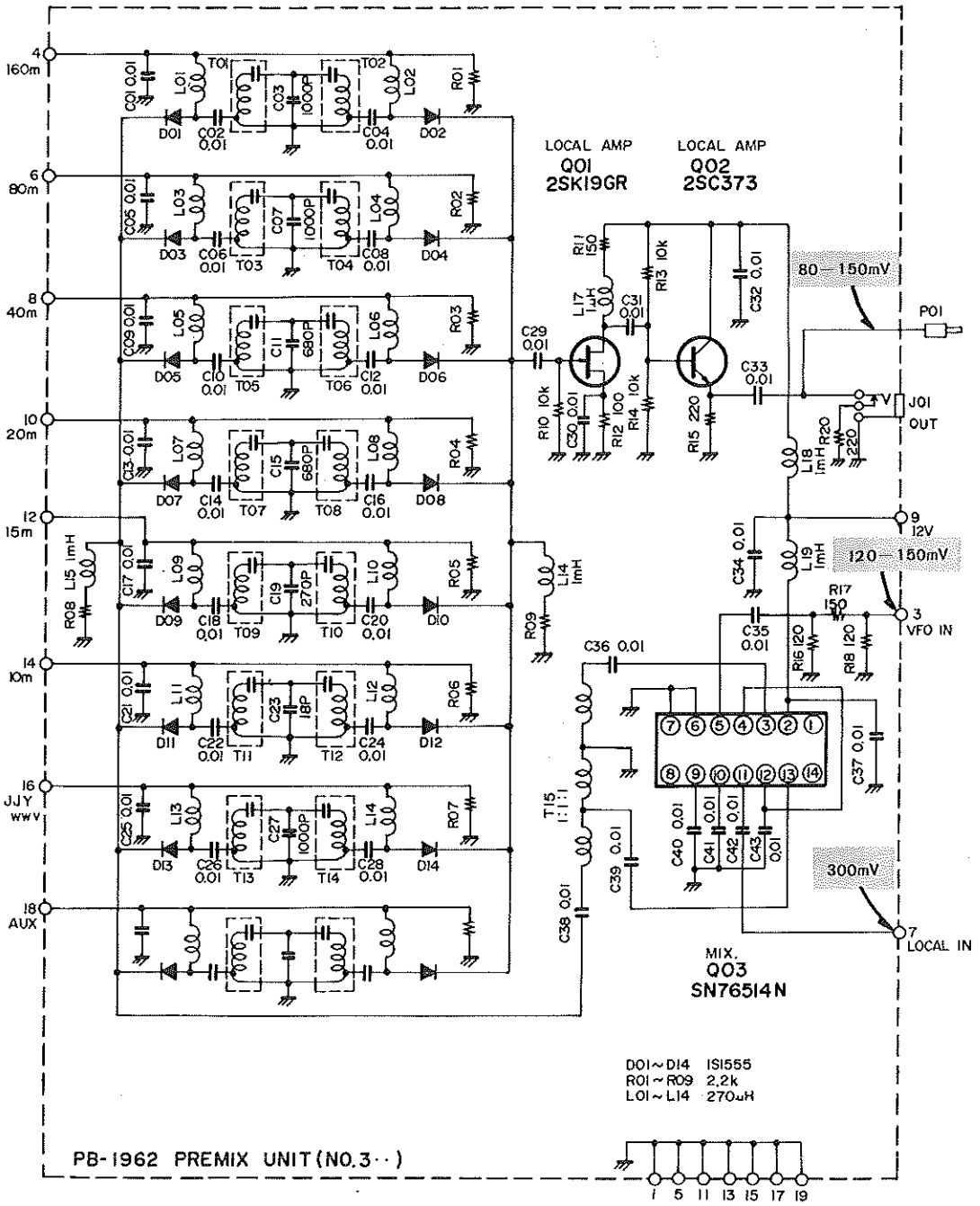


P8 (J201)



P9 (J202)

PREMIX UNIT (PB1962A)



DC VOLTAGES

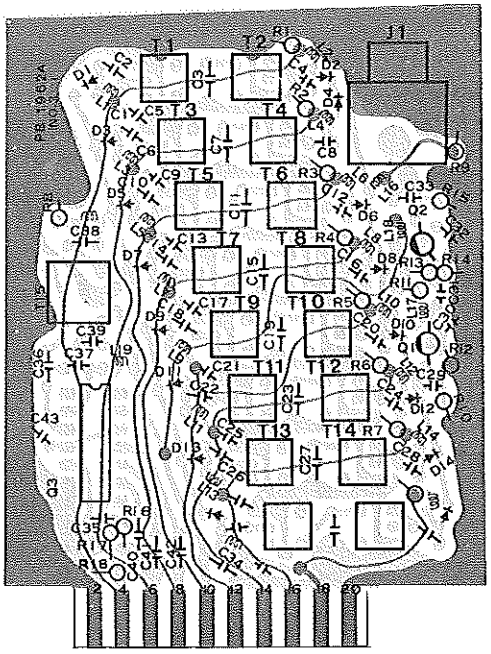
(V)

	E	C	B
Q_{301}	0.4	11.0	0
Q_{302}	4.4	12.0	4.8

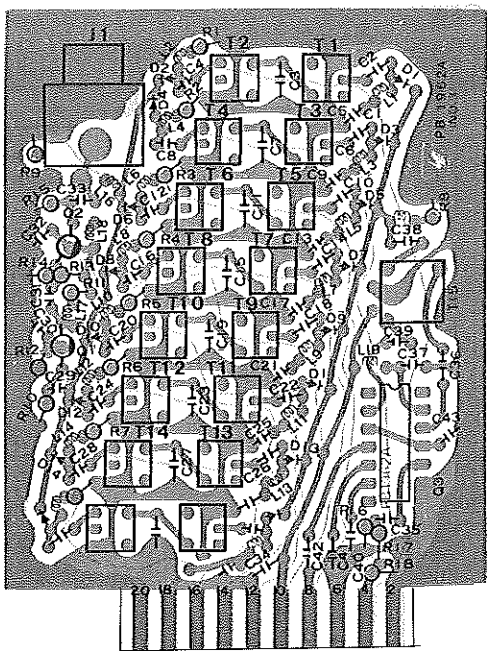
(V)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Q_{303}	0	12.1	10.2	6.1	3.9	0	0	0	3.9	6.0	6.0	6.0	10.2	0

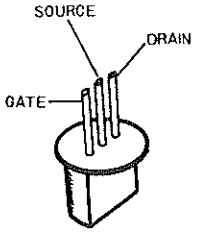
PREMIX UNIT PARTS LAYOUT



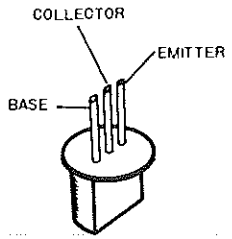
Viewed from component side



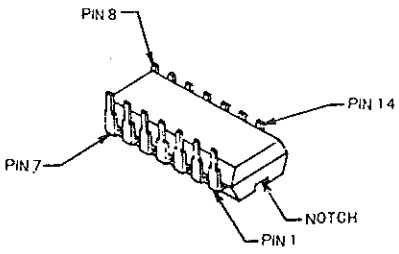
Viewed from solder side



2SK19GR

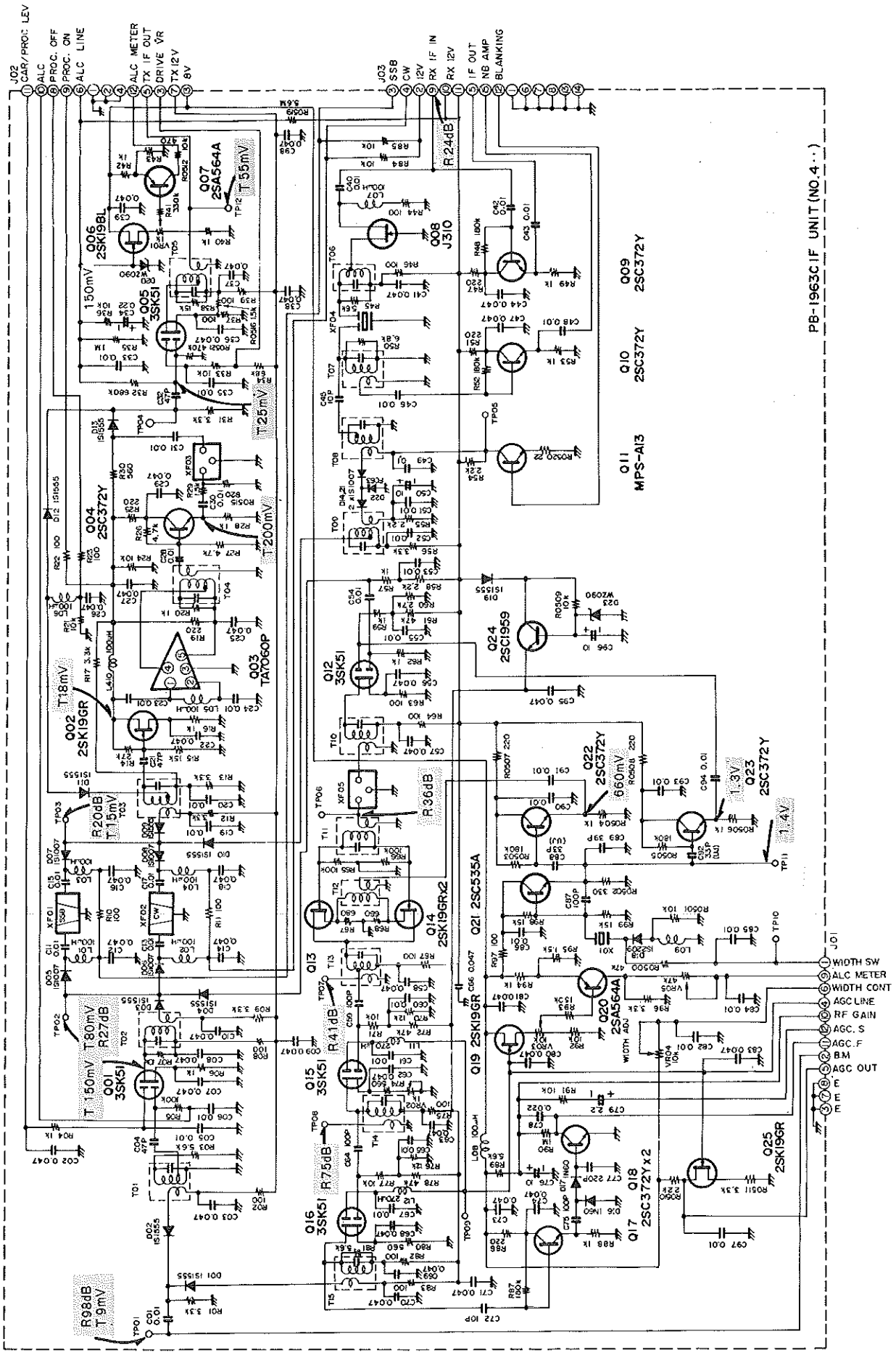


2SC373Y



SN76514N

IF UNIT (PB-1963C)



IF UNIT VOLTAGE CHARTS

DC VOLTAGES

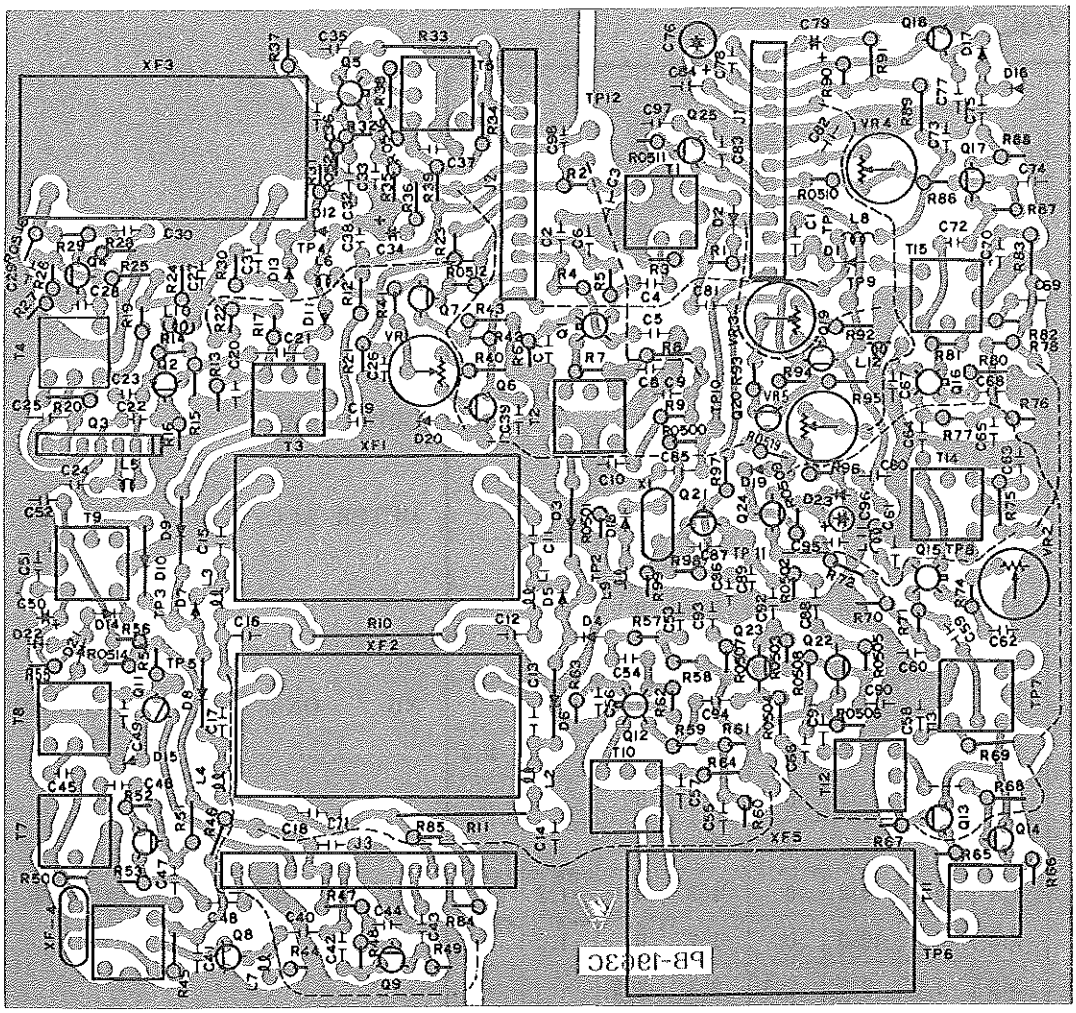
(V)

	E(S)		C(D)		B(G_1)		(G_2)		
	R	T	R	T	R	T	R	T	
Q_{401}	0	0.8	0	12.0	0	0	0	4.5	
Q_{402}	4.6	4.7	10.1	10.1	3.5	3.5	—	—	PROC ON
	1.5	1.3	1.7	1.7	0.6	0.6	—	—	PROC OFF
Q_{404}	3.8	4.6	9.1	8.6	4.5	4.2	—	—	PROC ON
	0.2	0.3	1.6	1.8	0.8	0.9	—	—	PROC OFF
Q_{405}	0	0.9	0	11.2	0	0	0	4.5	DRIVE MAX
Q_{406}	3.0	3.0	8.1	8.1	0	0	—	—	
Q_{407}	2.6	2.6	* 1.3	* 1.3	2.0	2.0	—	—	METER ALC (*IC, PO 2.1V)
Q_{408}	1.3	0	10.9	0	0	0	—	—	
Q_{409}	5.5	0	11.0	0	5.3	0	—	—	
Q_{410}	5.6	0	11.0	0	5.4	0	—	—	
Q_{411}	0	0	6.4	0	** 0.5	** 0.4	—	—	NB ON (**NB OFF 0V)
Q_{412}	0.2	0	12.0	0	0	0	0.6	0.6	
Q_{413}	1.7	0	11.7	0	0	0	—	—	
Q_{414}	1.7	0	11.7	0	0	0	—	—	
Q_{415}	2.4	0	10.2	0	1.7	0	*** 1.2	*** 1.2	RF GAIN MAX (***AGC OFF 3.6V)
Q_{416}	2.3	0	10.0	0	1.7	0	*** 1.2	*** 1.2	〃 (〃)
Q_{417}	3.0	3.0	7.5	7.5	3.3	3.3	—	—	
Q_{418}	0	0	1.2	1.2	0	0	—	—	RF GAIN MAX
Q_{419}	6.2	6.2	8.1	8.1	1.2	1.2	—	—	〃
Q_{420}	4.9	4.9	0	0	3.8	3.8	—	—	〃
Q_{421}	2.2	2.2	7.4	7.4	2.5	2.5	—	—	
Q_{422}	4.0	0	11.3	0	4.9	0	—	—	
Q_{423}	4.2	0	11.2	0	4.7	0	—	—	
Q_{424}	10.4	0	11.5	0	10.5	0	—	—	
Q_{425}	4.7	4.7	4.9	4.9	1.2	1.2	—	—	RF GAIN MAX

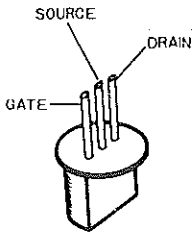
(V)

		1	2	3	4	5	
Q_{403}	R	1.5	1.5	0	9.5	9.5	PROC ON
	T	1.5	1.5	0	9.3	9.3	
	R	1.3	1.3	0	1.7	1.7	PROC OFF
	T	1.3	1.3	0	1.8	1.8	

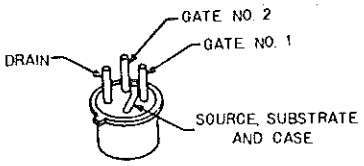
IF UNIT PARTS LAYOUT (1)



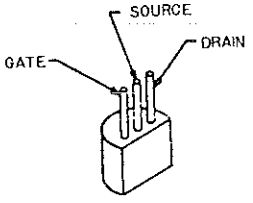
Viewed from component side



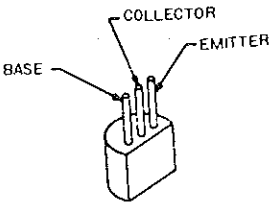
2SK19BL
2SK19GR



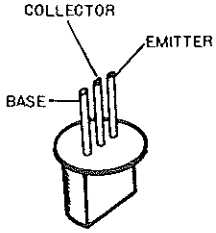
3SK51-03



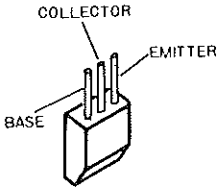
J310



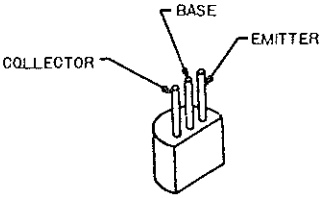
2SA564A



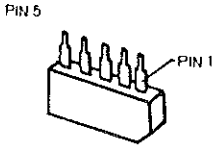
2SC372Y



2SC535A

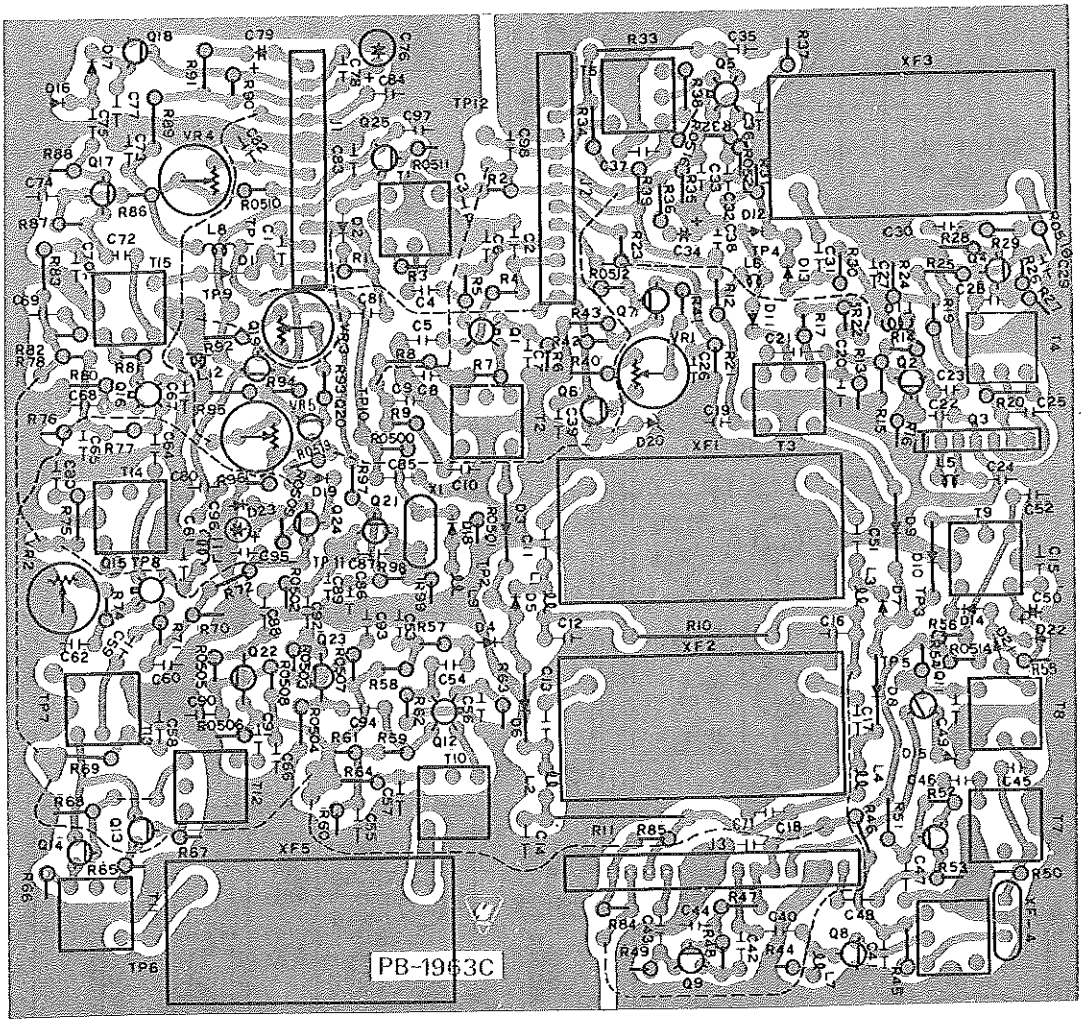


MPSA13

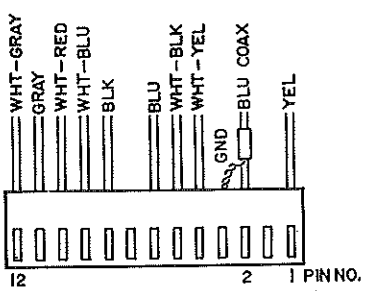


TA7060P

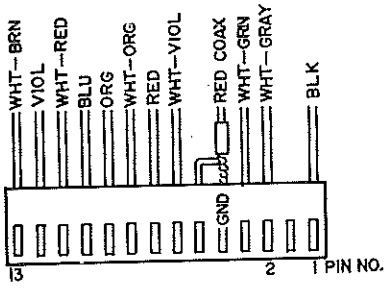
IF UNIT PARTS LAYOUT (2)



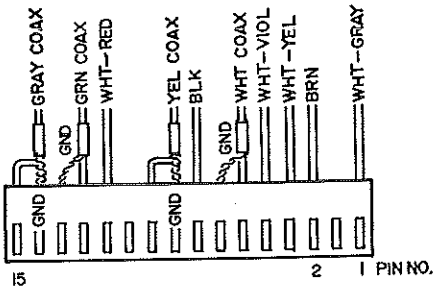
Viewed from solder side



P1 (J401)

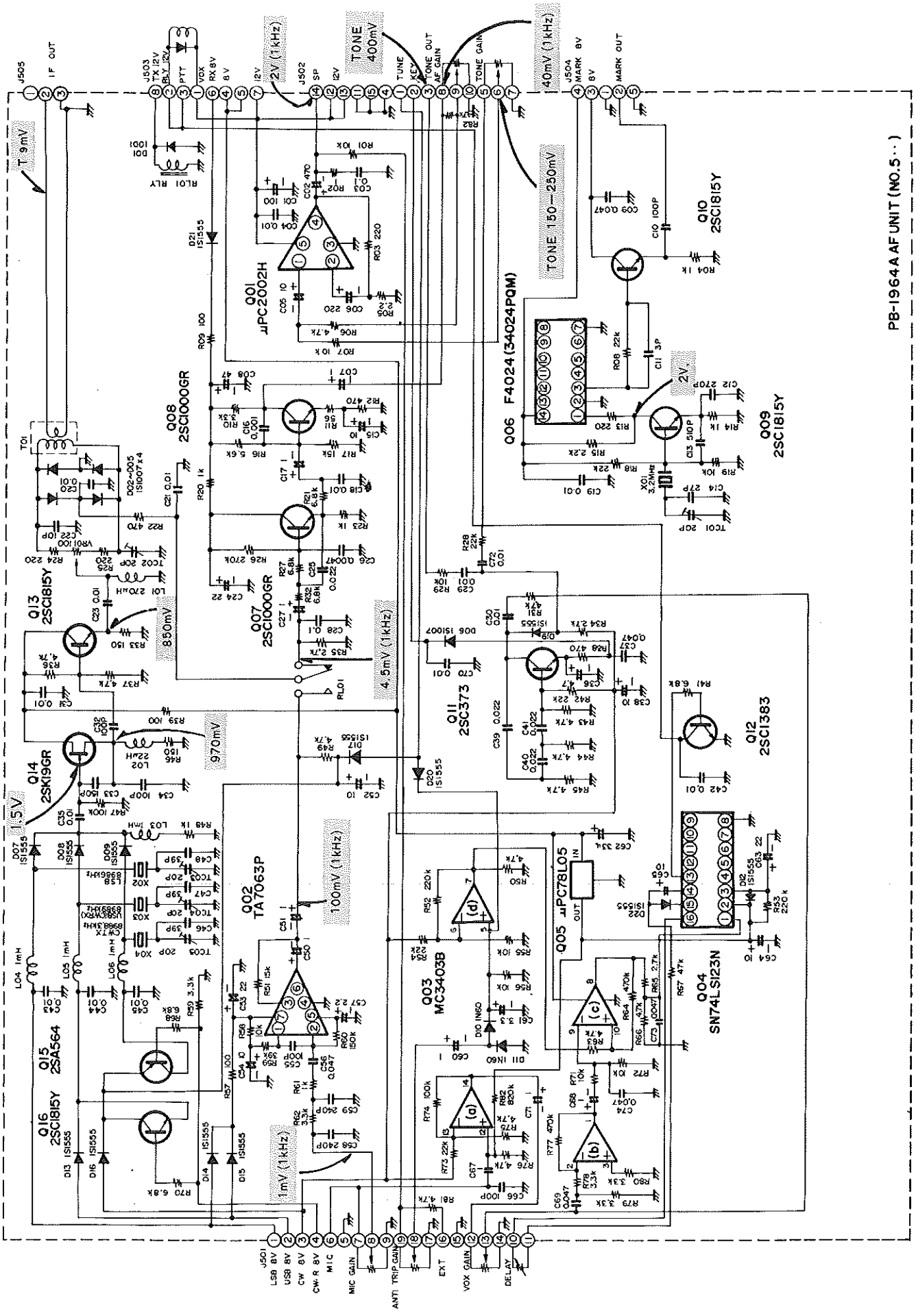


P2(J402)



P3(J403)

AF UNIT (PB-1964)



AF UNIT VOLTAGE CHARTS

DC VOLTAGES

(V)

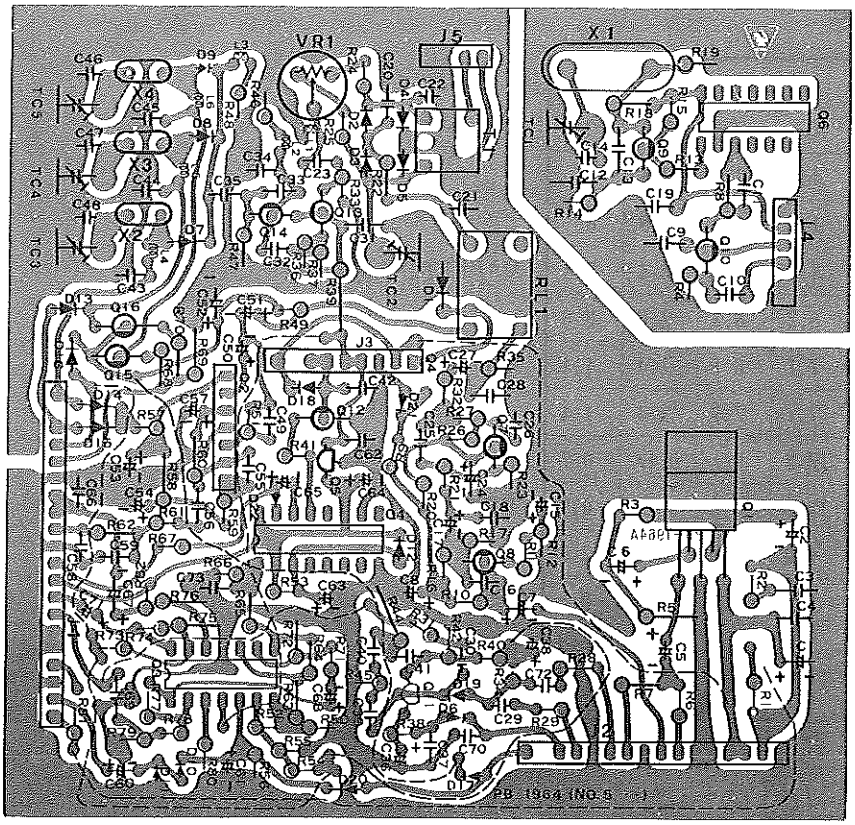
	E(S)		C(D)		B(G)		
	R	T	R	T	R	T	
Q_{507}	2.2	0	4.8	0	2.4	0	
Q_{508}	1.4	0	1.6	0	0.8	0	
★★ Q_{509}	1.8	1.8	3.5	3.5	2.4	2.4	MARKER ON
Q_{510}	★★ 5.5	★★ 5.5	8.2	8.2	★★ 3.6	★★ 3.6	〃 〃
Q_{511}	0.9	0.7	7.7	6.1	1.4	1.4	CW KEY DOWN (MARK)
	0.9	0.7	7.7	7.7	1.4	1.4	〃 UP (SPACE)
Q_{512}	0	0	12.2	0	0.12	0.7	PTT SW TRANSMIT
	0	0	12.2	0.2	0.12	0.7	VOX TRANSMIT
Q_{513}	2.4	2.4	6.0	6.0	2.8	2.8	
Q_{514}	0.9	0.9	6.0	6.0	0	0	
Q_{515}	7.4	7.4	7.4	7.4	6.7	6.7	TUNE
	7.4	7.4	0	7.4	8.0	6.7	CW
Q_{516}	1.7	1.7	7.4	7.4	2.1	2.1	TUNE
	7.2	7.2	7.4	7.4	7.8	1.7	CW

(V)

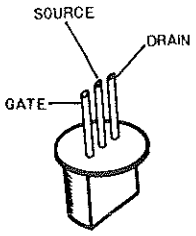
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Q_{501}	0.5	0.7	0	5.6	12.2	—	—	—	—	—	—	—	—	—	—	—
★ Q_{502}	1.3	0.6	0.02	0	0.7	4.8	7.3	—	—	—	—	—	—	—	—	—
Q_{503}	0	0	0	8.1	7.5	0.1	6.7	6.7	0	6.6	0	0	0	1.0	—	—
Q_{504}	4.2	5.0	3.5	4.3	0.1	0	0.4	0	1.2	0	5.0	4.3	0.1	0	1.2	5.0
Q_{505}	8.1	0	5.0	—	—	—	—	—	—	—	—	—	—	—	—	—
★★ Q_{506}	3.7	0	3.2	3.0	3.0	2.9	0	0	2.9	0	3.0	3.0	0	8.1	—	—

★SSB(CW 0V) ★★MARKER ON(OFF 0V)

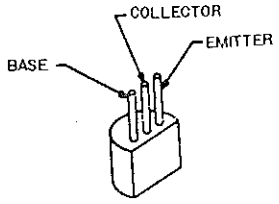
AF UNIT PARTS LAYOUT (1)



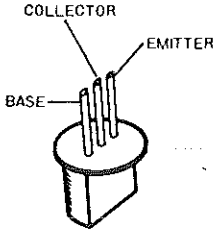
Viewed from component side



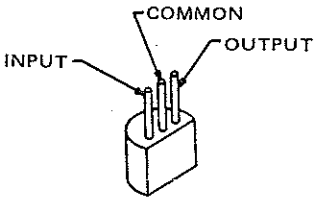
2SK19GR



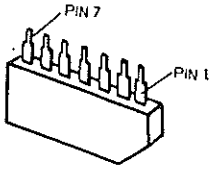
2SA564A
2SC1383
2SC1815Y



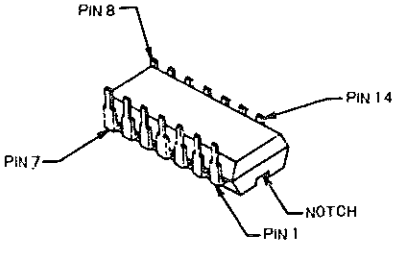
2SC373
2SC1000GR



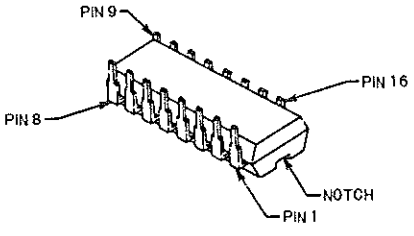
μPC78L05



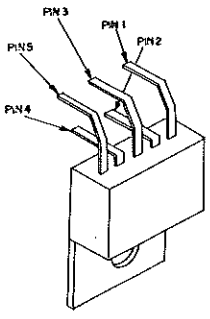
TA7063P



34024PCQM

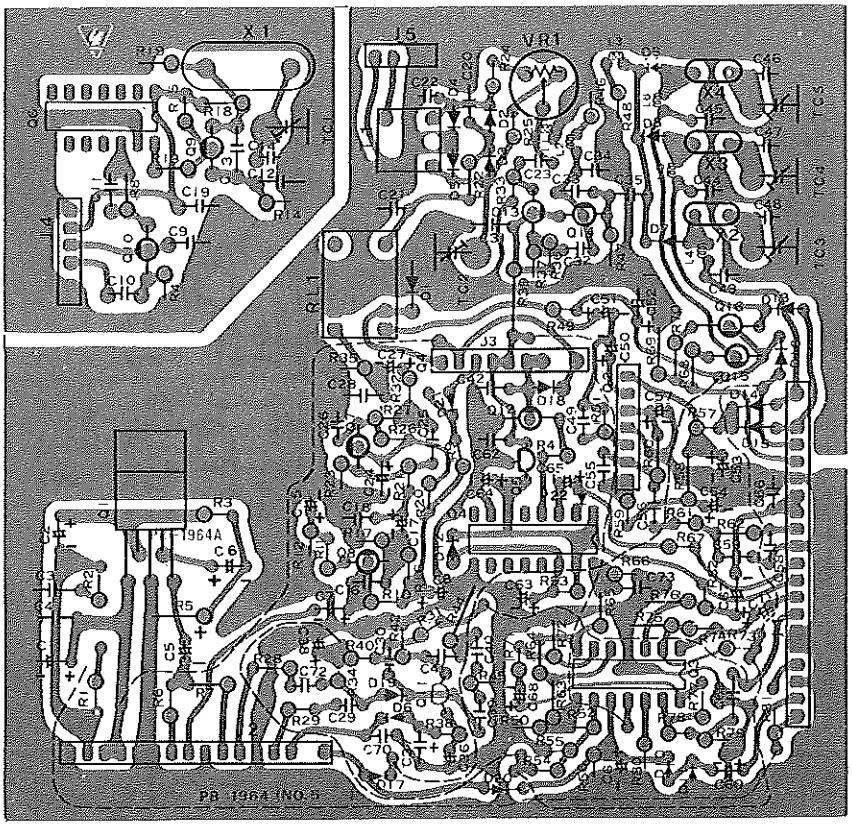


SN74LS123N

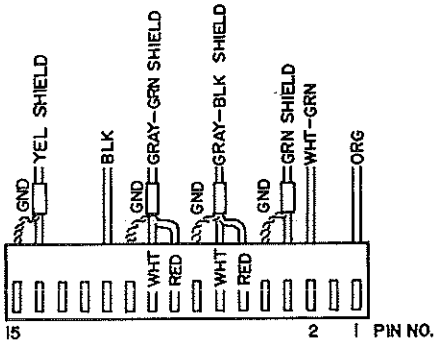


μPC2002H

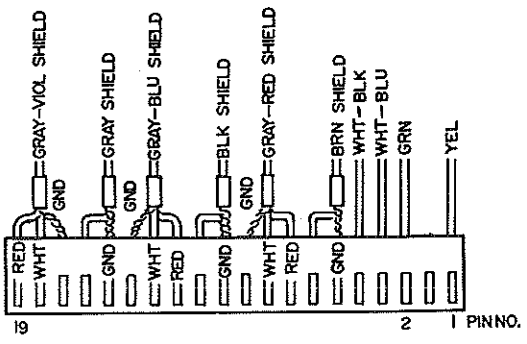
AF UNIT PARTS LAYOUT (2)



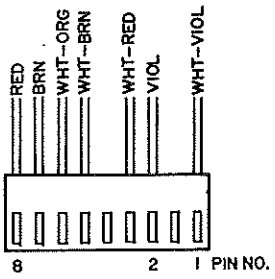
Viewed from solder side



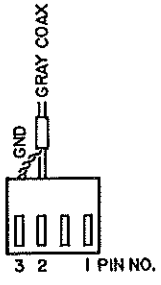
P5(J502)



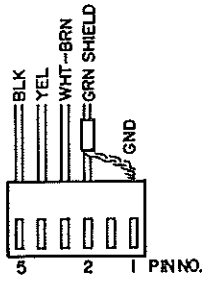
P4(J501)



P6(J503)

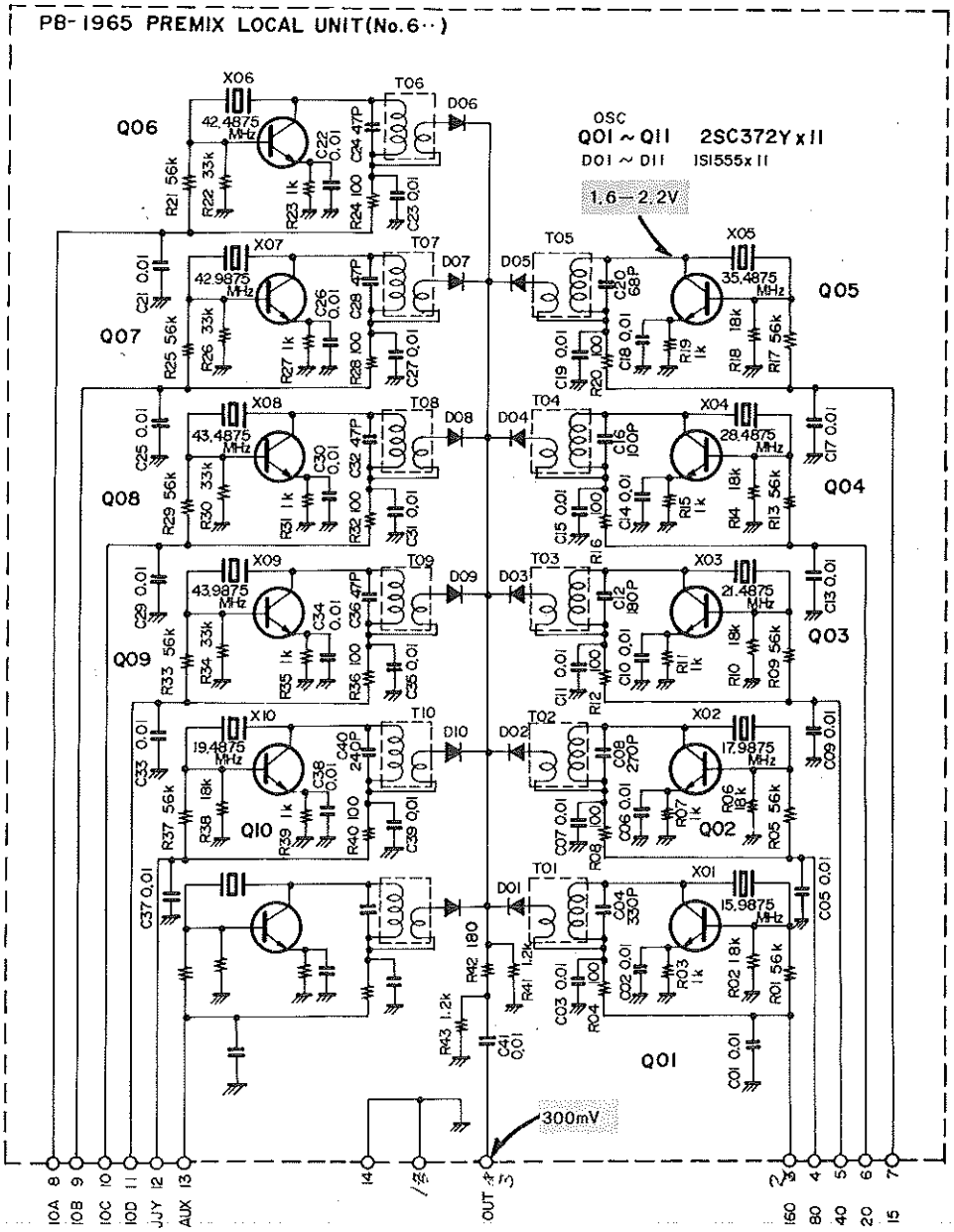


P18(J505)



P7(J504)

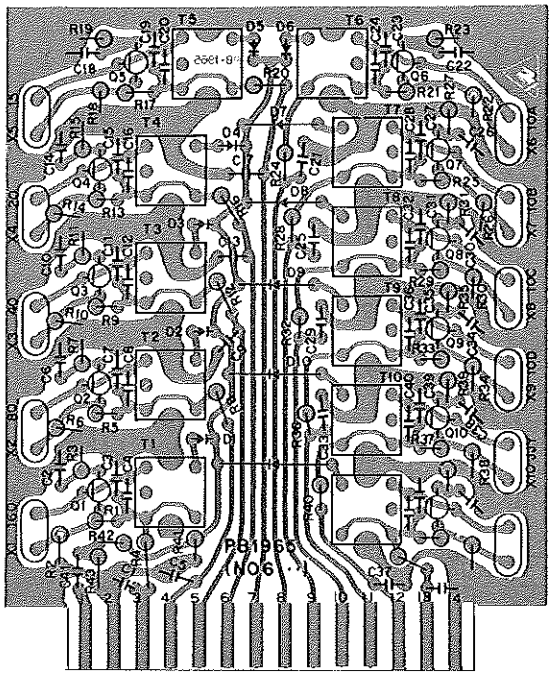
PREMIX LOCAL UNIT (PB1965)



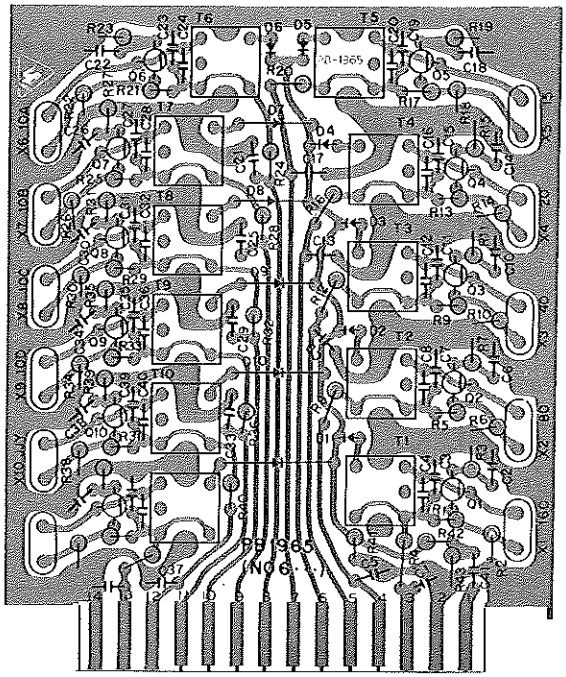
DC VOLTAGES (V)

	E	C	B
Q_{601}	3.1	6.7	1.5
Q_{602}	3.1	6.7	1.5
Q_{603}	3.0	6.7	1.5
Q_{604}	2.6	6.7	1.5
Q_{605}	2.5	6.7	1.0
Q_{606}	1.9	6.7	1.3
Q_{607}	2.8	6.6	1.9
Q_{608}	2.7	6.6	2.1
Q_{609}	2.5	6.6	1.7
Q_{610}	3.2	6.7	1.5
Q_{611}	2.6	6.7	1.5

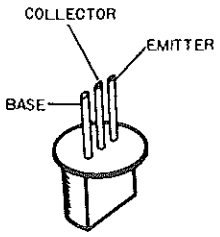
PREMIX LOCAL UNIT PARTS LAYOUT



Viewed from component side



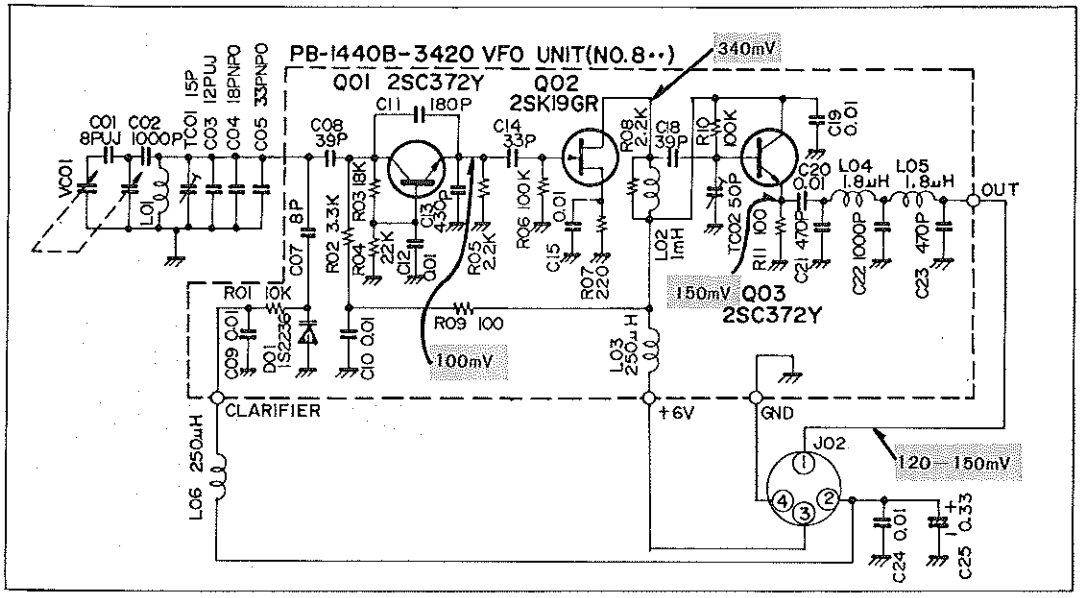
Viewed from solder side

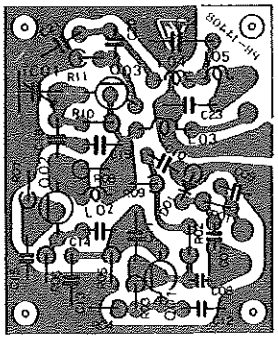


2SC372Y

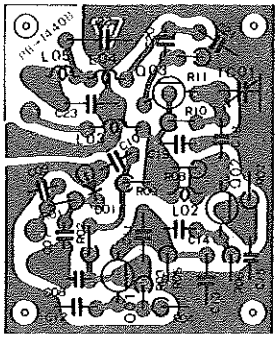
VFO ASSEMBLY

VFO BOARD (PB-1440B-3420)





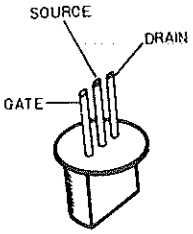
Viewed from component side



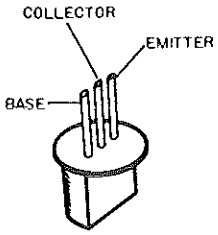
Viewed from solder side

DC VOLTAGES (V)

	E(S)	C(D)	B(G)
Q_{801}	1.4	3.7	1.9
Q_{802}	0.9	6.0	0
Q_{803}	0.9	6.0	1.6

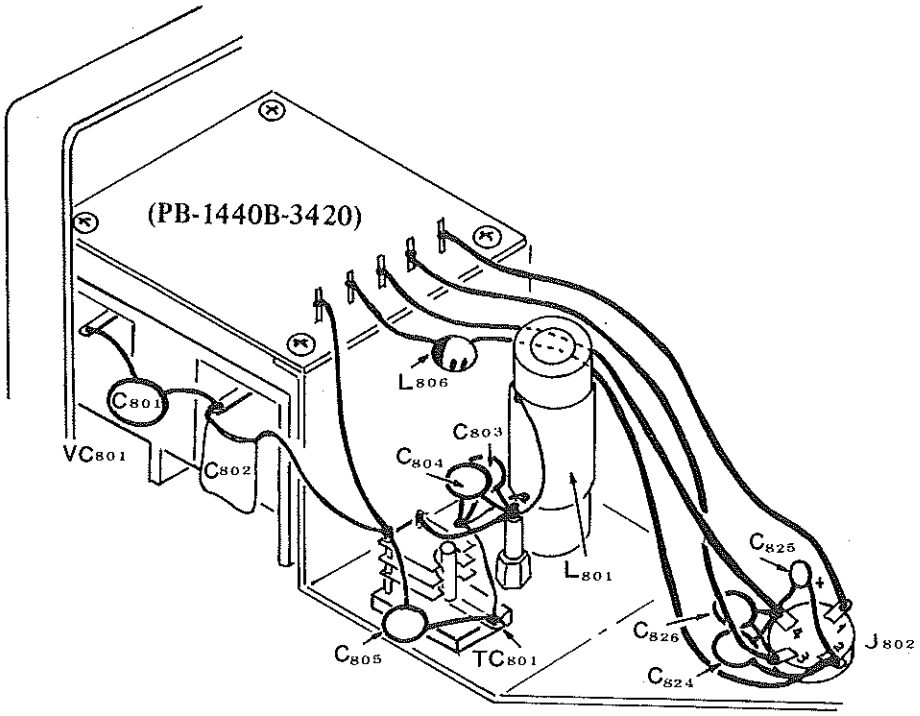


2SK19GR

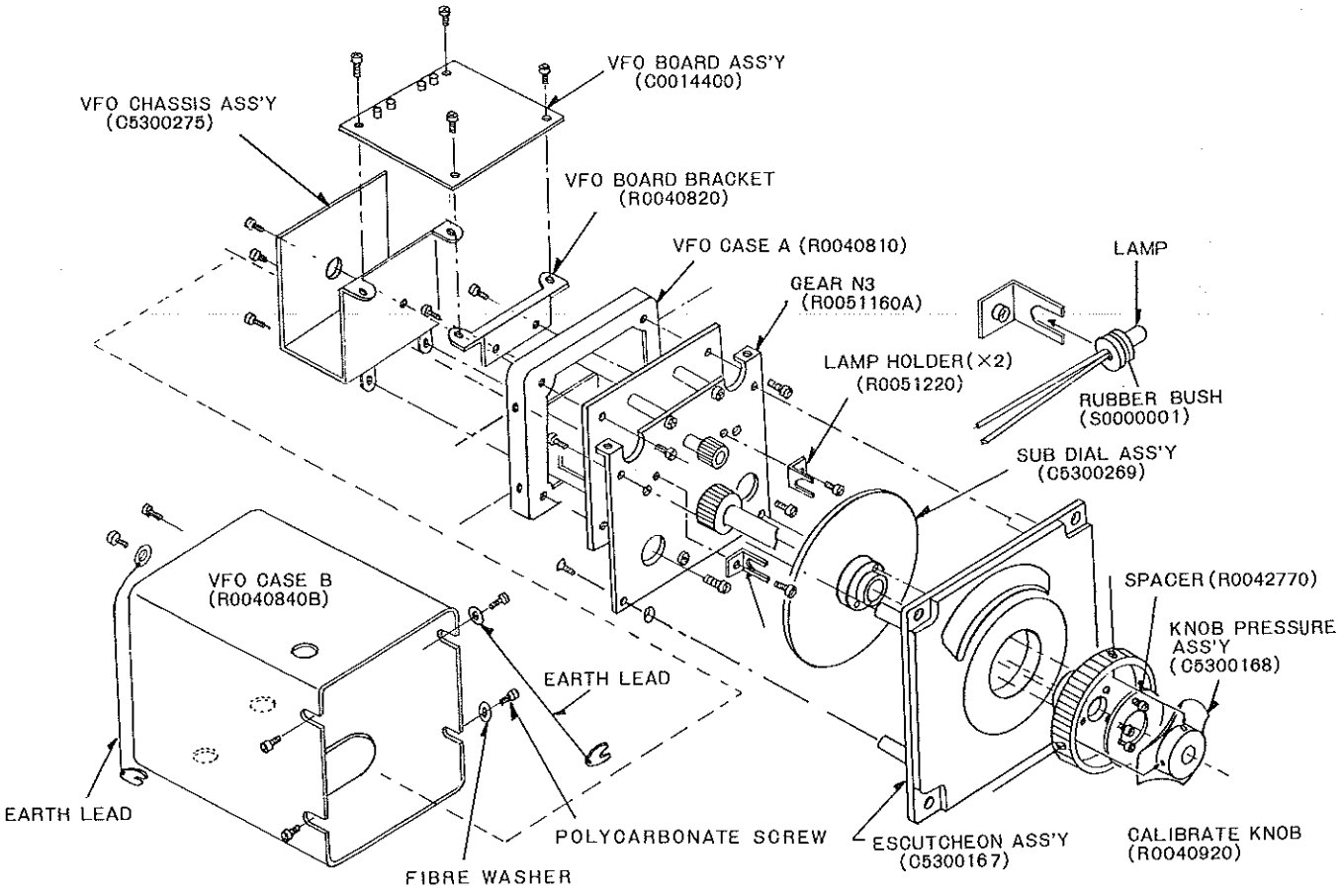


2SC372Y

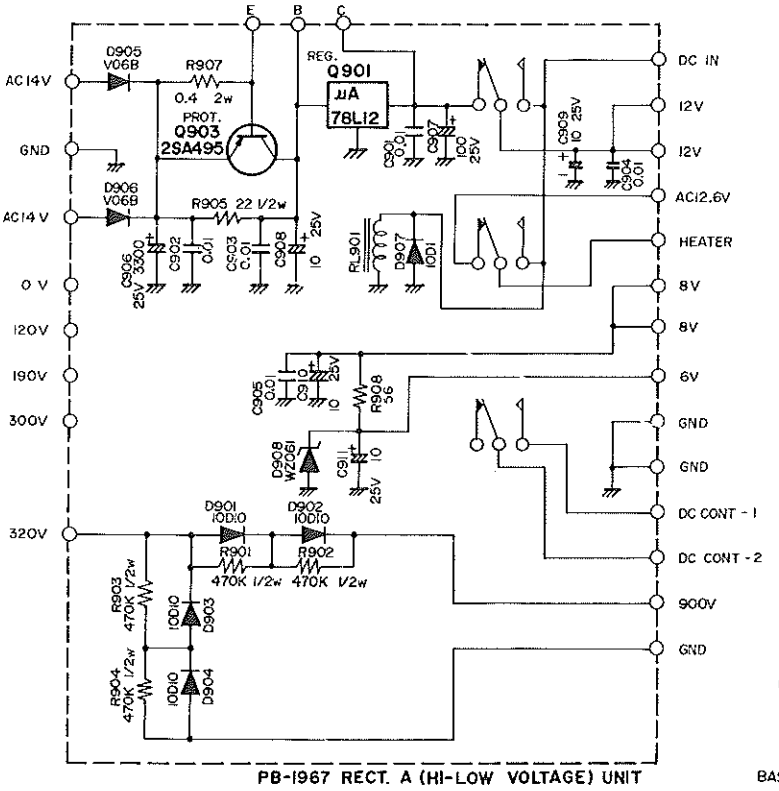
VFO ASSEMBLY PARTS LAYOUT



VFO UNIT EXPLODED VIEW



RECT A UNIT (HIGH/LOW VOLTAGES) UNIT (PB-1967)



DC VOLTAGES

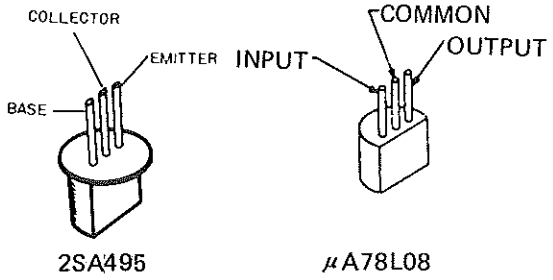
(V)

	IN	OUT
Q_{901}	★18.1	12.0

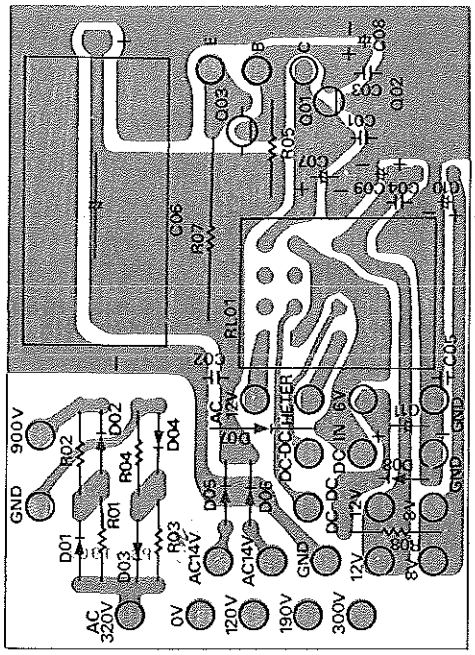
RECEIVE(★TRANSMIT 17.4V)

(V)

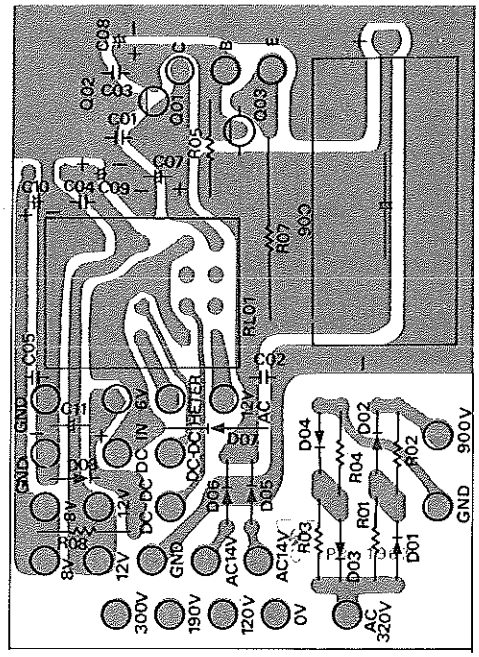
		E	C	B
Q_{903}	R	19.0	18.1	18.7
	T	18.5	17.4	18.2



2SA495 μA78L08

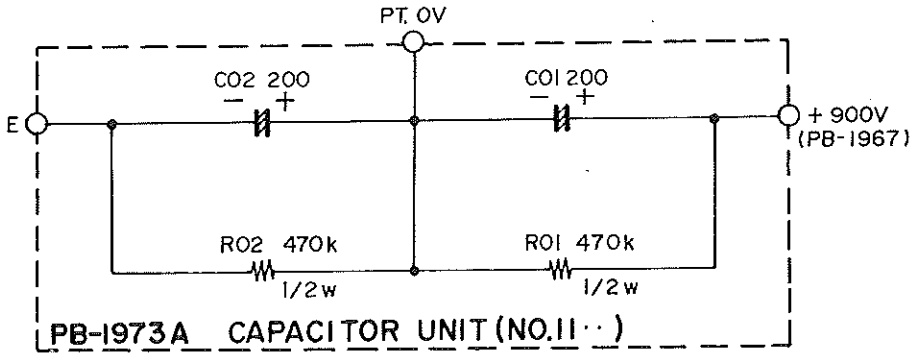


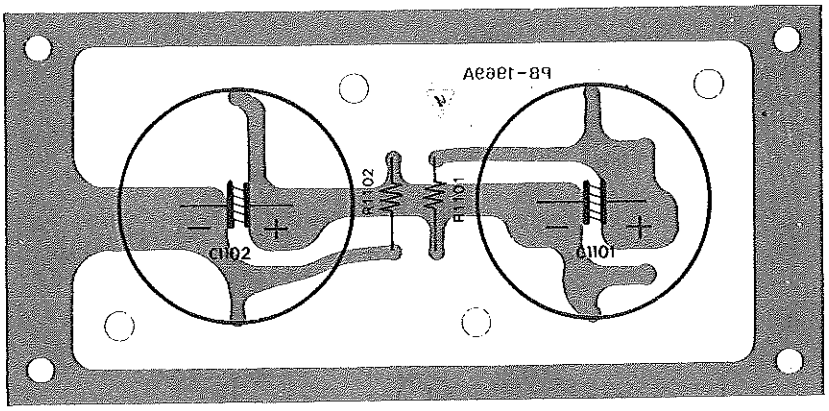
Viewed from component side



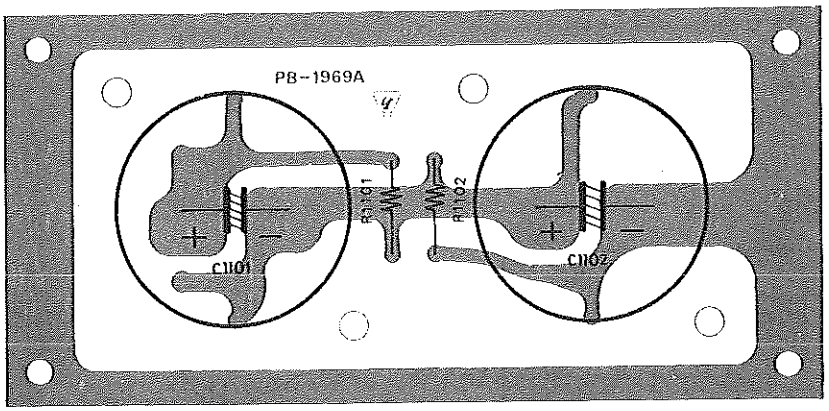
Viewed from solder side

CAPACITOR UNIT (PB-1969A)



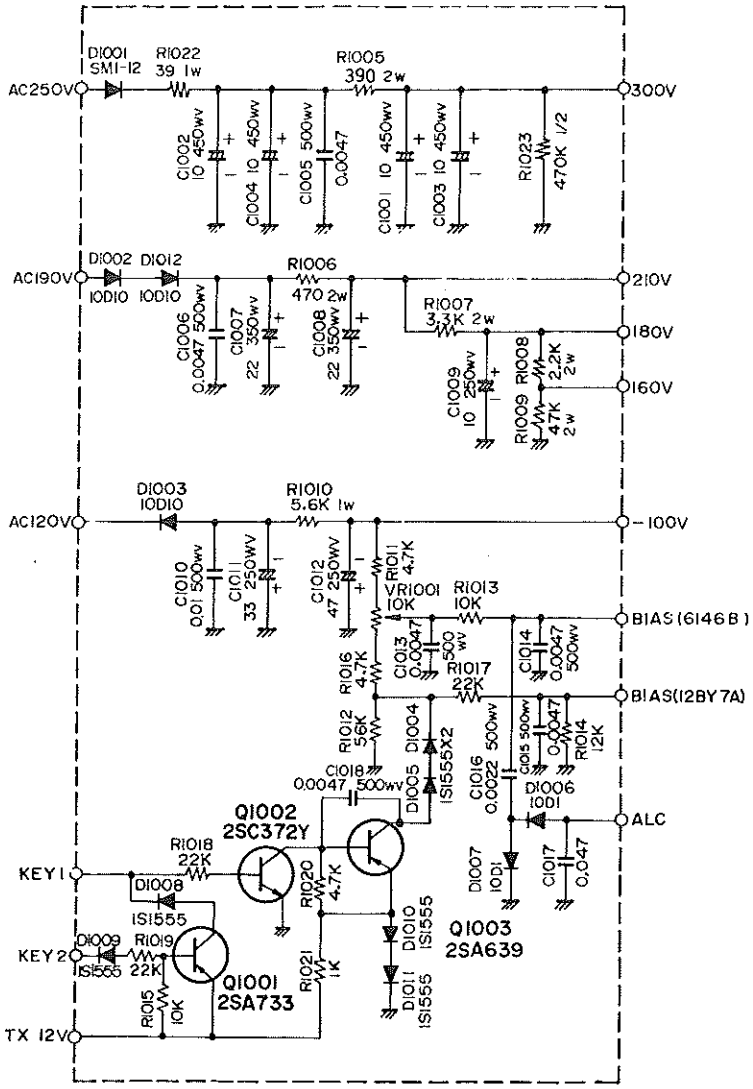


Viewed from component side



Viewed from solder side

RECT B (MEDIUM/BIAS VOLTAGES) UNIT (PB-1968B)

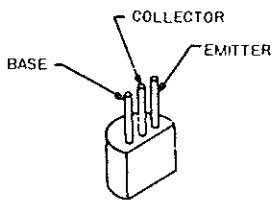


PB-1968 RECT. B(M.BIAS VOLTAGE) UNIT

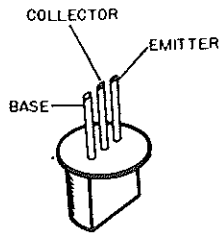
DC VOLTAGES

(V)

	E		C		B		
	R	T	R	T	R	T	
Q_{1001}	0	12.2	0	12.1	0	11.5	KEY UP
	0	12.2	0	0	0	11.9	KEY DOWN
Q_{1002}	0	0	0	1.5	0	0	KEY UP
	0	0	0	0	0	0.7	KEY DOWN
Q_{1003}	0	1.5	−84	−84	0	1.5	KEY UP
	0	0.8	−84	-0.8	0	0	KEY DOWN

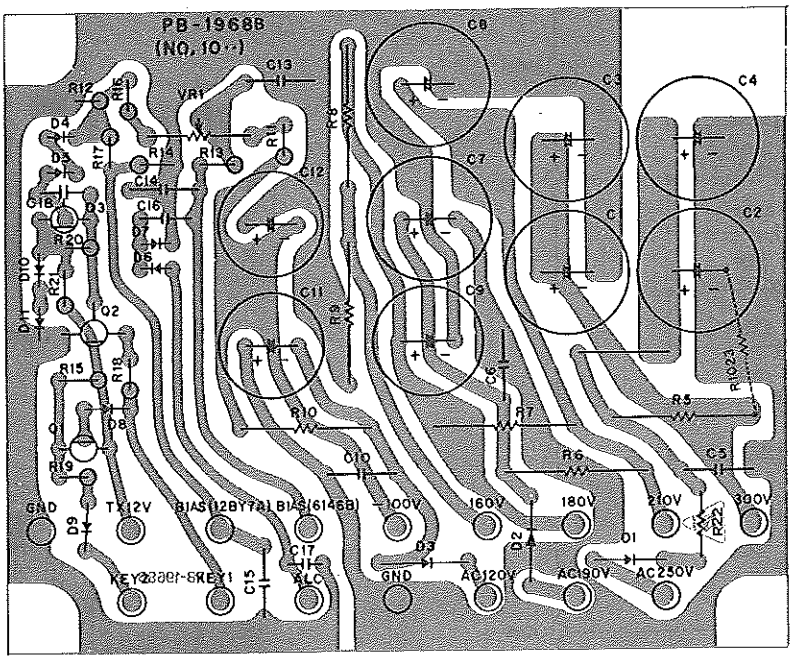


2SA639
2SA733

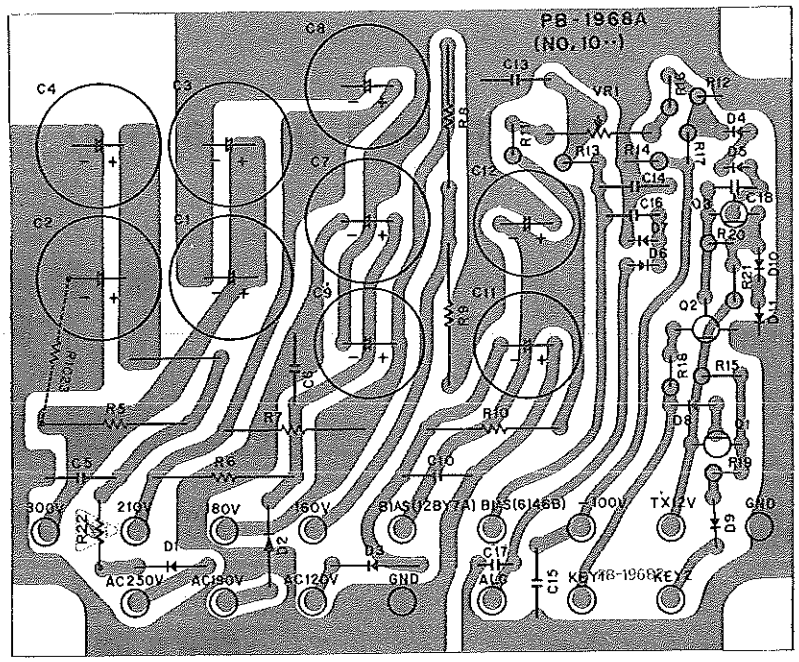


2SC372Y

RECT B UNIT PARTS LAYOUT

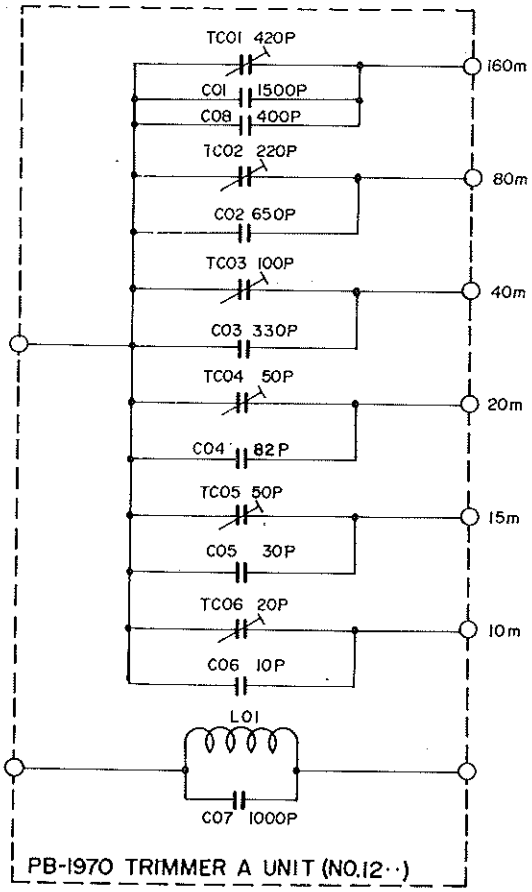


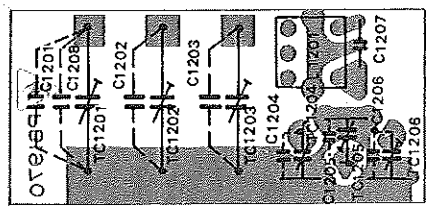
Viewed from component side



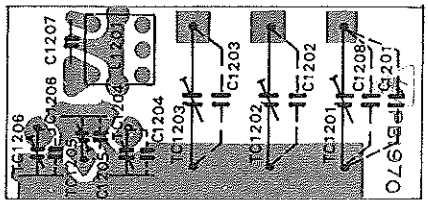
Viewed from solder side

TRIMMER A BOARD (PB-1970Ⓐ)



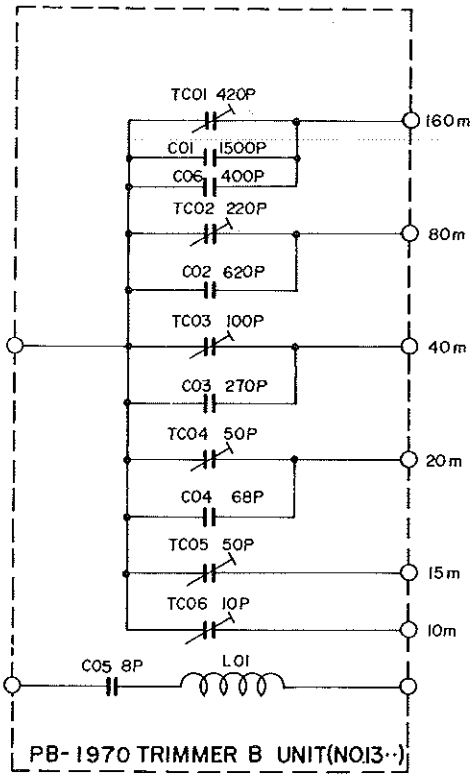


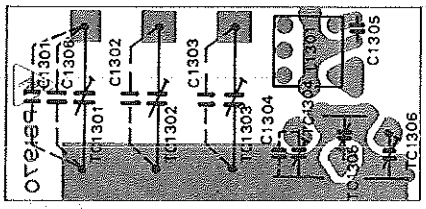
Viewed from component side



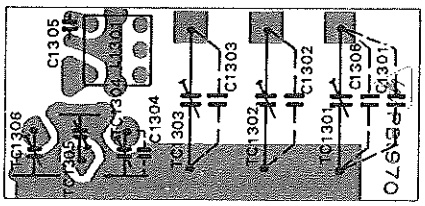
Viewed from solder side

TRIMMER B BOARD (PB-1970Ⓑ)



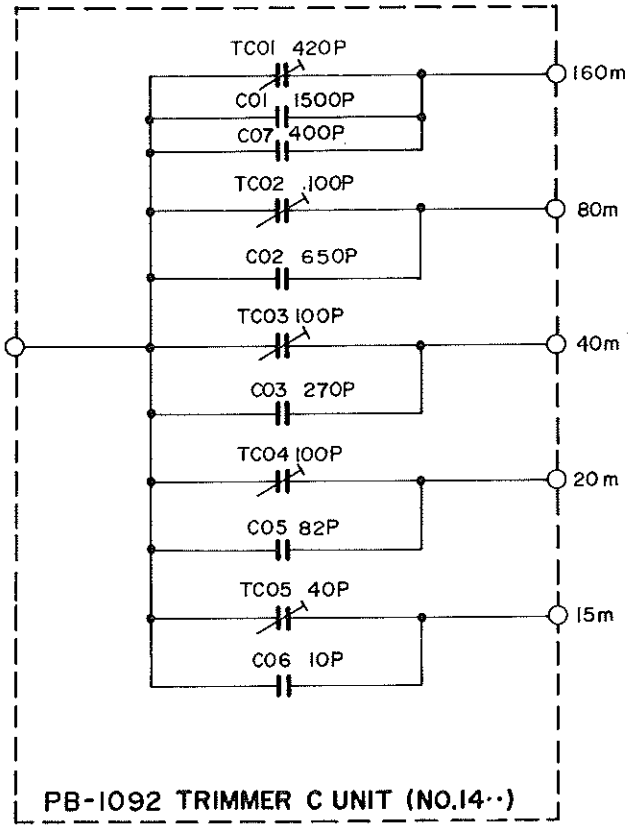


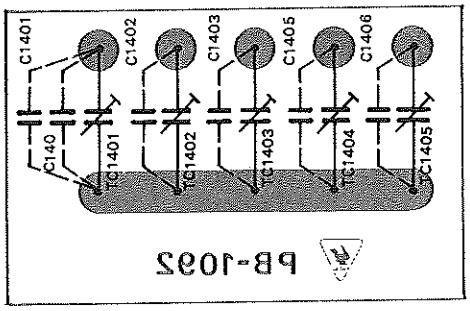
Viewed from component side



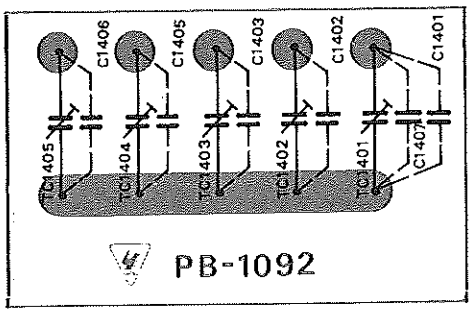
Viewed from solder side

TRIMMER C BOARD (PB-1092)



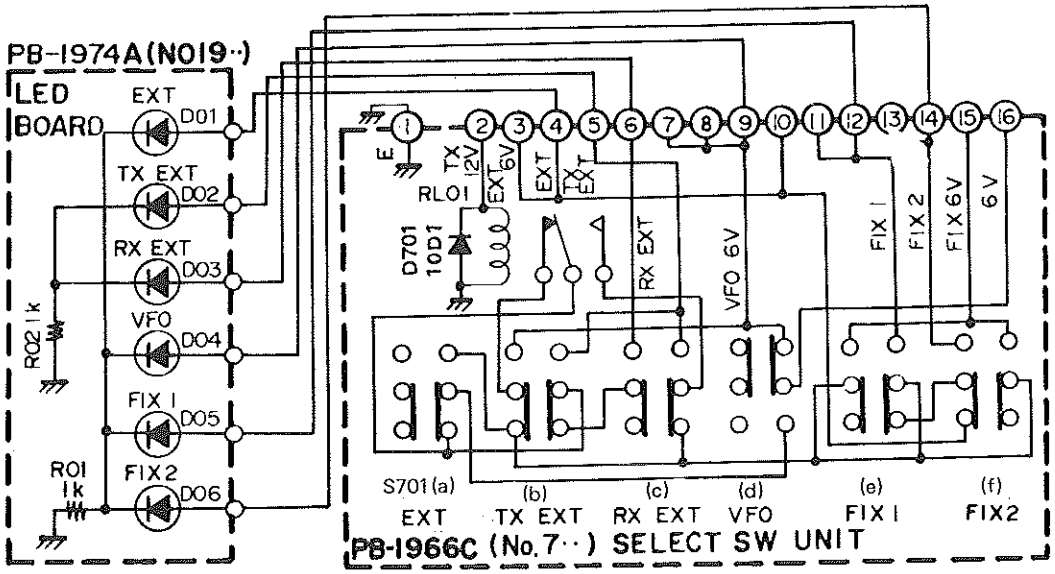


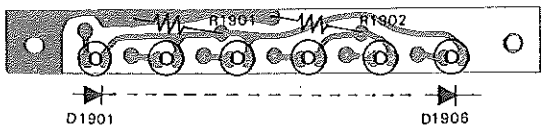
Viewed from component side

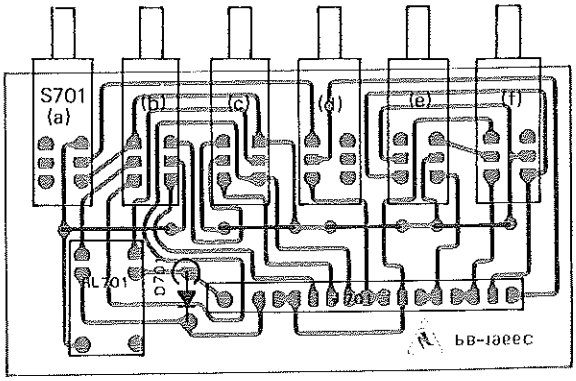


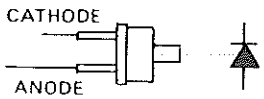
Viewed from solder side

LED UNIT(PB-1974A) SELECT SWITCH UNIT(PB-1966C)



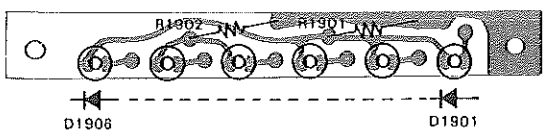


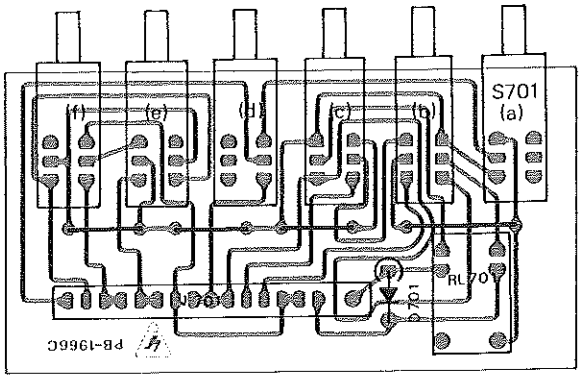




LED Connection

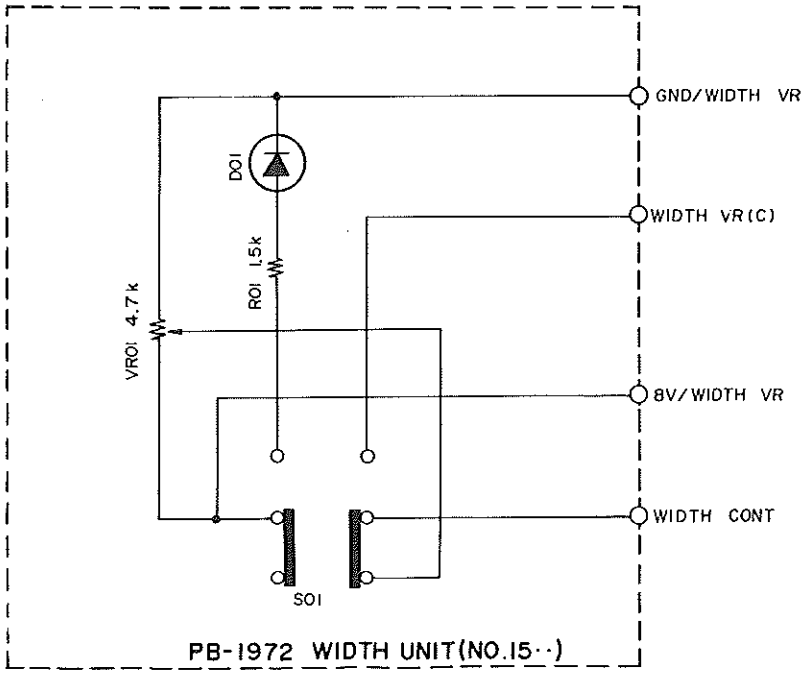
Viewed from component side

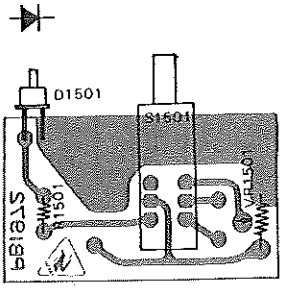




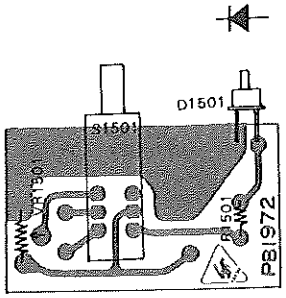
Viewed from solder side

BAND WIDTH CONTROL UNIT (PB-1972)

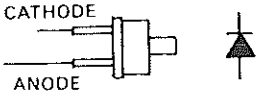




Viewed from component side

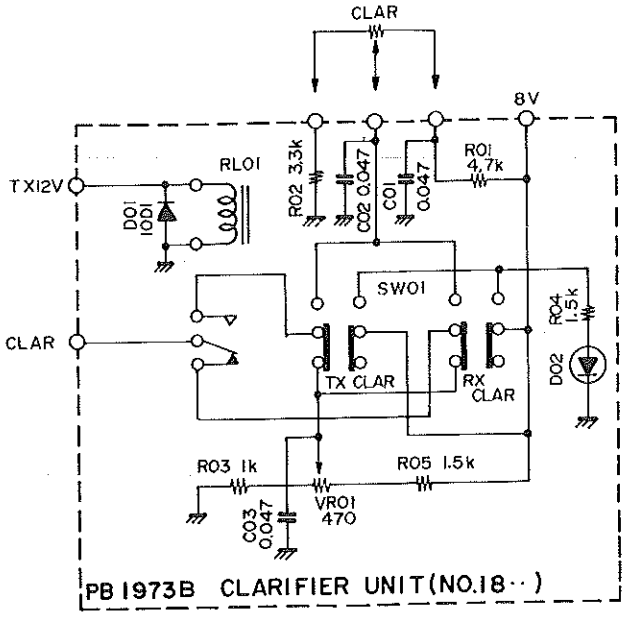


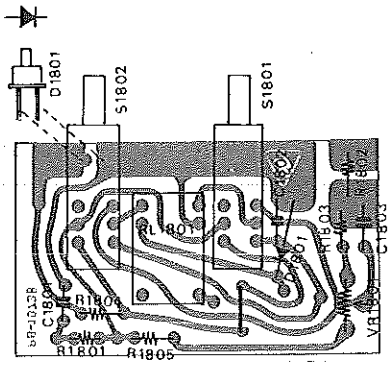
Viewed from solder side



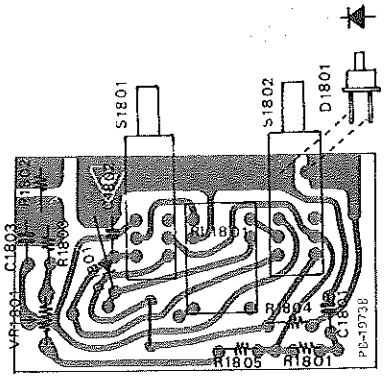
LED Connection

CLARIFIER UNIT (PB-1973)



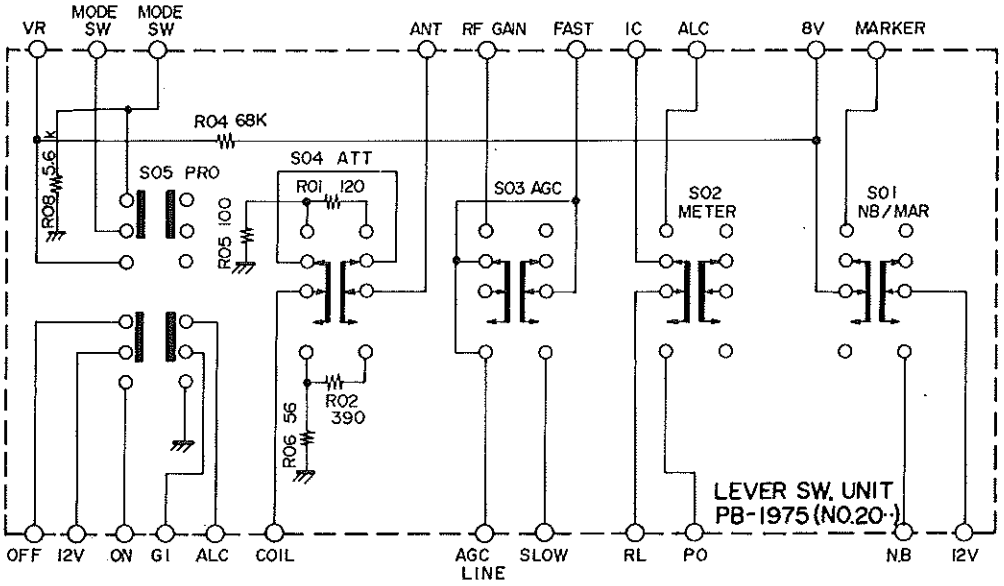


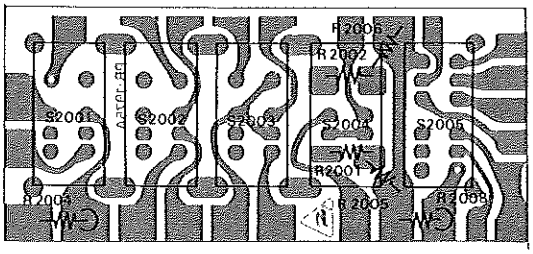
Viewed from component side



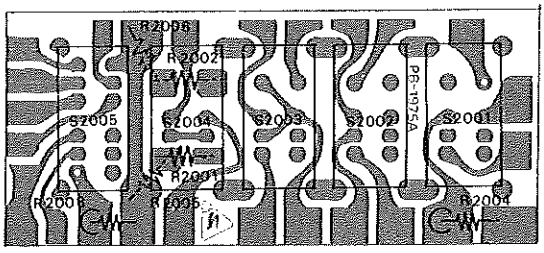
Viewed from solder side

LEVER SWITCH UNIT (PB-1975A)

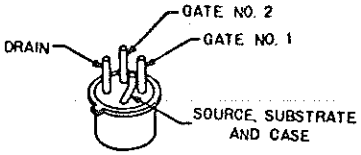




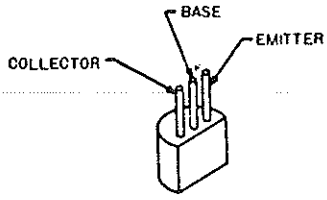
Viewed from component side



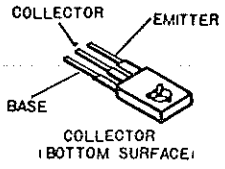
Viewed from solder side



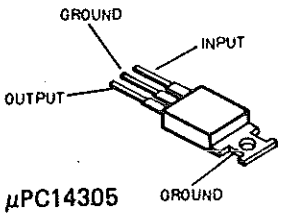
3SK40M
3SK51-03



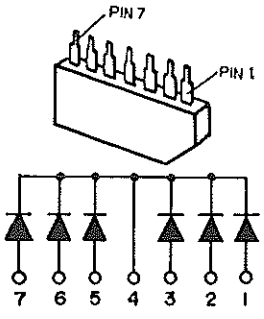
MPS3640



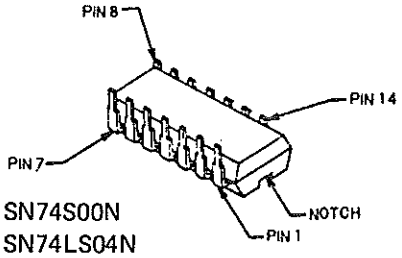
2SA496O



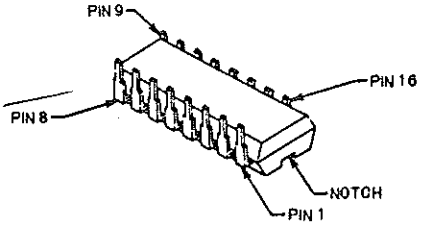
μPC14305



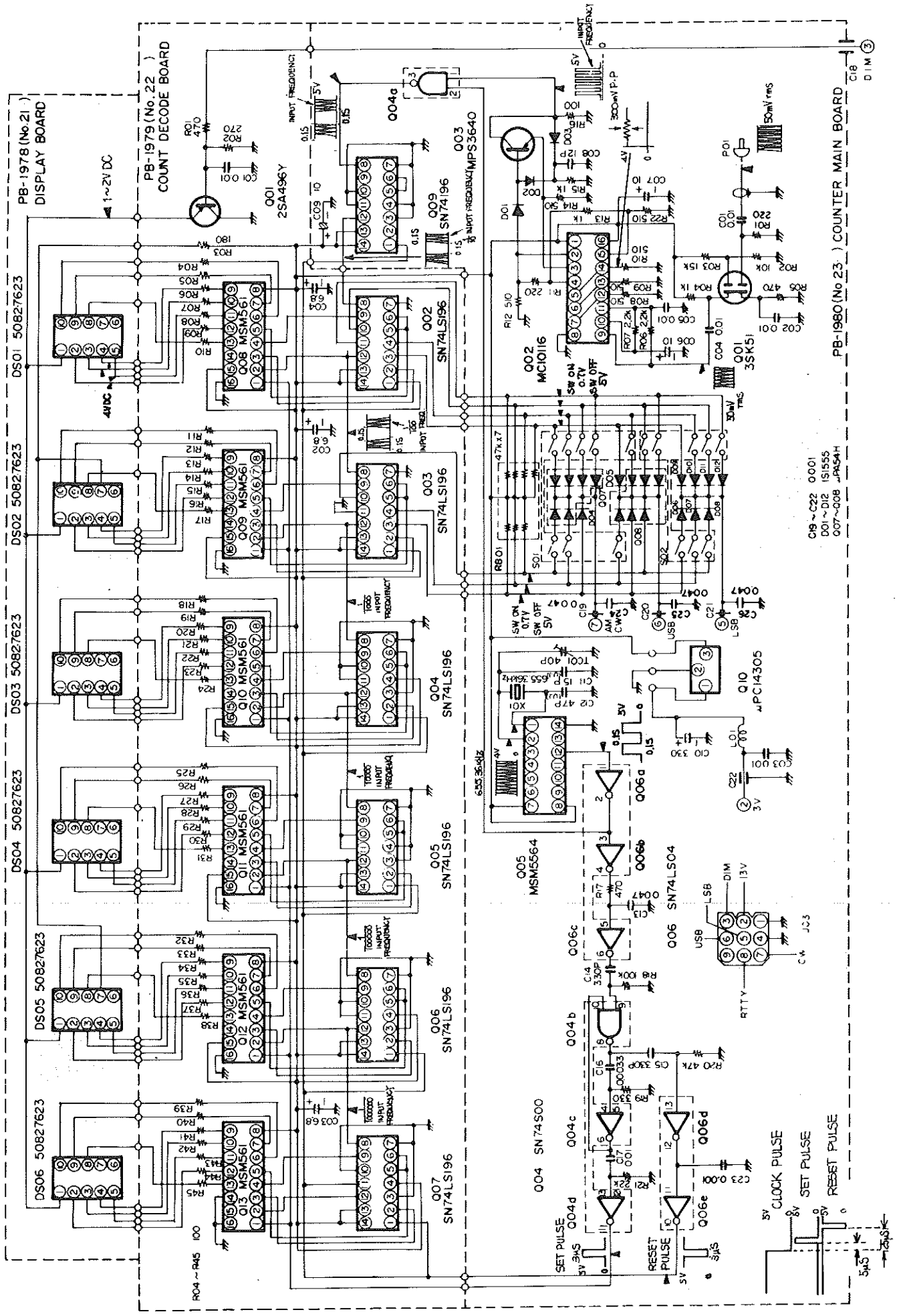
μPA54H



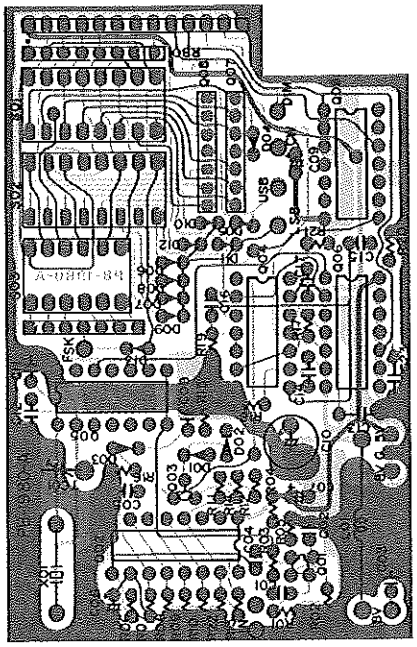
SN74S00N
SN74LS04N
SN74196N
SN74LS196N MSM5564



MSM561 MC10116

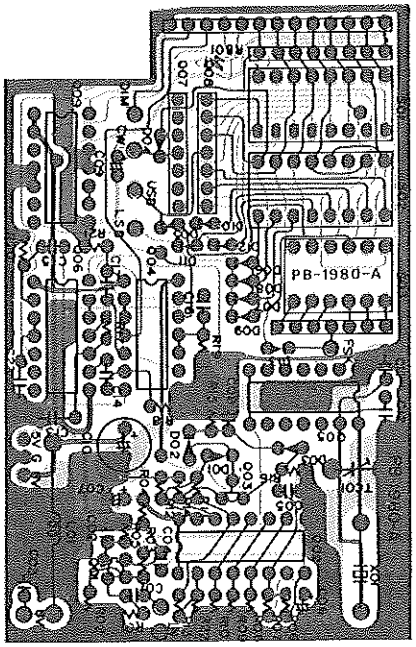

PB-1978 (No.21)
DISPLAY BOARD
PB-1979 (No.22)
COUNT DECODE BOARD
PB-1980 (No.23) COUNTER MAIN BOARD
1~2V DC
DS01 50827623
DS02 50827623
DS03 50827623
DS04 50827623
DS05 50827623
DS06 50827623
Q01 2SA496Y
Q02 MC1016
Q03 MPS3640
Q04 SN74S00
Q05 MSM5564
Q06 SN74LS04
Q07 SN74LS196
Q08 MSM561
Q09 MSM561
Q10 MSM561
Q11 MSM561
Q12 MSM561
Q13 MSM561
Q01 3SK51
Q09 SN74196
Q02 SN74LS196
Q03 SN74LS196
Q04 SN74LS196
Q05 SN74LS196
Q06 SN74LS196
Q07 SN74LS196
Q10 μPC14305
INPUT FREQUENCY
SW ON 0.7V
SW OFF 5V
CLOCK PULSE
SET PULSE
RESET PULSE
RTTY
DIM
LSB
USB

COUNTER UNIT PARTS LAYOUT

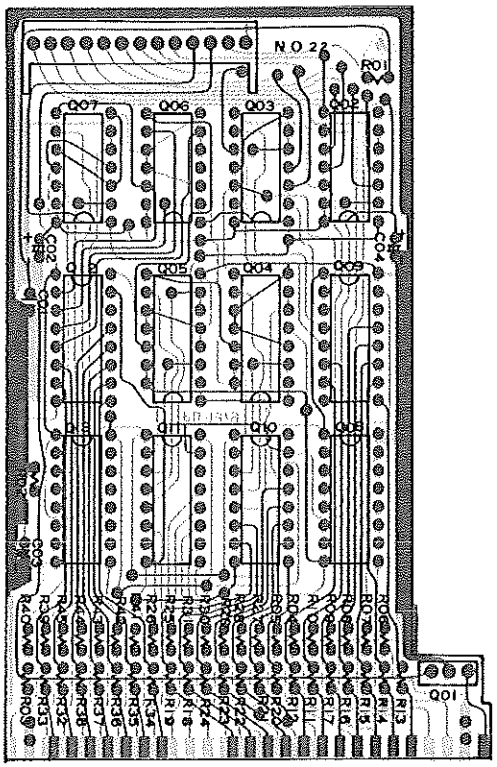


Viewed from component side

(PB-1980)

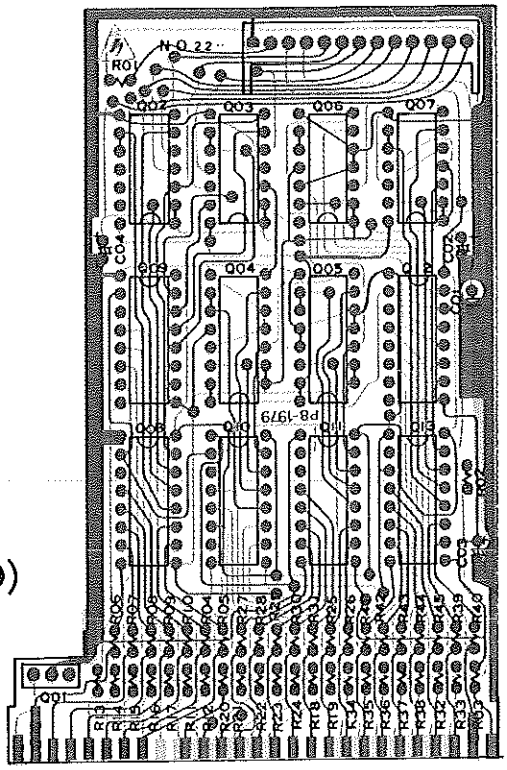


Viewed from solder side

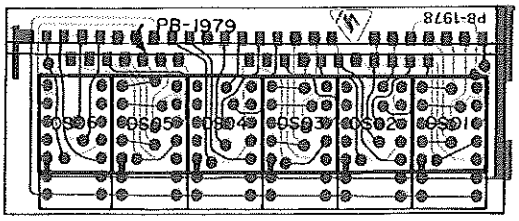


Viewed from component side

(PB-1979)

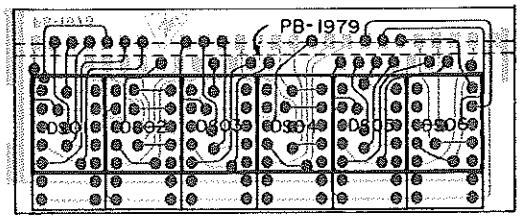


Viewed from solder side

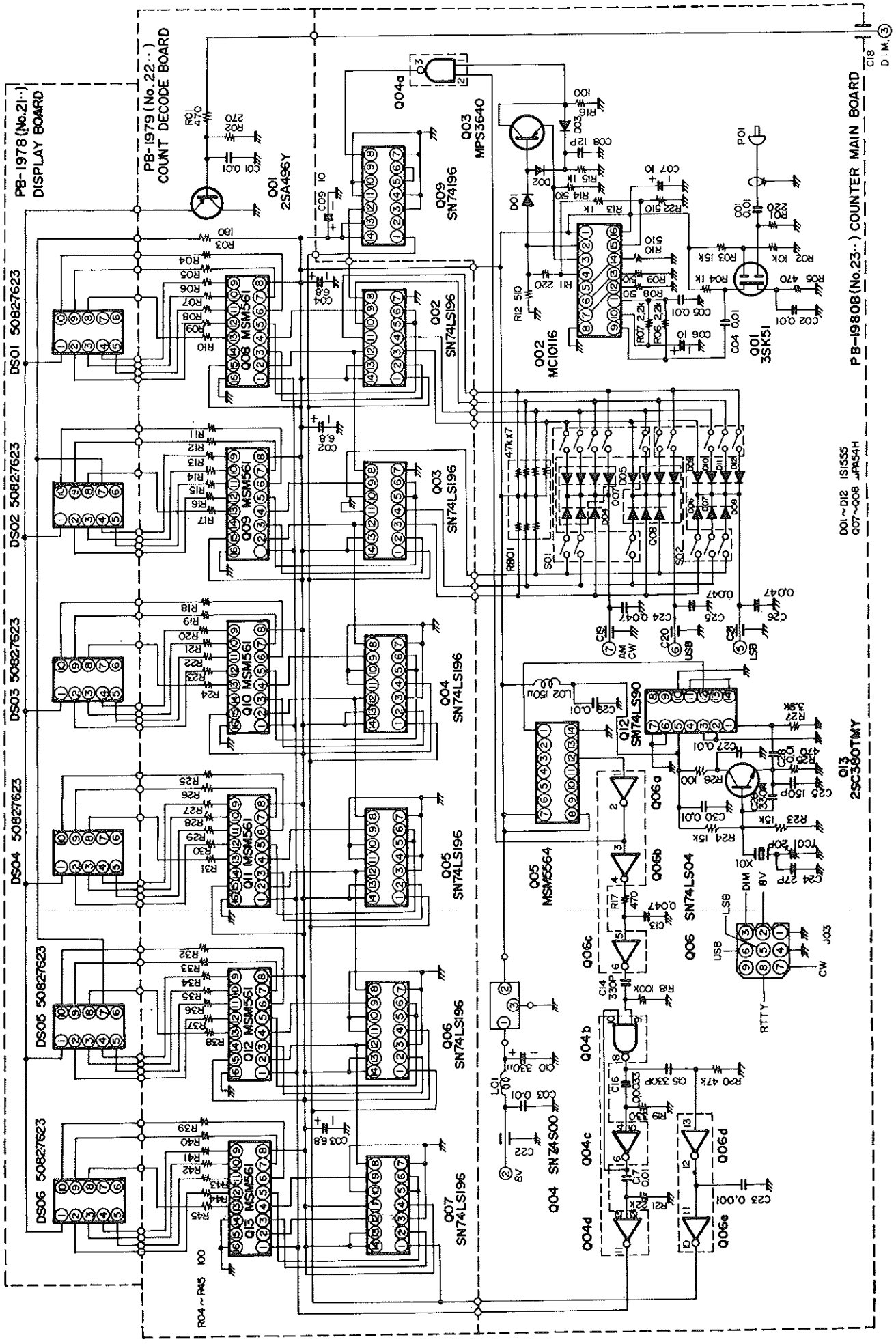


Viewed from solder side

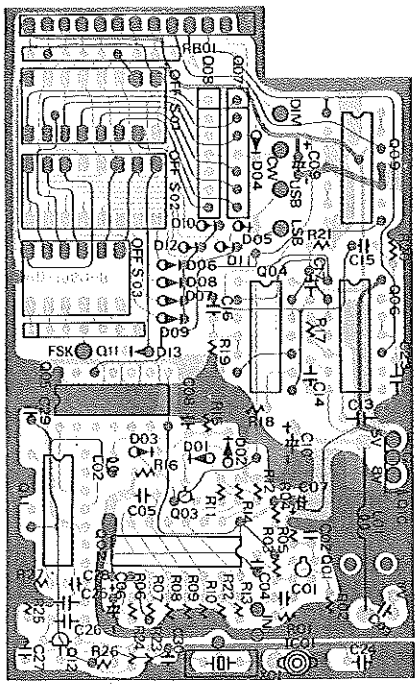
(PB-1978)



Viewed from component side

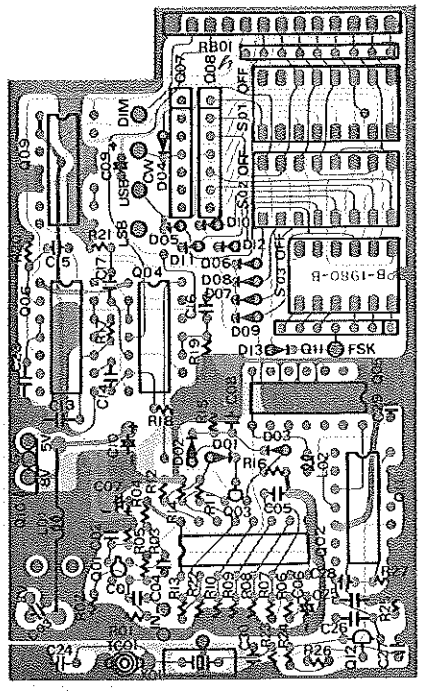

PB-1978 (No.21··)
DISPLAY BOARD
PB-1979 (No.22··)
COUNT DECODE BOARD
PB-1980 (No.23··) COUNTER MAIN BOARD
DS01 50827623
DS02 50827623
DS03 50827623
DS04 50827623
DS05 50827623
DS06 50827623
Q01 2SA496Y
Q02 MC10116
Q03 MPS3640
Q04 SN74LS00
Q05 MSM5564
Q06 SN74LS04
Q07 SN74LS196
Q08 MSM561
Q09 SN74196
Q010 MSM561
Q011 MSM561
Q012 SN74LS90
Q013 2SC380TMY
Q01 3SK51
DIM
AM CW
USB
LSB
CW
RTTY
DIM
8V

COUNTER UNIT PARTS LAYOUT

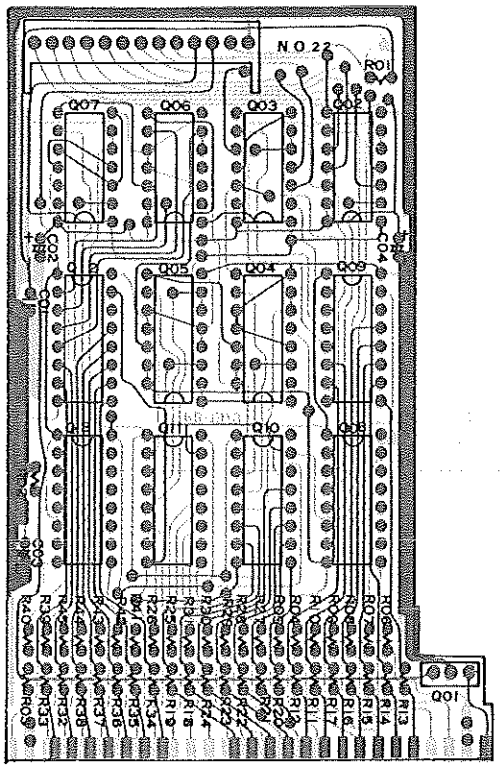


Viewed from component side

(PB-1980B)

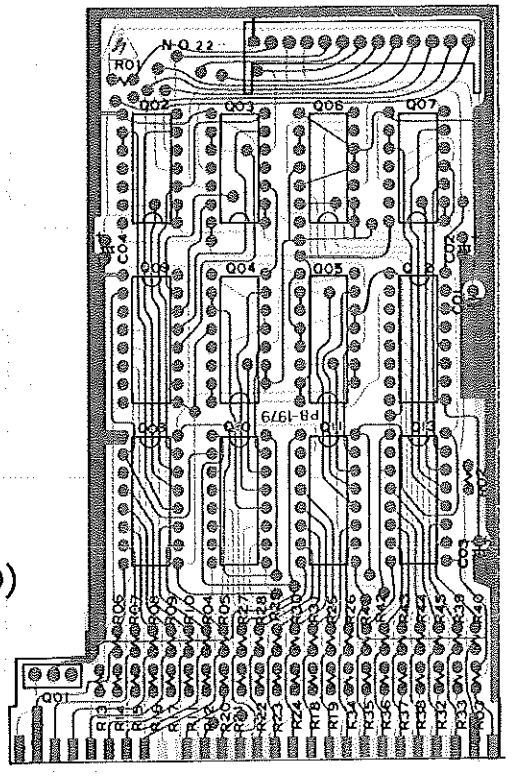


Viewed from solder side

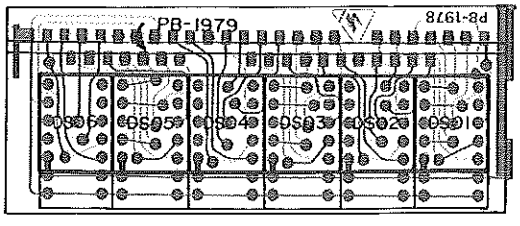


Viewed from component side

(PB-1979)

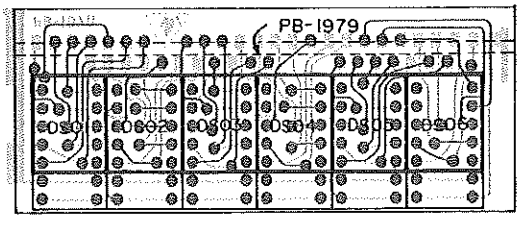


Viewed from solder side



Viewed from solder side

(PB-1978)



Viewed from component side

REMOVAL OF COUNTER AND DISPLAY UNITS

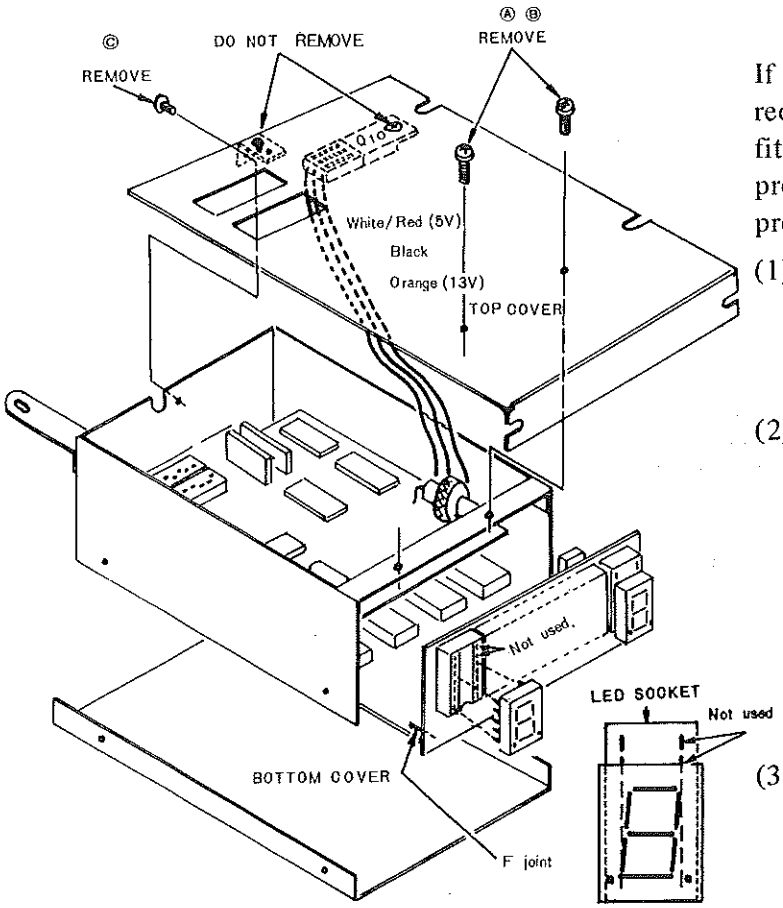


Figure 22.

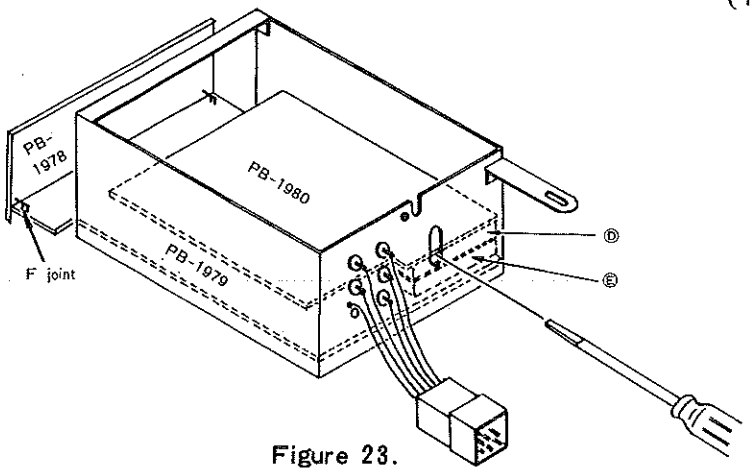


Figure 23.

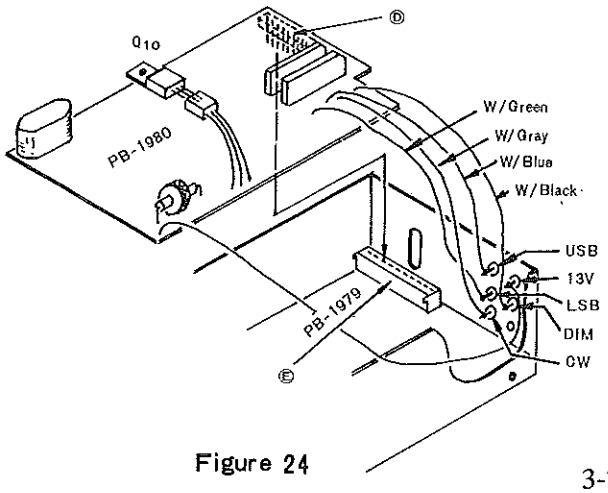


Figure 24

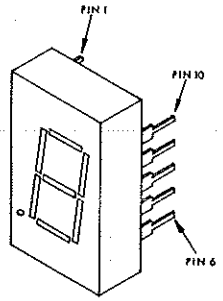
If servicing of the counter or display unit is required, some caution is required, as the physical fit of the two units is quite precise. However, the process is not difficult, if you follow the directions presented herein.

(1) Remove screws A, B, and C, as shown in Figure 22. Be careful not to remove the two screws on the top rear of the cover. Now remove the top cover.

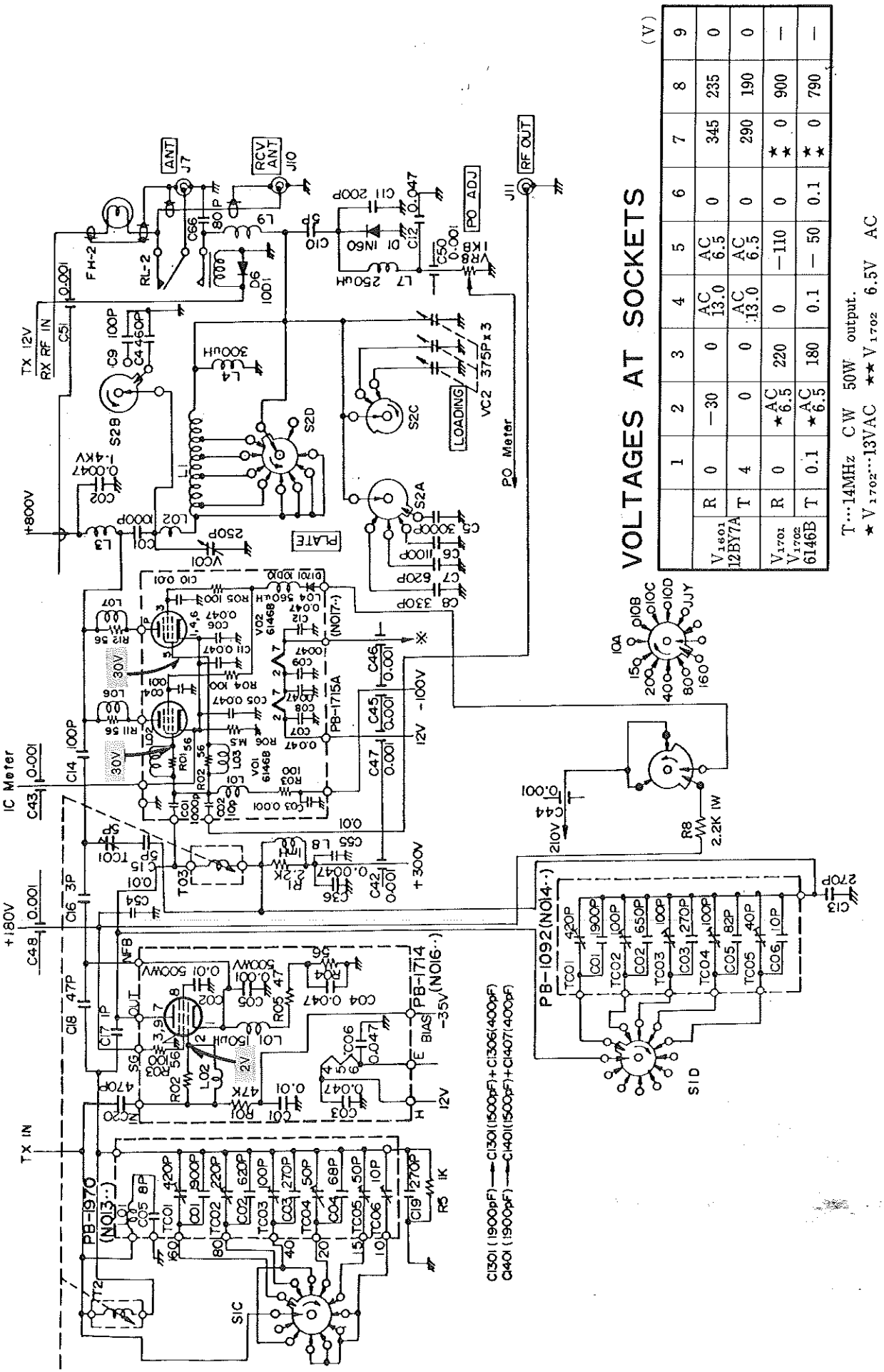
(2) PB-1980 and PB-1979 are stacked within the enclosure. The display module is held in place with two "F" joints, while the two circuit boards are held together by plug D and socket E. When replacing LED digits, note that the top two pins on each row of the socket are not used; be careful to align the LED correctly. The bottom cover is held in simply by a snap fit.

(3) To remove PB-1980, refer to Figure 23. and insert a small screwdriver in the oblong hole in the rear of the enclosure. Carefully pry plug D away from socket E, and then PB-1980 will be free for servicing.

(4) The color codes for the external access wiring are shown in Figure 24.



HP5082-7623



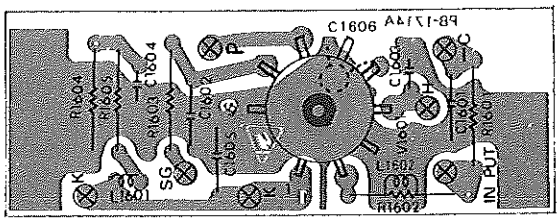
VOLTAGES AT SOCKETS

(V)

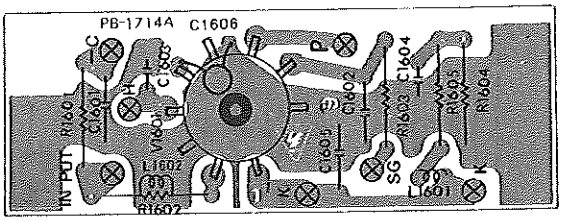
		1	2	3	4	5	6	7	8	9
V_{1601} 12BY7A	R	0	−30	0	AC 13.0	AC 6.5	0	345	235	0
	T	4	0	0	AC 13.0	AC 6.5	0	290	190	0
V_{1701} V_{1702} 6146B	R	0	★AC 6.5	220	0	−110	0	★★ 0	900	—
	T	0.1	★AC 6.5	180	0.1	− 50	0.1	★★ 0	790	—

T···14MHz CW 50W output.
★ V_{1702}···13VAC ★★ V_{1702} 6.5V AC

DRIVER BOARD (PB-1714A)

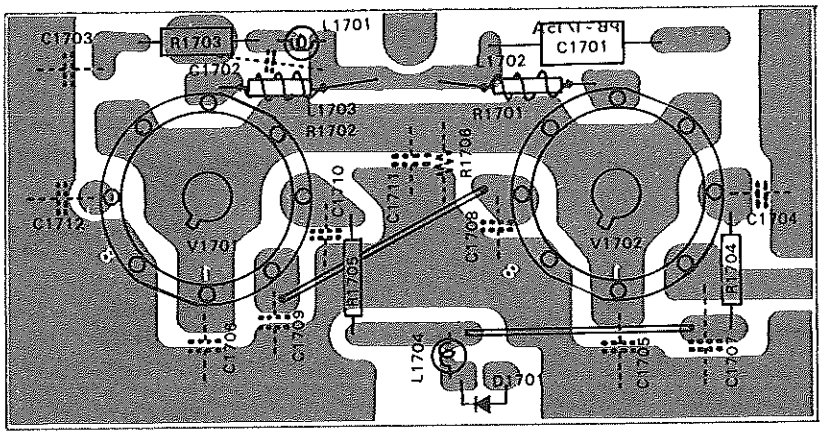


Viewed from component side

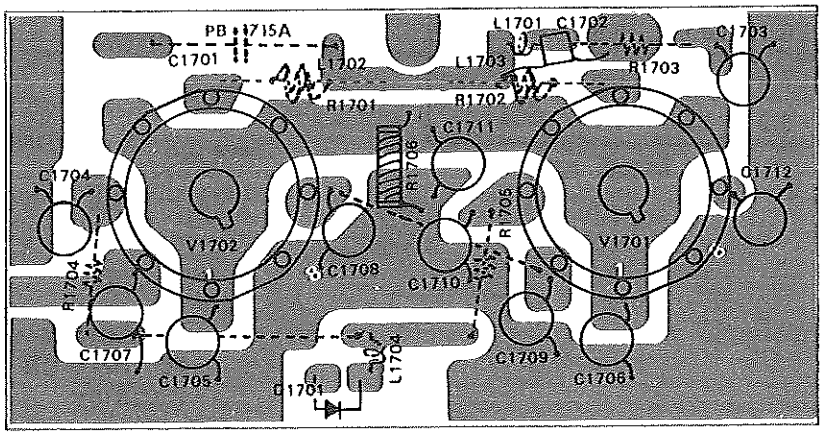


Viewed from solder side

FINAL BOARD (PB-1715A)

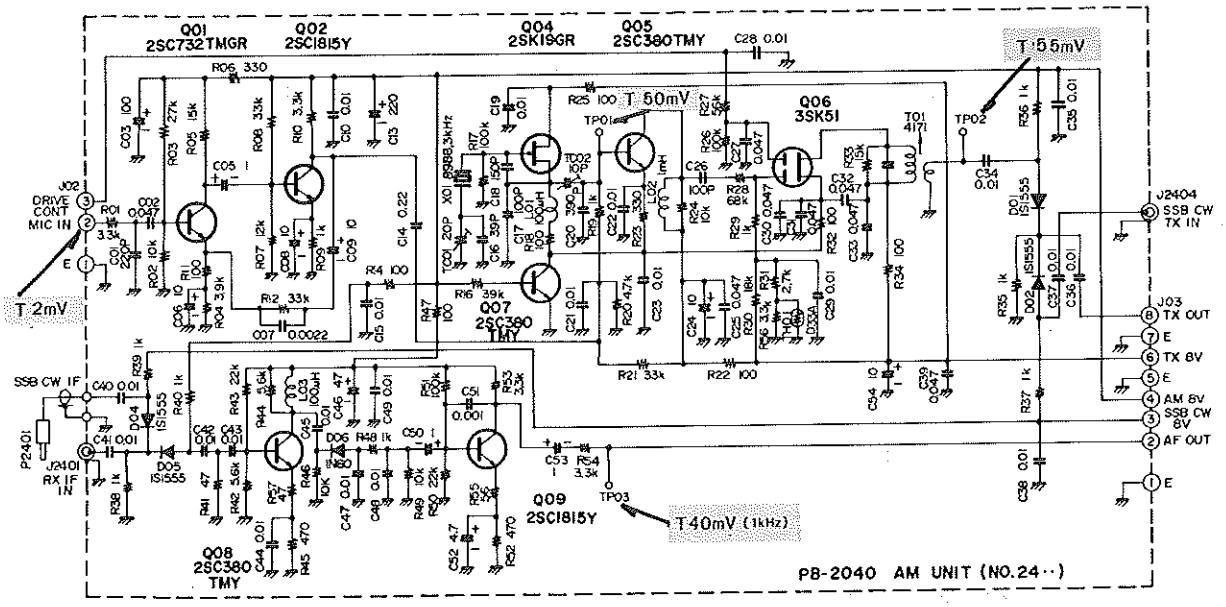


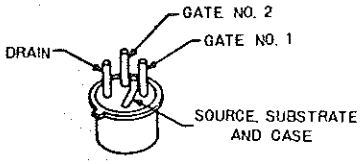
Viewed from component side



Viewed from solder side

AM UNIT (PB-2040)





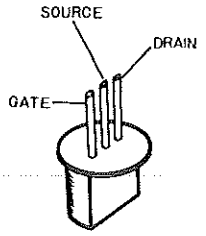
3SK40M
3SK51-03

DC VOLAGES (V)

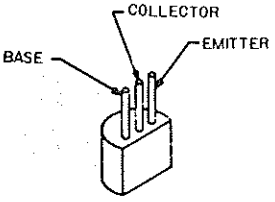
	E(S)		C(D)		B(G_1)		(G_2)	
	R	T	R	T	R	T	R	T
Q_{2401}	1.4	1.4	2	2	2	2	—	—
Q_{2402}	1.3	1.3	3.5	3.5	2	2	—	—
Q_{2404}	0	0.6	0	7.5	0	−2.5	—	—
Q_{2405}	0	0.3	0	8	0	1	—	—
Q_{2406}	0	1.3	0	6.5	0	3	0	1.5
Q_{2407}	0	0	0	0.15	0.6	0.8	—	—
Q_{2408}	0.8	0.8	7.5	7.5	0.5	0.5	—	—
Q_{2409}	0.6	0.6	3.9	3.9	1.2	1.2	—	—

DRIVE MAX

MODE AM

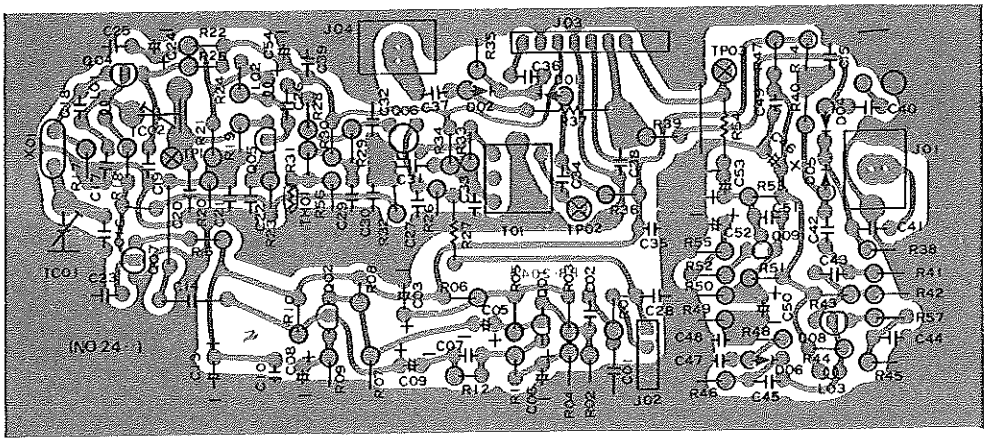


2SK19GR

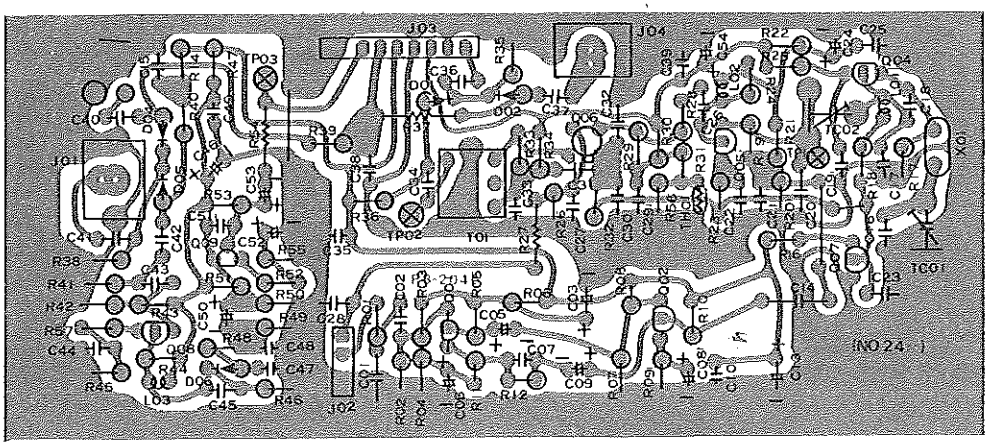


2SC380TM-Y
2SC732TM-GR
2SC1815Y

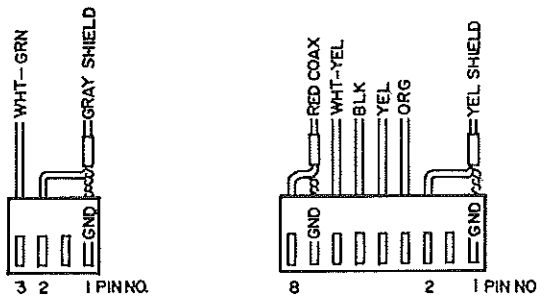
AM UNIT PARTS LAYOUT



Viewed from component side



Viewed from solder side



P19(J2402) P20(J2403)