MAINTENANCE SERVICE MANUAL FT-101ZD

385

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SECTION 1 – GENERAL

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HIGH-PERFORMANCE HF TRANSCEIVER
YAESU FT-101ZD

SPECIFICATIONS

Frequency coverage:

160 m	1.8 - 2.0 MHz
80 m	3.5 - 4.0 MHz
40 m	7.0 - 7.5 MHz
▲ 30 m	10.0 - 10.5 MHz
20 m	14.0 - 14.5 MHz
▲ 17 m	18.0 - 18.5 MHz
15 m	21.0 - 21.5 MHz
▲ 12 m	24.5 - 25.0 MHz
10 m	28.0 - 29.9 MHz

(▲ After Prod. #17)

Power requirements:

AC 100/110/117/200/220/234 volts, 50/60 Hz

DC 13.5 volts ± 10%
(DC-DC converter optional)

Power consumption:

AC 85 VA receive
(73 VA HEATER OFF)
330 VA transmit

DC 5.5 amps receive
(1.1 amps HEATER OFF)
22 amps transmit

Transmitter frequency stability:

Less than 300 Hz after 10 minute warmup; less than 100 Hz after 30 minute warmup.

Antenna output impedance:

50 - 75 ohms, unbalanced

Modulation:

A3J : Balanced modulator

A3 : Amplitude modulation of a low power stage

F3 : Variable-reactance frequency modulation, max. deviation ± 5 kHz.

Microphone input impedance:

500 - 600 ohms (low impedance)

RECEIVER

Sensitivity:

0.25 μV for S/N 10 dB (SSB, CW)
0.5 μV for S/N 10 dB (AM)
0.3 μV for 20 dB noise quieting (FM)

Image rejection:

Better than 60 dB (160 - 12 m)

TUBES AND SEMICONDUCTORS

Vacuum Tubes

12BY7A	1
6146B	2

Transistors

T20A6*	2
2SA495	1
2SA496Y	2
2SA564A	3
2SA639	1
2SA733	1
2SA952L	13
2SB616	1
2SC372Y	25
2SC373	2

Field Effect Transistors

2SK19GR	9
2SK19BL	1
3SK40M	1
3SK51-03	7
3SK73	1
J310	2

Integrated Circuits (IC)

μPA54H	1
μPC78L05	1
μPC78L12	1
μPC7805H	1
μPC14308	1
μPC2002H	1

Schottky Barrier Diode

ND487C2-3R	1

Silicon Diodes

1S1555	80
10D1	8
10D10	8
V06B	2
1SS53	6

Varactor Diodes

1S2209	1
1S2236	1
FC63	1

FM Unit

IC

μPC577H	1

Field Effect Transistors

2SK125	1
3SK51-03	1

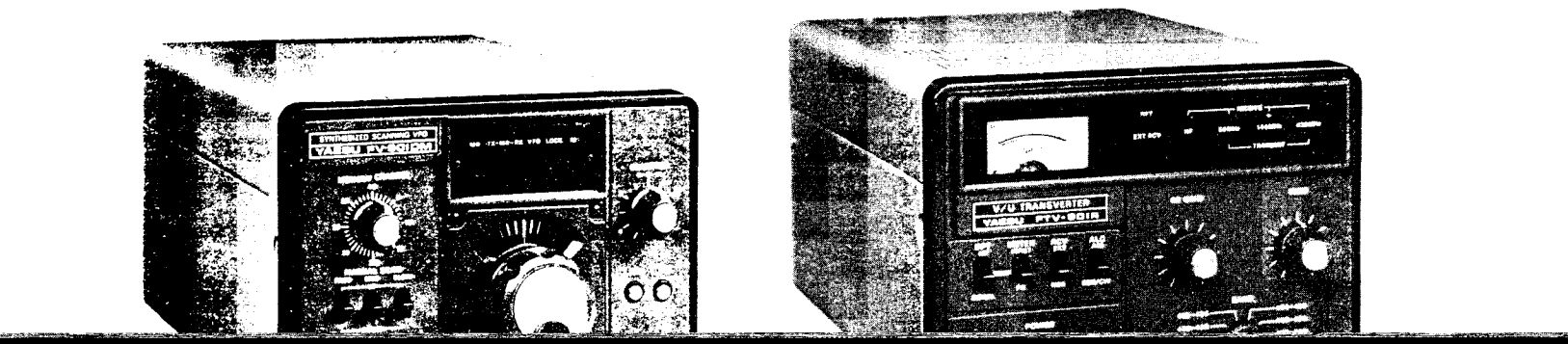
Transistors

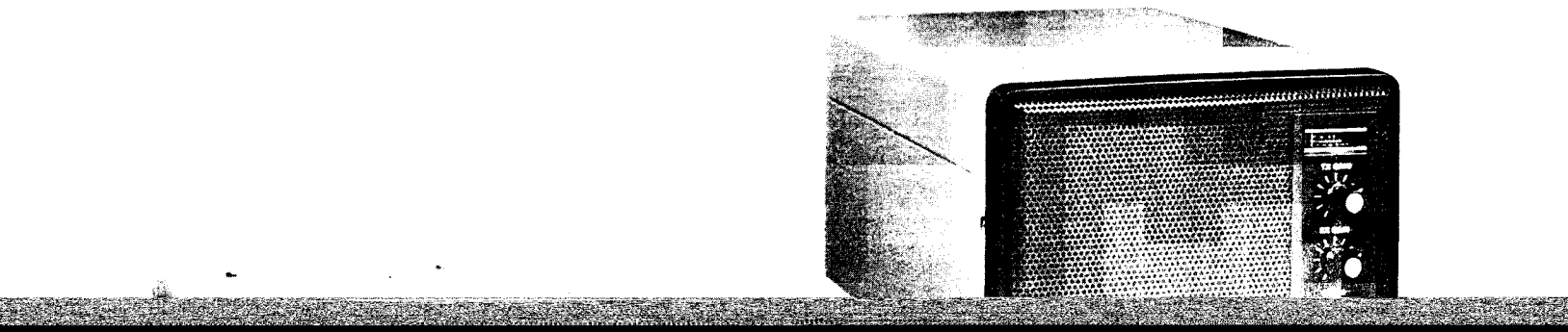
2SA733Q	1
2SC535B	1
2SC945Q	13

Diodes

1S188FM	4
1S1555	1
1SS53	8
FC63	1

RECOMMENDED ACCESSORIES





CONTROLS AND SWITCHES

(10) AF GAIN

The AF GAIN control varies the output level of

(20) DELAY

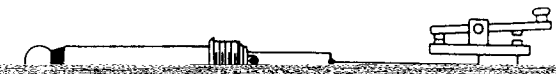
This control sets the delay time for the VOX relay.

(26) POWER

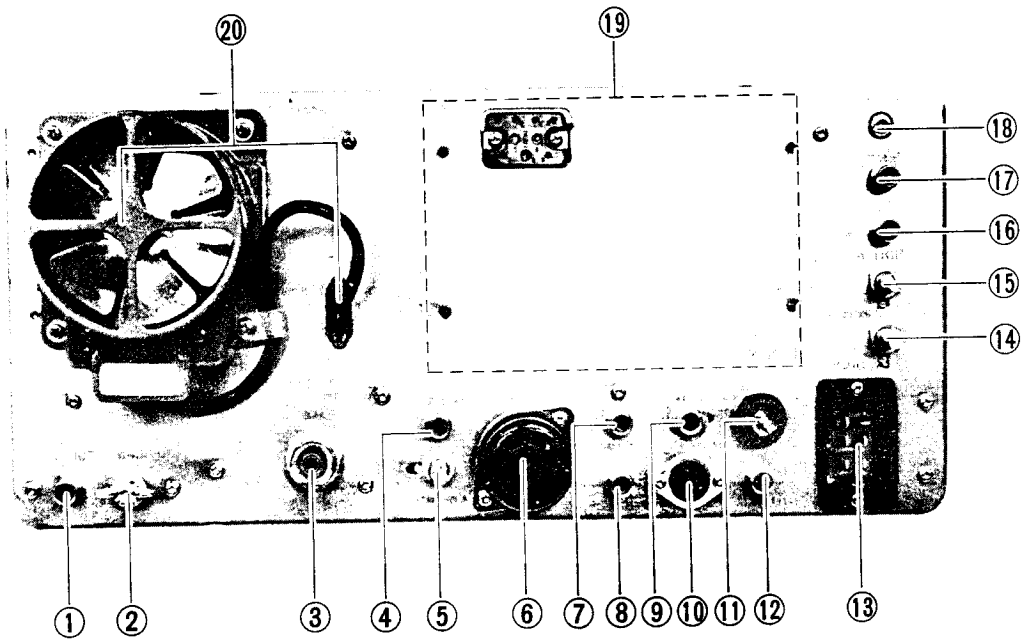
This is the main ON/OFF switch for the transceiver.

(27) HEATER

With the HEATER switch on, heater voltage is



REAR APRON



(1) RF OUT

RF output of 3 volts RMS is available at this jack for use with a transverter. Output is from the driver stage.

(2) GND

For best transceiver performance, as well as protection from electrical shock, a good ground connection should be made at this point, using a heavy, braided wire of the shortest length possible.

(3) ANT

Standard "UHF" connector for the antenna.

(4) RCV ANT

This jack is switched in parallel with the ANT jack on receive, for use with an external receiver.

(5) PO ADJ

This control adjusts the relative power output meter.

(6) ACC

Transceiver operating voltages and relay connections can be accessed through the accessory jack. Please insert the ACC plug at all times, to provide heater voltage for the driver and final amplifier tubes.

(7) TONE OUT

The CW sidetone may be fed to an external receiver through this jack.

(8) A TRIP IN

Anti-trip input from an external receiver may be made via this jack, to prevent the receiver audio output from tripping the FT-101ZD VOX.

(9) KEY

The CW key may be connected at this point. Key-up voltage is 7 volts, and key-down current is 1.5 mA. Be sure your electronic keyer's output switch will handle these levels.

(10) EXT VFO

Connection of an external VFO, such as the FV-901DM, can be made at this jack.

(11) FUSE

This is the fuse holder. For 100 - 117 volts, replace with only a 5 amp use. For 200 - 234 volts, use a 3 amp fuse. Replace fuses only with a fuse of the proper rating.

(12) IF OUT

Wideband IF output is available at this jack for use with a spectrum analyzer, etc.

(13) POWER

Connect the AC power cord at this point, being certain that your AC supply voltage matches the voltage specification for your transceiver. See the transformer primary connection chart. When using the optional DC-DC converter, the DC supply is connected at this point. DO NOT CONNECT THE AC POWER CORD TO A DC POWER SOURCE. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY SUCH IMPROPER POWER CONNECTIONS.

(17) PATCH

Microphone or phone patch input may be made at this jack. Impedance is 500 ohms.

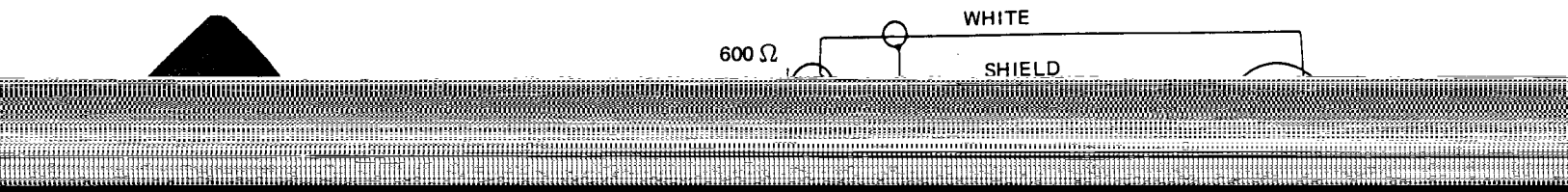
(18) EXT SP

This is a miniature phone jack for speaker output. When a plug is inserted into this jack, the transceiver internal speaker will be cut off. Impedance is 4 - 16 ohms.

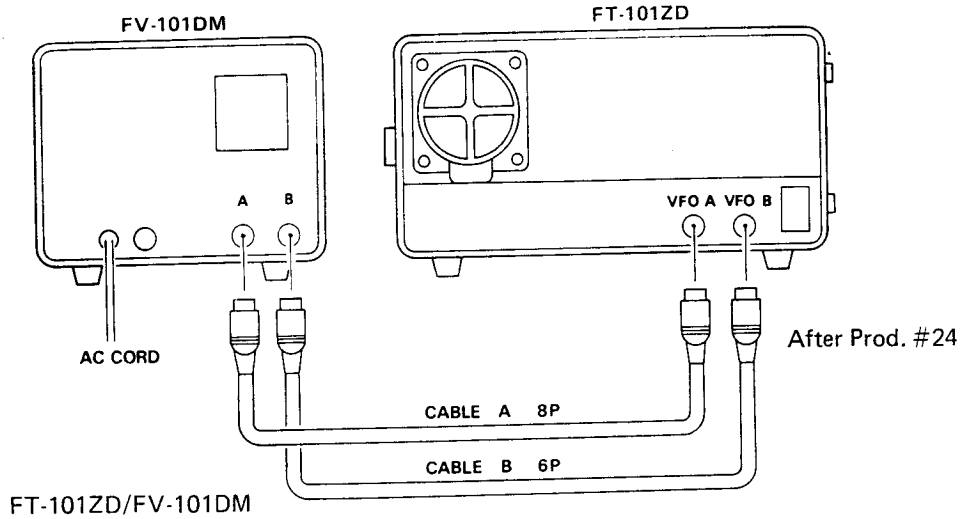
(19) DC-DC CONVERTER (OPTION)

The optional DC-DC converter allows operation

MICROPHONE CONNECTIONS

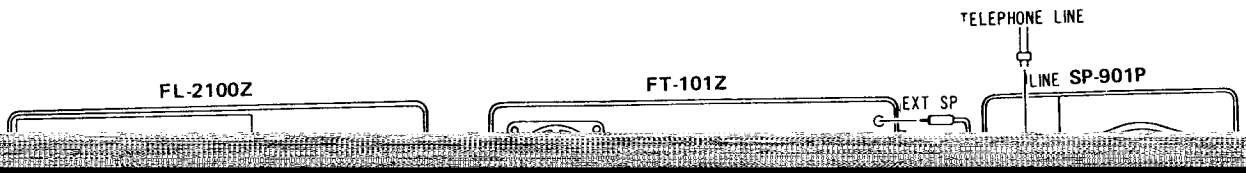


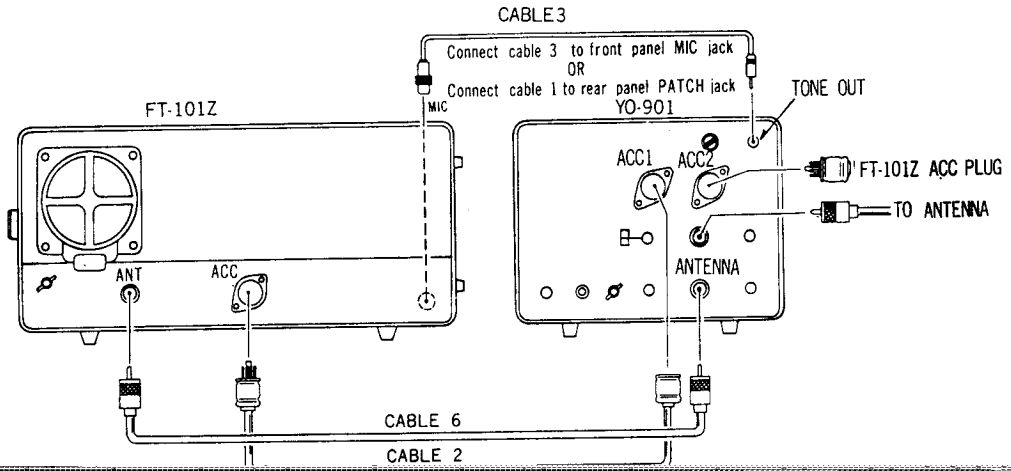
INTERCONNECTIONS



After Prod. #24

FT-101ZD/FV-101DM




CABLE 3
Connect cable 3 to front panel MIC jack
OR
Connect cable 1 to rear panel PATCH jack
MIC
FT-101Z
YO-901
TONE OUT
ACC1
ACC2
FT-101Z ACC PLUG
TO ANTENNA
ANT
ACC
ANTENNA
CABLE 6
CABLE 2

INSTALLATION

The FT-101ZD is designed to be a single-unit station for fixed or portable operation from AC power. Power supply connections providing for operation from a variety of source voltages are available. Please read the following sections carefully, so as to ensure proper installation of your new transceiver.

PRELIMINARY INSPECTION

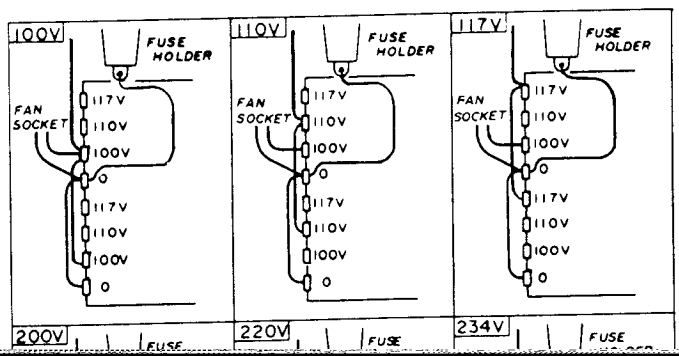
Upon opening the packing carton, immediately give the transceiver a thorough visual inspection. Check to see that all controls and switches are working freely, and inspect the cabinet for any signs of damage. If any damage has been sustained, immediately contact the shipping company, and document the damage completely. Save the packing carton and foam packing material for possible use at a later date.

BASE STATION INSTALLATION

The FT-101ZD is designed for use in many areas of the world, using supply voltages that may differ from your local supply voltage. For this reason, be absolutely certain that the voltage specification marked on the rear of the transceiver agrees with the local AC supply voltage. THIS INSPECTION MUST BE MADE BEFORE CONNECTING THE AC POWER CORD TO THE REAR APRON OF THE TRANSCEIVER.

CAUTION

PERMANENT DAMAGE WILL RESULT IF IMPROPER AC SUPPLY VOLTAGE IS APPLIED TO THE TRANSCEIVER. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY APPLICATION OF IMPROPER SUPPLY VOLTAGE. DO NOT CONNECT THE AC POWER CORD TO A DC POWER SOURCE.



The transceiver should be connected to a good earth ground. The ground lead should be made of a heavy, braided wire, and should be connected to the GND terminal on the rear apron of the transceiver.

MOBILE INSTALLATION

(Note: The DC-DC converter described herein is [illegible] Yaesu dealer.)

Before connecting the DC power cable to the transceiver, check the battery voltage with the engine running (battery charging). If the voltage exceeds 15 volts DC, the vehicle voltage regulator should be adjusted, so as to limit the highest charging rate to less than 15 volts. As well, do not operate the transceiver if the DC supply voltage is less than 12 volts. The transceiver should always be turned off when the car is started, to prevent voltage transients from damaging the power supply components.

OPERATION

The tuning procedure for this transceiver is not complicated. However, care should be exercised when tuning so that peak performance of the equipment is secured. The following paragraphs describe the procedure for receiver and transmitter tuning.

INITIAL CHECK

(3) The RX CLARIFIER may be utilized if the received signal is drifting. Push the RX button, and rotate the CLARIFIER control for offset of up to 2.5 kHz. A red LED indicator will light up when the clarifier is in use.

(4) When pulse-type noise is encountered, the NB (Noise Blanker) switch should be activated. Advance the noise blanker level control (located on the front panel) to the point which provides the desired blanking. Do not

TRANSMITTER TUNING

The following tuning procedure must be performed prior to commencing operation on the desired mode. See the paragraphs relating to the specific

(5) Peak the PRESELECT control for a maximum meter reading. If the meter reading exceeds 150 mA, reduce the setting of the DRIVE control.

(2) Rotate the VOX GAIN control to the MOX position, and rotate the PRESELECT control for a maximum meter reading.

RF SPEECH PROCESSOR ADJUSTMENT

The FT-101ZD RF speech processor, when correct-

For receiving, two positions of selectivity are provided. When the optional CW filter is installed,

SELECT SWITCHES

The SELECT switches allow selection of internal

For example, if the analog dial indicates 074, as shown in the example, and the BAND switch is on 40 meters (lower band edge: 7000 kHz), the operating frequency will be 7074 kHz. By rotating the BAND switch, this position of the analog

For operation on 21420 kHz USB, compute the crystal frequency as follows:
$F_X = 26498.5 - 21420 = 5078.5$ kHz.

Inspection of the values of F_1 in Table 1 will

SECTION 2 – TECHNICAL NOTES

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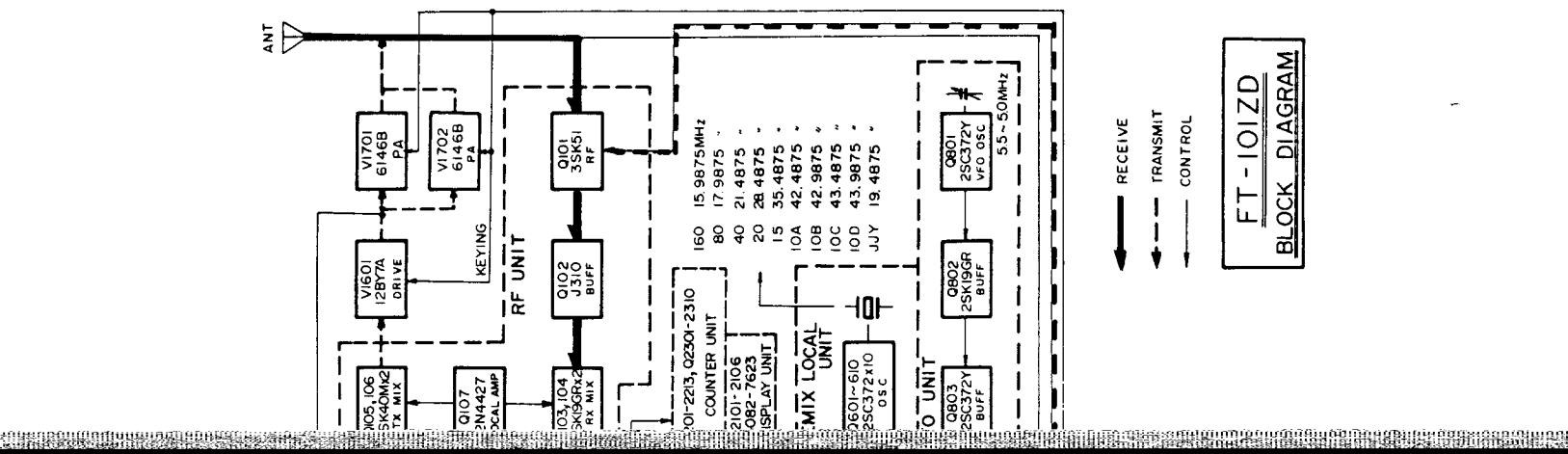
PART DESIGNATIONS ON CIRCUIT BOARDS

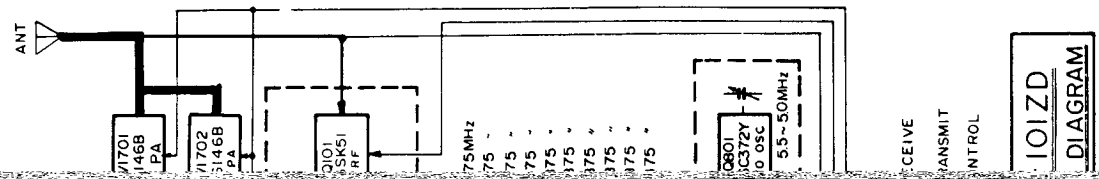
FT-101Z CIRCUIT BOARDS

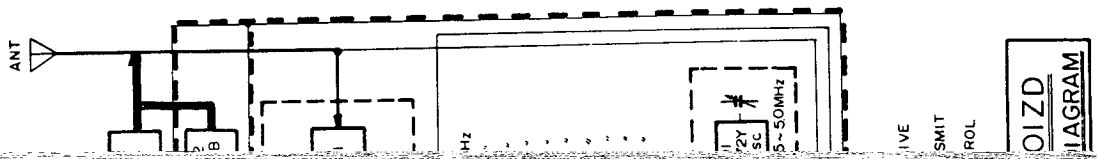
The FT-101Z series integrates the "mother board" concept and the "plug-in" type of circuit card. Each circuit board used in the FT-101Z has a code number assigned to it, and each part within the transceiver has a part number assigned to it (e.g. Q_{502}).

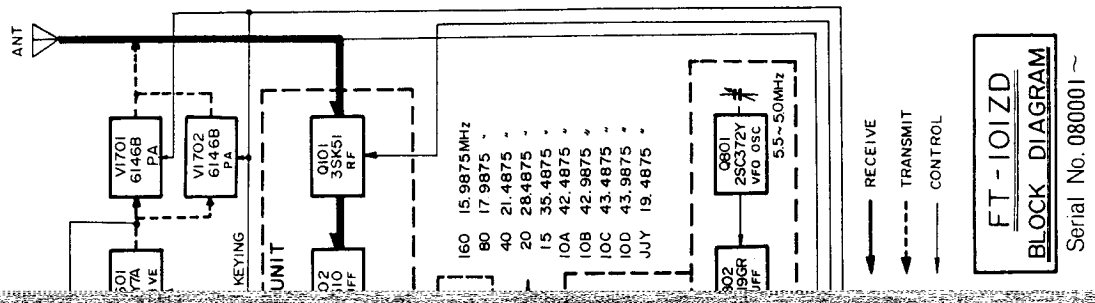
Parts numbers 01–99 (e.g. R_{12}) are located on the main chassis. Other parts, located on the circuit

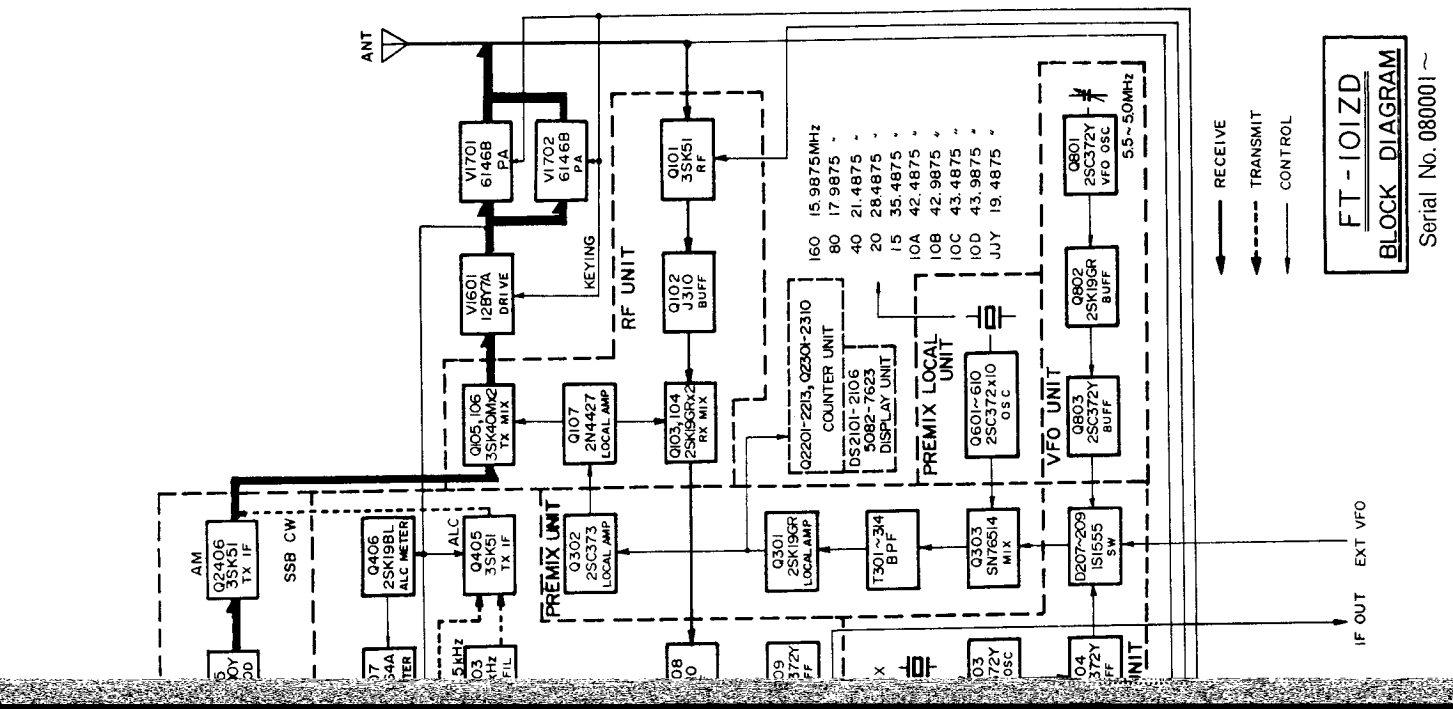
Code #	Unit	Board Designation
1	RF	PB-1960A (PB-2154)
2	NB/FIX	PB-1961B
3	PREMIX	PB-1962A (PB-2152)
4	IF	PB-1963B
5	AF	PB-1964A
6	PREMIX LOCAL	PB-1965 (PB-2153)
7	SELECT SW.	PB-1966C
8	VFO	PB-1440B-3420



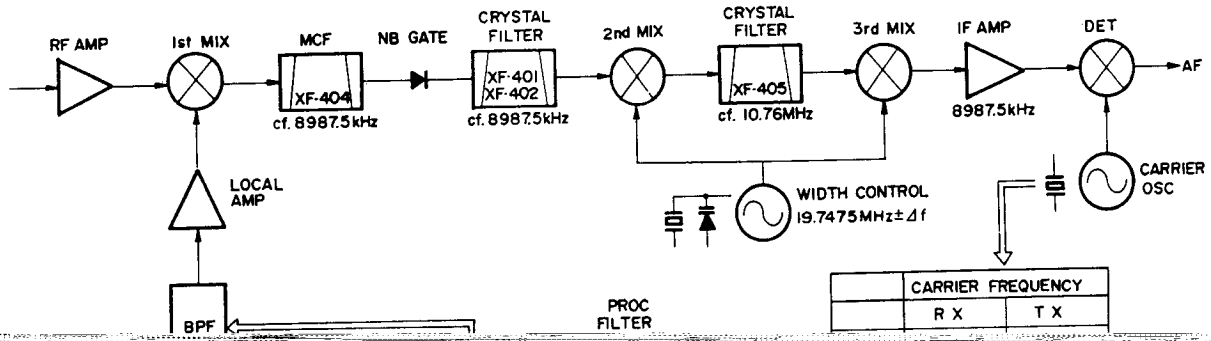







FT-101ZD
BLOCK DIAGRAM
Serial No. 080001 ~
RECEIVE
TRANSMIT
CONTROL
ANT
RF UNIT
PREMIX UNIT
PREMIX LOCAL UNIT
VFO UNIT
KEYING
AM
SSB CW
ALC
EXT VFO
IF OUT
5.5~5.0MHz
160 15.9875MHz
80 17.9875 "
40 21.4875 "
20 28.4875 "
15 35.4875 "
10A 42.4875 "
10B 42.9875 "
10C 43.4875 "
10D 43.9875 "
JUY 19.4875 "

FREQUENCY RELATIONSHIPS



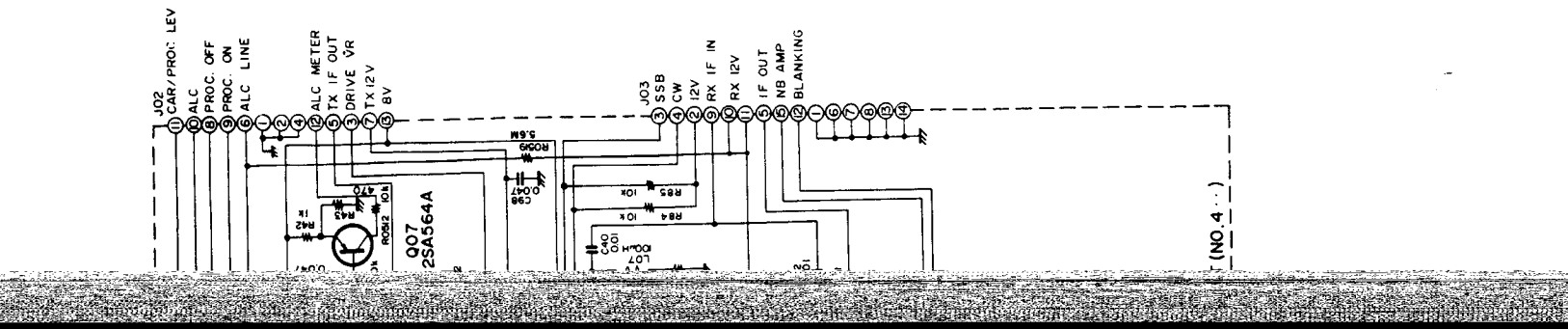
CIRCUIT DESCRIPTION

The block diagram and following circuit descrip-

balanced mixer consisting of Q_{103} and Q_{104} (2SK19GR), where the input signal is heterodyned

The IF signal is then passed through the SSB filter XF_{401} (or optional CW filter XF_{402}). Selection of the filter to be used is made by diodes D_{405} - D_{408}

For use with the FV-901DM scanning VFO, or other optional equipment, the AGC voltage is fed through buffer Q_{125} (2SK19GR) and fed to the



NB-FIX UNIT (PB-1961)

A portion of the 8.9 MHz IF signal is fed through buffer Q_{410} (**2SC372Y**) and amplified by Q_{206} and Q_{205} (**2SC1583**).

When a carrier of noise-free modulated signal is received, the IF signal is rectified by D_{201} and D_{202} (**1N60**), producing a DC voltage. This DC voltage is amplified by Q_{202} (**2SC372Y**), which charges C_{214}, for AGC purposes. The AGC voltage is used to control the gain of Q_{206} and Q_{205}.

When impulse-type noise is received, D_{203} and D_{204} (**1N60**) rectify the IF signal, producing a DC voltage which controls the NB switch Q_{411} (MPS-A13).

Noise pulses have a very short duration, but high amplitude. Because of the very slow time constant of the C_{214}/R_{212} discharge path, AGC voltage is not induced by these short-duration pulses. Therefore, Q_{206} and Q_{205} operate at full gain, providing maximum voltage to the base of Q_{411}. When a pulse is received, Q_{411} biases D_{414} to block the signal path momentarily. When a desired signal and a noise pulse are received simultaneously, the blanking action is not impaired, because the relative amplitude difference between the desired signal and the noise pulse is still high. The front panel noise blanker level control varies the DC voltage applied to the base of Q_{411}.

AF UNIT (PB-1964)

The IF signal from pin 2 is fed through T_{501} to the ring demodulator, consisting of D_{502} - D_{505} (**1S1007**), where the IF signal is demodulated into audio, using the carrier signal delivered from Q_{513} (**2SC1815Y**). The carrier signal is generated by oscillator Q_{514} (**2SK19GR**), and it oscillates at one of the following frequencies:

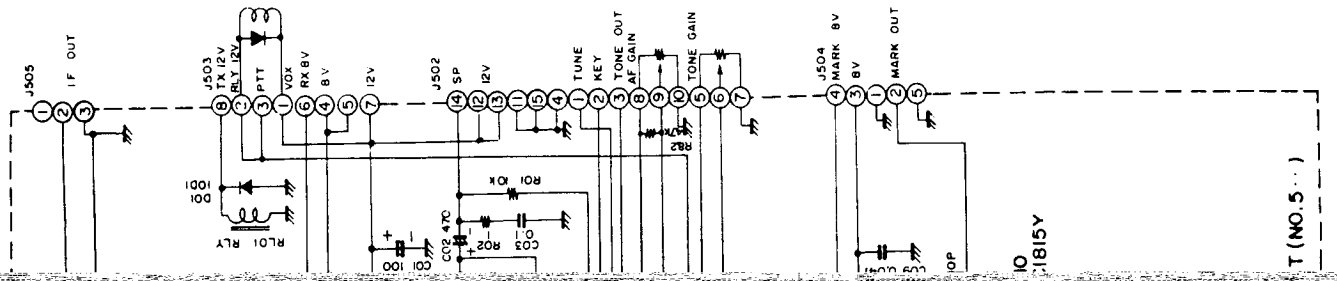
USB, CW·RX	8989 KHz
LSB	8986 KHz
CW·TX	8988.3 KHz

The audio signal is then amplified by audio amplifiers Q_{507}, Q_{508} (**2SC1000GR**), and Q_{509} (**μPC2002**), delivering 3 watts of audio output to the speaker.

The audio spectrum is shaped by an active low-pass filter of f_0 = 2.7 kHz, −12 dB/octave.

MARKER GENERATOR

A 25 kHz marker signal is provided, for alignment and testing purposes. Marker generator Q_{509} (**2SC1815Y**) generates a basic 3200 kHz signal, which is divided into 25 kHz multiples by Q_{506} (**MC14024B**), a binary counter.



TRANSMIT CIRCUIT

SSB MODE

The output from microphone jack J_2 is fed through the MIC GAIN control VR_{3a} to pin 8 of the AF UNIT.

AF UNIT (PB-1964)

controlling the gain of this stage. When the RF processor is off, ALC voltage is also fed to gate 1 of Q_{401}. Q_{407} (**2SA564**) amplifies the ALC voltage for indication on the front panel meter.

RF UNIT (PB-1960) Early model (before Prod. #17)

The IF signal is fed through T_{104} to the transmit mixer, consisting of parallel-connected Q_{105} and Q_{106} (**3SK40M**), where the IF signal at gate 1 is mixed with the local signal fed to gate 2, producing

reduced to −0.1 volt and −60 volts, respectively, during "key down" conditions.

amplifier, Q_{501}, for delivery to the speaker. The output from the sidetone oscillator is also fed to

The VFO signal is amplified by buffer amplifiers Q_{802} (2SK19GR) and Q_{803} (2SC372Y), and passed to the PREMIX UNIT.

NB & FIX UNIT (PB-1961)

Two crystal-controlled channels are provided for operation with this transceiver. The oscillator signal is generated by Q_{203} (2SC372Y) and amplified by Q_{204} (2SC372Y), and delivered to the PREMIX UNIT. Crystals X_{201} and X_{202} oscillate in the 5.0 - 5.5 MHz range.

PREMIX LOCAL UNIT (PB-1711) (before Prod. #17)

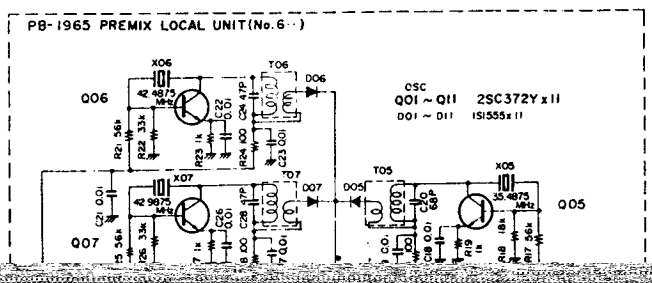
Crystal oscillators Q_{601} - Q_{610} (2SC372Y) generate the premix local signal at the frequencies shown in Table 3. Diode switches D_{601} - D_{610} (1S1555) select the proper local signal for the band in use. The local signal is then delivered to the PREMIX UNIT.

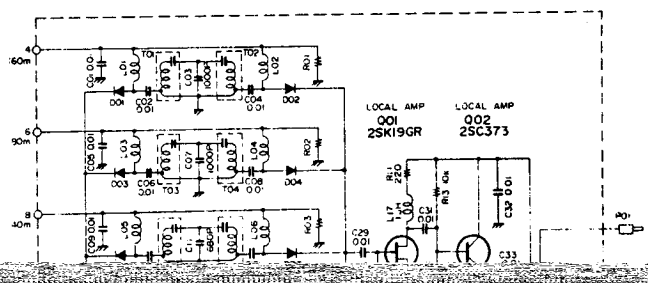
PREMIX UNIT (PB-1962) (before Prod. #17)

The premix signal is produced at Q_{303} (SN76514N), a double-balanced mixer, where the premix local signal from Q_{601} - Q_{610} is mixed with the VFO or crystal controlled 5 MHz signal. The premix output frequencies are shown in Table 3. The premix signal is passed through bandpass filter T_{301} - T_{314}, and amplified by Q_{301} (2SK19GR) and Q_{302} (2SC373). The amplified signal is then fed to the RF UNIT, where the signal is further amplified by Q_{107} for delivery to the transmitter and receiver mixers.

		XCO Frequency	PREMIX OUT Frequency
160m	X_{601}	15.9875MHz	10.4875~10.9875MHz
80m	X_{602}	17.9875MHz	12.4875~12.9875MHz
40m	X_{603}	21.4875MHz	15.9875~16.4875MHz
20m	X_{604}	28.4875MHz	22.9875~23.4875MHz
15m	X_{605}	35.4875MHz	29.9875~30.4875MHz
10mA	X_{606}	42.4875MHz	36.9875~37.4875MHz
10mB	X_{607}	42.9875MHz	37.4875~37.9875MHz
10mC	X_{608}	43.4875MHz	37.9875~38.4875MHz
10mD	X_{609}	43.9875MHz	38.4875~38.9875MHz
JJY/ WWV	X_{610}	19.4875MHz	13.9875~14.4875MHz

Table 3





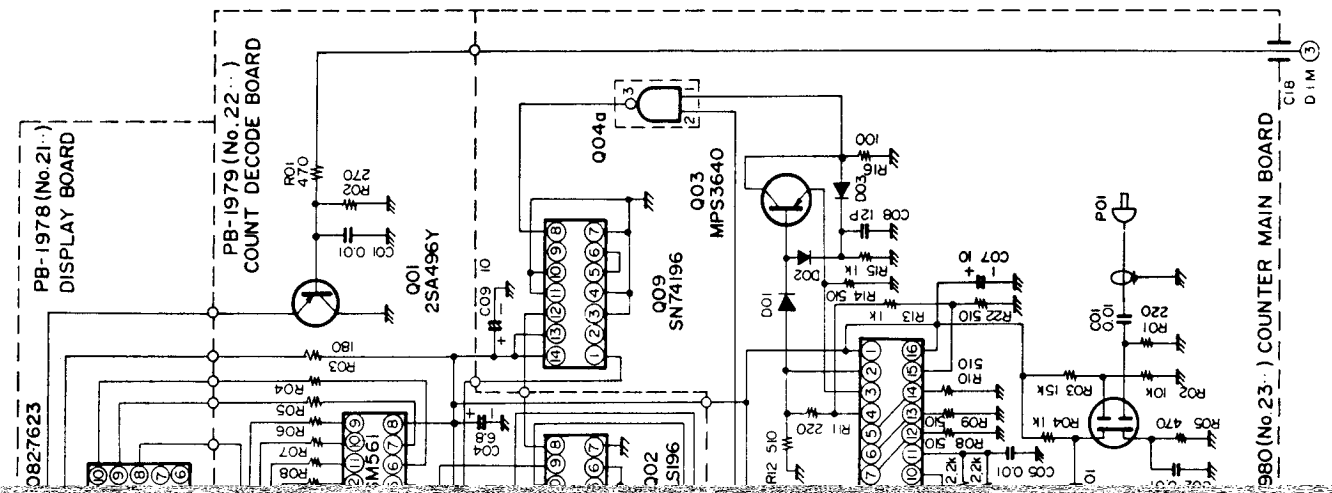
COUNTER UNIT (PB-1978, PB-1979, PB-1980) (before Prod. #16)

The premix local signal from the PREMIX LOCAL circuit is fed to amplifier Q_{2301} (3SK51-03), located on PB-1980. The amplified signal is then fed to waveshaper Q_{2302} (MC10116). Q_{2303} (MPS3640) acts as an interface between Q_{2302} and the TTL circuitry. The signal is then fed to the counter gate, Q_{2304} (SN74S00N).

The clock pulses are generated by Q_{2305} (MSM5564), which produces a 655.36 MHz signal. The signal is then divided by a factor of 217, producing

For USB, the preset number is 91.011.0. For a frequency of 14.000 MHz USB, the manipulation is as follows: 91.011 + 22.989 (Premix freq.) = 114.000. The first digit is the overflow digit, and the remaining digits are displayed. Note that the second digit from the left is not zero, so no blanking signal is sent to the 10 MHz digit.

For a CW or AM frequency of 21.000 MHz, the premix frequency is 29.9883, and the preset frequency is 91.011.7. The manipulation is: 91.011.7 + 29.9883 = 121.0000. The first digit is dropped, and the remaining digits are displayed.

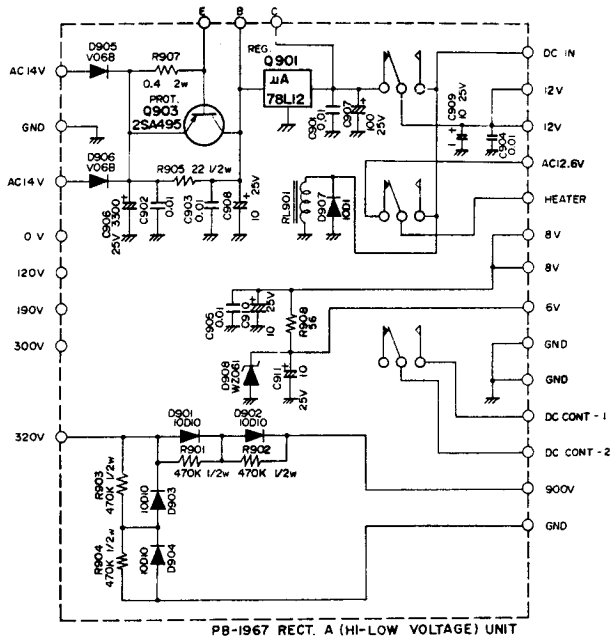

PB-1978 (No.21··)
DISPLAY BOARD
PB-1979 (No.22··)
COUNT DECODE BOARD
Q01
2SA496Y
Q09
SN74196
Q03
MPS3640
Q04a
Q02
S196
M561
P01
980 (No.23··) COUNTER MAIN BOARD

POWER SUPPLY

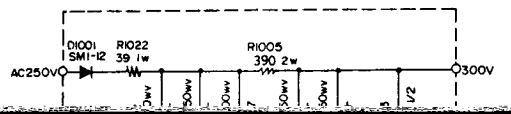
The power supply is designed to operate from 100/110/117/200/220/234 volts AC. A DC-DC converter is an available option, providing operation from 13.5 volts DC. Insertion of the appropriate power plug into the rear panel receptacle makes the necessary connections for AC or DC operation.

When the transceiver is operated from a DC 13.5 volt power source, using the optional DC-DC converter, transistors Q_{3201} and Q_{3202} **(T20A6)** function as a low frequency oscillator, providing AC voltage at approximately 80 Hz to the power transformer. All of the tube heaters receive their power through the HEATER switch on the front panel. When the HEATER switch is OFF, voltage is still supplied to the receiver section, thus allowing continuous reception with reduced power consumption. The heaters of the two 6146B are connected in series to operate at 12 volts DC.

The 14 volt AC power delivered from the secondary winding of the power transformer is rectified by D_{905} and D_{906} **(V06B)**. Voltage regulators Q_1 **(2SB616)**, Q_{901} **(78L12)**, and Q_{903} **(2SA495)** stabilize the DC supply at 12 volts. The supply voltage is further stabilized at 8 volts by Q_3 **(μPC14308)** for delivery to the counter, AF, and other units. The 6 volt supply for the VFO is



PB-1967 RECT. A (HI-LOW VOLTAGE) UNIT



SECTION 3 – SERVICING

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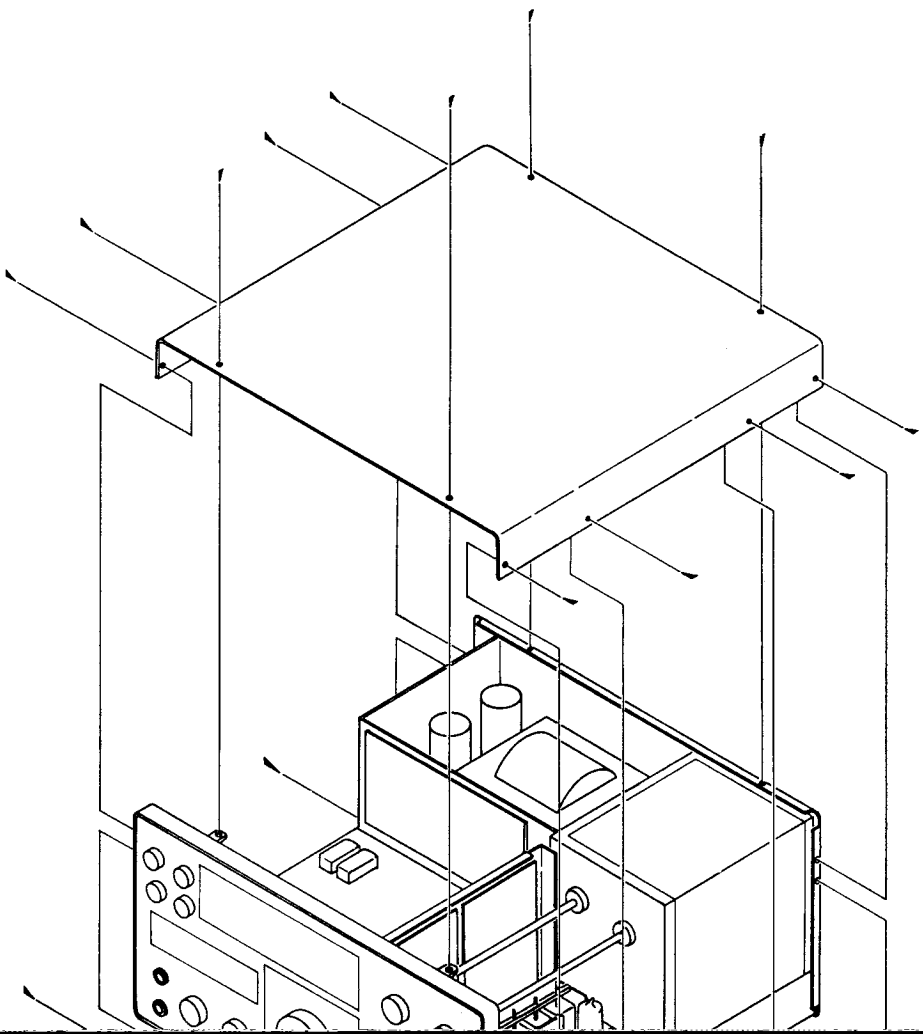
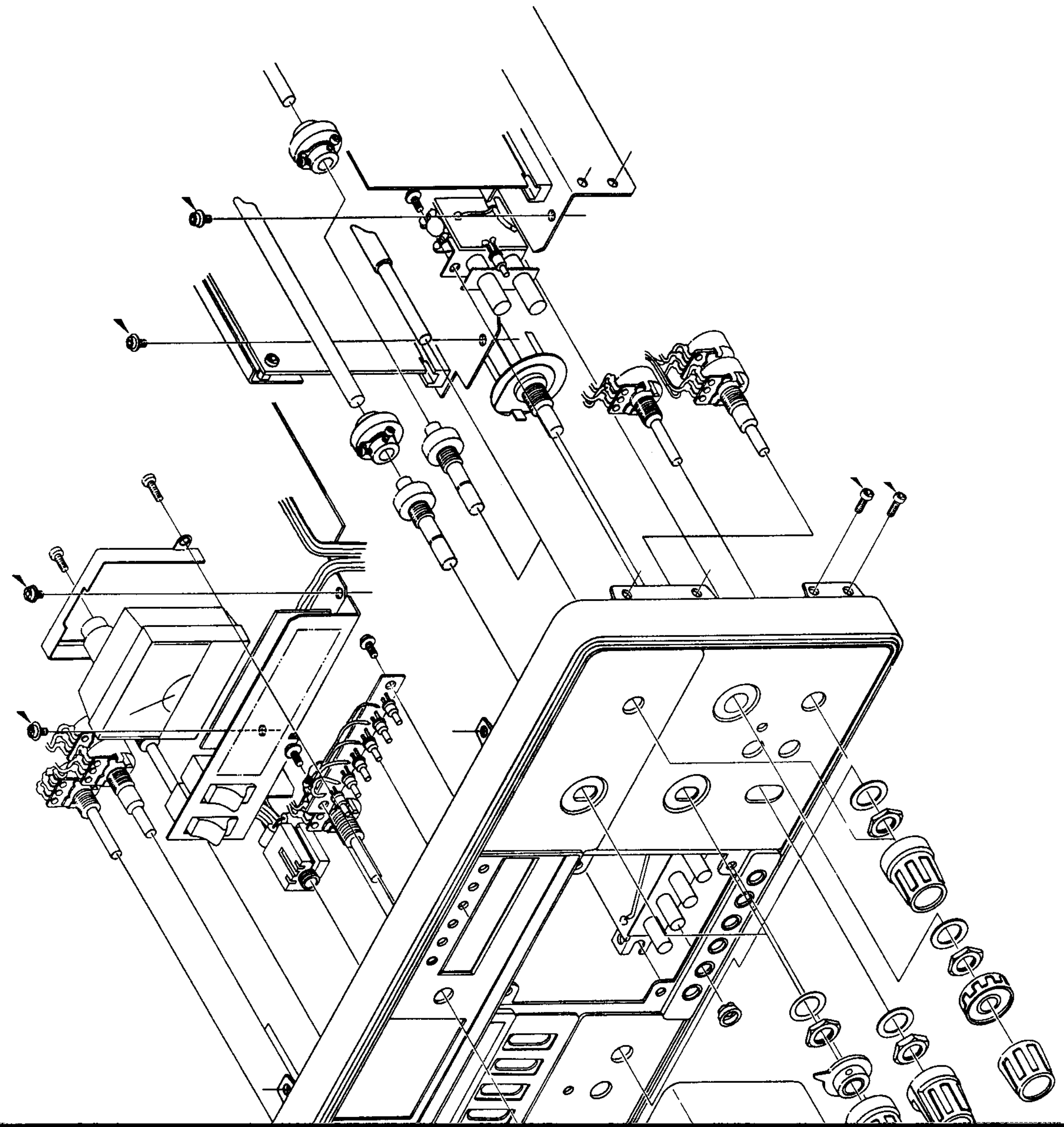
OUTER COVER REMOVAL

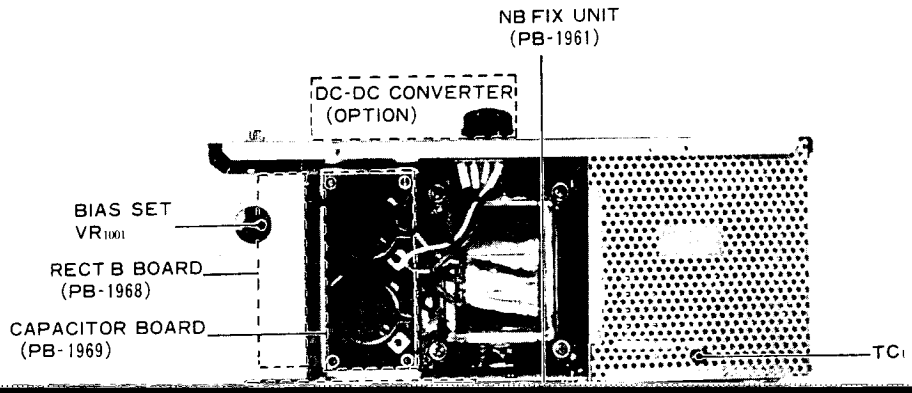


ONT PANEL REMOVAL



BOARD LAYOUT

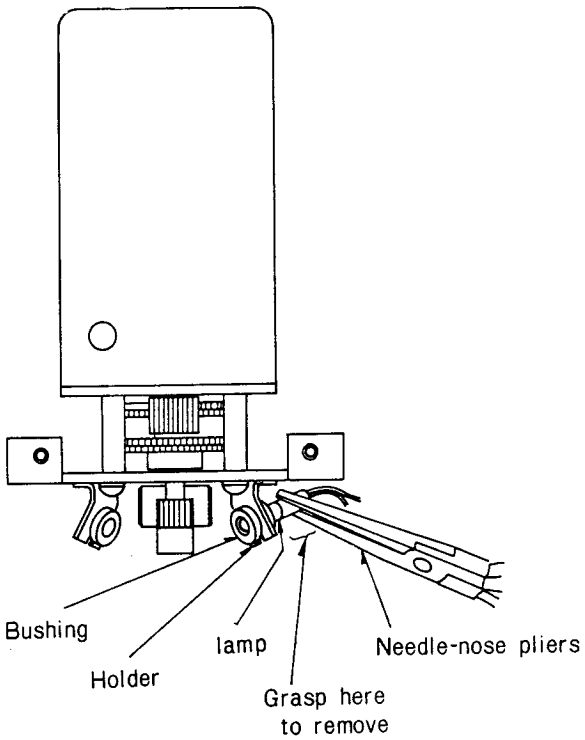
Early model (before Prod. #15)

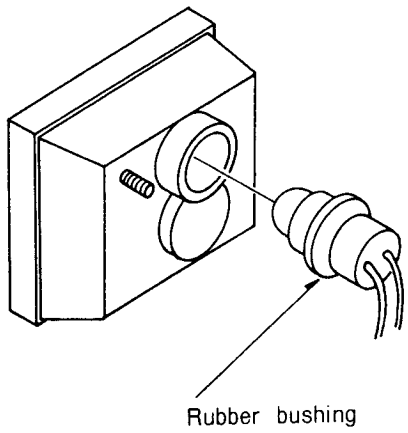


PILOT LIGHT REPLACEMENT

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.



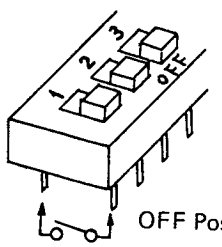


COUNTER PRESET SWITCH REPLACEMENT

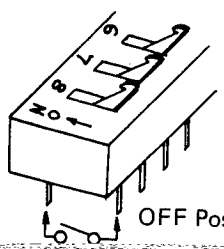
Early model (before Prod. #15)

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



OFF Position



OFF Position

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.

(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

COUNTER UNIT INSTALLATION ON FT-101Z

Early model (before Prod. #15)

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.

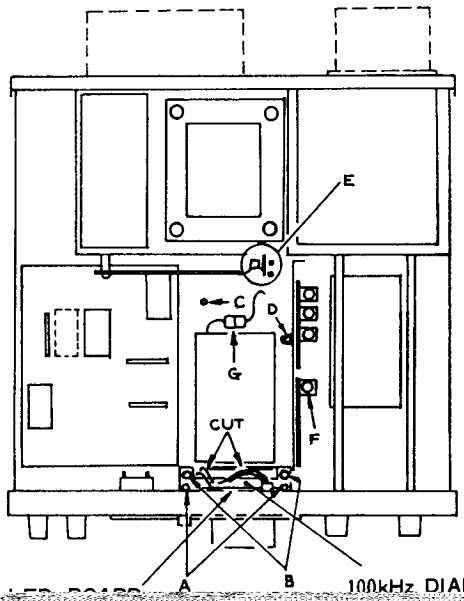
(2) Remove the screws marked "A" in Figure 5. These screws support the LED board.

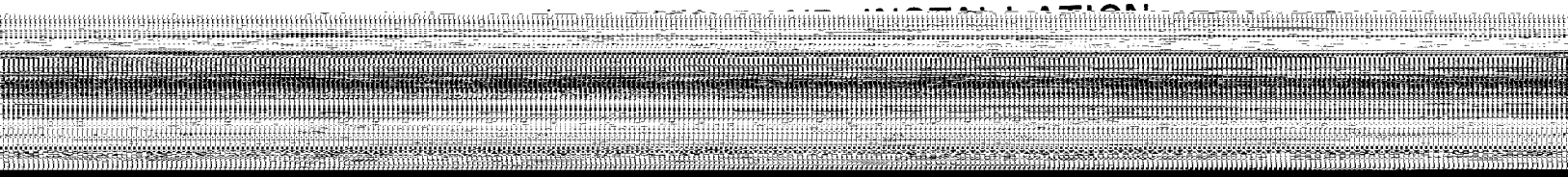
(3) Remove the screws marked "B" in Figure 5, as well as the tension spring, and remove the analog display panel.

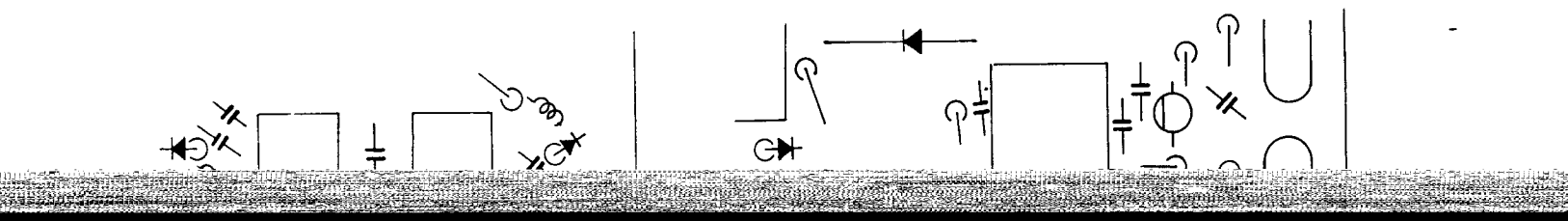
(4) Locate the analog display lamp. Cut the leads to this lamp, insert 1 lead each into the vinyl tube supplied with the counter kit, and position these leads out of the way of the VFO gears, etc.

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.





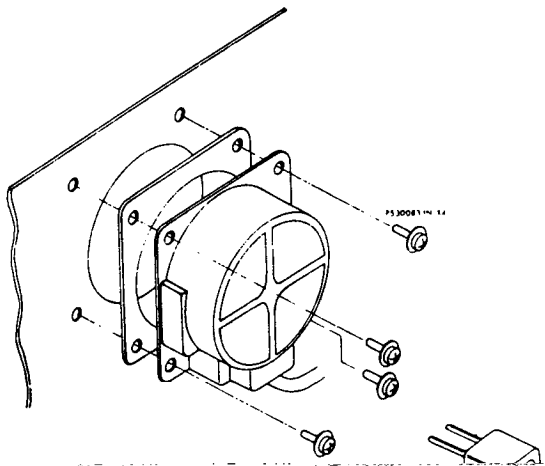


FT101Z AUX BAND

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

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 trans-

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 not cause 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 [illegible] with the tip grounded. Also

NOTES ON USE OF CMOS IC's:

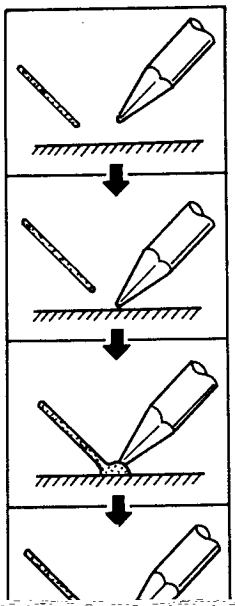
As CMOS devices are extremely sensitive to damage from static electricity, special precautions must be observed.

In storage, use only sponge specially designed for CMOS components.

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 potential 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,

BASIC SOLDERING PRACTICE



(1) Prepare soldering iron and solder.

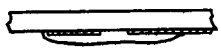
(2) Apply soldering iron to surface to be soldered.

(3) Apply solder to heated surface.

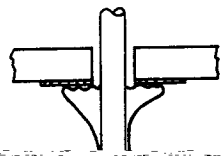
(4) When enough solder is applied, remove solder.

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)



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

Suggestions after the design and drafting of a board

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.

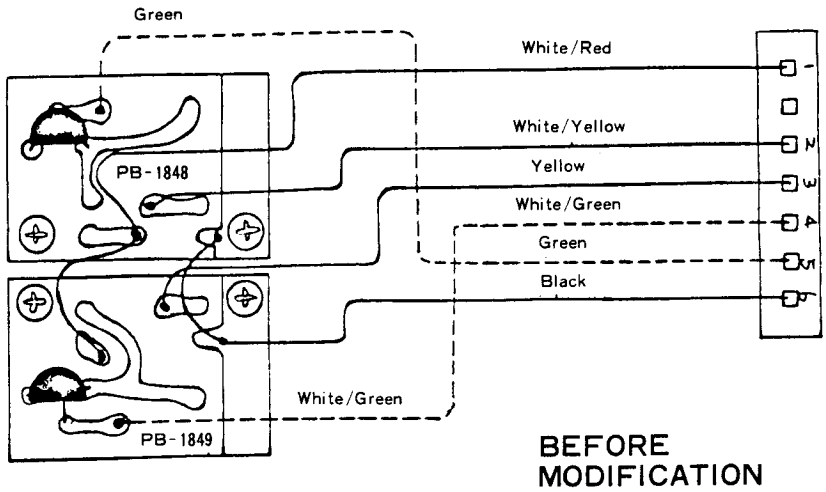


Figure 15.

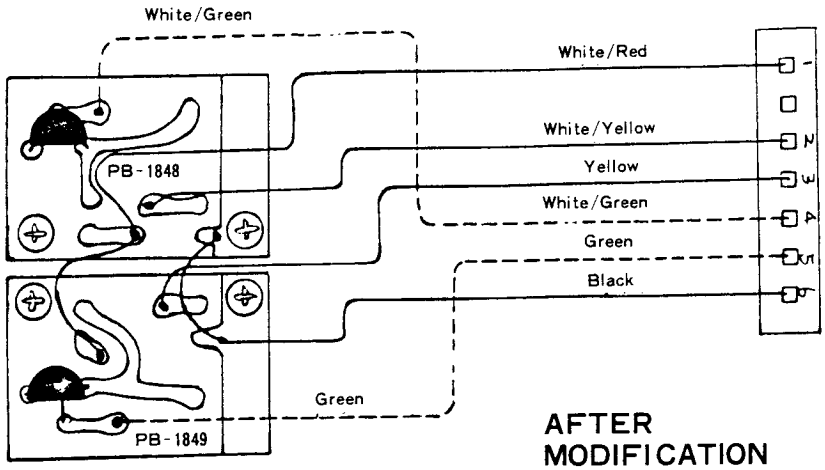


Figure 16.

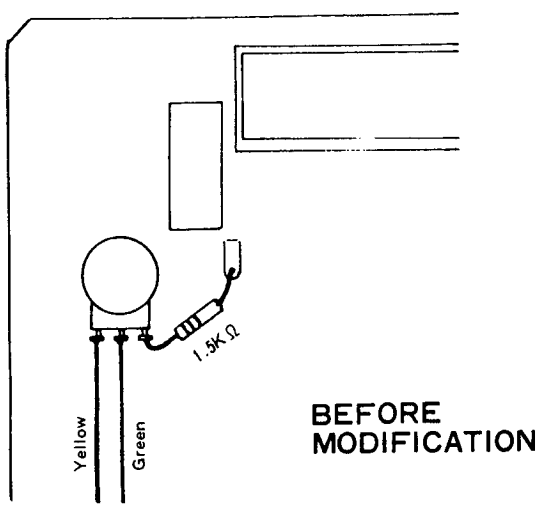


Figure 17.

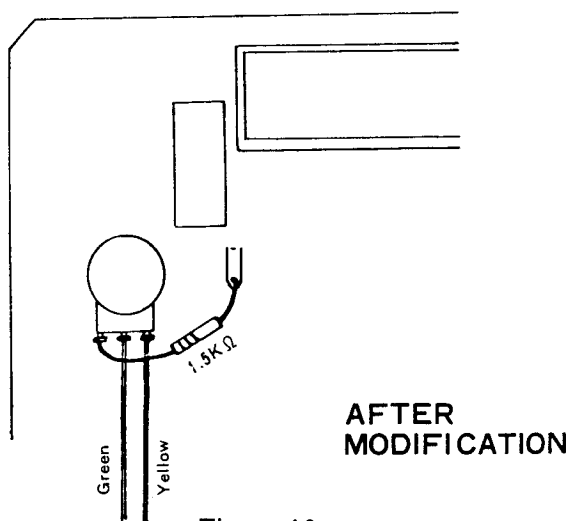
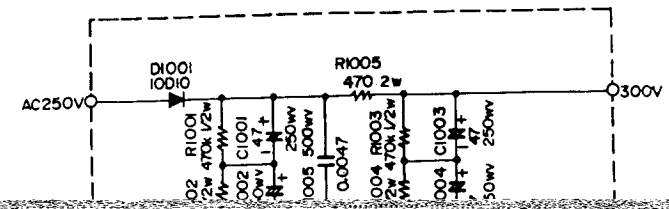


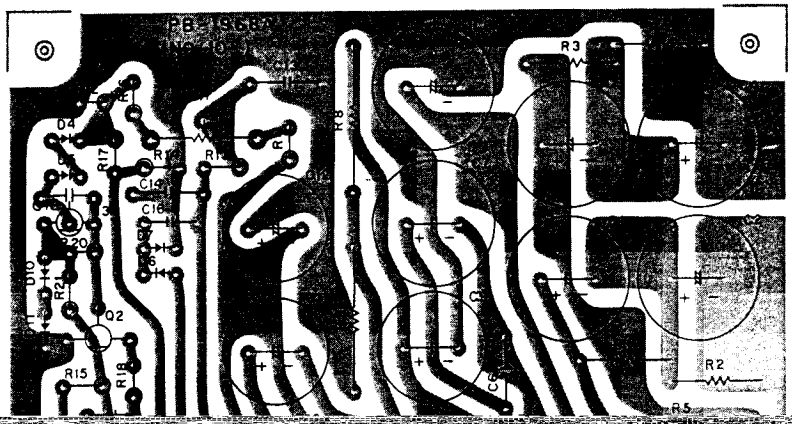
Figure 18.

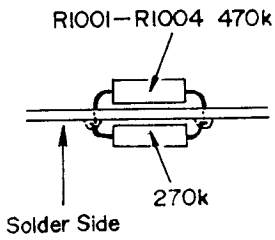
RECTIFIER B UNIT MODIFICATIONS

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



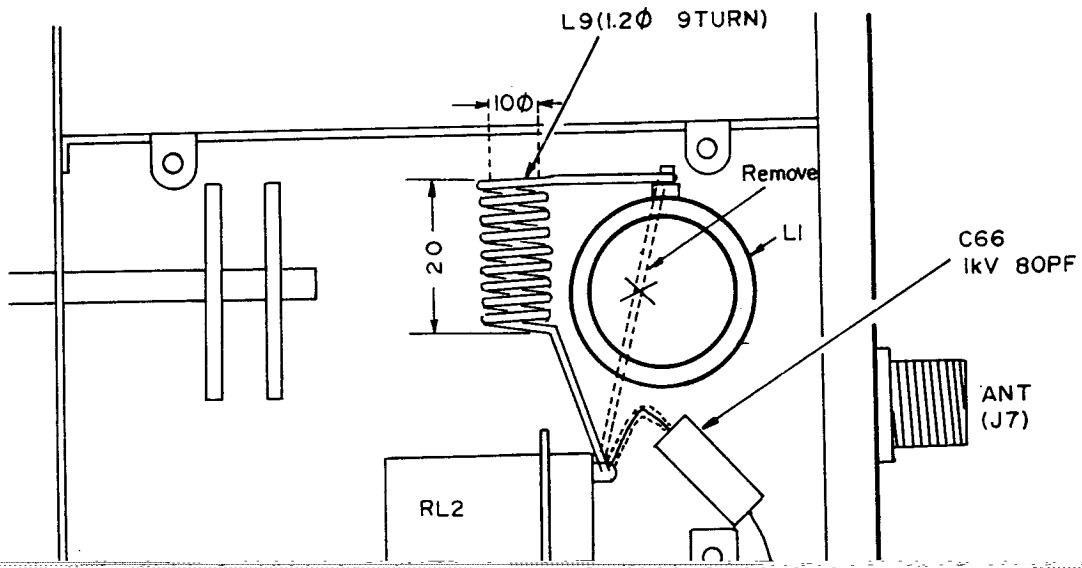
RECT B UNIT PARTS LAYOUT





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

(2) Add a new disc ceramic capacitor (C_{574}),

COUNTER CIRCUIT MODIFICATIONS

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

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

(a) Install the three bypass capacitors C_{2324}, [illegible] from the GW - USB

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

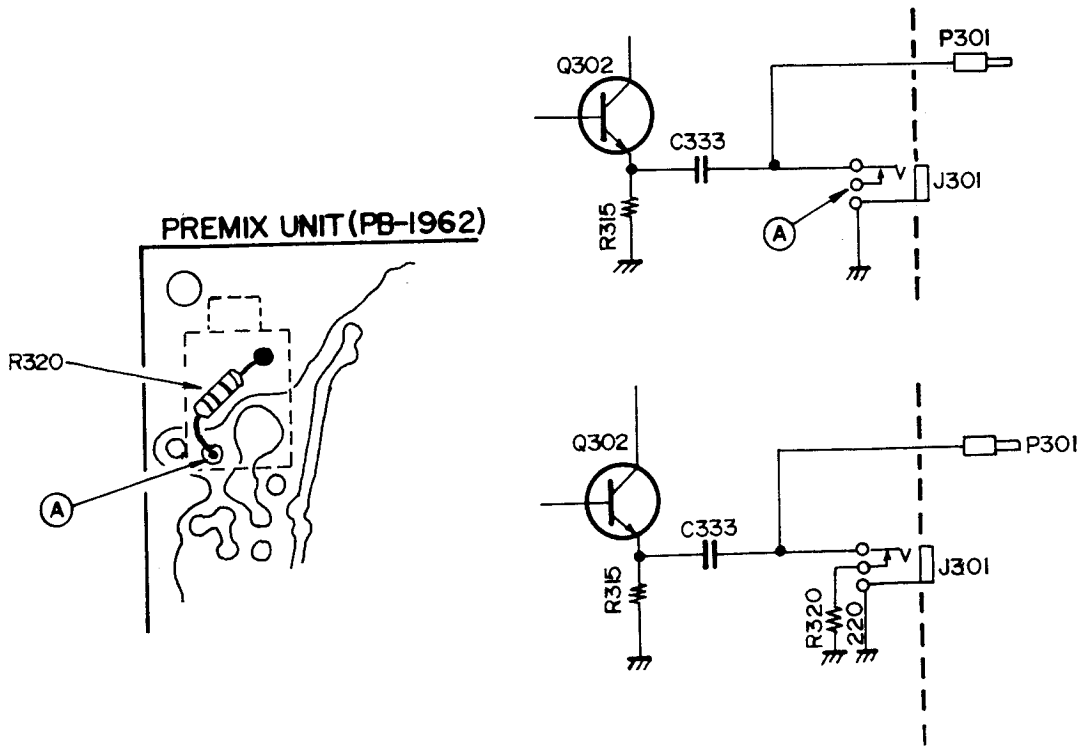
(2) Install a three-pin (one grounded) terminal strip adjacent to MJ_1, one the bottom side of the chassis, as shown in the drawing. Connect the white/brown wire to one side, and install the μPC78L08 regulator so that the output

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 [redacted] The capacitors affected are:

MAINTENANCE AND ALIGNMENT

WARNING

DANGEROUS VOLTAGES ARE PRESENT [illegible]

(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

CW Sidetone

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

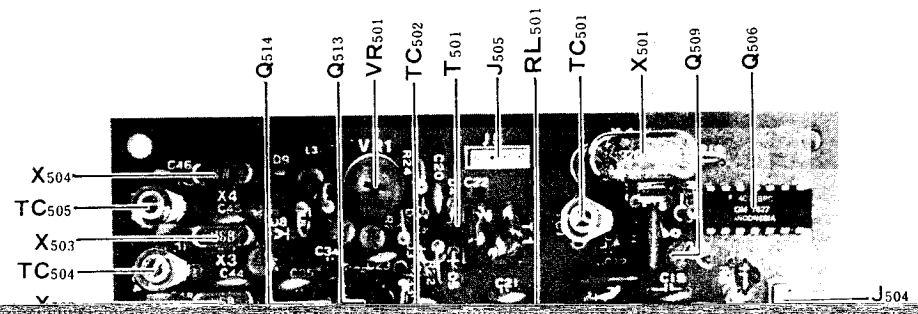
Marker Frequency setting

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.



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.

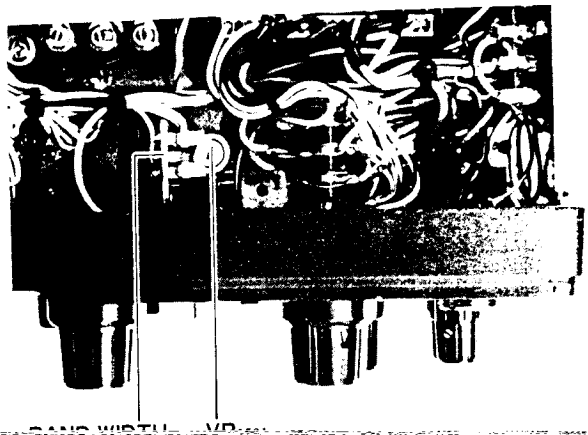
monitor receiver, tuned to the transmitter frequency, and adjust VR_{501} and TC_{502} for a minimum S-meter reading on the external receiver.

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 adjust-

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

VFO UNIT

The VFO UNIT is very critical in its adjustment. [illegible] which should ever

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


T202
Q201
Q202
T201
TC202
CH2
CH1
TC201

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}

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.

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

(4) Connect the RF probe of a VTVM to the collector of Q_{202} (NB-FIX UNIT). Reduce the

(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

(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.

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.

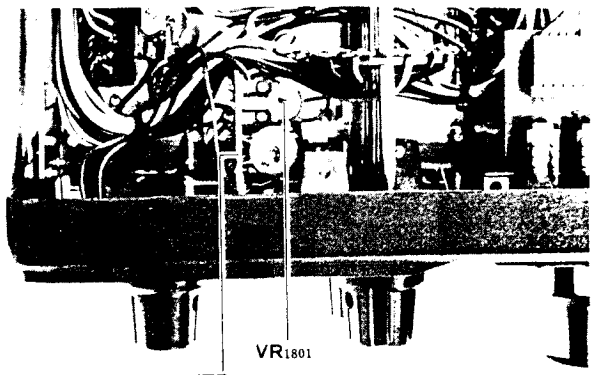
[redacted]

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



FAULT LOCALIZATION

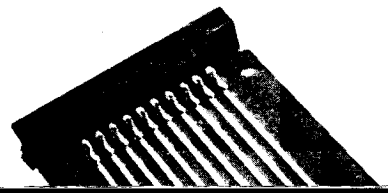
The process of troubleshooting is highly individualistic. Fundamentally, though, the process is one of logical elimination.

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

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.



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	Component burned

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

(5). Marker inoperative	(a) RX OK, no marker	* Defective NB/MARK switch

TRANSMITTER

		Probable Cause(s)

	(b) ALC meter does not function	* Defective 12BY7A * ALC line shorted to ground * Defective D_{1006}, D_{1007} * [illegible] IF stages require realignment

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_{2201}–R_{2245}

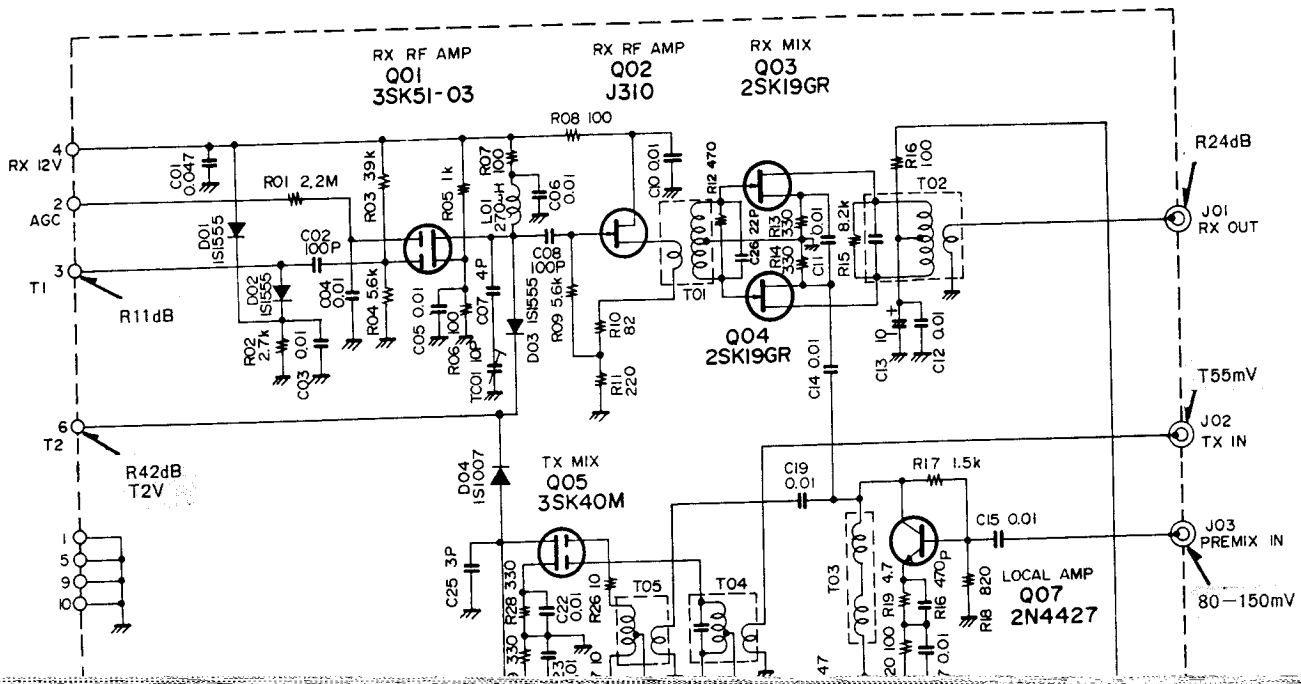
(4) Indicators	(a) WIDTH LED does not work	* Defective LED D_{1501} or R_{1501}, S_{1501}
	(b) CLARIFIER LED does not work	* Defective LED D_{1802} or S_{1801}, S_{1802}, R_{1804}
	(c) PROCESSOR LED does not work	* Defective LED D_9 or R_{17}, S_{2005}
	(d) CH_1, CH_2 does not work	* Defective LED D_{1905}, 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	* Unstable 8 V REG supply, check Q_3.

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

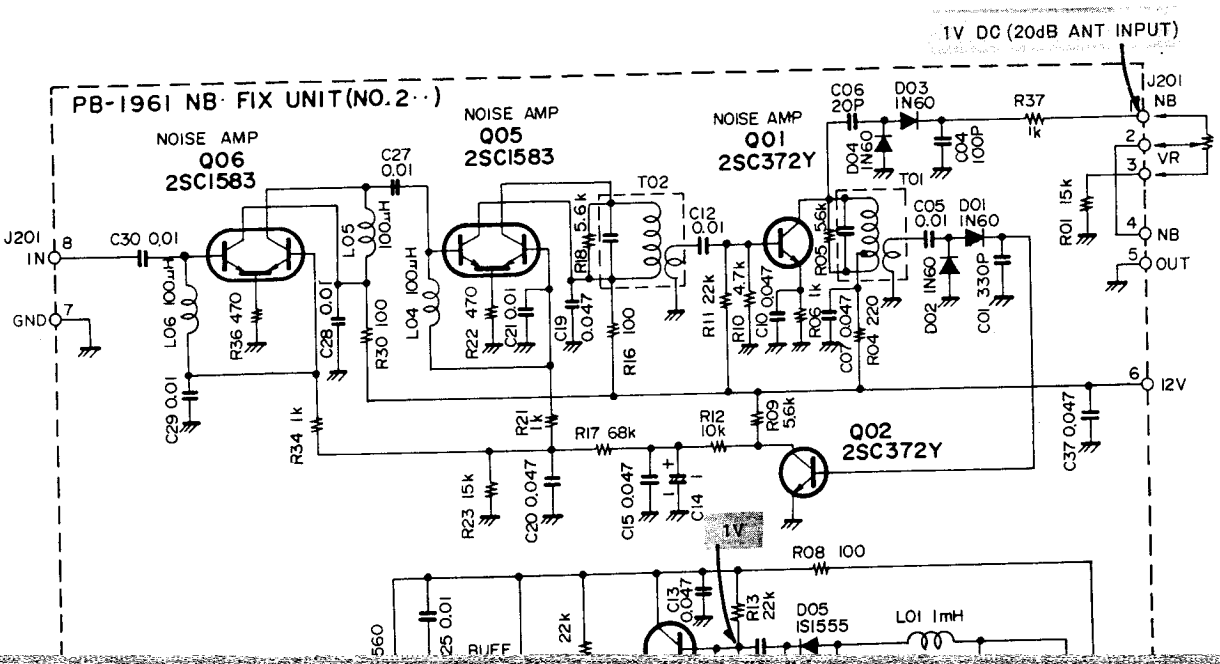
RF UNIT (PB-1960A)

(Early model) Before Prod. #16

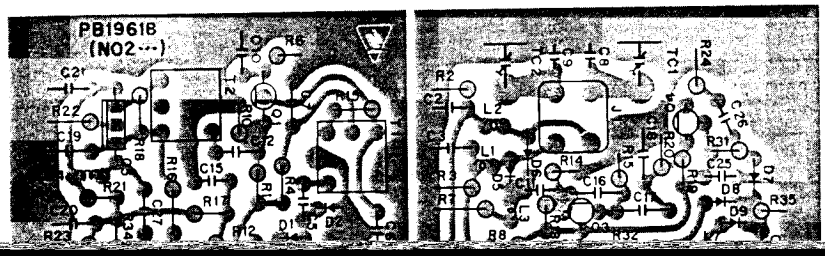


RF UNIT PARTS LAYOUT

NB/FIX UNIT (PB1961B)

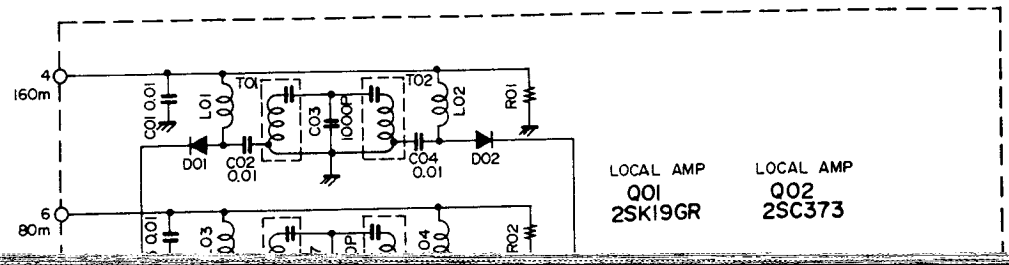


NB / FIX UNIT PARTS LAYOUT



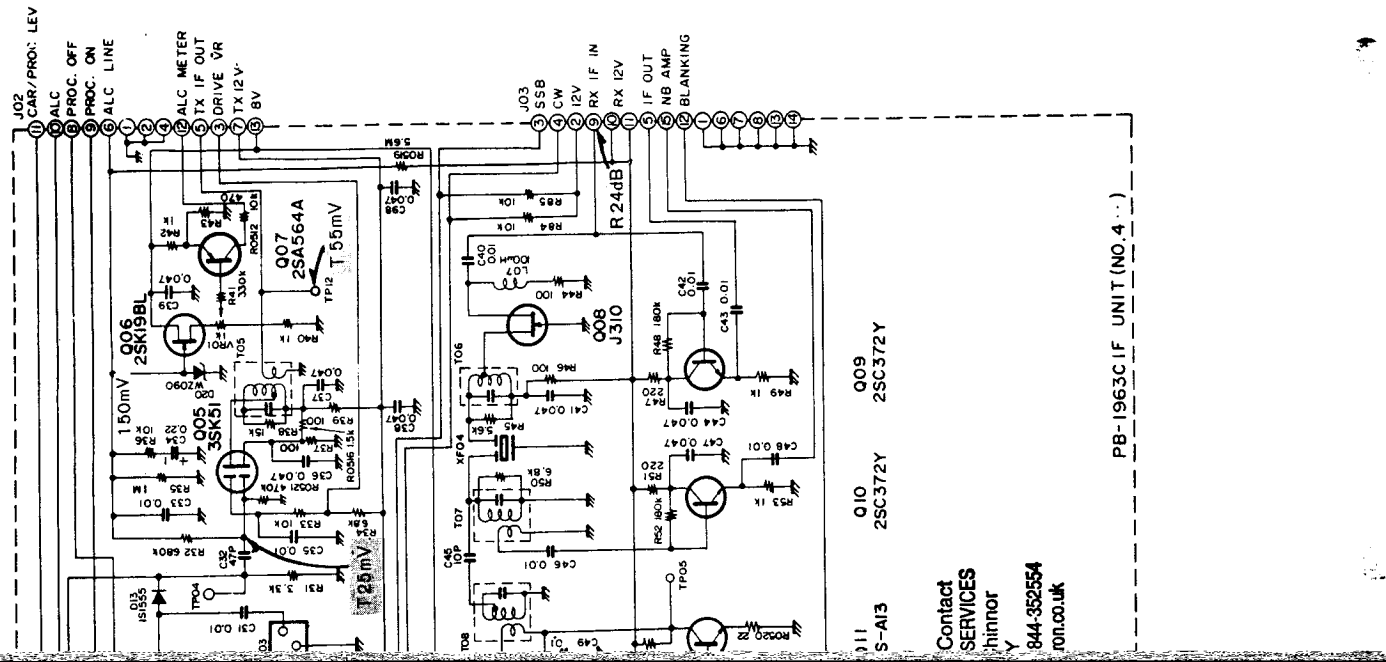
PREMIX UNIT (PB1962A)

(Early model) Before Prod. #16



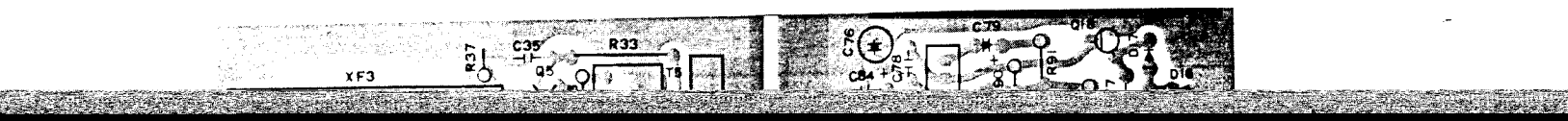
PREMIX UNIT PARTS LAYOUT

IF UNIT (PB-1963C)

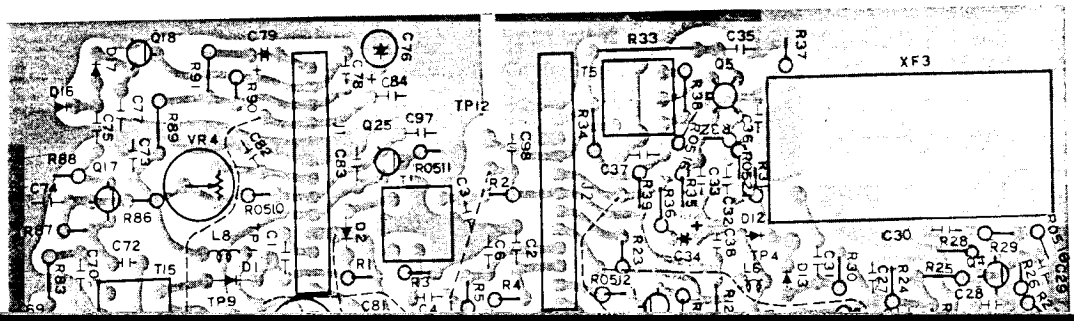


[redacted] VOLTAGE CHARTS

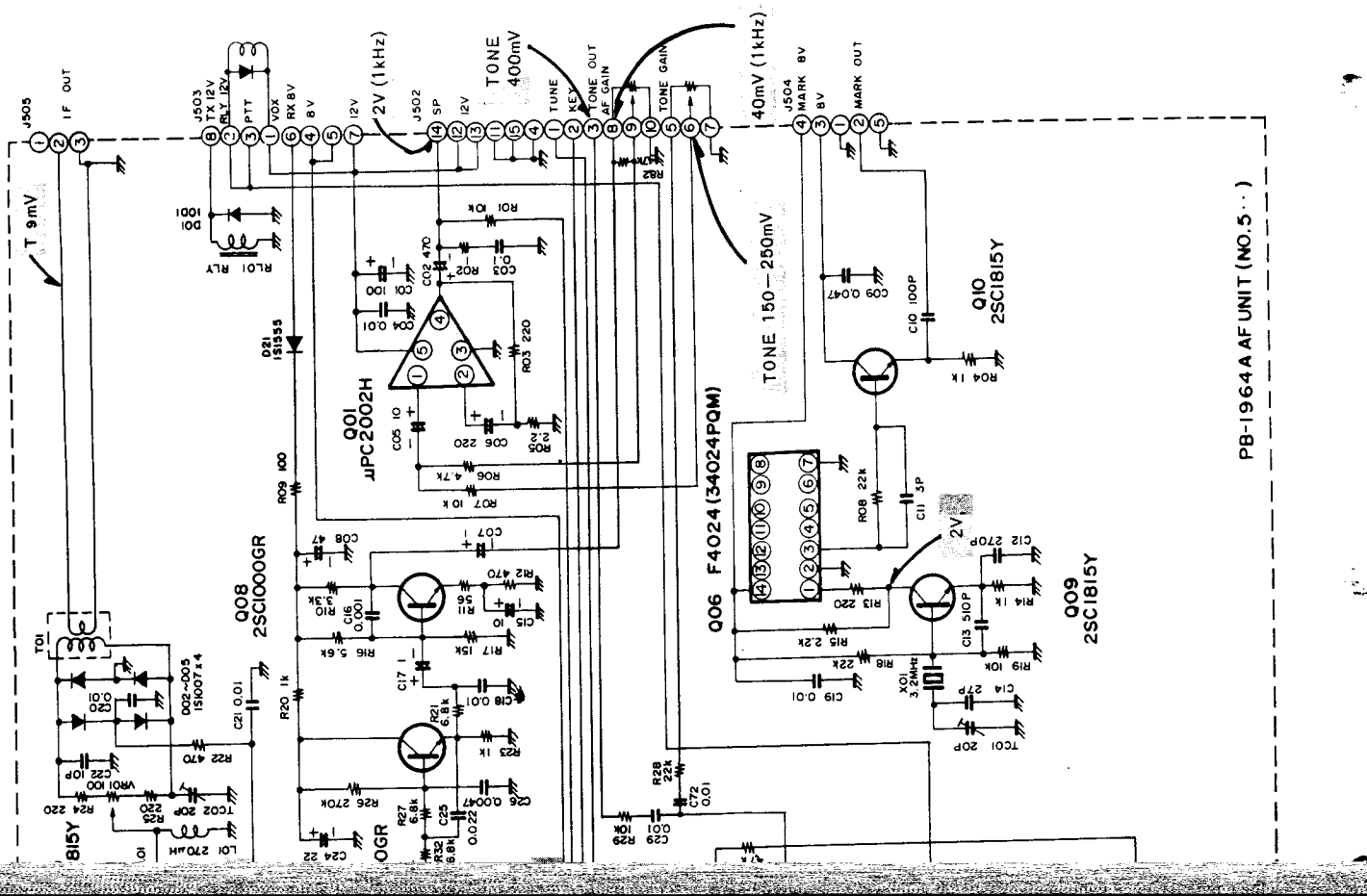
IF UNIT PARTS LAYOUT (1)



IF UNIT PARTS LAYOUT (2)



AF UNIT (PB-1964)



AF UNIT VOLTAGE CHARTS

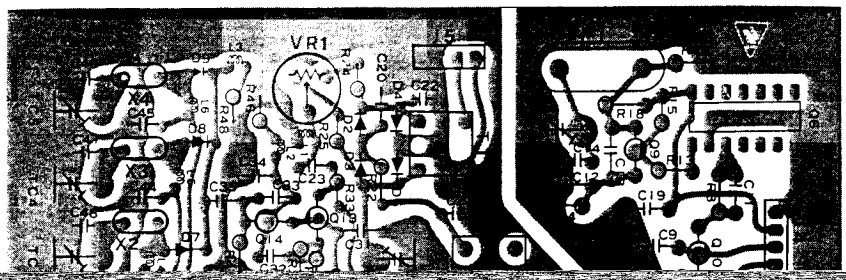
DC VOLTAGES

(V)

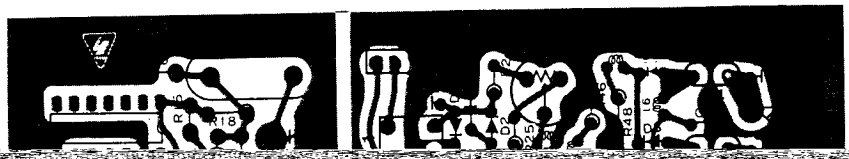
	E(S)		C(D)		B(G)	
	R	T	R	T	R	T
Q_{507}	2.2	0	4.8	0	2.4	0
Q_{508}	1.4	0	1.6	0	0.8	0
Q_{509} ★★	1.8	1.8	3.5	3.5	2.4	2.4
★★	★★				★★	★★

MARKER ON

AF UNIT PARTS LAYOUT (1)

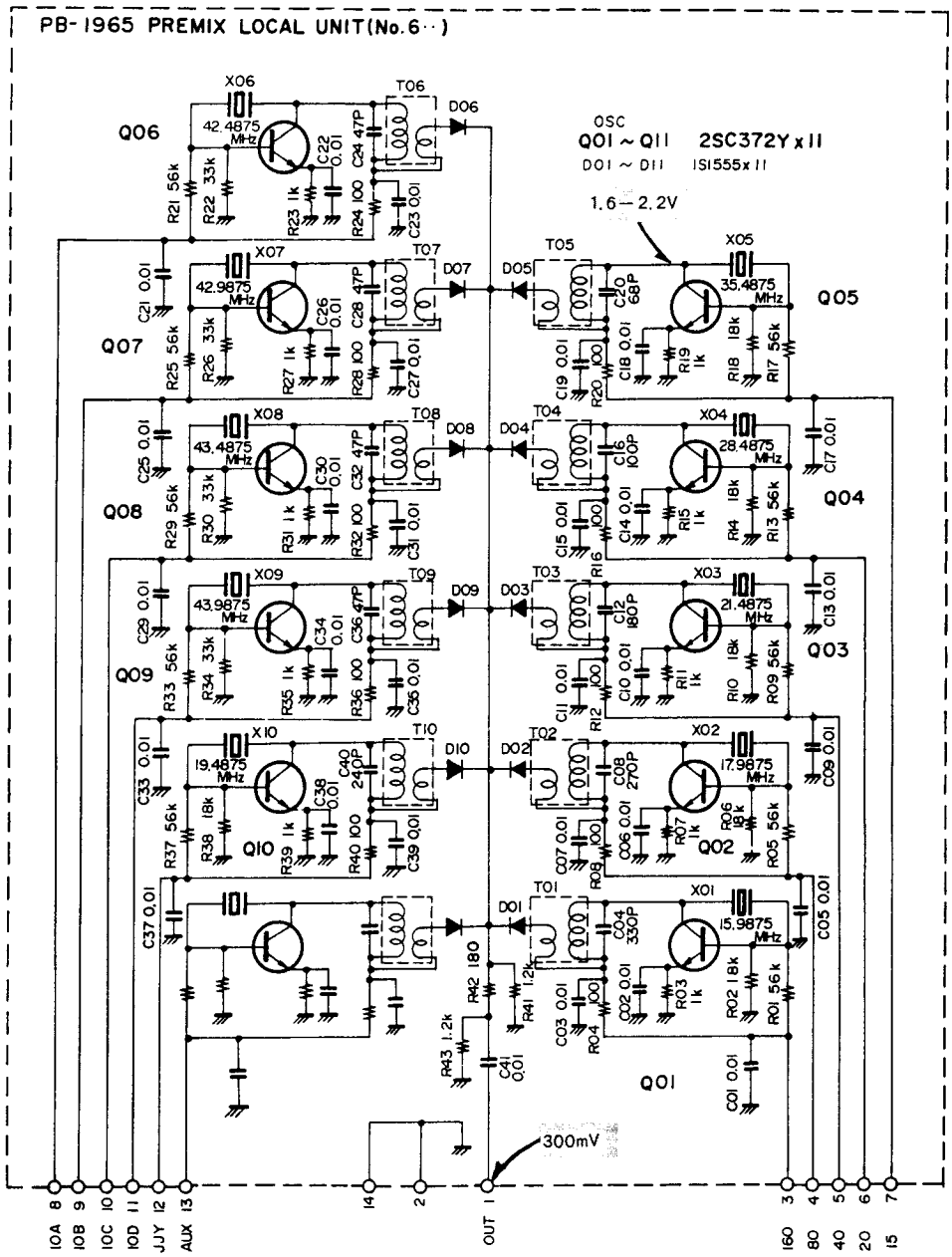


AF UNIT PARTS LAYOUT (2)



PREMIX LOCAL UNIT (PB1965)

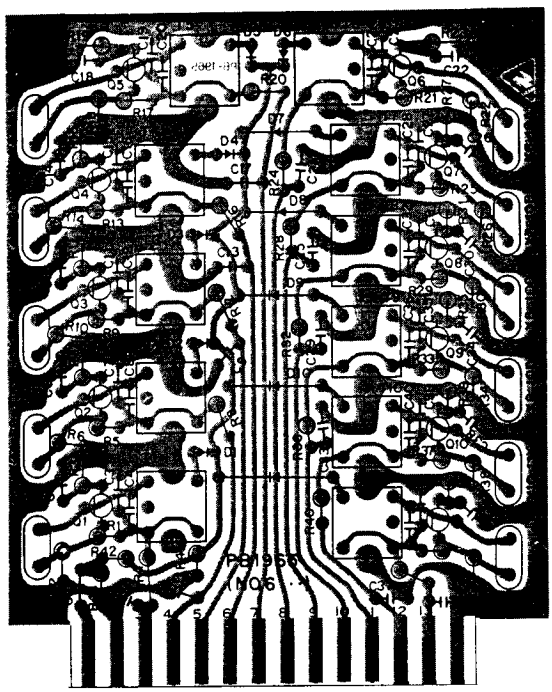
(Prod. #01 ~ #16)



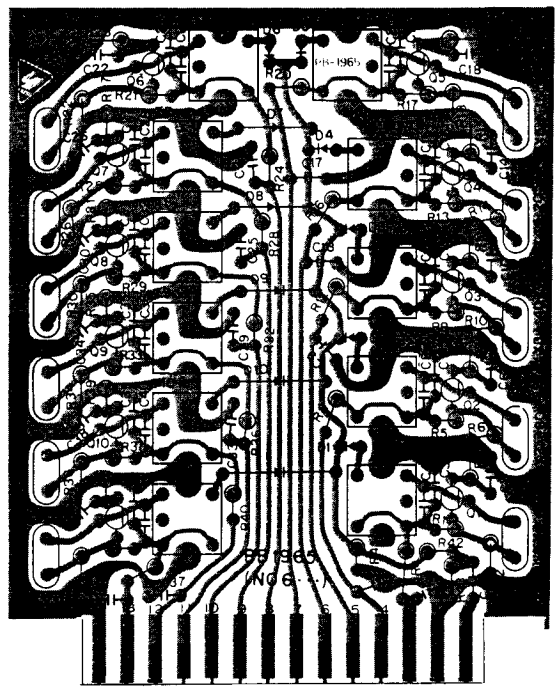
DC VOLTAGES (V)

	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

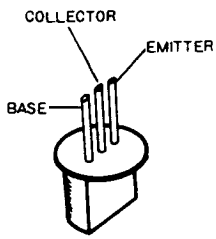
PREMIX LOCAL UNIT PARTS LAYOUT



Viewed from component side



Viewed from solder side

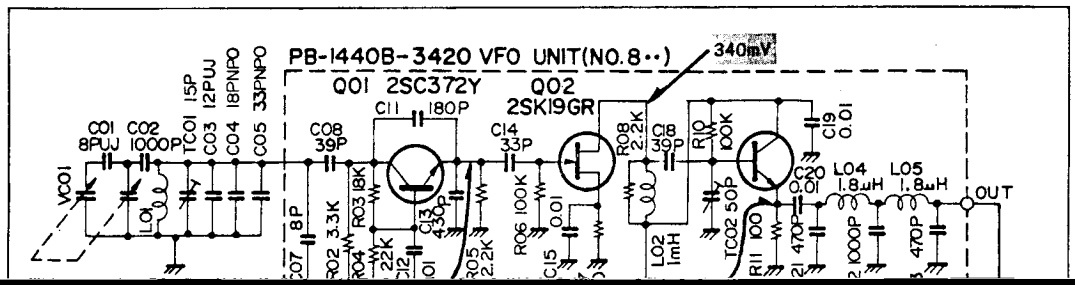


2SC372Y

For Service Manuals Contact
MAURITRON TECHNICAL SERVICES
8 Cherry Tree Rd, Chinnor
Oxon OX9 4QY
Tel:- 01844-351694 Fax:- 01844-352554
Email:- enquiries@mauritron.co.uk

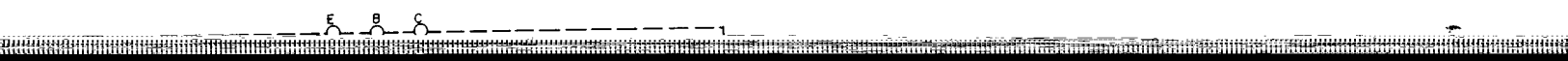
VFO ASSEMBLY

VFO BOARD (PB-1440B-3420)

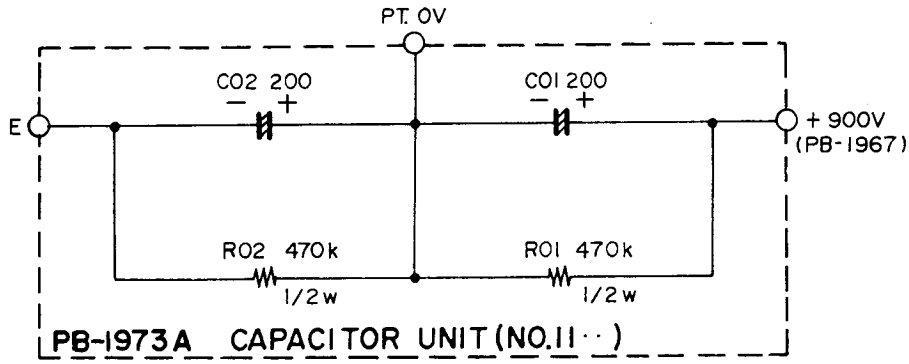


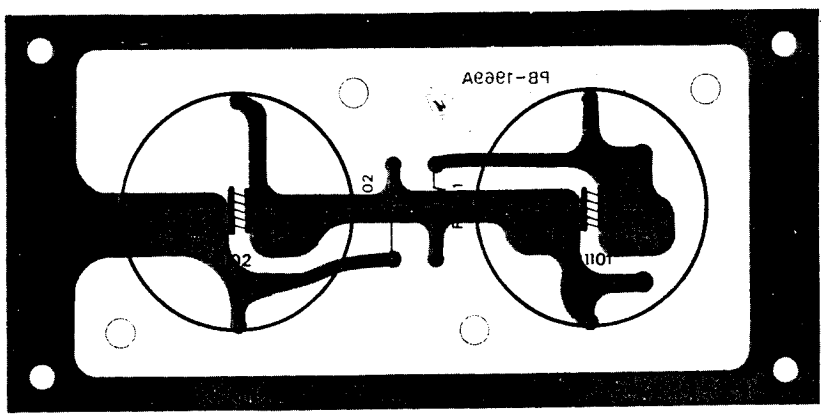
VFO ASSEMBLY PARTS LAYOUT

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

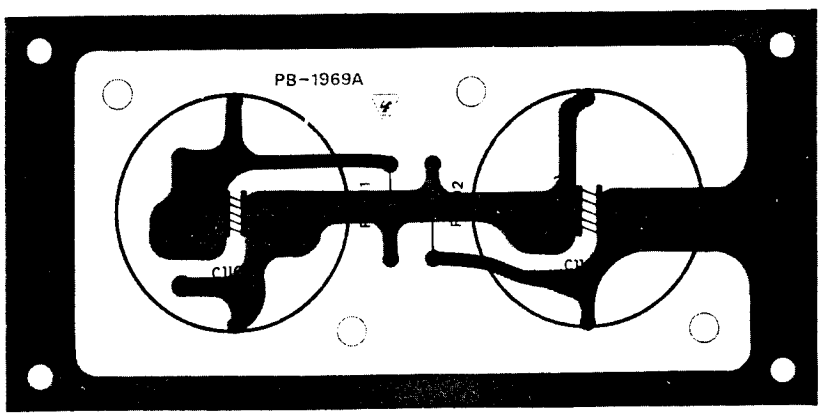


CAPACITOR UNIT (PB-1969A)





Viewed from component side



Viewed from solder side

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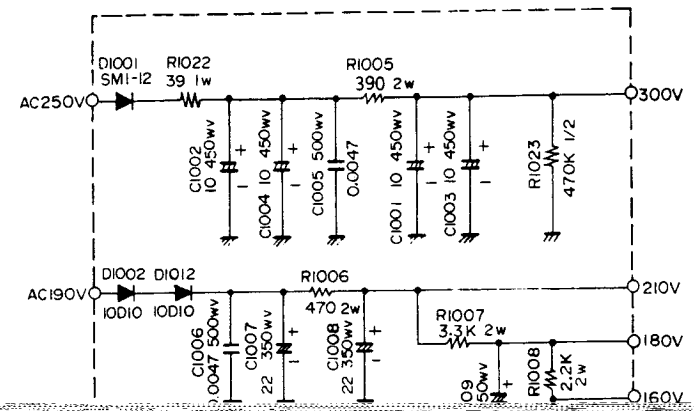
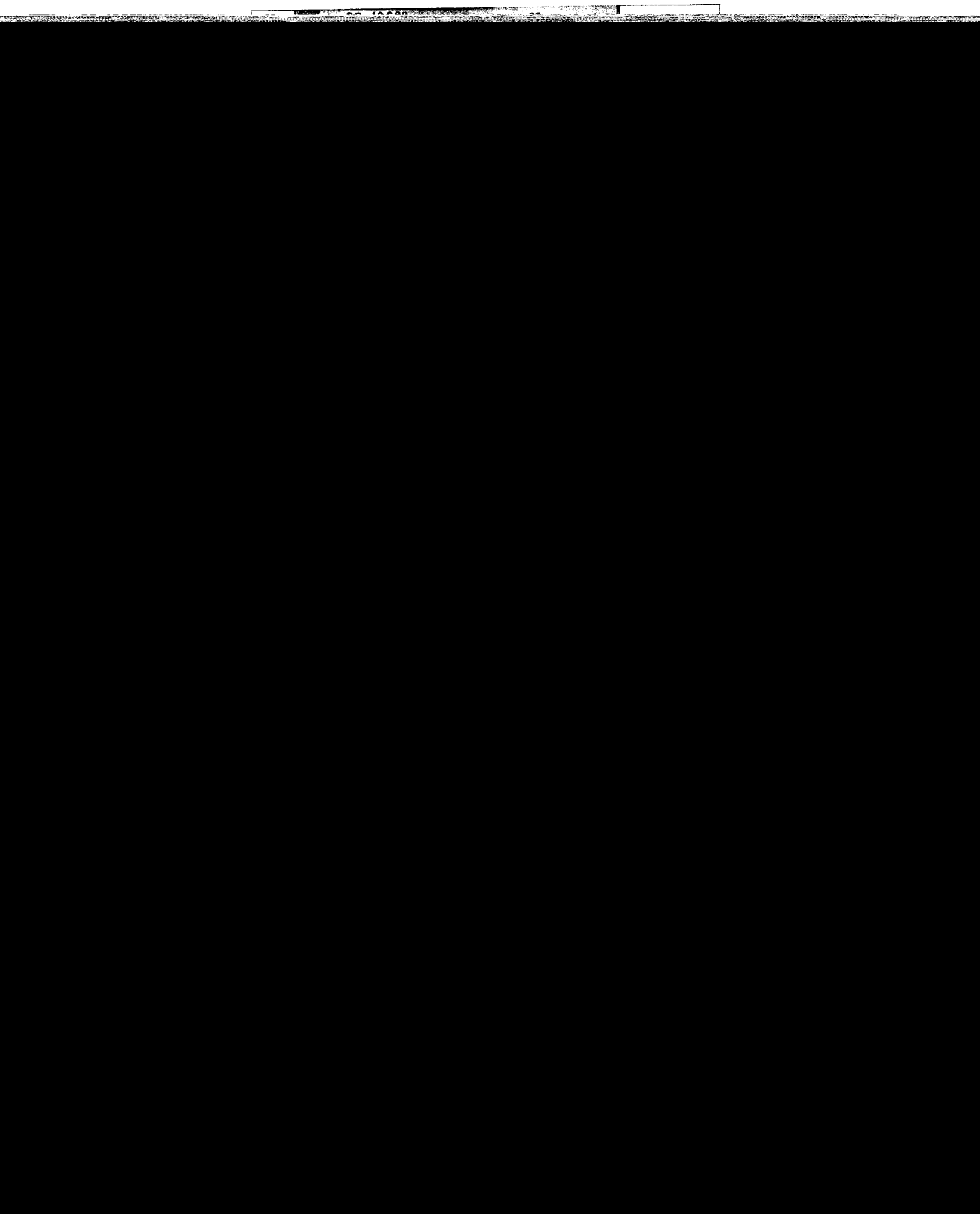
Tel:- 01844-351694 Fax:- 01844-352554
Email:- enquiries@mauritron.co.uk

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

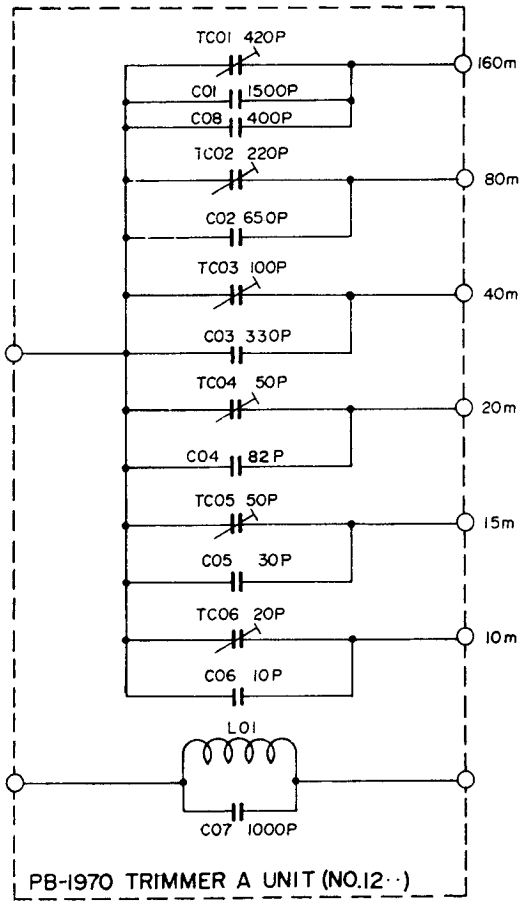


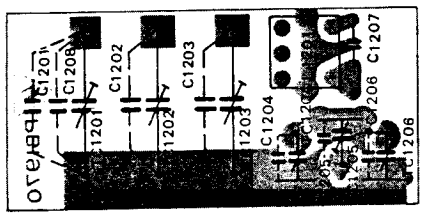
RECT B UNIT PARTS LAYOUT



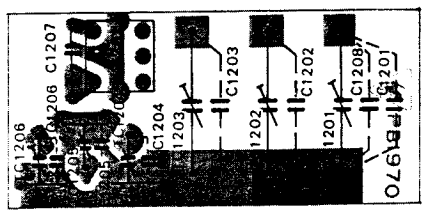
TRIMMER A BOARD (PB-1970Ⓐ)

(Early model) Before Prod. #16





Viewed from component side

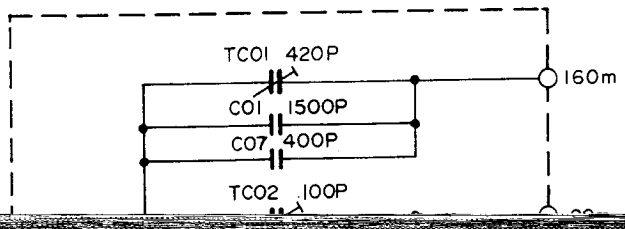


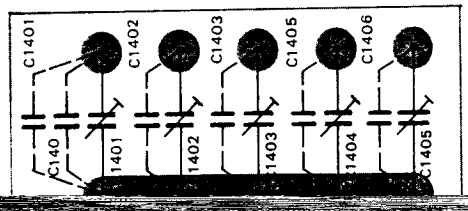
Viewed from solder side

TRIMMER B BOARD (PB-1970Ⓑ)

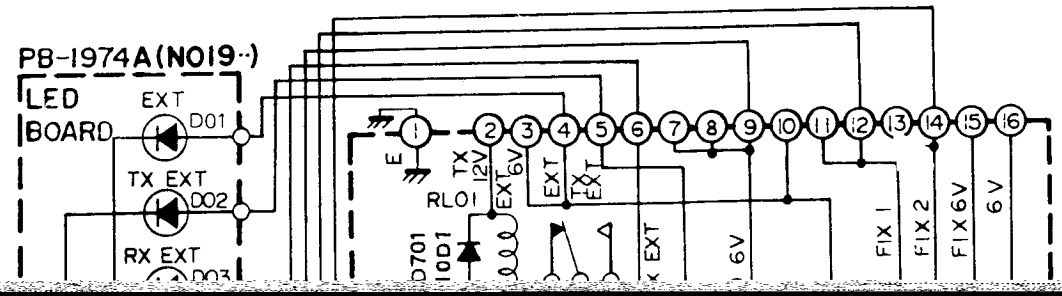
(Early model) Before Prod. #16

TRIMMER C BOARD (PB-1092)



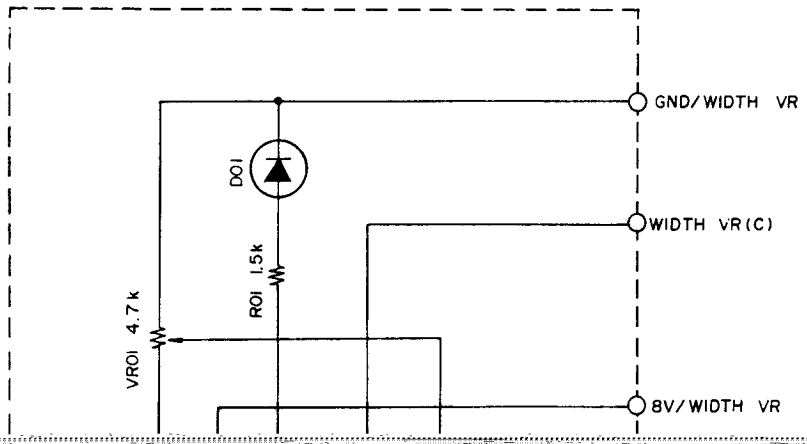


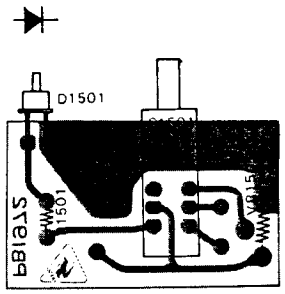
LED UNIT(PB-1974A) SELECT SWITCH UNIT(PB-1966C)



BAND WIDTH CONTROL UNIT (PB-1972)

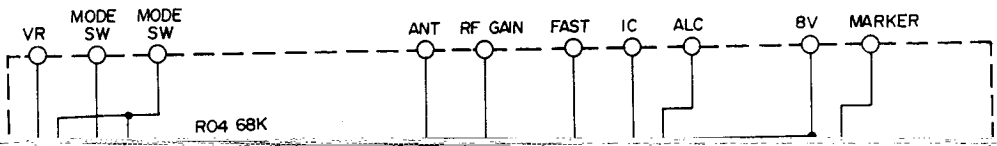
(Early model) Before Prod. #23

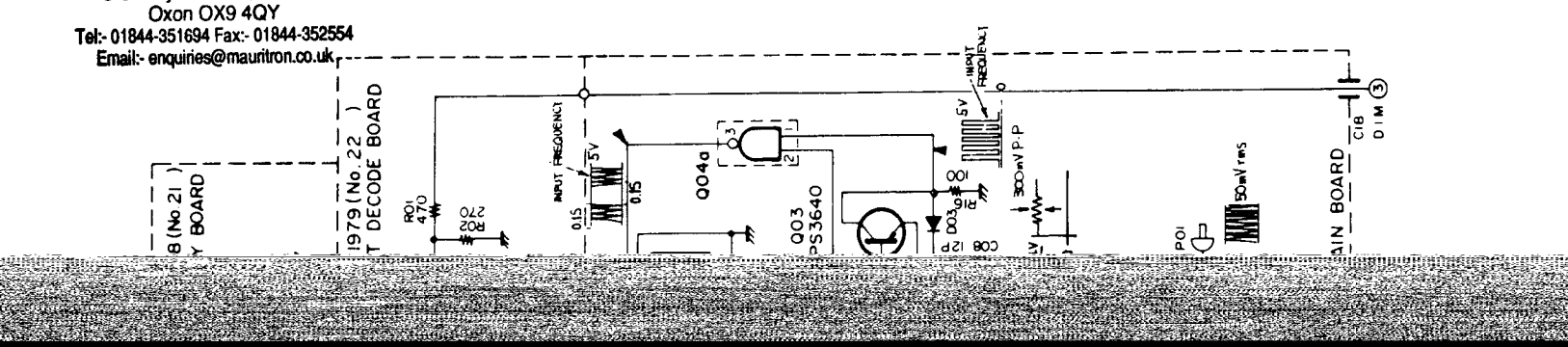




Viewed from component side

LEVER SWITCH UNIT (PB-1975A)

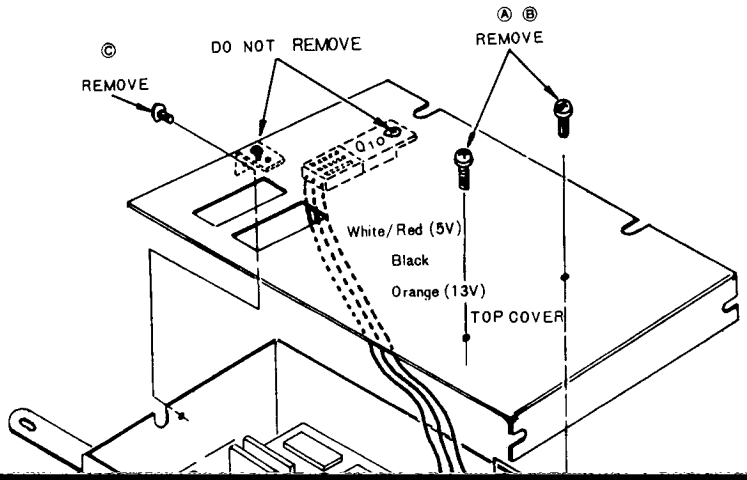




COUNTER UNIT PARTS LAYOUT

(Early model) Before Prod. #15

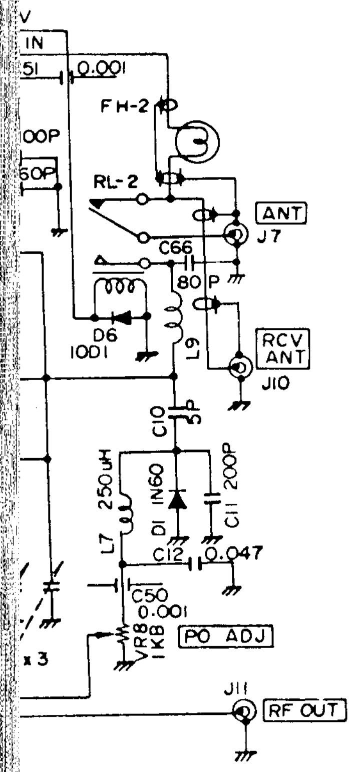
REMOVAL OF COUNTER AND DISPLAY UNITS



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



SOCKETS

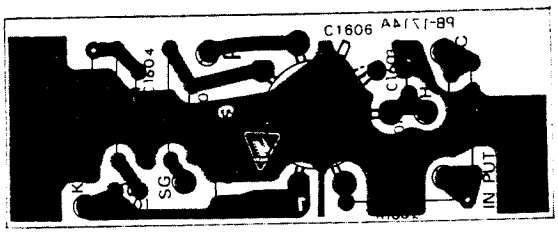
(V)

4	5	6	7	8	9
AC 13.0	AC 6.5	0	345	235	0
AC 13.0	AC 6.5	0	290	190	0
0	−110	0	★★ 0	900	—
0.1	− 50	0.1	★★ 0	790	—

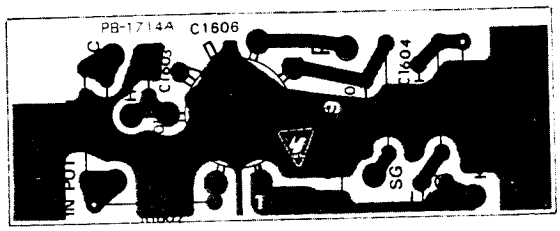
output.

1702 6.5V AC

DRIVER BOARD (PB-1714A)

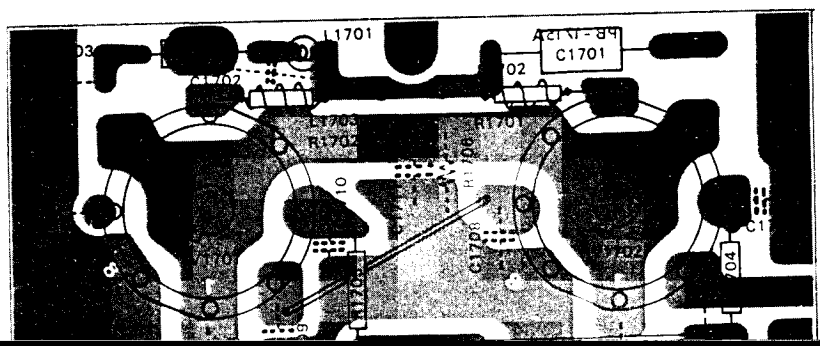


Viewed from component side



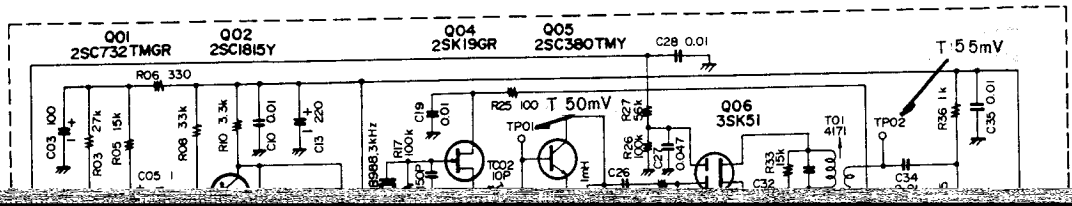
Viewed from solder side

FINAL BOARD (PB-1715A)

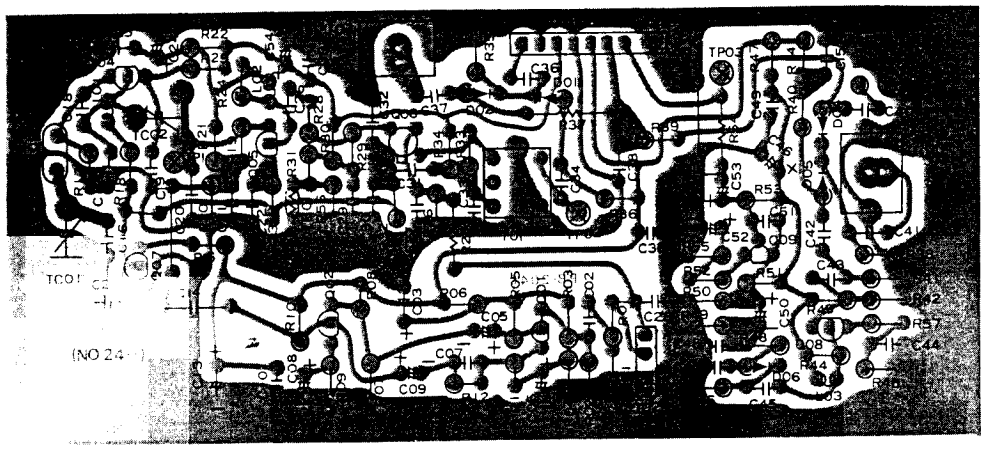


AM UNIT (PB-2040)

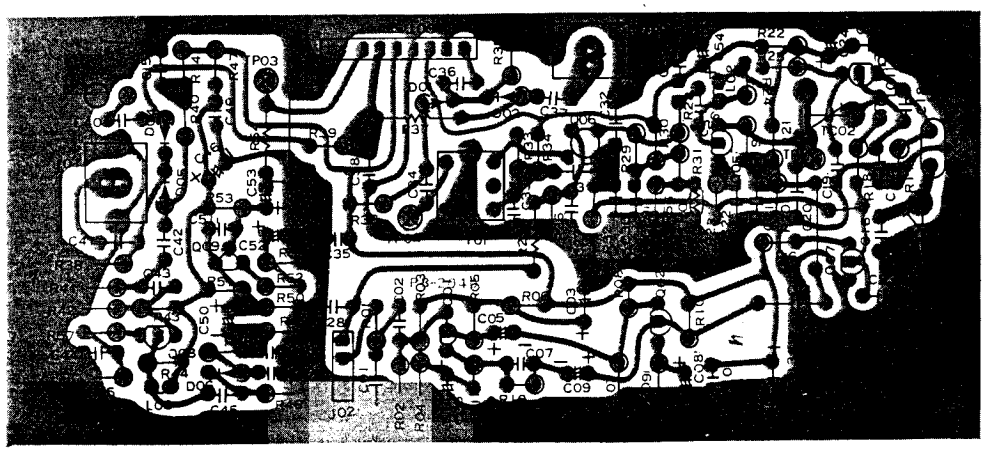
(After Prod. #8)



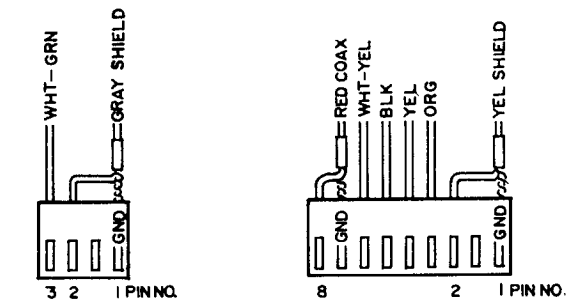
AM UNIT PARTS LAYOUT



Viewed from component side



Viewed from solder side



P19(J2402) P20(J2403)

SECTION 4 – REPAIR PARTS

PARTS LIST AND ORDERING FORMS 4-1
PARTS LIST 4-5

PARTS LIST AND ORDERING FORMS

If you live in the United States, you may order parts from Yaesu Electronics Corporation. In other

YAESU MUSEN COMPANY, LTD. – C.P.O. BOX 1500, TOKYO, JAPAN
YAESU ELECTRONICS CORPORATION – P.O. Box 498, Paramount, CA 90723
YAESU ELECTRONICS CORPORATION – 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

ORDER BLANK

QUANTITY	TRANSCEIVER IDENTIFICATION	LOCATION	PART NUMBER	CIRCUIT DESIGNATION

I authorize shipment via: ☐ Best Way ☐ Parcel Post
☐ UPS ☐ Other

Ship To: Name: _____
(Print or Type) Address: _____
City: _____ State: _____ Zip: _____
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(cut here)

YAESU MUSEN COMPANY, LTD. – C.P.O. BOX 1500, TOKYO, JAPAN
YAESU ELECTRONICS CORPORATION – P.O. Box 498, Paramount, CA 90723
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I authorize shipment via: ☐ Best Way ☐ Parcel Post
☐ UPS ☐ Other

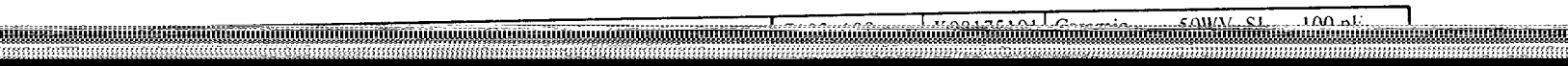
Ship To: Name: _____
(Print or Type) Address: _____
City: _____ State: _____ Zip: _____
Country: _____

PARTS LIST

MAIN CHASSIS			C5	K30279062	Dipped mica 500 WV 3000 pF
Symbol No.	Parts No.	Description			(DM19-302K5)
		IC, TRANSISTOR	C66	K31306800	Moulded mica 1 KWV 80 pF
Q2	G3104960O	TR 2SA496(O)	C17	K02279001	Ceramic 500 WV 1 pF
Q1	G3206160	" 2SB616	C10	K02279002	" " 5 pF
			C18	K02279003	" " 47 pF

		TRANSFORMER
T1	L0020544	#220544
T2	L0020011	#220011
T3	L0020074	#220074
		METER
M1	M0090002	Y-45-02 #250042

		MULTI JACK
MJ1	P4090001	121S-10B-105A
MJ2	P4090007	220D-20B-205A
MJ3	P4090002	121S-14B-105A



★★★★★ LED B BOARD ★★★★★		
PB-1390	F0001390	P.C. Board
D9	G2090060	GD4-203-SRD

RF UNIT

Symbol No.	Parts No.	Description
	C0019600	RF unit with components
PB-1960A	F0001960A	P.C. Board
		FET & TRANSISTOR
Q103, 104	G3800190G	FET 2SK19GR
Q105, 106	G4800400M	" 3SK40M
Q101	G4800510C	" 3SK51-03
Q102	G3090019	" J310
Q107	G3090010	TR 2N4427
		DIODE
D104	G2010070	Ge (GB) 1S1007
D101–103	G2015550	Si 1S1555
		RESISTOR
R119	J00245479	Carbon film 1/4W VJ 4.7 Ω
R126, 127	J00245100	" " " " 10 Ω
R110	J00245820	" " " " 82 Ω
R106–108, 116, 120, 121 130	J00245101	" " " " 100 Ω
	J00245221	" " " " 220 Ω
R111,113,114, 128,129	J00245331	" " " " 330 Ω
R112	J00245471	" " " " 470 Ω
R118	J00245821	" " " " 820 Ω
R105	J00245102	" " " " 1 kΩ
R117	J00245152	" " " " 1.5 kΩ
R102, 122	J00245272	" " " " 2.7 kΩ
R104, 109	J00245562	" " " " 5.6 kΩ
C102, 108	K00175101	Ceramic 50WV SL 100 pF
C103–106, 110–112, 114,115,117, 119–124	K13170103	" " 0.01 μF
C101, 118	K13170473	" " 0.047 μF
C113	K40120106	Electrolytic 16WV TT 10 μF
		TRIMMER CAPACITOR
TC101	K91000019	ECV-1ZW 10 x 40 10 pF
		INDUCTOR
L101, 102	L1190038	FL-5H271K 270 μH
		TRANSFORMER
T101,103,105	L0020209	#220209
T102, 104	L0020221	#220221
		JACK
J101–103	P1090018	SQ3081

NB-FIX UNIT

Symbol No.	Parts No.	Description
	C0019610	NB-FIX unit with components
PB-1961B	F0001961B	P.C. Board
		TRANSISTOR
Q201–204	G3303720Y	2SC372Y
Q205, 206	G3315830	2SC1583
		DIODE
D201–204	G2090029	Ge 1N60

T309, 310	L0020505	#220505	XF403	H1100890	XF8.9HP
T311, 312	L0020633	#220633	XF404	H1100470	8.9M20A
T313, 314	L0020507	#220507	XF405	H1100900	XF10GS
T315	L0020210	#220210			
					RESISTOR
		JACK	R0517, 0518, 0520	J00245220	Carbon film 1/4W VJ 22 Ω
J301	P1090018	SQ3081			

R0521	J01245474	Carbon film 1/4W TJ 470 kΩ	L409	L0020145	5.2 μH #220145
R432	J00245684	" " " VJ 680 kΩ			
R490	J00245105	" " " " 1 MΩ			
	J00245225	" " " " 2.2 MΩ			
R0519	J10246565	" composition " GK 5.6 MΩ			**TRANSFORMER**
			T410	L0020150	R12-4074
			T402,403,404, 407,409,413, 414	L0020140	R12-4170
		POTENTIOMETER			
VR401, 402	J51723102	SR-19R 1 kΩB	T401,406,408, 415	L0020141	R12-4171
VR403, 404	J51723103	10 kΩB			
VR405	J51723473	47 kΩB	T405	L0020221	# 220221
			T411	L0020460	# 220460
			T412	L0020209	# 220209
		CAPACITOR			**MINI CONNECTOR**
C477	K30176221	Dipped mica 50WV 220 pF			
C445, 472	K02173100	Ceramic " CH 10 pF	J401	P0090038	5048-12A
C488, 492	K06175330	" " UJ 33 pF	J402	P0090039	5048-13A
C489	K06175390	" " UJ 39 pF	J403	P0090040	5048-15A
C404,421,432	K02175470	" " CH 47 pF			
C487	K06175101	" " UJ 100 pF			
C459,464,475	K02175101	" " CH 100 pF			
C401,405,406, 411,413,415, 417,419,420, 423,424,428, 430,431,433, 435,440,442, 443,446,448	K13170103	" " 0.01 μF	TP401–412	Q5000011	Wrapping terminal C

D501, 518	G2090001	Si 10D1	
		CRYSTAL	
X501	H0100260	HC-6/W 3200 kHz #210026	
X502	H0100421	HC-18/U 8986 kHz #210042-1	
X503	H0100422	" 8989 kHz #210042-2	
X504	H0100423	" 8988.3 kHz #210042-3	
		RESISTOR	
R511	J00245560	Carbon film 1/4W VJ 56 Ω	
R508,530,557	J00245101	" " " " 100 Ω	

C513	K30176511	Dipped mica 50WV	510 pF
C511	K02172030	Ceramic 50 WV CH	3 pF
C522	K02173100	" " "	10 pF
C514	K02179011	" " "	27 pF
C546–548	K02175390	" " "	39 pF
C510,532,534, 555,566	K02175101	" " "	100 pF
C533	K02175151	" " "	150 pF
C558, 559	K00179020	" " SL	240 pF
C504,519–521, 523,531,535, 542–545, 570	K13170103	" "	0.01 μF
C509,537	K13170473	" "	0.047 μF
C516	K50177102	Mylar 50 WV	0.001 μF
[illegible]	[illegible]	" "	0.0047 μF

		MINI CONNECTOR	C612	K02179023	Ceramic	50WV CH	180 pF
J501	P0090043	5048-19A	C640	K02179026	"	" "	240 pF

		MINI CONNECTOR			TRIMMER CAPACITOR

C906	K41140338	Electrolytic 25WV 3300 μF
		RELAY
RL901	M1190003	FRL-264 D012/04CS-01
	Q5000011	Wrapping terminal C
	Q5000004	Test point D

RECT. B UNIT

Symbol No.	Parts No.	Description
	C0019680	RECT. B unit with components
PB-1968B	F0001968B	P.C. Board
		TRANSISTOR
Q1003	G3106390	2SA639
Q1001	G3107330	2SA733

		CAPACITOR
C1017	K13170473	Ceramic 50WV 0.047 μF
C1016	K12279003	" 500WV 0.0022 μF
C1005, 1006, 1013–1015, 1018	K12279004	" " 0.0047 μF
C1010	K12279002	" " 0.01 μF
C1009	K40240106	Electrolytic 250WV 10 μF
C1011	K40240336	" " 33 μF
C1012	K40240476	" " 47 μF
C1001–1004	K40270106	" 450WV 10 μF
C1007, 1008	K40260226	" 350WV 22 μF
	Q5000011	Wrapping terminal C

CAPACITOR UNIT

Symbol No.	Parts No.	Description

		TRIMMER CAPACITOR	
TC1203	K91000032	B2PY	100 pF
TC1202	K91000052	B4PY	220 pF
TC1201	K91000033	B7PY	470 pF
TC1206	K91000013	ECV-1ZW 20 x 32	20 pF
TC1204, 1205	K91000016	" 50 x 32	50 pF
		INDUCTOR	
L1201	L0020545	Trap coil =220545	

TRIMMER B BOARD

Symbol No.	Parts No.	Description
	C0019701	TRIMMER B unit with components
PB-1970	F0001970	P.C. Board
		CAPACITOR
C1303	K30176271	Dipped mica 50WV 270 pF
C1306	K30176391	" " " 390 pF
C1302	K30176621	" " " 620 pF
C1301	K30209003	" " " 1500 pF
C1305	K02173080	Ceramic 50WV CH 8 pF
C1304	K02175680	" " " 68 pF
		TRIMMER CAPACITOR
C1407	K30276391	Dipped mica 500WV 390 pF
C1402	K30276651	" " " 650 pF
C1401	K30279055	" " " 1500 pF
		TRIMMER CAPACITOR
TC1404, 1405	K91000031	B1PY 40 pF
TC1402, 1403	K91000032	B2PY 100 pF
TC1401	K91000033	B7PY 420 pF

BAND WIDTH CONTROL UNIT

Symbol No.	Parts No.	Description
	C0019720	B.W. CONT. unit with components
PB-1972	F0001972	P.C. Board
		LED
D1501	G2090060	GD4-203 SRD
		RESISTOR
R1501	J00245152	Carbon film 1/4W VJ 1.5 kΩ
		POTENTIOMETER
VR1501	J50710502	V10K8-1-2 5 k ΩB

Q2301	G4800510C	FET 3SK51-03			**TRIMMER CAPACITOR**
Q2303	G3090008	TR MPS3640	TC2301▲	K9100030	ECV-1ZW 40 x 53 40 pF
Q2312★	G1090034	IC SN74LS90N	TC2302★	K91000029	ECV-1ZW 20 x 53 20 pF
Q2313★	G3303800Y	TR 2SC380TM-Y			
					INDUCTOR
		DIODE	L2301	L1020012	35 μH #220012
D2301–2312	G2015550	Si 1S1555	L2302	L1190020	150 μH
		CRYSTAL			**SWITCH**
X2301▲	H0100250	HC-14/W 655.36 kHz	S2301, 2302	N7090016	DSS208
X2301★	H0102272	HC-18/U 6553.6 kHz			
					PLUG
		RESISTOR	P2301	P0090045	SQ4052
R2316, 2326★	J00245101	Carbon film 1/4 WS VJ 100 Ω	P2302 (with wire)	T9201360	1625-09P-1 #240136
R2301, 2311	J00245221	" " " " " 220 Ω			
R2319	J00245331	" " " " " 330 Ω			
[illegible]	[illegible]	" " " " " 470 Ω			

SECTION 5 – LATE MODEL UPDATE

GENERAL DESCRIPTION 5-1
CONTROLS AND SWITCHES 5-2
REAR APRON CONNECTIONS 5-5
BLOCK DIAGRAM 5-7
CIRCUIT DESCRIPTION 5-8
MAINTENANCE AND ALIGNMENT 5-17
OPTIONAL INSTALLATIONS 5-20
PARTS LIST 5-25

HIGH—PERFORMANCE HF TRANSCEIVER
YAESU FT-101ZD

GENERAL DESCRIPTION

The FT-101ZD is a precision engineered, high-performance HF transceiver of advanced design, providing all band (160 - 10 meters) operation on SSB, CW, and AM* or FM*. This transceiver operates at an input power of 180 watts.

Advanced features include digital plus analog frequency display, continuously variable IF bandwidth (300 Hz - 2.4 kHz), a superb noise blanker with threshold adjustment, and an effective RF speech processor. The receiver boasts excellent dynamic range, despite its high sensitivity, for

All circuits, except the transmitter driver and final amplifier stages, are solid state. Solid state devices provide extremely high reliability and high component density, along with low power drain. The FT-101ZD may be operated from a variety of AC voltages, from 100 to 234 volts. A DC-DC converter, providing operation from a 13.5 VDC power source, is an available option.

For the economy FT-101Z, the counter unit is an available option, providing digital display capability, should you want to upgrade your transceiver at a

(10) (11) CLARIFIER SELECT switches

Press the RX button for offset of the receive frequency.
Press the TX button for offset of the transmit frequency.
Press both buttons for offset of the transceive

(20) METER

The meter displays final amplifier cathode current (IC), relative power output (PO), and ALC feedback voltage.

PO/IC/ALC .... In the PO position, relative power output is displayed on the meter. In the IC position, final amplifier cathode current is displayed. In the ALC position, ALC voltage is displayed. Regardless of the setting of the meter switch, the meter functions as an S-meter on receive.

NB/MARK..... In the NB position, the noise blanker is activated. In the MARK position, the internal

(29) HEATER

With the HEATER switch on, heater voltage is applied to the driver and final amplifier tubes. This switch may be turned off during periods of RX, when energy conservation is critical.

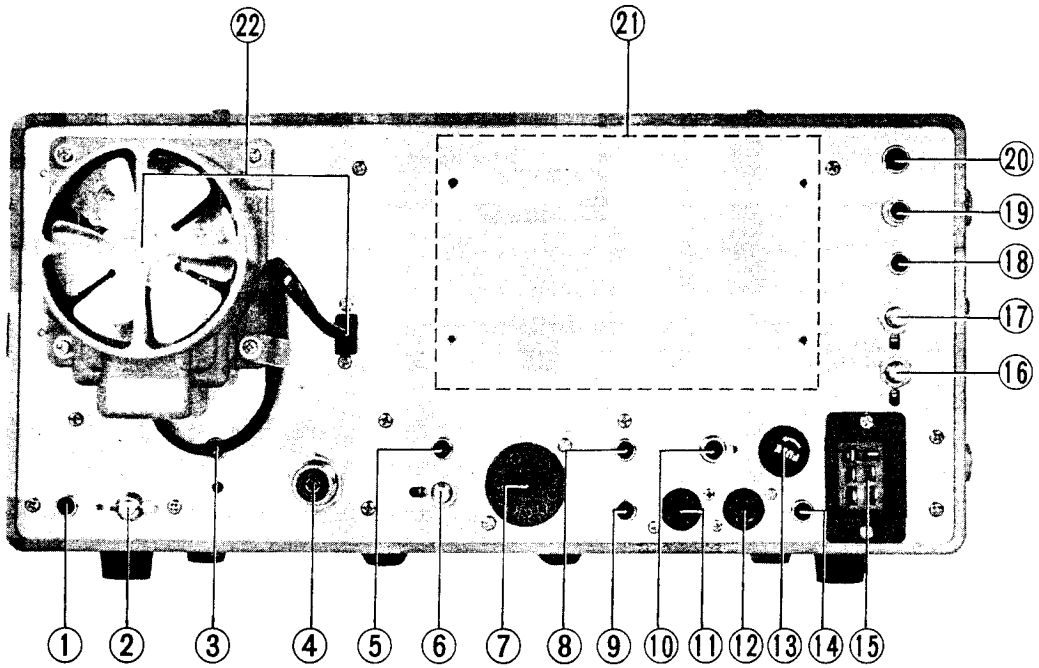
(30) PHONES

This is a standard ¼" phone jack for use with headphones.

(31) MIC

This is a 4 conductor jack for microphone and

REAR APRON



(1) RF OUT

RF output of 3 volts RMS is available at this jack for use with a transverter. Output is from the driver stage.

Please insert the ACC plug at all times, to provide heater voltage for the final amplifier tubes.

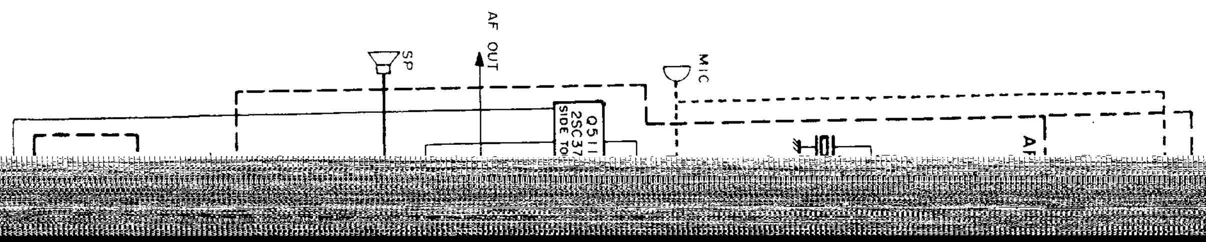
(8) TONE OUT

(14) IF OUT

Wideband IF output is available at this jack for use

(18) PTT

External control of the transceiver PTT (push to

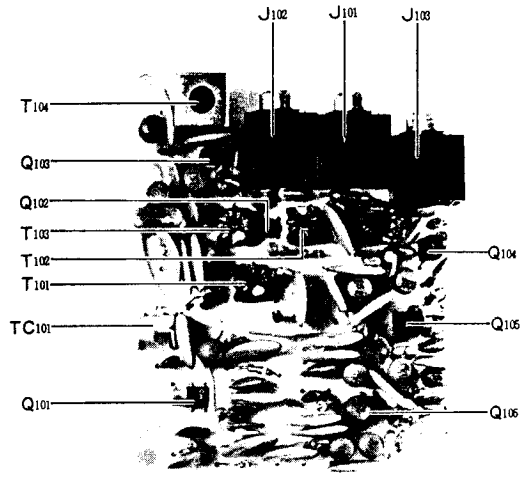

SP
AF OUT
MIC
Q511

CIRCUIT DESCRIPTION

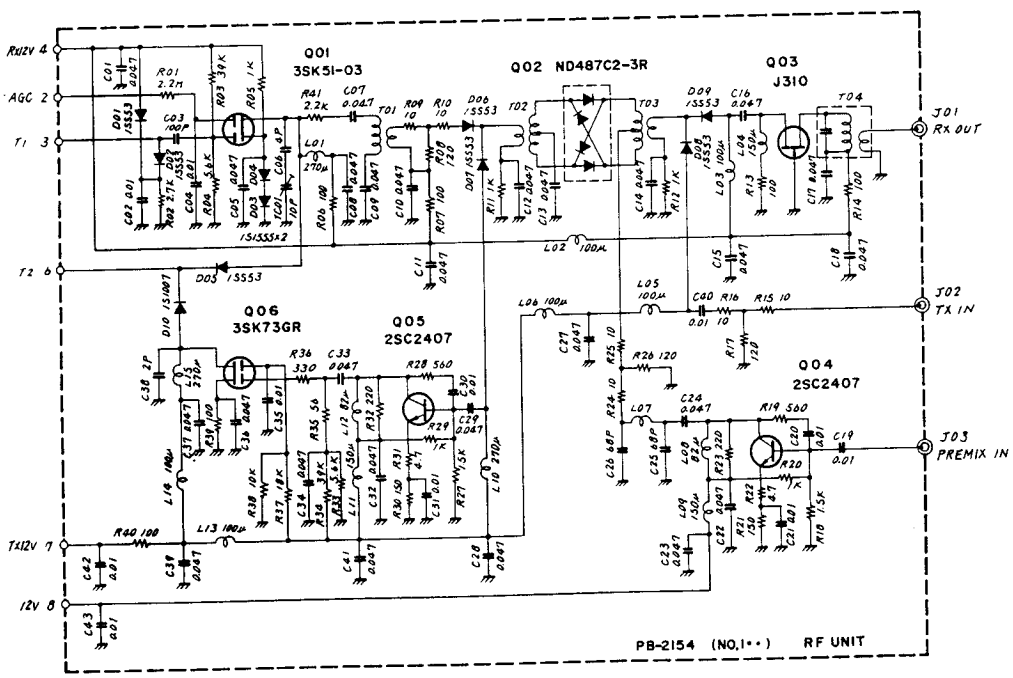
RECEIVER

RF UNIT (PB-2154)

The incoming signal is amplified by the RF amplifier, Q_{101} (3SK51-03), a dual-gate MOS FET with excellent rejection of cross modulation and intermodulation. The amplified signal is fed to the Schottky barrier diode module, Q_{102} (ND487C2-3R), where the RF signal is mixed with a local signal delivered from Q_{104} (2SC2407), resulting in a first IF of 8.9875 MHz. The IF signal is then amplified by Q_{103} (J310) and fed to J_{101}.



RF UNIT (PB-2154)



FM UNIT (PB-2219) OPTION

APF UNIT (PB-2217)

The APF UNIT is placed in the audio circuit by the APF/NOTCH switch on the front panel. For APF operation, a selective active filter is formed by Q_{1502}(**a**), and the output is delivered to the AF UNIT through the AF GAIN control.

The sections of Q_{1502}(**b**) are also used for the high-

RF UNIT (PB-2154)

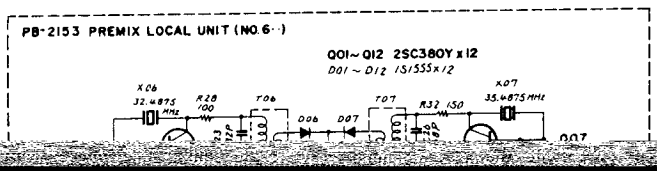
The IF signal from J_{102} is delivered to the Schottky barrier diode module Q_{102} **(ND487C2-3R)**, where the IF signal is mixed with a local signal delivered from Q_{104} **(2SC2407)**, producing the RF output signal. The RF signal is then amplified by Q_{105} (2SC2407) and Q_{106} **(3SK40M)**, and fed through diode switch D_{103} **(1S1007)** to the DRIVE UNIT.

PREMIX LOCAL UNIT (PB-2153)

Crystal oscillators Q_{601}–Q_{612} (2SC380Y) generate the premix local signal at the frequencies shown in Table 3. Diode switches D_{601}–D_{612} (1S1555) select the proper local signal for the band in use. The local signal is then delivered to the PREMIX UNIT.

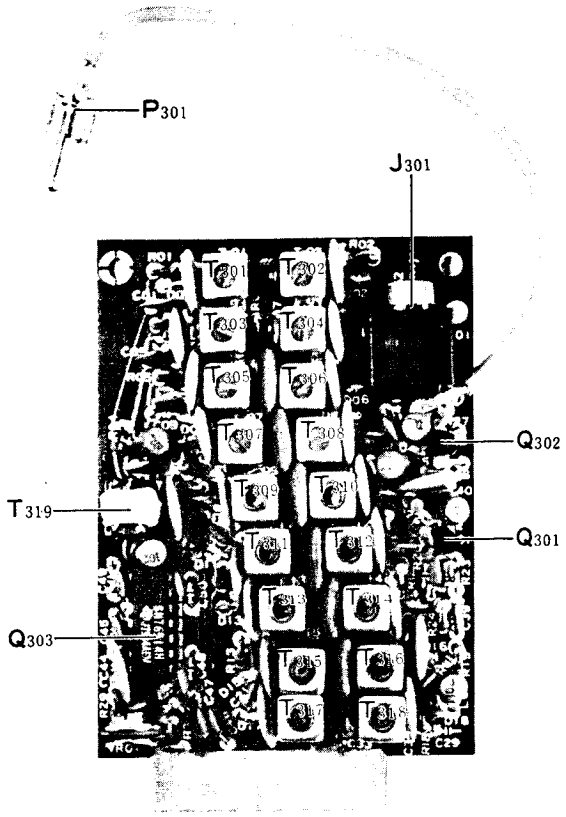
		XCO Frequency	PREMIX OUT Frequency
160m	X_{601}	15.9875MHz	10.4875~10.9875MHz
80m	X_{602}	17.9875MHz	12.4875~12.9875MHz
40m	X_{603}	21.4875MHz	15.9875~16.4875MHz
30m	X_{604}	24.4875MHz	18.9875~19.4875MHz
20m	X_{605}	28.4875MHz	22.9875~23.4875MHz
17m	X_{606}	32.4875MHz	26.9875~27.4875MHz
15m	X_{607}	35.4875MHz	29.9875~30.4875MHz
12m	X_{608}	38.9875MHz	33.4875~33.9875MHz
10m A	X_{609}	42.4875MHz	36.9875~37.4875MHz
10m B	X_{610}	42.9875MHz	37.4875~37.9875MHz
10m C	X_{611}	43.4875MHz	37.9875~38.4875MHz
10m D	X_{612}	43.9875MHz	38.4875~38.9875MHz

Table 3

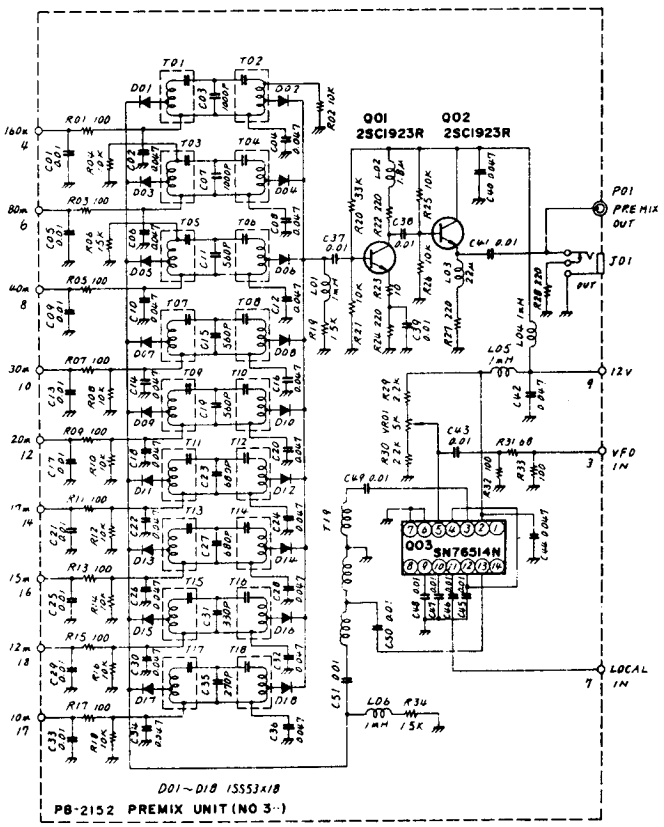


PREMIX UNIT (PB-2152)

The premix signal is produced at Q_{303} (SN76514N), a double-balanced mixer, where the premix local signal from Q_{601}–Q_{612} is mixed with the VFO or crystal controlled 5 MHz signal. The premix output frequencies are shown in Table 3. The premix signal is passed through bandpass filter T_{301}–T_{318}, and amplified by Q_{301}, Q_{302} (2SC1923R). The amplified signal is then fed to the RF UNIT, where the signal is further amplified by Q_{102} for delivery to the transmitter and receiver mixers.



PREMIX UNIT (PB-2152)



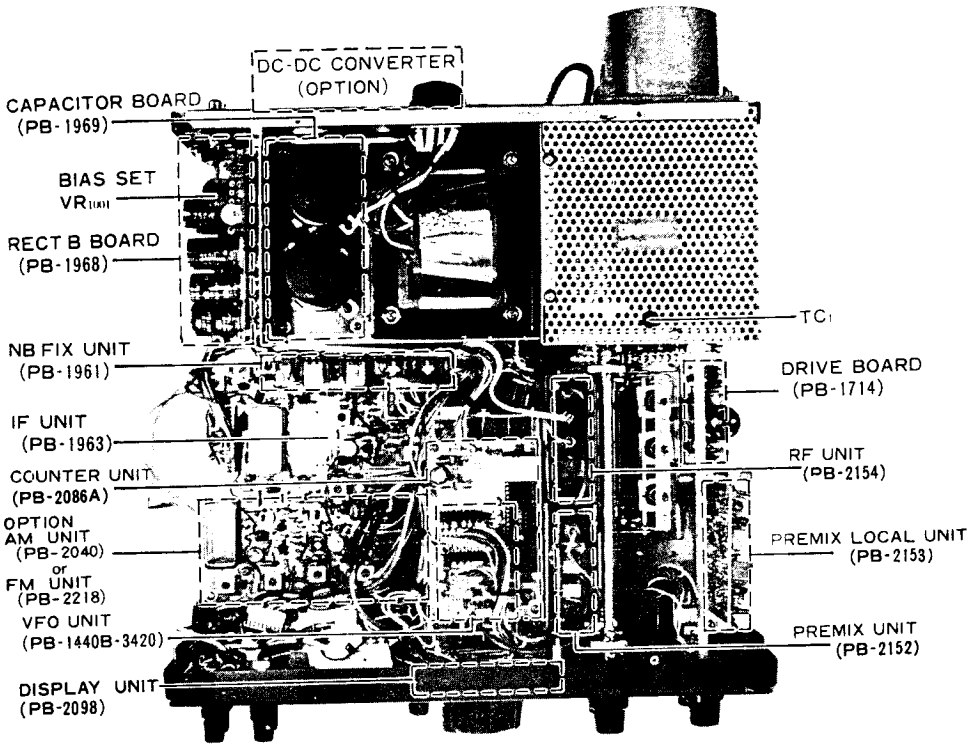
	Nominal Premix Local Frequency	L S B	U S B	CW, AM/FM
160m	10.4875–10.9875(MHz)	10.486–10.986(MHz)	10.489–10.989(MHz)	10.4883–12.9883(MHz)
80m	12.4875–12.9875	12.486–12.986	12.489–12.989	12.4883–12.9883

COUNTER UNIT (PB-2086A-3420/PB-2098)

The local oscillator signal is applied to Large-Scale Integrated Circuit (LSI) chip for display on the front panel digital display.

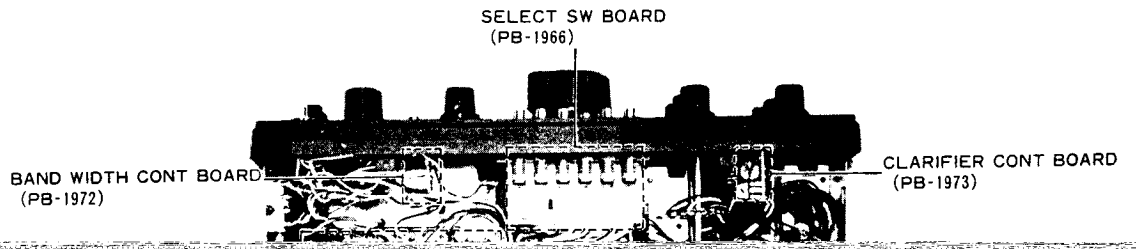
The premix signal as shown in Table 4 from the LOCAL unit, is amplified by Q_{2301} (3SK73). The from Q_{2303} is amplified by Q_{2304} (2SC1815Y) and fed to gate 2 of Q_{2301} controlling the gain of this amplifier.

The output from the LSI is fed to the display. The output from pins 24 through 30 is delivered to segment drivers Q_{2313}–Q_{2319} (2SA952L) and digit drivers Q_{2306}–Q_{2311} (2SA952L) through a dynamic drive configuration. Display is performed



TOP VIEW

For Service Manuals Contact
MAURITRON TECHNICAL SERVICES
8 Cherry Tree Rd, Chinnor
Oxon OX9 4QY
Tel:- 01844-351694 Fax:- 01844-352554
Email:- enquiries@mauritron.co.uk



PREMIX LOCAL UNIT

Premix Local Alignment

1. Connect the RF probe of the VTVM to pin 3 of MJ_3.
2. Refer to Table 6, and adjust the appropriate transformer for a level of 300 mV for each

BAND	CRYSTAL	FREQUENCY	TRANS FORMER
160m	X_{601}	15.9875MHz	T_{601}
80m	X_{602}	17.9875	T_{602}
40m	X_{603}	21.4875	T_{603}
30m	X_{604}	24.4875	T_{604}

PREMIX UNIT

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

BAND	TRANS-FORMER	PASSBAND
160m	T... T...	10.4—11.0(MHz)

FM UNIT

Set the transceiver to operate at 29.0 MHz (10 mC).

RX IF Adjustment

Turn the SQL control fully counterclockwise, and adjust T_{2501} and T_{2502} for maximum receiver noise from the speaker, with no signal applied to the ANT connector.

Squelch Threshold Adjustment

Set the SQL control at the 10 o'clock position, and adjust VR_{2501} to the point where the receiver noise just disappears.

Carrier Frequency Adjustment

Connect a frequency counter to pin 8 of J_{2501}, and set the MIC GAIN control fully counterclockwise.

Adjust T_{2501} for a reading of exactly 8988.3 kHz.

TX IF Adjustment

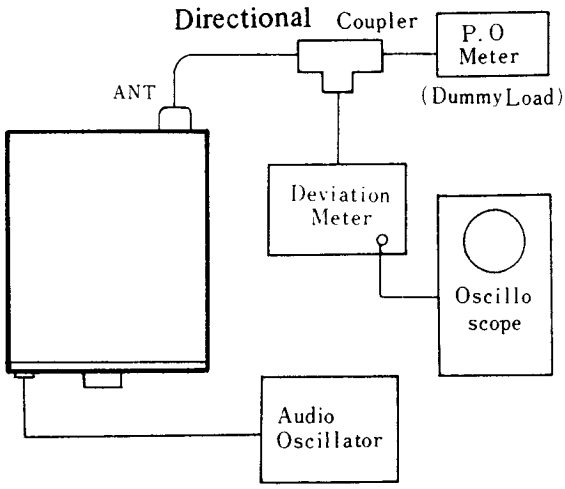
Connect the probe of a VTVM to pin 8 of J_{2506}, and adjust T_{2504} and T_{2505} for a maximum reading on the VTVM. While this adjustment is being made, the DRIVE control should be adjusted so as not to clip the signal in the IF stage. If the DRIVE control is set too excessively high, the peak cannot

Deviation Adjustment

Connect a deviation meter to the antenna jack, and connect an audio signal generator to the microphone input terminal, as shown in Figure 17.

Set the MIC GAIN control fully clockwise, and set VR_{2502} at the 9 o'clock position. Apply a 1 kHz, 15 mV signal to the microphone terminal, and adjust VR_{2503} for a deviation of ±4.5 kHz, as shown on the deviation meter.

Set the MIC GAIN control at the 2 o'clock position, and reduce the output of the signal generator to 2 mV. Now adjust VR_{2502} for a deviation of ±3.5 kHz on the deviation meter.



OPTIONAL INSTALLATIONS

FT-101ZD DC-DC CONVERTER INSTALLATION

(6) When making connections to the battery, be absolutely certain that the proper polarity is

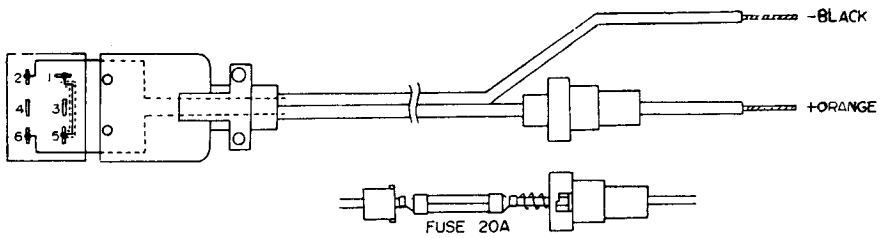


Figure 7

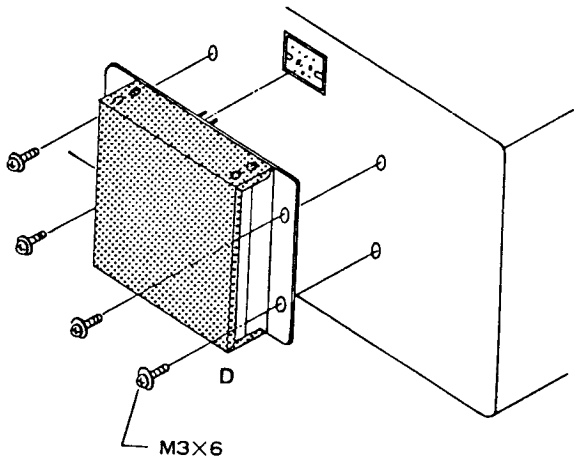


Figure 8

COUNTER UNIT (PB-2086A) INSTALLATION ON FT-101Z

The installation of the New Counter unit (PB-2086A) to the FT-101Z economy can be easily accomplished in a matter of minutes.

Counter units PB-1980 and PB-1980B cannot be installed in FT-101Z's with serial number above XX160001.

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 Figure10 These screws support the LED board.

(3) Remove the screws marked "B" in Figure10 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

axial cable from the Counter unit is connected to point "F" in Fig. 10.

(8) Remove the 820 ohm (Gray-Red-Brown) resistor from the terminal strip marked "E" in Figures 10 and 11.

(9) Close the transceiver. No alignment of the unit is necessary.

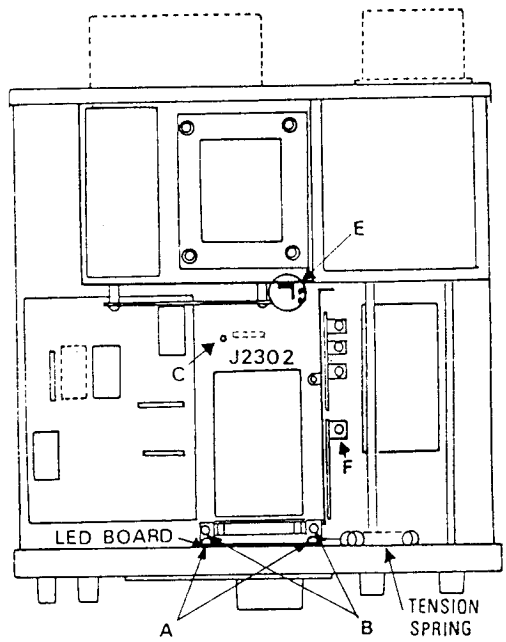
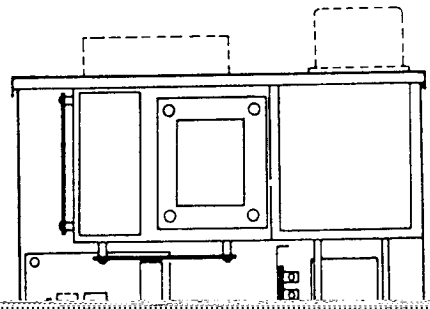


Figure 10

FM UNIT INSTALLATION



1. Remove the top cover of the transceiver, as shown in Figure 1 on page 3-5.
2. Remove the two screws (shown as "C" on Figure 13) from the IF unit, and replace with the two post screws supplied.

AM UNIT INSTALLATION

(1) Remove the top cover of the transceiver, as shown in Figure 1 on page 3-5.

(5) Locate the 3-pin and 8-pin Molex connectors in the vicinity of the IF unit. Loosen their cables as necessary from the harness re-

MAIN CHASSIS

Symbol No.	Part No.	Description
		IC, TRANSISTOR
Q2	G3104960Y	TR 2SA496(Y)
Q1	G3206160R	" 2SB616R(S)
Q4	G3408800	" 2SD880(O)
Q3	G1090070	IC μPC14308
	G1090080	" μPC78L08
		DIODE
D1	G2090029	Ge 1N60
D2–5,10–14	G2015550	Si 1S1555
D6	G2090001	" 10D1
		RESISTOR
R22, 24	J01245220	Carbon film 1/4W TJ 22 Ω

C6	K30279052	Dipped mica	500 WV 1100 pF (DM19D-112K5)
C5	K30279062	" "	500 WV 3000 pF (DM19D-302K5)
C59, 66	K31306800	Moulded mica	1 KWV 80 pF
C17	K02279001	Ceramic	500 WV 1 pF
C10	K02279002	"	" 5 pF
C18	K02279003	"	" 47 pF
C11	K00279001	"	" 200 pF
C20	K00279002	"	" 470 pF
C16	K00359003	"	1 KV 3 pF
C15	K02309002	"	" 5 pF
C14	K02309003	"	" 100 pF
C3	K00329002	"	1.5 KWV 460 pF
C9	K00359001	"	3 KV 100 pF
C1	K12359001	"	" 1000 pF
C74, 75	K13170102	"	50 WV 0.001 μF
C29,34,35,41, 73,76–81	K13170103	"	" 0.01 μF

REPAIR PARTS

		TRANSFORMER	J19	P1090111	J-7015
T1	L0020544A		J20	P1090152	D8-703B-11
T2, T3	L0020074				
					MULTI JACK
		METER	MJ1	P4090001	121S-10B-105A
M1	M0090002	Y-45-02	MJ2	P4090007	220D-20B-205A
			MJ3	P4090002	121S-14B-105A

	Q600005	Terminal block 1L2P (0-2)
	Q6000014	" 1L5P (3-0-2)
★★★★★ LED B BOARD ★★★★★		
PB-1390	F0001390	P.C. Board
D9	G2090060	GD4-203-SRD

RF UNIT

Symbol No.	Part No.	Description
PB-2154A	F0002154A	Printed Circuit Board
	C0021540	P.C.B. with components
		IC, FET & TRANSISTOR
Q102	G2090135	IC (Ring Module) ND487C2-3R
Q106	G4800400M	FET 3SK40M
Q101	G4800510C	" 3SK51-03
Q103	G3090019	" J310
Q104, 105	G3324070	TR 2SC2407
		DIODE
D110	G2010070	Ge 1S1007
D103, 104	G2015550	Si 1S1555
D101, 102, 105–109	G2090027	" 1SS53
		RESISTOR
R122, 131	J00245479	Carbon film ¼W VJ 4.7 Ω
R109,110,115, 116,124,125, 140	J00245100	" " " " 10 Ω
R135	J00245560	" " " " 56 Ω
R106,107,113, 114,139	J00245101	" " " " 100 Ω
R108,117,126	J00245121	" " " " 120 Ω
R121, 130	J00245151	" " " " 150 Ω
R123,132	J00245221	" " " " 220 Ω
R136	J00245331	" " " " 330 Ω
R119, 128	J00245561	" " " " 560 Ω
R105,111,112, 120,129	J00245102	" " " " 1 kΩ
R118, 127	J00245152	" " " " 1.5 kΩ
R141	J00245222	" " " " 2.2 kΩ
R102	J00245272	" " " " 2.7 kΩ
R104, 133	J00245562	" " " " 5.6 kΩ
R138	J00245103	" " " " 10 kΩ
R137	J00245183	" " " " 18 kΩ
R103, 134	J00245393	" " " " 39 kΩ
R101	J00245225	" " " " 2.2 MΩ

		CAPACITOR
C138	K02179003	Ceramic 50WV CH 2 pF
C106	K02172040	" " " 4 pF
C125, 126	K00175680	" " SL 68 pF
C103	K00175101	" " " 100 pF
C124	K30176391	" " " 390 pF
C102,104,116, 119–121, 130,131,135, 140,144,145	K13170103	" " 0.01 μF
C101, 105, 107–115, 117, 118, 122, 123, 127–129, 132–134, 136,137,139, 142, 143	K13170473	" " 0.047 μF
C141	K40120336	Electrolytic 16WV 33 μF
		TRIMMER CAPACITOR
TC101	K91000019	ECV-1ZW 10 x 40 10 pF
		INDUCTOR
L107	L0020491	0.32 μH
L108	L1190005	FL4H-1R0M 1 μH
L112	L1190033	FL5H-820K 82 μH
L102,103,105, 106,113,114	L1190016	FL5H-101K 100 μH
L104,109,111	L1190020	FL5H-151K 150 μH
L101,110,115	L1190038	FL5H-271K 270 μH
		TRANSFORMER
T101–103	L0020788A	
T104	L0020221A	
		JACK
J101–103	P1090018	SQ-3081

NB-FIX UNIT

Symbol No.	Part No.	Description
	C0019610	NB-FIX unit with components
PB-1961B	F0001961B	P.C. Board
		TRANSISTOR
Q201–204	G3303720Y	2SC372Y
Q205, 206	G3315830	2SC1583

		DIODE	
D201–204	G2090029	Ge	1N60
D205–209	G2015550	Si	1S1555

		RESISTOR			
R208,216,224, 230,238,239	J00245101	Carbon film	1/4W	VJ	100 Ω
R204	J00245221	"	"	"	220 Ω
R222, 236	J00245471	"	"	"	470 Ω
R231–233,235	J00245561	"	"	"	560 Ω
R206,215,221, 234,237	J00245102	"	"	"	1 kΩ
R207	J00245222	"	"	"	2.2 kΩ
R240	J10245472	"	"	TJ	4.7 kΩ
R210	J00245472	"	"	VJ	4.7 kΩ
R205,209,218	J00245562	"	"	"	5.6 kΩ
R202,203,212, 214,225,226	J00245103	"	"	"	10 kΩ
R201,220,223	J00245153	"	"	"	15 kΩ
R211,213,219	J00245223	"	"	"	22 kΩ
R217	J00245683	"	"	"	68 kΩ

		CAPACITOR		
C216–218	K30176331	Dipped mica	50WV	330 pF
C234, 236	K30176471	"	"	470 pF
C235	K30176821	"	"	820 pF

		CRYSTAL SOCKET
XS201	P3090025	S-14 2P

		MINI CONNECTOR
J201	P0090037	5048-08A
J202	P0090038	5048-12A

PREMIX UNIT

Symbol No.	Part No.	Description
	C0021520	PREMIX unit with components
PB-2152C	F0002152C	P.C. Board

		IC, FET, TRANSISTOR	
Q303	G1090062	IC	SN76514N
Q301, 302	G3319230R	TR	2SC1923R

		DIODE	
D301–318	G2090027	Si	1SS53

C341	K30176391	Dipped mica	50WV	390 pF	Q402,419,425	G3090035	FET 2SK19TM-GR
C311,315,319	K30176561	" "	"	560 pF	Q401,405,412, 415, 416	G4800510C	" 3SK51-03
C323, 327	K30176681	" "	"	680 pF			
C307	K30176751	" "	"	750 pF	Q408	G3090019	J310
C301,305,309, 313,317,321, 325,329,333, 337–339,343, 345–351	K13170103	Ceramic	"	0.01 μF	Q407, 420	G3105641	TR 2SA564A
					Q404,409,410, 417, 418, 422–424	G3303720Y	" 2SC372Y
					Q421	G3305350A	" 2SC535A
C302,304,306, 308,310,312, 314,316,318, 320,322,324, 326,328,330, 332,334,336, 340,342,344	K13170473	"	"	0.047 μF	Q411	G3090005	" MPSA13
							DIODE
					D416, 417	G2090029	Ge 1N60
					D414, 421	G2010070	" (GB) 1S1007
C303	K50177102	Mylar	"	0.001 μF	D405–408, 425–428	G2090118	" 1SS97
					D401–404, 409–413, 419, 424	G2015550	Si 1S1555
		INDUCTOR					
L303	L1100007	FL4H 1R8M		1.8 μH	D418	G2022090	Varactor 1S2209

R443	J00245471	Carbon film	1/4W	VJ	470 Ω
R474, 480, 0522	J00245561	"	"	"	560 Ω
R467, 468	J00245681	"	"	"	680 Ω
	J00245821	"	"	"	820 Ω
R406,416,428, 440,442,449, 453,457,459, 462,488,494, 0504, 0506, 0515	J00245102	"	"	"	1 kΩ
R429	J00245122	"	"	"	1.2 kΩ
R495, 0516	J00245152	"	"	"	1.5 kΩ
	J01245152	"	"	TJ	1.5 kΩ
R454,455,458, 0510	J00245222	"	"	VJ	2.2 kΩ
R460	J00245272	"	"	"	2.7 kΩ

		CAPACITOR			
C477	K30176221	Dipped mica	50WV		220 pF
C445, 472	K02173100	Ceramic	"	CH	10 pF
C488, 492	K06175330	"	"	UJ	33 pF
C489	K06175390	"	"	"	39 pF
C404,421,432	K02175470	"	"	CH	47 pF
C487	K06175101	"	"	UJ	100 pF
C459,464,475	K02175101	"	"	CH	100 pF
C401,405,406, 411,413,415, 417,419,420, 423,424,428, 430,431,433, 435,440,442, 443,446,448, 451–455, 460,465,482,	K13170103	"	"		0.01 μF

T401,406,408, 415	L0020141	R12-4171
T405	L0020221	
T411	L0020460	
T412	L0020209	
		MINI CONNECTOR
J401	P0090038	5048-12A
J402	P0090039	5048-13A
J403	P0090040	5048-15A
TP401–412	Q5000011	Wrapping terminal C

X503	H0100422	HC-18/U 8988.3 kHz
X504	H0100423	" 8989 kHz
		RESISTOR
	J00245560	Carbon film 1/4W VJ 56 Ω
R509,539,557	J00245101	" " " " 100 Ω
R511	J00245121	" " " " 120 Ω
R533, 546	J00245151	" " " " 150 Ω
R503,513,524, 525	J00245221	" " " " 220 Ω
R512,522,538	J00245471	" " " " 470 Ω
R504,514,520, 523,548,561	J00245102	" " " " 1 kΩ
R515	J00245222	" " " " 2.2 kΩ
R534,535,565	J00245272	" " " " 2.7 kΩ
R510,562,569, 578–580	J00245332	" " " " 3.3 kΩ
	J01245472	" " " TJ 4.7 kΩ

C510,532,534, 555, 566	K02175101	Ceramic	50WV	CH	100 pF	J503	P0090037	5048-08A
						J504	P0090042	5048-05A
C533	K02175151	"	"	"	150 pF	J505	P0090041	5048-03A
C558, 559	K00179020	"	"	SL	240 pF			
C512	K06175271	"	"	UJ	270 pF			
C504,519–521, 523,531,535, 542–545,570	K13170103	"	"		0.01 μF			
							R0042800A	HEAT SINK
C509,537,574	K13170473	"	"		0.047 μF			

C811	K02179023	Ceramic disc 50WV CH 180 pF			**RESISTOR**
C821, 823	K00175471	" " " " 470 pF	R908	J01245560	Carbon film 1/4W TJ 56 Ω

		RESISTOR			CRYSTAL

TRIMMER C BOARD		
Symbol No.	Part No.	Description
	C0010920	TRIMMER C unit with components
PB-1092	F1001092	P.C. Board

		CAPACITOR	
C1501	K13170103	Ceramic 50WV (DB201YF103Z5L5)	0.01 μF
C1505, 1506	K50177153	Mylar 50WV (50F2U153M)	0.015 μF
C1503, 1504,	K40179001	Electrolytic 50WV	1 μF

FINAL BOARD

Symbol No.	Part No.	Description
	C0017151	Final board with components (without vacuum tube)
PB-1715B	F0001715B	P.C. Board
		VACUUM TUBE
V1701, 1702	G6090001	6146B
		VACUUM TUBE SOCKET
VS1701, 1702	P3090024	SB-3606
		DIODE
D1701	G2090002	Si 10D10

		DIODE
D1801	G2090001	Si 10D1
D1802	G2090060	LED GD4-203SRD
		RESISTOR
R1803	J00245102	Carbon film 1/4W VJ 1 kΩ
R1804, 1805	J00245152	" " " " 1.5 kΩ
R1802	J00245332	" " " " 3.3 kΩ
R1801	J00245472	" " " " 4.7 kΩ
		POTENTIOMETER
VR1801	J50710501	V10K8-1-2 500 ΩB
		CAPACITOR
C1801–1803	K13170473	Ceramic 50WV 0.047 μF

R1022	J20306390	Metallic film 1W	39 Ω	C1206	K02173100	Ceramic 50WV CH	10 pF
R1005	J20336391	" " 2W	390 Ω	C1205, 1210	K02179012	" " "	30 pF
R1006	J20336471	" " "	470 Ω	C1204, 1209	K02175820	" " "	82 pF
R1008	J20336222	" " "	2.2 kΩ				
R1007	J20336332	" " "	3.3 kΩ				
R1009	J20336473	" " "	47 kΩ				
R1023	J10276474	Carbon composition ½W GK	470 kΩ			**TRIMMER CAPACITOR**	
				TC1203	K91000032	B2PY	100 pF
				TC1202	K91000079	BW3P-2	210 pF
					K91000033	B7PY	470 pF
		POTENTIOMETER		TC1206	K91000013	ECV-1ZW 20 x 32	20 pF
VR1001	J50708103	V18K3-2	10 kΩB	TC1204, 1205	K91000016	" 50 x 32	50 pF

		TRIMMER CAPACITOR		P0090065	CONNECTOR PLUG QS-P6FL
TC2301	K91000030	ECV-1ZW 40 x 53 40 pF		P0090018	**PIN PLUG** STP58
				P0090035	**ACC PLUG** PA602B04
				Q0000005	**FUSE** (100V–117V) 5 A
				Q0000004	" (200V–234V) 3 A
		INDUCTOR			
L2301	L2030068				
		CONNECTOR	**AM UNIT**		
J2301	P0090051	5048-06A	Symbol No.	Part No.	Description
J2302	P0090054	5048-07A		C0020400	AM unit with components
J2303	P0090037	5048-08A	PB-2040	F0002040	P.C. Board
P2301	P0090045	SQ4052			

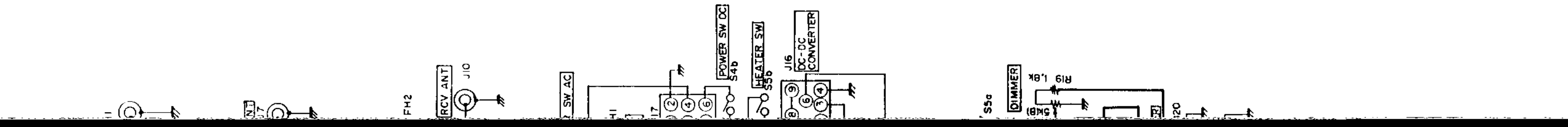
R2402, 2424, 2446, 2449,	J00245103	Carbon film 1/4W VJ	10 kΩ		
R2458	J01245103	" " " TJ	10 kΩ		
R2407	J00245123	" " " VJ	12 kΩ		
R2405, 2433	J00245153	" " " "	15 kΩ		
R2430	J00245183	" " " "	18 kΩ		
R2443, 2450	J00245223	" " " "	22 kΩ		
R2403	J00245273	" " " "	27 kΩ		
R2408, 2412, 2421	J00245333	" " " "	33 kΩ		
R2416	J00245393	" " " "	39 kΩ		
R2427	J00245563	" " " "	56 kΩ		
R2428	J00245683	" " " "	68 kΩ		
R2417, 2426, 2451	J00245104	" " " "	100 kΩ		
		THERMISTOR			
TH2401	G9090003	D33A			
		CAPACITOR			
C2420	K30176391	Dipped mica 50WV	390 pF		
C2416	K02175390	Ceramic " CH	39 pF		
C2417, 2426, 2456	K02175101	" " "	100 pF		
C2418	K02175151	" " "	150 pF		
C2401	K02179025	" " "	220 pF		
C2419, 2421–2423, 2428,	K13170103	" " "	0.01 μF		

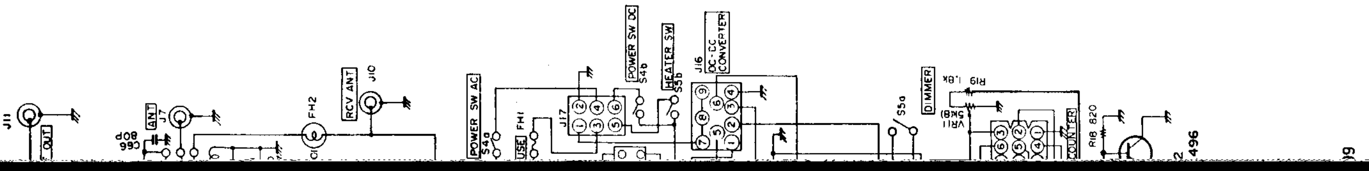
		TRIMMER CAPACITOR
TC2402	K91000012	ECV1ZW 10 x 32 10 pF
TC2401	K91000013	" 20 x 32 20 pF
		INDUCTOR
L2401, 2403	L1190016	FL5H-101K 100 μH
L2402	L1190017	FL5H-102K 1 mH
L2404	L1190038	FL5H-271K 270 μH
		TRANSFORMER
T2401	L0020141	R12-4171
		CONNECTOR
J2401, 2404	P1090016	SQ3056
J2402	P0090041	5048-03A
J2403	P0090037	5048-08A
P2401	P0090075	P-7015
	Q5000011	Wrapping terminal C
	B4025945B	P.C.B. support D

		CRYSTAL	R2504, 2525, 2526, 2533, 2543, 2560	J00245562	Carbon film 1/4W VJ 5.6 kΩ
X2501	H0100431A	HC-18/U 8532.5 kHz			
X2502	H0100440A	" 8988.3 kHz			
			R2505	J00245822	" " " " 8.2 kΩ
			R2536, 2545, 2551, 2553, 2567	J00245103	" " " " 10 kΩ
		CRYSTAL FILTER			
XF2501	H1100470	8.9M20A	R2572	J00245183	" " " " 18 kΩ
					" " " " 22 kΩ

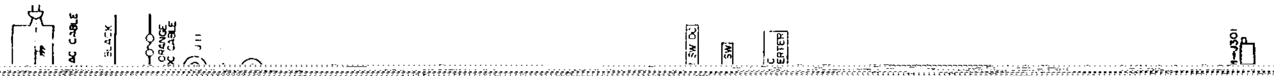
REPAIR PARTS

C2548	K19149021	Ceramic 25WV 0.047 F (UAT08X473KL46AE)			
C2515, 2530	K19149025	Ceramic 25WV 0.1 F (UAT13X104K-L46AE)			
	K51176101	Styrol 100 pF (50SU101K)			
C2513, 2514, 2517, 2522, 2539	K50177102	Mylar 50WV 0.001 μF (50F2U102M)			
	K50177152	Mylar 50 WV 0.0015 μF (50F2U102M)			
C2531	K50177103	Mylar 50WV 0.01 μF (50F2U103M)			
C2523–2525, 2535, 2538	K50177223	Mylar 50WV 0.022 μF (50F2U223M)			
C2527, 2528	K50177333	Mylar 50WV 0.033 μF (50F2U333M)			
C2516, 2518–2521, 2547, 2570	K50177473	Mylar 50WV 0.047 μF			
C2536, 2549	K40170105	Electrolytic 50WV 1 μF (50RL105)			
C2526	K40140475	Electrolytic 25WV 4.7 μF (25RL475)			
C2532, 2533, 2540, 2541, 2543, 2544,	K40120106	Electrolytic 16WV 10 μF (16RL106)			


FH2
RCV ANT
J10
SW AC
POWER SW DC
S4b
HEATER SW
S5b
J16
DC-DC CONVERTER
S5a
DIMMER
R19 1.8K



J11
J7
ANT
C66 80P
FH2
RCV ANT
J10
POWER SW AC
S4a
FH1
J17
POWER SW DC
S4b
HEATER SW
S5b
J16
DC-DC CONVERTER
S5a
DIMMER
R19 1.8K
VR11 5K(B)
COUNTER
R18 820


AC CABLE
BLACK
ORANGE
DC CABLE