MAINTENANCE SERVICE MANUAL FT-101ZD

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INDEX

SECTION 4 – REPAIR PARTS

FOREWORD

The purpose of this manual is to provide the reader with information critical to the operation and maintenance of the FT-101ZD transceiver. Technical details are geared for maximum comprehension by the technician or owner, rather than the design engineer. To this end, the descriptions have been kept brief, while photographs and drawings are utilized liberally.

Use of this manual is entirely at the owner's risk. While we believe the material presented herein to be correct and factual, we assume no liability for damage which may occur when this manual is used as a reference.

The FT-101ZD has had an enviable service record, and we trust that you will seldom have recourse to this manual. Should reference be necessary, though, we hope and trust that the information presented will be sufficient for your service needs.

The author wishes to express his gratitude to the engineering and service staffs of Yaesu Musen Company and Yaesu Electronics Corporation, whose skills and insights have contributed significantly to the completion of this manual.

73,

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Public Relations Manager
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SECTION 1 – GENERAL

HIGH-PERFORMANCE HF TRANSCEIVER
YAESU FT-101ZD

GENERAL DESCRIPTION

The FT-101Z series was introduced early in 1979 as the culmination of a decade of experience with the FT-101 series. Borrowing heavily from the highly regarded FT-901 series, the FT-101Z series brings together a number of "top of the line" features at a "bottom of the line" price.

As with the FT-901, the receiver section of the FT-101Z is particularly impressive. Careful gain distribution has produced wide dynamic range, without compromising sensitivity. Variable IF bandwidth allows continuous adjustment of the width of the IF passband from 300 Hz to 2.4 kHz, and an all-new noise blanker provides significantly improved blanking capability.

The transmit side includes a high-performance RF speech processor, which provides a significant increase in average power without the distortion found in some AF clipping systems used in other makes of equipment. The final tubes utilize RF negative feedback, for improved linearity.

Built into every FT-101ZD transceiver are digital plus analog readout of the operating frequency, VOX, semi-break-in CW with sidetone, a 25 kHz crystal calibrator, selectable AGC, and a 10 dB/20 dB attenuator in the receive line. For the economy FT-101Z model, the counter and display units are options, which may easily be added at a later date, should you decide to upgrade your station.

Compatibility with the FT-901DM series accessories lets you take advantage of such advanced features as the scanning and memory of the FV-901DM external synthesized VFO; the FTV-901R VHF/UHF transverter; and the YO-901 Multiscope. Read on for details of these accessories and their use with the FT-101Z.

All circuits, except for the driver and final amplifier tubes, are solid state. If the ratings of the solid state devices are not exceeded, they will exhibit practically infinite lifetimes. The FT-101Z series may be operated from AC supplies of 100/110/117/200/220/234 volts, and a DC-DC converter is an available option.

The pages to follow will describe more fully the high-performance features and ease of operation of the FT-101ZD. For today's active amateur, the 101Z series is, indeed, "THE RADIO."

SPECIFICATIONS

Frequency coverage:

160 m	1.8 - 2.0 MHz
80 m	3.5 - 4.0 MHz
40 m	7.0 - 7.5 MHz
20 m	14.0 - 14.5 MHz
15 m	21.0 - 21.5 MHz
10 m	28.0 - 29.9 MHz
WWV/JJY	5.0 - 5.5 MHz

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)
21 amps transmit

Size:
345 (W) x 157 (H) x 326 (D) mm

Weight:
Approx. 15 kg.

TRANSMITTER

Emission type:
LSB, USB, CW
AM (after prod. lot #8)

Power input:
180 watts DC (SSB, CW)
50 watts DC (AM)

Carrier suppression:
Better than 40 dB

Unwanted sideband suppression:
Better than 40 dB (14 MHz, 1 kHz)

Spurious radiation:
Better than 40 dB down

Transmitter frequency response:
300 - 2700 Hz (–6 dB)

Third order distortion products:
Better than 31 dB down

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

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)

Image rejection:
Better than 60 dB (160 - 15 m)
Better than 50 dB (10 m)

IF rejection:
Better than 70 dB (160, 80, 20, 15, 10 m)
Better than 60 dB (40 m)

Selectivity:
SSB, AM 2.4 kHz at 6 dB down, 4.0 kHz at 60 dB down
CW (with optional CW filter) 600 Hz at 6 dB down, 1.2 kHz at 60 dB down

Bandwidth control:
Continuous from 2.4 kHz to 300 Hz

Audio output impedance:
4 - 16 ohms

Audio output:
3 watts at 10% THD, 4 ohm load

Specifications subject to change without notice.

TUBES AND SEMICONDUCTORS

Vacuum tubes

12BY7A	1
6146B	2

Transistors

T20A6	2
2SA496Y	1
2SA564A	3
2SA639	1
2SA733	1
2SB616	1
2SC372Y	25
2SC373	2
2SC380TMY	3
2SC535A	1
2SC732TMGR	1
2SC1000GR	2
2SC1383	1
2SC1583	2
2SC1815Y	6
2N4427	1
MPS3640	1
MPSA13	1

Field Effect Transistors

2SK19GR	11
2SK19BL	1
3SK40M	2
3SK51-03	8
J310	2

Integrated Circuits (IC)

μPC78L05	1
μPC78L12	1
μPC14305	1
μPC14308	1
μPC2002H	1
MC3403P	1
MC10116	1
MC14024B	1
MSM561RS	6
MSM5564	1
SN76514N	1
SN74LS04N	1
SN74LS123N	1
SN74196N	1
SN74LS196N	6
TA7060P	1
TA7063P	1

Germanium Diodes

1N60	11
1S1007 (GB)	10

Silicon Diodes

1S1555	96
10D1	4
10D10	8
V06B	2

Zener Diodes

WZ061	1
WZ090	1

Varactor Diodes

1S2209	1
1S2236	1

Light Emitting Diodes

GD4-203SRD	9

LED Display

HP-5082-7623	6

FT-101ZD SERIES MODEL CHART

○ = BUILT-IN FEATURE   X = AVAILABLE OPTION

FEATURE	FT-101ZD	FT-101Z
ALL BAND CRYSTALS	○	○
COUNTER UNIT	○	X
DC-DC CONVERTER	X	X
CW FILTER	X	X
MICROPHONE	X	X
RF PROCESSOR	○	○
COOLING FAN	X	X

RECOMMENDED ACCESSORIES

FV-901DM

FTV-901R

FV-901DM SYNTHESIZED, SCANNING REMOTE VFO

The FV-901DM external VFO provides a synthesized control system for your FT-101ZD station. A three-speed scanner will take you anywhere in the band instantly, and the auto-scan feature will sweep the band until it finds a signal.

The 100 Hz steps of the synthesizer are coupled with a 40-frequency memory bank, allowing wide versatility for contest, DX, or net operation. The TX/RX clarifier allows offset from either dial or memory frequencies, for precise tuning.

Because there is no display provided on the FV-901DM, it is not readily possible to use this unit with the analog FT-101Z, as the operating frequency cannot be determined.

FTV-901 VHF/UHF/OSCAR TRANSVERTER

In another Yaesu "first," the FTV-901R brings together three bands in the VHF and UHF regions, all in one compact case. The basic FTV-901R comes equipped for 144–148 MHz, and the 6 meter and 70 cm modules may be added as options.

The satellite 1–3 bands provide operation on OSCAR Modes A/B/J, on full duplex, when an external receiver is used. Of course, the FT-221R or FT-225RD transceivers may be used for transmission on the OSCAR 145 MHz uplink. In this case, your FTV-901R can be used for instant QSY between 29 MHz, 145 MHz, and 435 MHz.

Repeater split is provided on 6 and 2 meters.

SP-901P

SP-901P SPEAKER/HYBRID PHONE PATCH

The SP-901P features a shaped-response loudspeaker, and the hybrid phone patch allows efficient operation during patches. Styling and size match the FT-101Z series.

YO-901

YO-901 MULTISCOPE

The YO-901 Multiscope provides superb monitoring capability, with instant interface to your FT-101ZD station. Output signal monitoring, trapezoidal and two-tone tests, and general oscilloscope measurements are made with ease with the YO-901.

A panoramic adapter, known as the Band Scope, is an available option, allowing quick examination of the band for activity.

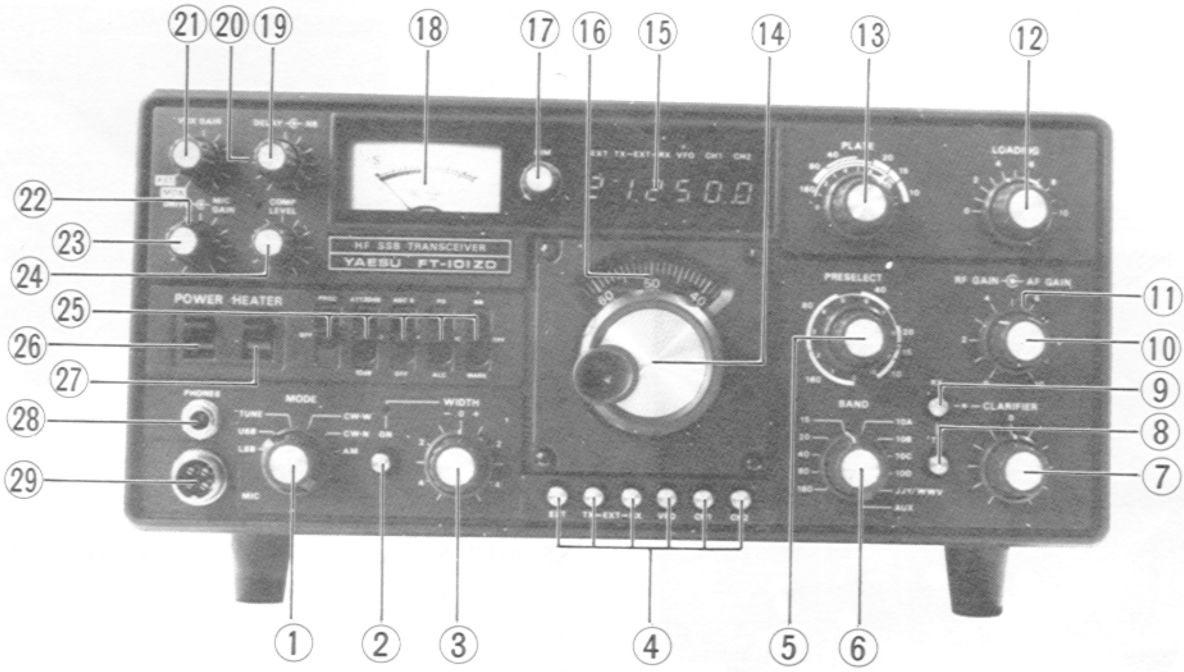
IF TX and RX monitoring is not possible with the FT-101ZD/YO-901 combination.

FC-901

FC-901 ANTENNA COUPLER

Present a 50 ohm load to your FT-101ZD transceiver all across the band with the FC-901 antenna coupler. As many as three coax-fed antennas, and one random wire antenna, may be accommodated. SWR and power metering allow quick determination of proper matching conditions.

CONTROLS AND SWITCHES



(1) **MODE**

Selection of LSB, USB, CW-W (SSB filter), CW-N (optional CW filter) and AM is provided.

(2) **WIDTH ON**

When this button is pressed, the variable bandwidth function is activated.

(3) **WIDTH**

This control varies the IF bandwidth from 2.4 kHz down to 300 Hz. When the WIDTH switch is OFF, the bandwidth is fixed by the filter selected at the MODE switch.

(4) **SELECT switches**

When using the optional FV-901DM synthesized, scanning external VFO, these switches determine which component will control the transmit, receive, or transceive frequency.

EXT . . . . . . This switch, when pressed, shifts control of the transceive frequency to the external VFO.

TX EXT. . . This switch, when pressed, shifts control of the transmit frequency to the external VFO.

RX EXT. . . This switch, when pressed, shifts control of the receive frequency to the external VFO.

VFO. . . . . . This switch selects control of the transceive frequency on the FT-101ZD internal VFO.

CH1, CH2. . These switches select optional fixed channels, transceive only.

(5) **PRESELECT**

The preselector control peaks the RF and IF stages for the frequency in use.

(6) **BAND**

The bandswitch selects the frequency band in use: 160 - 10 meters, plus WWV/JJY 5 MHz.

(7) **CLARIFIER**

The clarifier control allows offset of ±2.5 kHz from the frequency established by the main tuning dial.

(8) (9) **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 frequency.

(10) AF GAIN

The AF GAIN control varies the output level of the audio amplifier stages. Clockwise rotation increases the audio output level.

(11) RF GAIN

The RF GAIN control varies the gain of the RF and IF stages. Clockwise rotation increases the gain of these stages.

(12) LOADING

This control tunes the output circuit of the final amplifier pi network to match the feedpoint impedance of the load.

(13) PLATE

This control tunes the plate circuit of the final amplifier.

(14) MAIN TUNING KNOB

Rotation of this knob selects the operating frequency, in conjunction with the setting of the bandswitch. One revolution of the dial produces a frequency change of approximately 17 kHz.

(15) DIGITAL DISPLAY

The digital display reads out the operating frequency, with resolution to 100 Hz. The display unit is built into the FT-101ZD, and is an available option for the FT-101Z.

(16) ANALOG DIAL

The analog dial allows readout of the operating frequency to better than 1 kHz. The combination of the precision dial mechanism and drive unit provides zero backlash at slow tuning rates.

(17) DIM

This control allows dimming of the meter and dial lamps.

(18) METER

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

(19) NB

This control varies the threshold point for the noise blanker, and should be set to the minimum point that provides the desired blanking action.

(20) DELAY

This control sets the delay time for the VOX relay. For voice-actuated SSB, or semi-break-in CW, the operator may select the delay time most suitable for his or her operating habits.

(21) VOX GAIN

The threshold level for the VOX (voice operated relay) system can be varied using this control. In the PTT position, PTT (push to talk) control is provided, for relay control via the microphone PTT switch or footswitch.

(22) DRIVE

This control sets the carrier level for CW/AM and tuning purposes. When the RF processor is ON, this control varies the RF output on SSB, as well.

(23) MIC GAIN

This control sets the output level of the microphone amplifier stage. Clockwise rotation increases the mic gain level.

(24) COMP LEVEL

This control varies the compression level for the built-in RF speech processor. The processor does not function in the AM mode.

(25) FUNCTION switches

PROC . . . . This switch activates the RF speech processor.

ATT . . . . This switch allows the insertion of 10 or 20 dB attenuators in the incoming signal path.

AGC S/F/OFF . . This switch allows selection of the desired AGC decay time. In the OFF position, the AGC is switched off, and the S-meter will not function.

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 crystal calibrator is activated.

(26) POWER

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

(27) HEATER

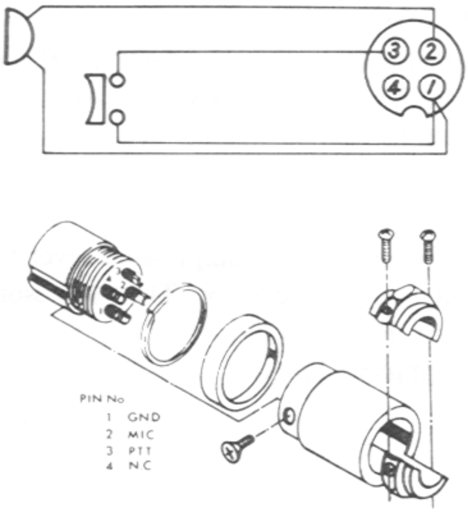
With the HEATER switch on, heater voltage is applied to the driver and final amplifier tubes. This switch may be turned off during periods of RX, when energy conservation is critical.

(28) PHONES

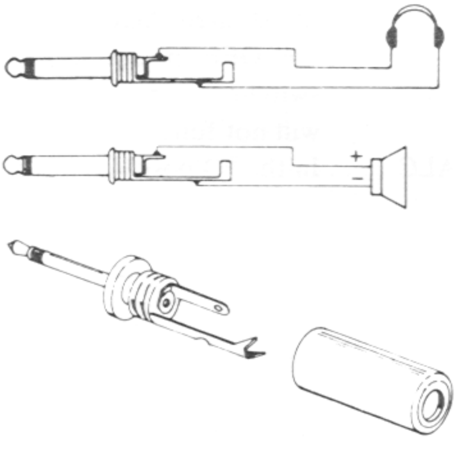
This is a standard ¼" phone jack for use with headphones.

(29) MIC

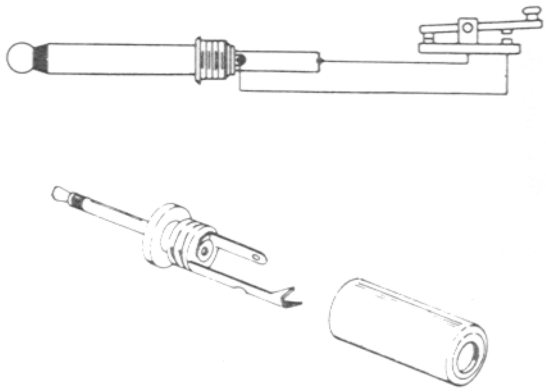
This is a 4 conductor jack for microphone and PTT input.



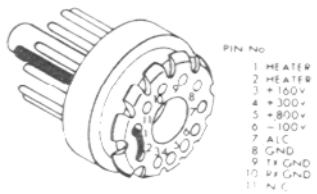
Mic plug



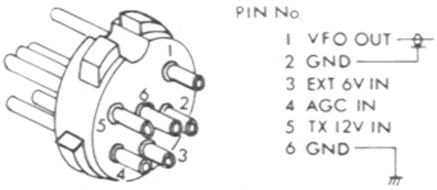
Headphone and external speaker plug



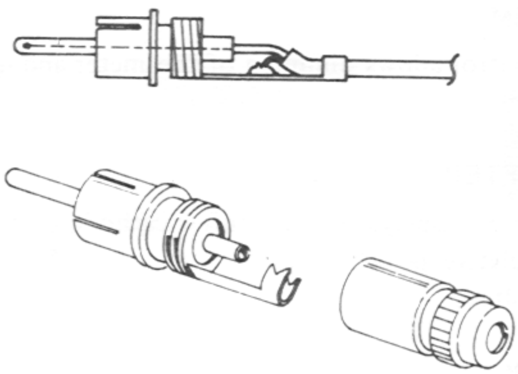
Key plug



ACC plug

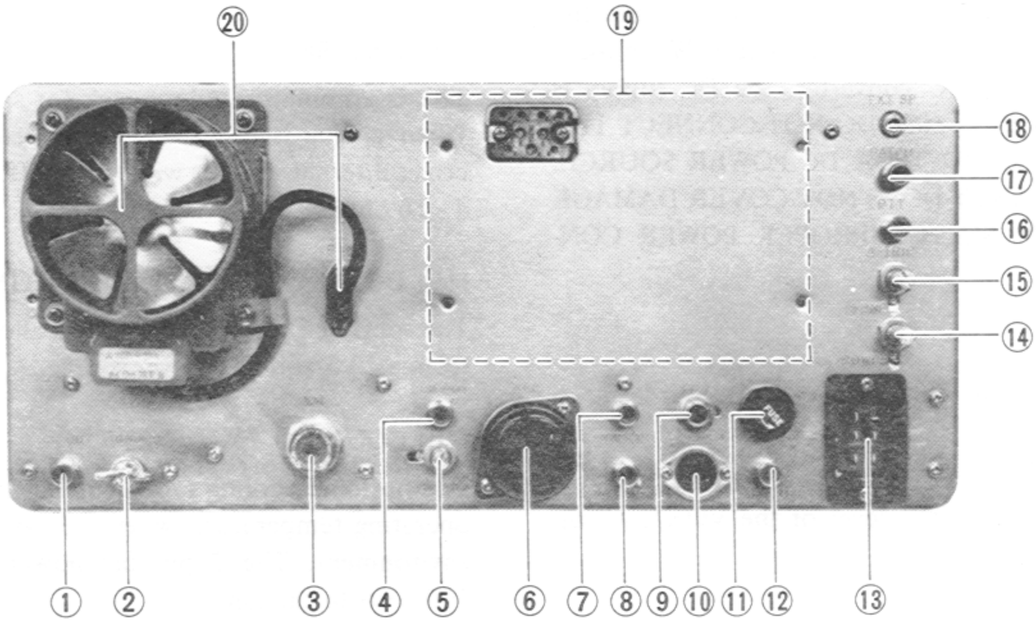


VFO Plug



Pin plug

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.

(14) TONE

This control varies the CW sidetone output level.

(15) A TRIP

This control varies the level of the VOX anti-trip circuit.

(16) PTT

External control of the transceiver PTT (push to talk) system may be made at this jack, for use with a footswitch, etc.

(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 from a 13.5 volt DC power source.

(20) COOLING FAN (OPTION)

The optional cooling fan keeps the tubes at a safe operating temperature, when they are used in a hot environment. The 2 pin fan power jack supplies 100 volts to the fan.

ACCESSORIES

The following accessories are included with your new transceiver:

(1) AC POWER CORD 1

The power cord comes equipped with a 6-prong connector for connection to the AC supply.

(2) ACC PLUG 1

The accessory plug allows access to relay contacts and transceiver operating voltages. The ACC plug must be inserted in the accessory socket for proper operation of the transceiver, whether or not external connections are being made.

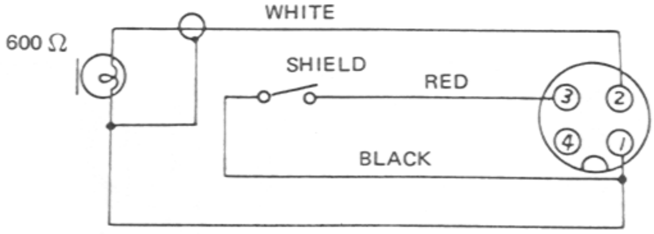
(3) PHONO PLUG 2

Use these plugs for interface with station equipment via the FT-101ZD rear panel.

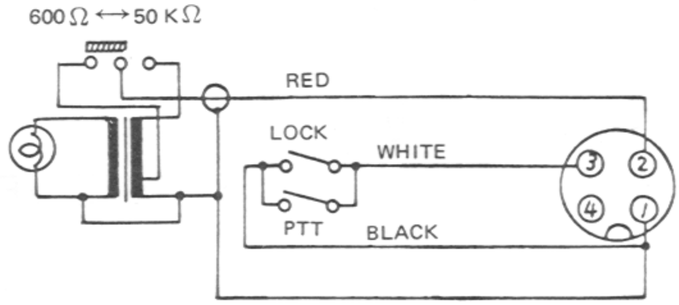
(4) SPARE FUSES 5A (3A) 1 each

When replacing fuses, be absolutely certain to use a fuse of the proper rating. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY IMPROPER FUSE REPLACEMENT. For 100 - 117 volt AC operation, use a 5 amp fuse. For 200 - 234 volt operation, use a 3 amp fuse.

MICROPHONE CONNECTIONS



YE-7A



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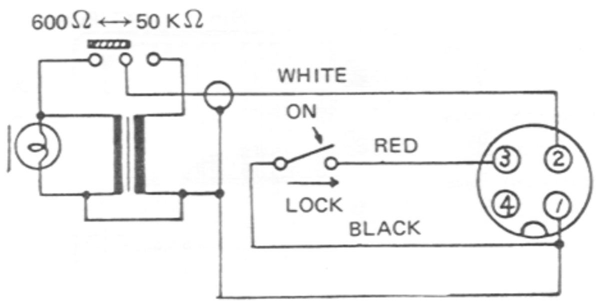

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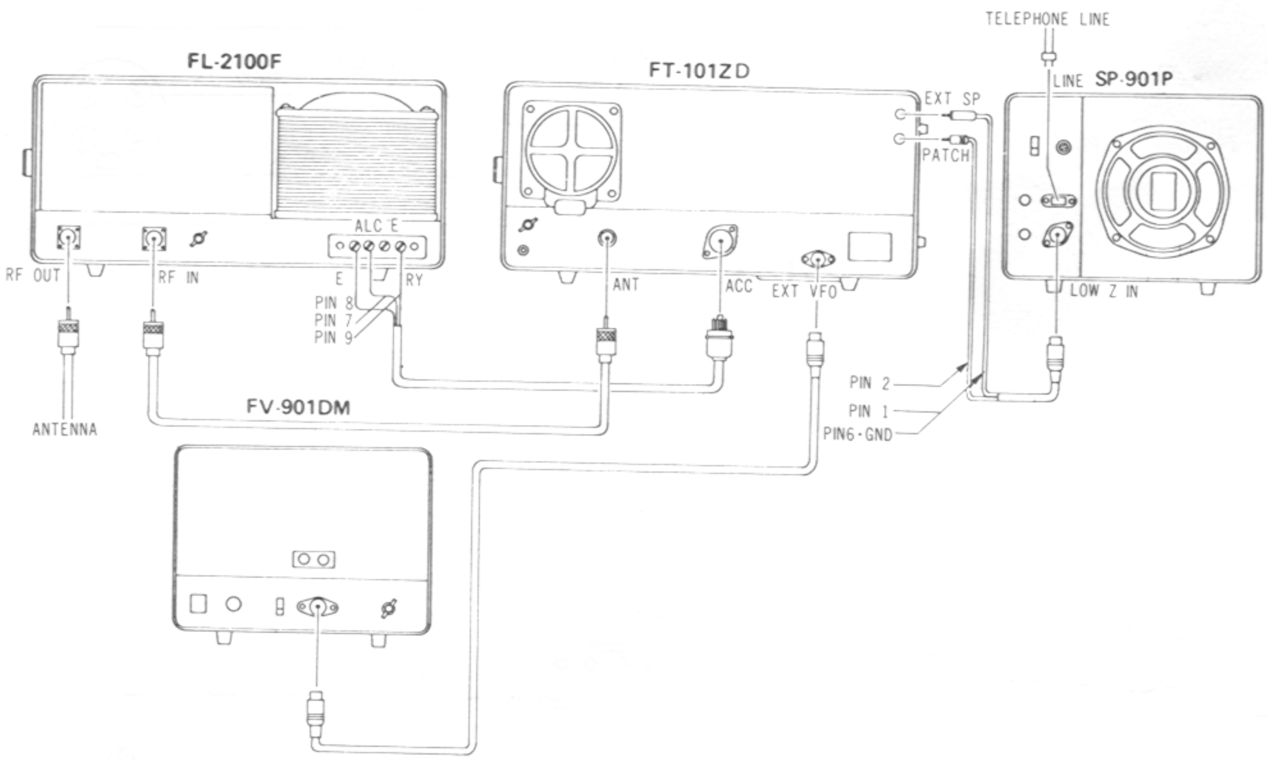
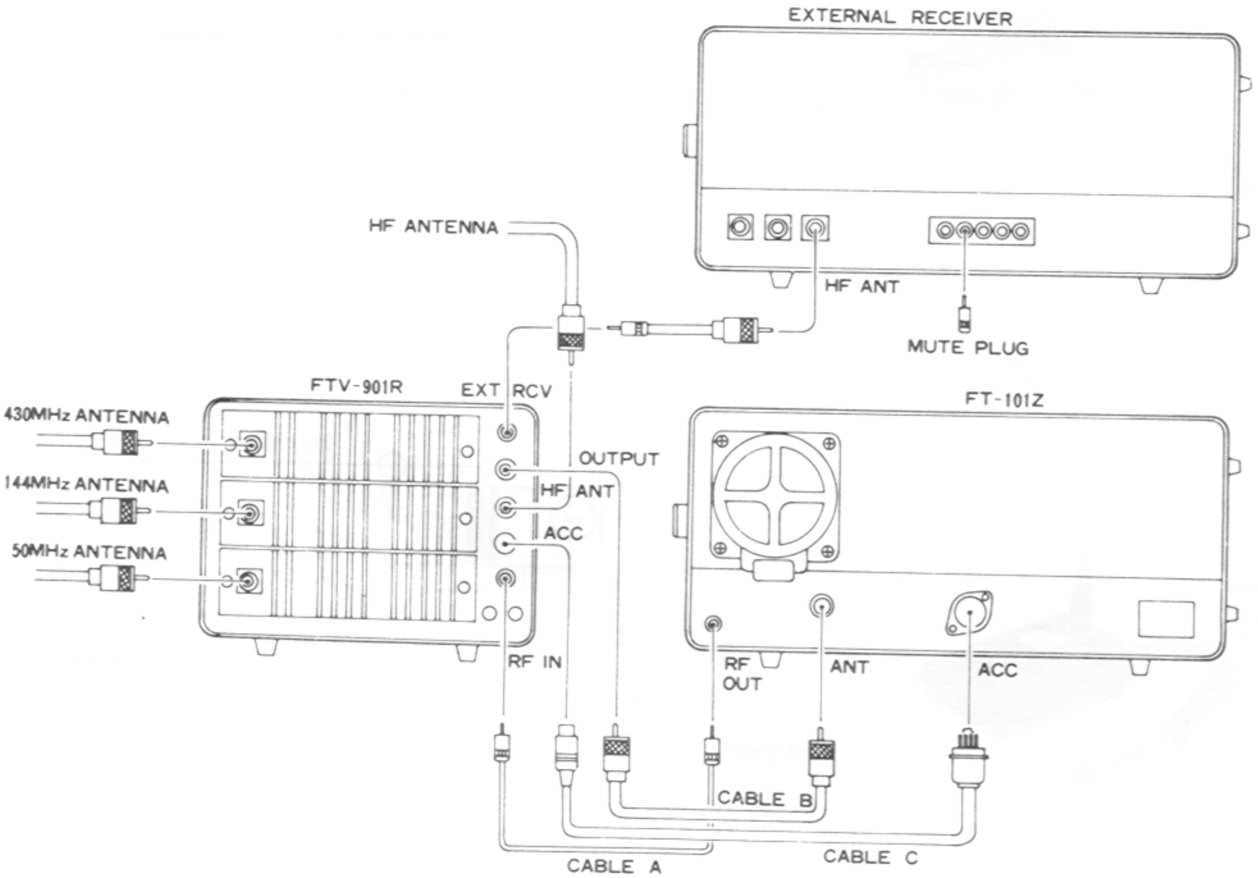
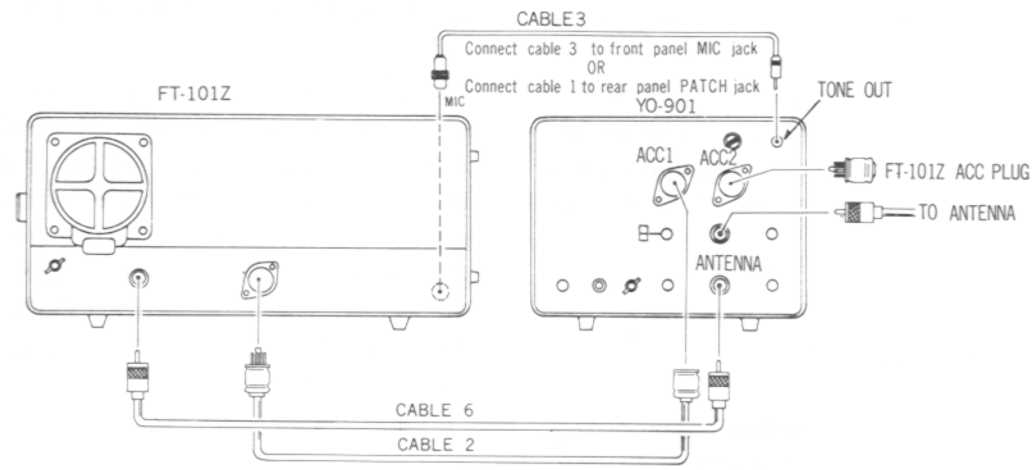
INTERCONNECTIONS



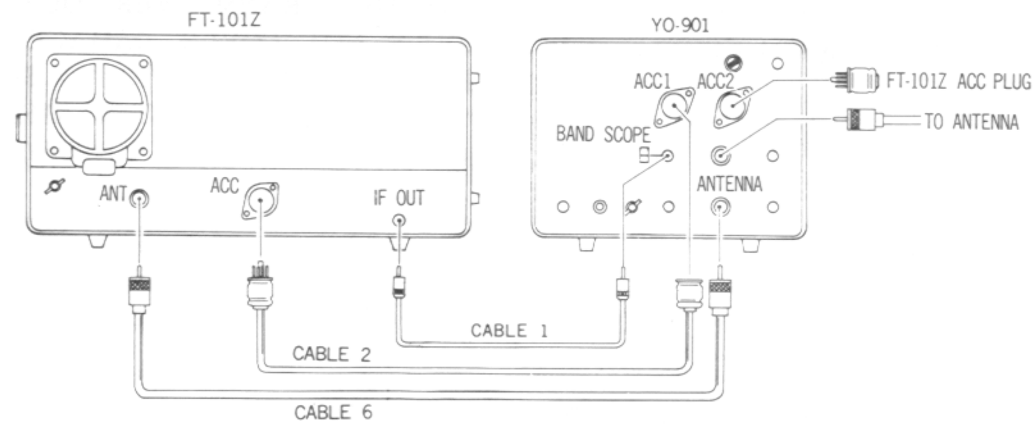
FT-101ZD/FV-901DM/FL-2100F/SP-901P



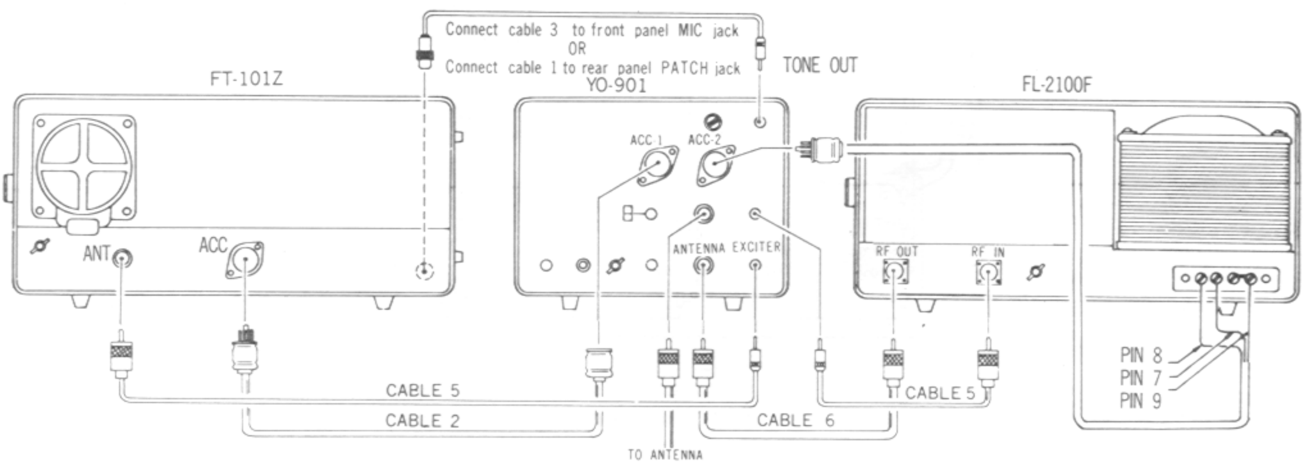
FT-101ZD/FTV-901R/EXTERNAL RX



FT-101ZD/YO-901
(monitorscope mode)



FT-101ZD/YO-901
(Band scope mode)



FT-101ZD/YO-901/FL-2100F

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

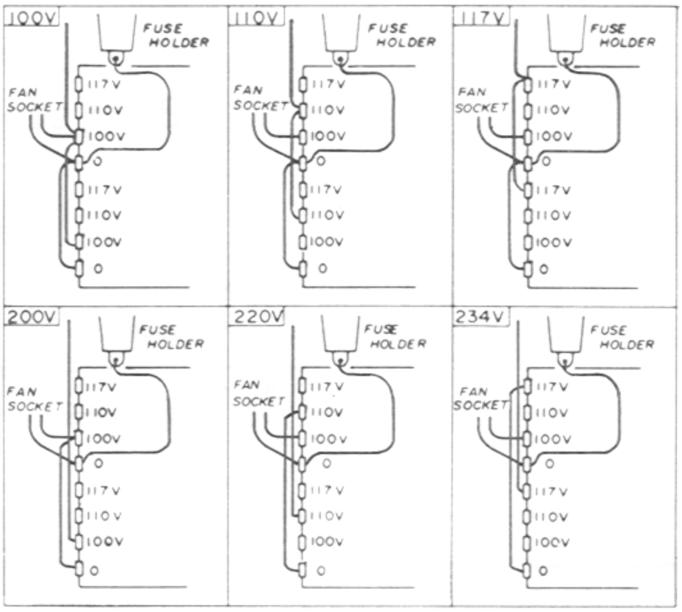
Upon opening the packing carton, immediately give the transceiver a thorough visual inspection. Check to see that all controls and switches are working freely, and inspect the cabinet for any signs of damage. If any damage has been sustained, immediately contact the shipping company, and document the 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 optional equipment. See your Yaesu dealer.)

When the optional DC-DC converter is installed, the FT-101ZD will operate satisfactorily from a 13.5 volt DC power source capable of providing the required current. The DC power cord is included with the DC-DC converter kit.

For under-dash mobile mounting, a special mobile mounting bracket is an available option for your transceiver. The FT-101ZD should be located away from heater ducts, and a minimum of two inches of air space on all sides is recommended, to allow proper air flow around the cabinet. Never stack other units above or below the FT-101ZD, as the accumulated heat from both units could cause damage.

The transceiver requires an average of 14 amps on transmit, with 20 amps on voice peaks. The DC power cable comes equipped with a 20 amp fuse. Be certain to use only a 20 amp fuse when making replacement.

When making battery connections, be absolutely certain that the RED lead is connected to the POSITIVE battery terminal, and the BLACK lead is connected to the NEGATIVE battery terminal. Reversed connections could cause permanent damage to the transceiver. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY IMPROPER SUPPLY CONNECTIONS.

It is recommended that the power connections be made directly to the battery, instead of to the ignition switch, etc. The battery provides considerable filtering action against ignition noise, and connection to the ignition switch can place the power line in a noisy circuit. Keep the power lead as short as possible, and keep the lead away from ignition cables.

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.

ANTENNA CONSIDERATIONS

The FT-101ZD is designed for use with an antenna system presenting a 50 - 75 ohm resistive load at the antenna jack. While the transmitter output circuitry is designed for uniform response within this impedance range, significant departures from the 50 - 75 ohm specification will result in seriously degraded transceiver performance, and may result in damage to the final amplifier tubes.

If an open-wire feedline is used, or if the input impedance of the antenna system presents a higher or lower impedance than specified, some sort of antenna tuner must be used to provide the proper impedance for the transceiver. See your Yaesu dealer for details of the FC-901 antenna coupler.

For mobile operation, most of the commercially-available antennas will provide satisfactory results, if care is taken to tune the antenna for minimum SWR. The outer conductor of the coaxial cable should be securely grounded to the automobile chassis at the antenna mount. See your Yaesu dealer for details on the RSL series of mobile antennas.

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

Before connecting the transceiver to the power source, be certain that the voltage specification marked on the rear of the transceiver matches your local supply voltage, and also confirm that a fuse of the proper rating is being used.

FREQUENCY SELECTION

Frequency readout on the FT-101ZD is by digital as well as analog displays. The FT-101Z uses analog display only. The analog readout dial provides resolution to 1 kHz, while the FT-101ZD digital display provides resolution to 100 Hz. The digital display may be added to the FT-101Z as an option. See your Yaesu dealer for details.

RECEIVE OPERATION

(1) Preset the controls and switches as follows:

POWER . . . . . OFF
HEATER . . . . OFF
VFO. . . . . Switch pushed
VOX GAIN . . PTT position
RF GAIN . . . . Fully clockwise
AF GAIN . . . Adjust later for comfortable level
BAND . . . . . . Desired band
MODE . . . . . . Desired mode
PRESELECT . Desired band segment
AGC. . . . . OFF
ATT . . . . OFF
MARK/NB . . . OFF

(2) Turn the power switch to ON. The meter will light up, and the operating frequency will be displayed on the dial window (FT-101ZD). Adjust the AF GAIN control for a comfortable listening level, and adjust the PRESELECT control for maximum receiver noise or signal level. The PRESELECT control may require repeaking as the transceiver is tuned across the band.

(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 advance the level control beyond the point required to eliminate the noise pulses.

(5) For varying the width of the IF passband, press the WIDTH button, and rotate the WIDTH control. In the IF, two 8-pole crystal filters are used. One filter is fixed, and presents a boundary for the bandwidth. The center frequency is then varied across the passband of the second filter, using a mixing scheme that provides no change of pitch in the received signal.

The result is continuously variable bandwidth, from 2.4 kHz down to approximately 300 Hz. When the WIDTH switch is turned OFF, the second IF filter is instantly aligned with the first filter, returning the receiver to a 2.4 kHz bandwidth.

(6) For extremely strong signals, the ATT (attenuator) switch may be activated, providing 10 dB or 20 dB of attenuation on the incoming signal path, depending on the position of the ATT switch.

TRANSMITTER TUNING

The following tuning procedure must be performed prior to commencing operation on the desired mode. See the paragraphs relating to the specific mode after basic transmitter tune-up has been accomplished.

Be certain that a dummy load or matched antenna is connected to the antenna receptacle on the rear apron of the transceiver. It is possible to damage the final amplifier components of this equipment if this simple precaution is not followed prior to commencing transmission.

Do not exceed 10 seconds of key-down time while tuning.

As well, be certain that the ACC plug is inserted into the rear apron ACC jack. Without this plug, there will be no power applied to the tube heaters. Heater voltage is applied through pins 1 and 2 of the accessory socket.

(1) Preset the controls and switches as follows:
MODE . . . . TUNE
DRIVE . . . . Fully counterclockwise
DELAY . . . . Fully counterclockwise
MIC GAIN. . . . . . . Fully counterclockwise
COMP LEVEL . . . Fully counterclockwise
HEATER . . . . ON
PROC . . . . OFF
PO/IC/ALC IC
PLATE . . . . Set to desired band segment
LOADING 0
PRESELECT . . . . . Peaked on receive for maximum response
TX CLARIFIER . . OFF (button not pushed)

(2) Turn the HEATER switch ON, and wait 1 minute for the tube heaters to warm up.

(3) Set the VOX GAIN switch to the MOX position. Observe the reading on the IC meter: it should read 50 mA with no drive applied. If it is not, adjust the **PB-1968** BIAS control for a resting current of 50 mA on the IC meter. Be certain that the DRIVE control is fully counterclockwise for this adjustment. See page 3-29

(4) Set the VOX GAIN switch to MOX. Advance the DRIVE control for a reading of 150 mA.

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

(6) Rotate the PLATE control for a minimum reading ("dip") on the IC meter. Return the transceiver to the receive mode by rotating the VOX GAIN switch out of the MOX position.

LOADING POSITIONS

BAND	FREQUENCY	POSITION
160 m	1.8 MHz	0
	2.0 MHz	5
80 m	3.5 MHz	1
	4.0 MHz	5
40 m	7.0 MHz	4.5
	7.5 MHz	6
20 m	14.0 MHz	3.5
	14.5 MHz	4
15 m	21.0 MHz	2
	21.5 MHz	2.5
10 mA	28.0 MHz	2
10 mB	28.5 MHz	2
10 mC	29.0 MHz	2
10 mD	29.5 MHz	2

NOTE: LOADING positions are nominal. Minor variations from positions shown are to be expected.

FINAL TUNING

Final transmitter tuning uses the relative power output setting of the METER switch. At full rated output, using a 50 ohm load, the PO meter will indicate between 1/2 and 2/3 of full scale deflection. If the PO reading is too high (off scale) or too low (1/4 scale or less), and if the load impedance is very close to 50 ohms, the PO ADJ control on the rear apron may be varied to provide the proper deflection. Once the PO meter is calibrated, off-scale deflections are the result of reflected power (high SWR), and corrective action may be required in the antenna system.

Set the controls as follows for final tuning:

(1) Set the METER switch to PO. Rotate the DRIVE control to the 9 o'clock position.

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

(3) Rotate the LOADING control for a maximum meter reading. Rotate the PLATE control for a maximum meter reading.

(4) Again rotate the LOADING control and PLATE control, each time advancing the

DRIVE control approximately 2 steps, until the DRIVE control is fully clockwise. The transmitter is now tuned for maximum power output. Do not exceed the maximum tuning time stipulated previously. Return the VOX GAIN switch to the VOX position (out of the MOX position), return the METER switch to IC, and return the DRIVE control to the fully counterclockwise position.

SSB OPERATION

After completing the above tuning procedure, set the MODE switch to USB or LSB as desired. Set the VOX GAIN control to PTT, and activate the transmitter by pushing the microphone PTT switch or the footswitch, if used. With the METER switch set to the ALC position, speak into the microphone in a normal voice. Advance the MIC GAIN control until the meter kicks up to the midscale of the green-colored portion of the meter scale.

Note: When the METER switch is set to IC, voice modulation peaks will indicate 150 - 200 mA. Actual peak current, though, is approximately 2 times the indicated value.

To set the sensitivity of the VOX (voice-operated T/R switching) system, advance the VOX GAIN control slowly while speaking into the microphone. Advance the VOX GAIN control to the point where the speech signal activates the transmitter.

Set the antitrip potentiometer on the rear apron to the minimum point which prevents the speaker output from tripping the VOX. Do not use more VOX gain nor antitrip than is necessary. Adjust the front panel DELAY control for the desired relay recovery time.

RF SPEECH PROCESSOR ADJUSTMENT

The FT-101ZD RF speech processor, when correctly adjusted, will improve the intelligibility threshold at the receiving end, by increasing the average SSB power output. RF clipping is applied to the IF signal, which is then filtered to remove harmonics and out of band intermodulation products. RF envelope clipping causes much less distortion than that caused by an equivalent amount of AF clipping, and the result is an output signal with more "punch".

Set the PROC switch to OFF, and set the MIC GAIN control as described previously (voice peaks falling within the green zone of the ALC meter scale). Now set the PROC switch to ON, and set the COMP LEVEL control to the 10 o'clock position. Advance the DRIVE control so that the desired power output is obtained, and be sure that the ALC meter indication is within the green zone.

With the RF speech processor activated, the ALC meter indication may not be quite as high as when the processor is off. This is entirely normal, because the average power output is higher with the processor, although the **peaks** are being clipped.

Setting the COMP LEVEL control up to the 12 o'clock position will provide up to 10 dB of compression. Advancing the control beyond the 10 o'clock point may, however, degrade the voice-to-noise ratio, so caution is recommended.

CW OPERATION

After completing the tuning procedure, insert the key line into the KEY jack on the rear panel.

The operator may select any power output desired by advancing the DRIVE control. Once the maximum power output level has been reached, the DRIVE control should not be advanced further.

The transmitter may be activated by the VOX circuit, or by the PTT or MOX systems. The TONE control on the rear apron of the transceiver sets the CW sidetone level.

The key-up voltage at the key jack is 7 volts, and the key-down current is 1.5 mA.

For receiving, two positions of selectivity are provided. When the optional CW filter is installed, the operator may select between the 600 Hz bandwidth of the CW filter and the 2.4 kHz bandwidth of the SSB filter. The WIDTH control may be used with either position of the MODE switch: CW-W or CW-N.

AM OPERATION

AM operation of the transmitter is accomplished by setting the MODE switch to the AM position and inserting the proper amount of carrier with the DRIVE control.

After completing basic transmitter tune-up, place the MODE switch in the AM position. Activate the transmitter, and rotate the DRIVE control until the meter reads .10 (100 mA) in the IC position of the METER switch. While speaking into the microphone in a normal voice, increase the MIC GAIN control until the meter indicates very slight movement with voice peaks. Care must be exercised that the DRIVE control is not advanced too far. Do not exceed .10 (100 mA) meter indication during AM operation or damage to the transmitter final amplifier tubes may result.

SELECT SWITCHES

The SELECT switches allow selection of internal or external VFO frequency control, as well as selection of up to 2 optional crystal-controlled channels.

When the crystal-controlled channels are installed, they may be selected by pressing CH1 or CH2, as desired. See the crystal information elsewhere for full information on crystal requirements.

When using the FV-901DM synthesized, scanning external VFO, available from your Yaesu dealer, your FT-101ZD will have available a 40-frequency memory bank, as well as a three-speed scanner. Because there is no calibrated display for the FV-901DM, the FV-901DM cannot be used with the analog FT-101Z.

For transceive frequency control on the external VFO, press EXT. For external VFO control of the transmit frequency, with receive frequency control on the FT-101ZD, press TX EXT. For receive frequency control on the external VFO, and transmit frequency control on the FT-101ZD, press RX EXT. For full transceive control on the FT-101ZD, press VFO.

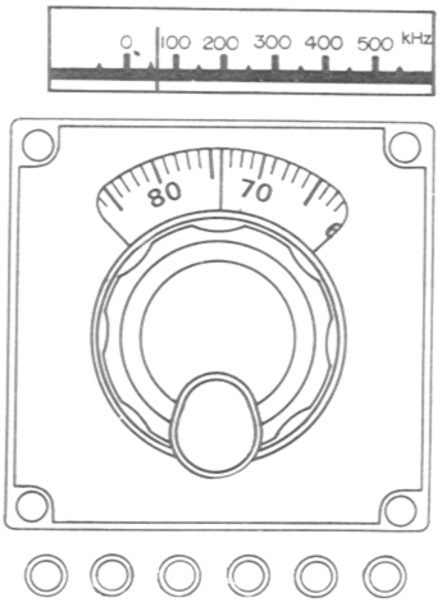
DIAL CALIBRATION AND FREQUENCY DETERMINATION

The FT-101ZD mixing scheme accounts for the difference in carrier frequencies between USB and LSB. For this reason, no recalibration is required. Once the calibration is properly aligned (at the factory, or in shop), no further adjustment is required for accurate frequency derivation. The 25 kHz calibrator is included largely for alignment purposes, as it provides a useful reference signal for signal peaking, etc.

Frequency readout on the FT-101ZD digital display is straightforward. The full operating frequency is displayed, with resolution to 100 Hz.

The analog display on the FT-101Z and FT-101ZD transceivers provides easy determination of the operating frequency. The frequency displayed on the analog sub dial (and the main display window, for the FT-101Z) is added to the lower band edge frequency.

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 display will produce 14074 kHz for 20 meters, 21074 for 15 meters, etc. For 80 meters, the lower band edge is 3500 kHz, while for 160 meters the band edge is 1.5 MHz. Therefore, the dial should read 074 to produce 3574 kHz, but 374 for 1874 kHz. Be careful so as not to operate outside the amateur bands.



FIXED CHANNEL CRYSTAL INFORMATION

Two fixed channels may be used with your FT-101ZD, using optional crystals. Crystals are available from your Yaesu dealer. Crystals must meet the specifications shown in Table 2 , and must fall within the operating range 5500 - 5000 kHz. Frequency calculation is made from the formula

$$F_X = F_1 - F_0$$

where F_X is the crystal frequency
F_1 is a constant derived from Table 1
F_0 is the operating frequency.

For example, let us say it is desired to operate on 7199 kHz LSB. Referring to Table 1 , we see than for 40 meter LSB, F_1 is 12501.5 kHz. Subtracting F_0 (7199 kHz) from F_1 (12501.5 kHz) yields 5302.5 kHz, the crystal frequency (F_X).

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 reveal that the 7199 kHz crystal for LSB will work on 14199 kHz, 21199 kHz, etc. Of course, LSB is not normally used on these bands. If the operator switches to USB, the operating frequency will be moved 3 kHz (in this case, to 14196 kHz, 21196 kHz, etc.). If the move is made from LSB to CW, the frequency will move 2.3 kHz down.

BAND \ MODE	USB	LSB	CW AM
160m	6998.5	7001.5	6999.2
80m	8998.5	9001.5	8999.2
40m	12498.5	12501.5	12499.2
20m	19498.5	19501.5	19499.2
15m	26498.5	26501.5	26499.2
10m A	33498.5	33501.5	33499.2
10mB	33998.5	34001.5	33999.2
10mC	34498.5	34501.5	34499.2
10mD	34998.5	35001.5	34999.2

Table 1

Type	HC-25/U
Load Capacitance	30pF
Series Resistance	25 Ohms or less
Static Capacitance	7pF or less
Drive Level	5mW

Table 2

SECTION 2 – TECHNICAL NOTES

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 boards, are assigned a three or four digit part number; the last two digits are the part number for that particular board, while the first one or two digits are the code number for the board.

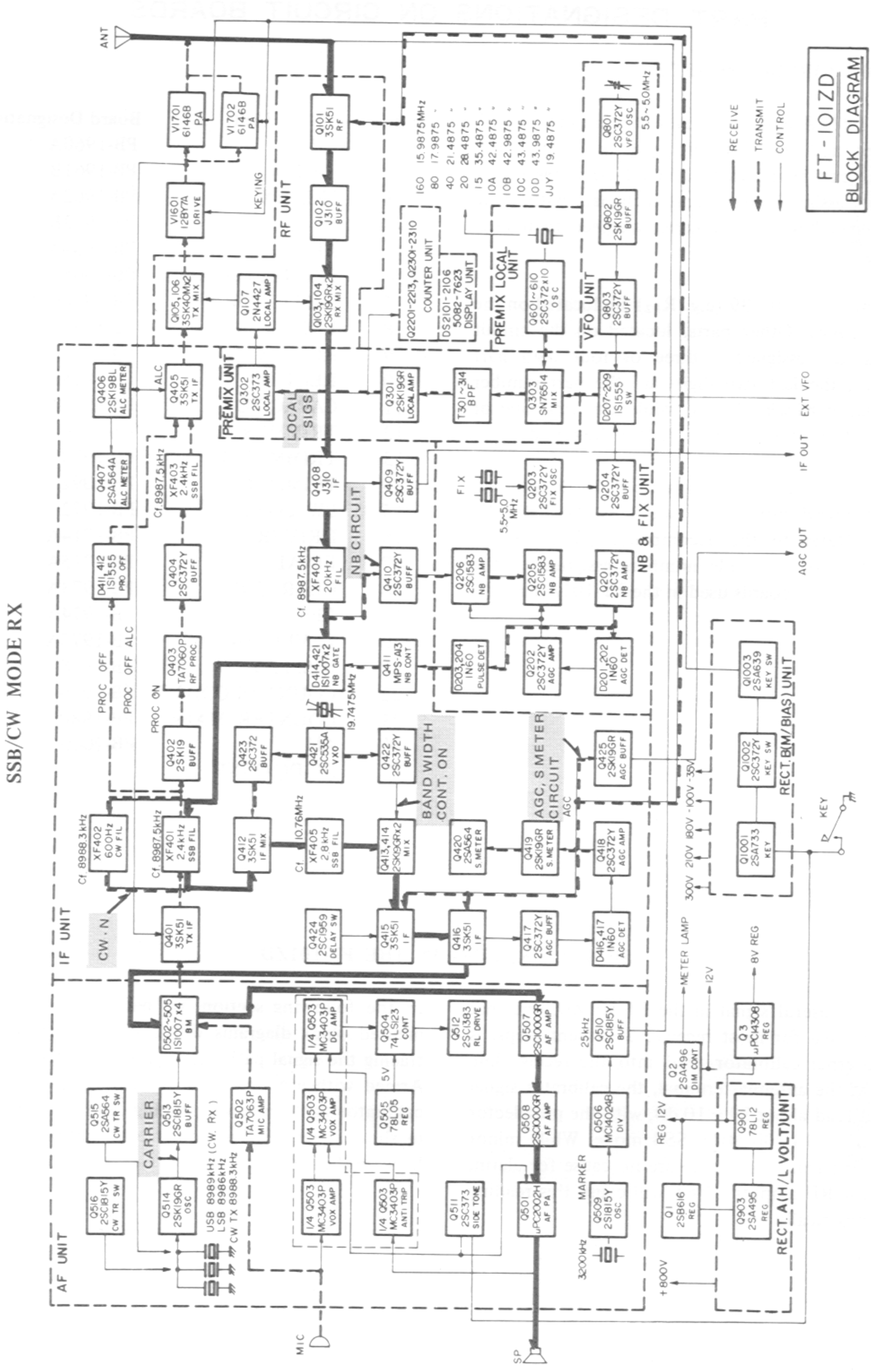
Thus, Q_{301} is transistor number 01, located on circuit board number 3, which is the PREMIX UNIT. Refer to the accompanying chart for a tabulation of the code numbers assigned to the various circuit boards used in the FT-101Z series.

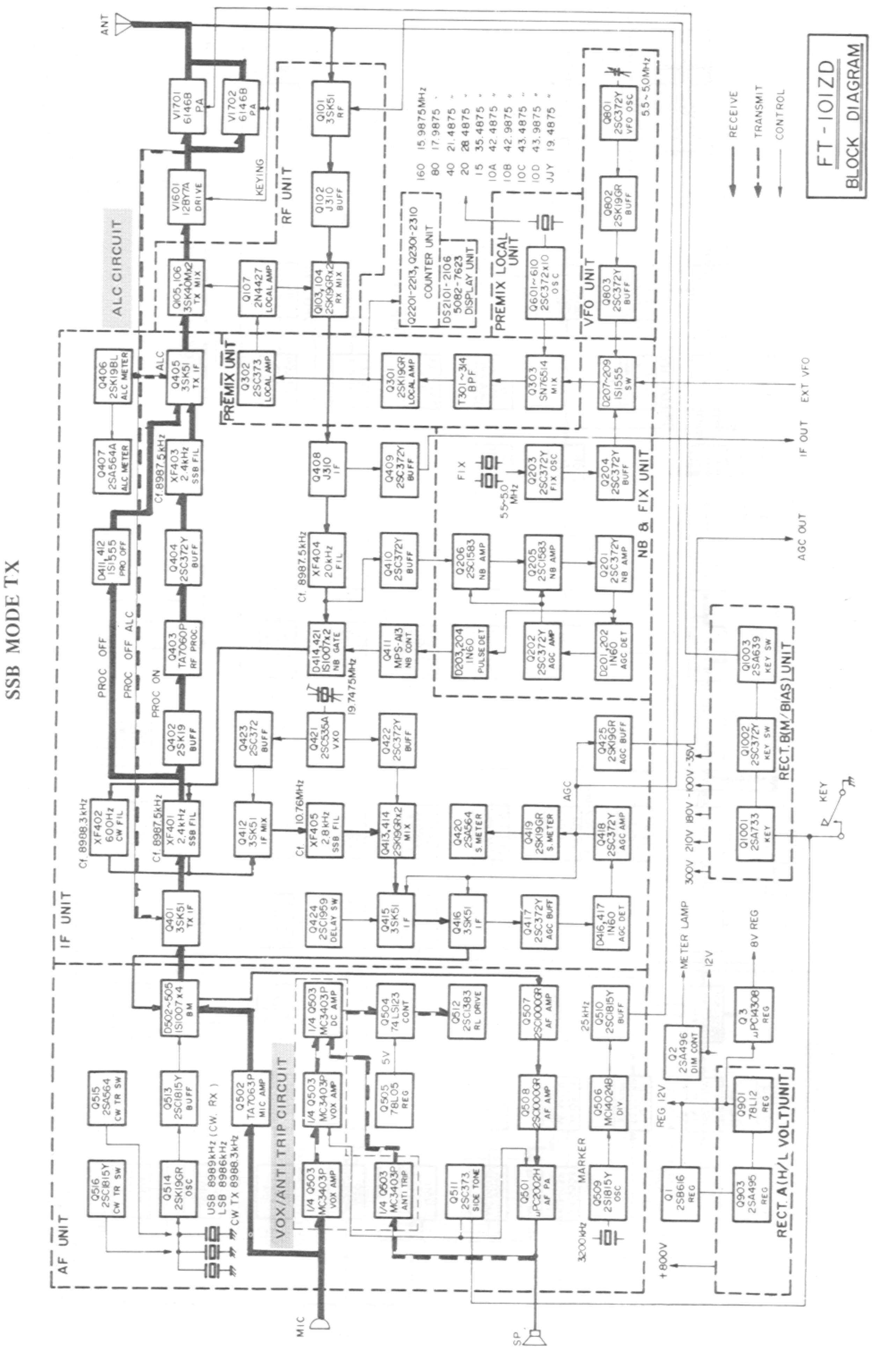
Code #	Unit	Board Designation
1	RF	PB-1960A
2	NB/FIX	PB-1961B
3	PREMIX	PB-1962A
4	IF	PB-1963B
5	AF	PB-1964A
6	PREMIX LOCAL	PB-1965
7	SELECT SW.	PB-1966C
8	VFO	PB-1440B-3420
9	RECT A	PB-1967
10	RECT B	PB-1968A
11	CAPACITOR	PB-1969A
12	TRIMMER A	PB-1970
13	TRIMMER B	PB-1970
14	TRIMMER C	PB-1092
15	BW CONT	PB-1972
16	DRIVER	PB-1714A
17	FINAL	PB-1715A
18	CLAR CONT	PB-1973A
19	LED	PB-1974A
20	LEVER SW	PB-1975A
21	DISPLAY	PB-1978
22	COUNT/DECODE	PB-1979
23	COUNTER MAIN	PB-1980
24	AM	PB-2040
32	DC-DC CONV	–

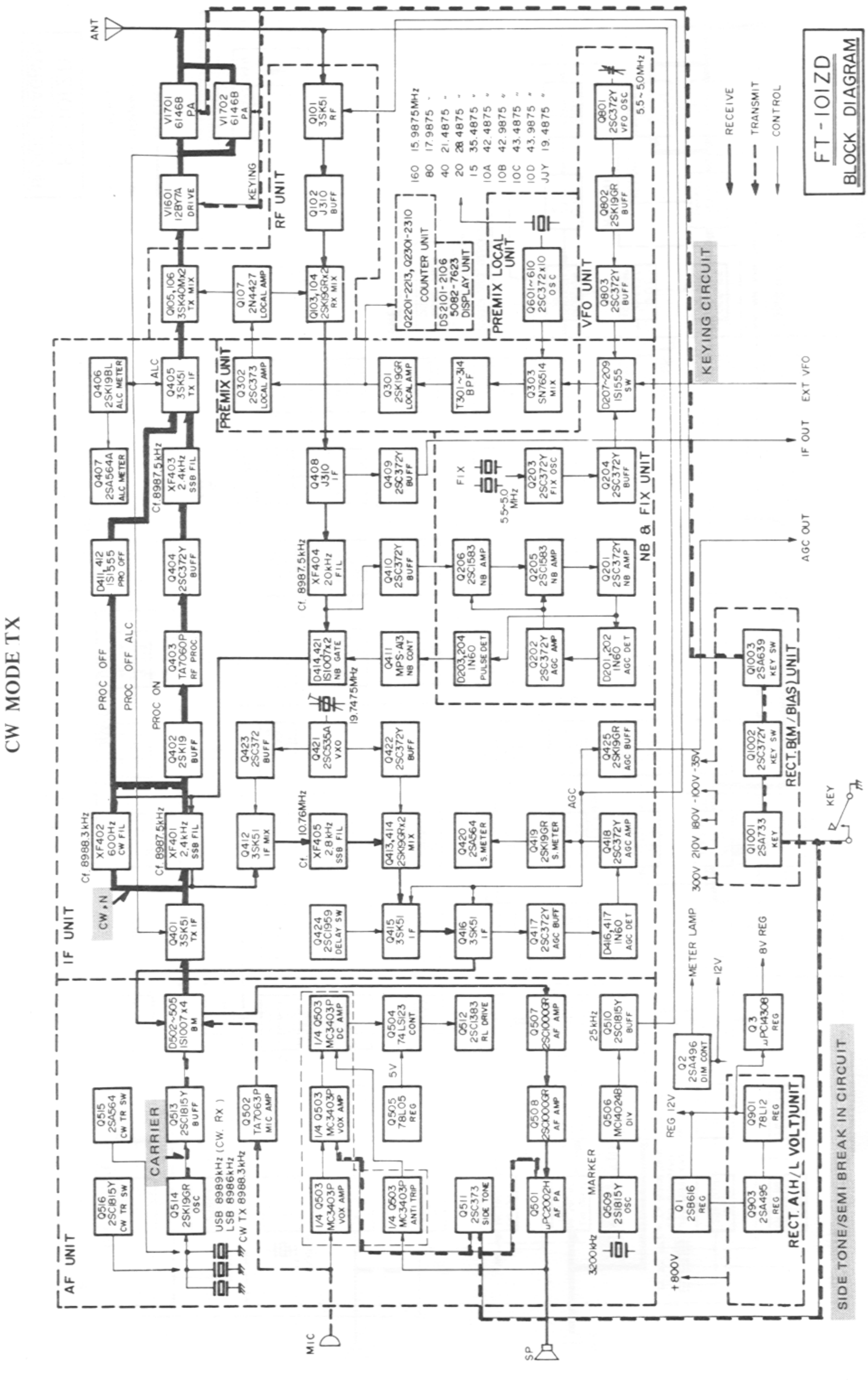
SIGNAL TRACING IN THE FT-101ZD

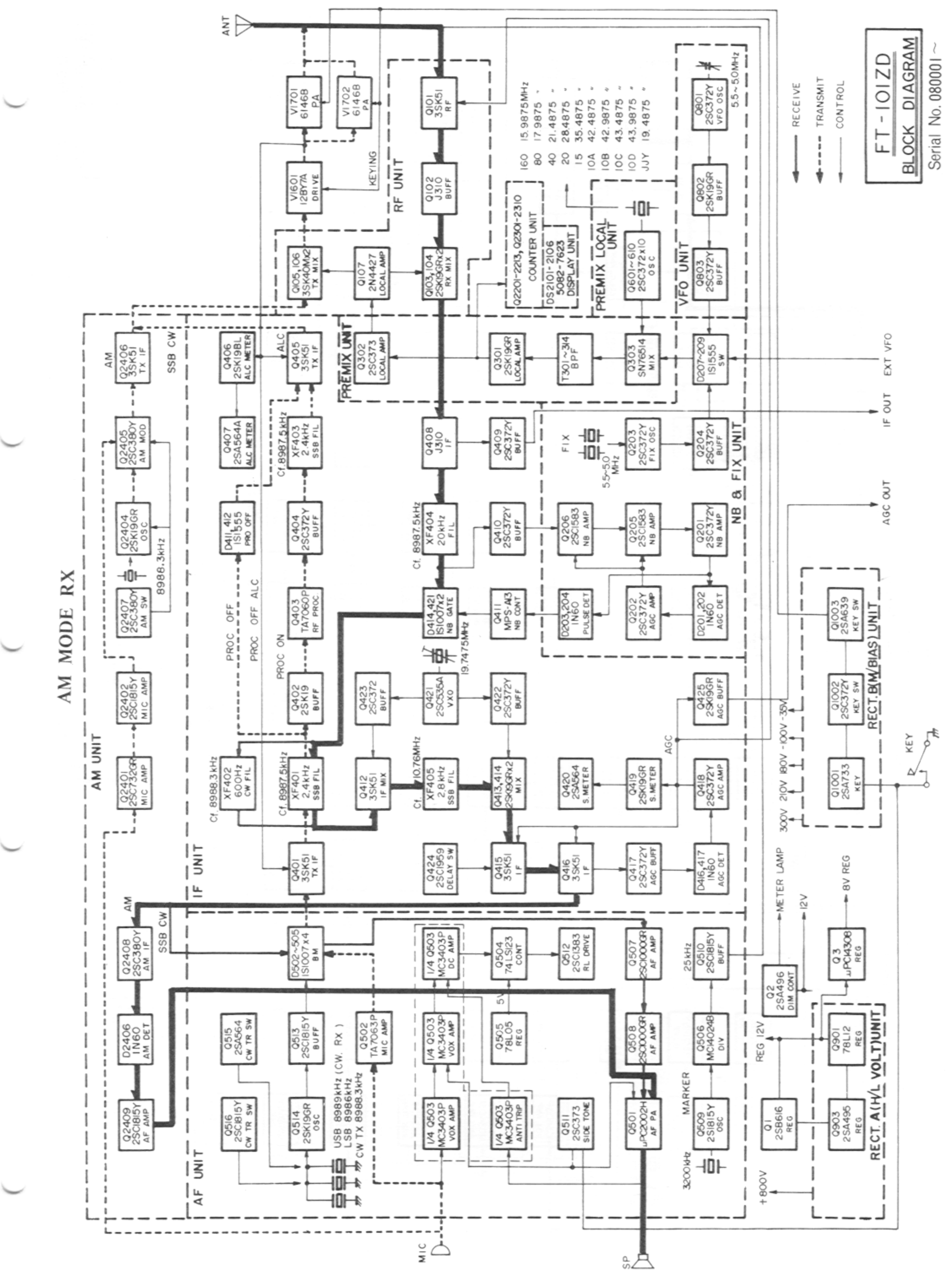
A highly useful signal in the FT-101ZD, one that can be used for most receiver alignment steps, is the internal calibrator. Fed into the receive line right at the antenna terminal, the calibrator signal should read about S9 + 10 dB, with the preselector peaked, at 14.200 MHz, SSB mode. While minor variations from this figure are no cause for alarm, a blown RF amplifier FET will cause this reading to be practically nil.

In the following section, we have presented augmented block diagrams which should help you in tracing the signal paths throughout the FT-101ZD. Armed with a couple of alignment wands and the calibrator signal, receiver peaking can be completed in short order, leaving you free to diagnose problems on the TX side.


SSB/CW MODE RX
FT-101ZD
BLOCK DIAGRAM
RECEIVE
TRANSMIT
CONTROL
RF UNIT
IF UNIT
AF UNIT
PREMIX UNIT
PREMIX LOCAL UNIT
VFO UNIT
NB & FIX UNIT
COUNTER UNIT
DISPLAY UNIT
RECT. A(H/L VOLT) UNIT
RECT. B(M/BIAS) UNIT
ANT
MIC
SP
KEY
EXT VFO
IF OUT
AGC OUT


SSB MODE TX
FT-101ZD
BLOCK DIAGRAM
RECEIVE
TRANSMIT
CONTROL
ANT
MIC
SP
KEY
ALC CIRCUIT
VOX/ANTI TRIP CIRCUIT
RF UNIT
IF UNIT
AF UNIT
PREMIX UNIT
PREMIX LOCAL UNIT
VFO UNIT
NB & FIX UNIT
RECT B(M/BIAS) UNIT
RECT A(H/L VOLT) UNIT
COUNTER UNIT
DISPLAY UNIT
V1701 6146B PA
V1702 6146B PA
V1601 12BY7A DRIVE
Q101 3SK51 RF
Q102 J310 BUFF
Q103,104 2SK19GRx2 RX MIX
Q105,106 3SK40Mx2 TX MIX
Q107 2N4427 LOCAL AMP
Q801 2SC372Y VFO OSC
Q802 2SK19GR BUFF
Q803 2SC372Y BUFF
Q601~610 2SC372x10 OSC
EXT VFO
IF OUT
AGC OUT
8V REG
METER LAMP
+800V
PROC OFF
PROC ON
KEYING
55~50MHz


CW MODE TX
FT-101ZD
BLOCK DIAGRAM
RECEIVE
TRANSMIT
CONTROL
RF UNIT
IF UNIT
AF UNIT
PREMIX UNIT
PREMIX LOCAL UNIT
VFO UNIT
NB & FIX UNIT
KEYING CIRCUIT
SIDE TONE/SEMI BREAK IN CIRCUIT
RECT. A(H/L VOLT)UNIT
RECT. B(M/BIAS)UNIT
CARRIER
ANT
MIC
SP
KEY
EXT VFO
IF OUT
AGC OUT
METER LAMP
8V REG
REG 12V
+800V


AM MODE RX
FT-101ZD
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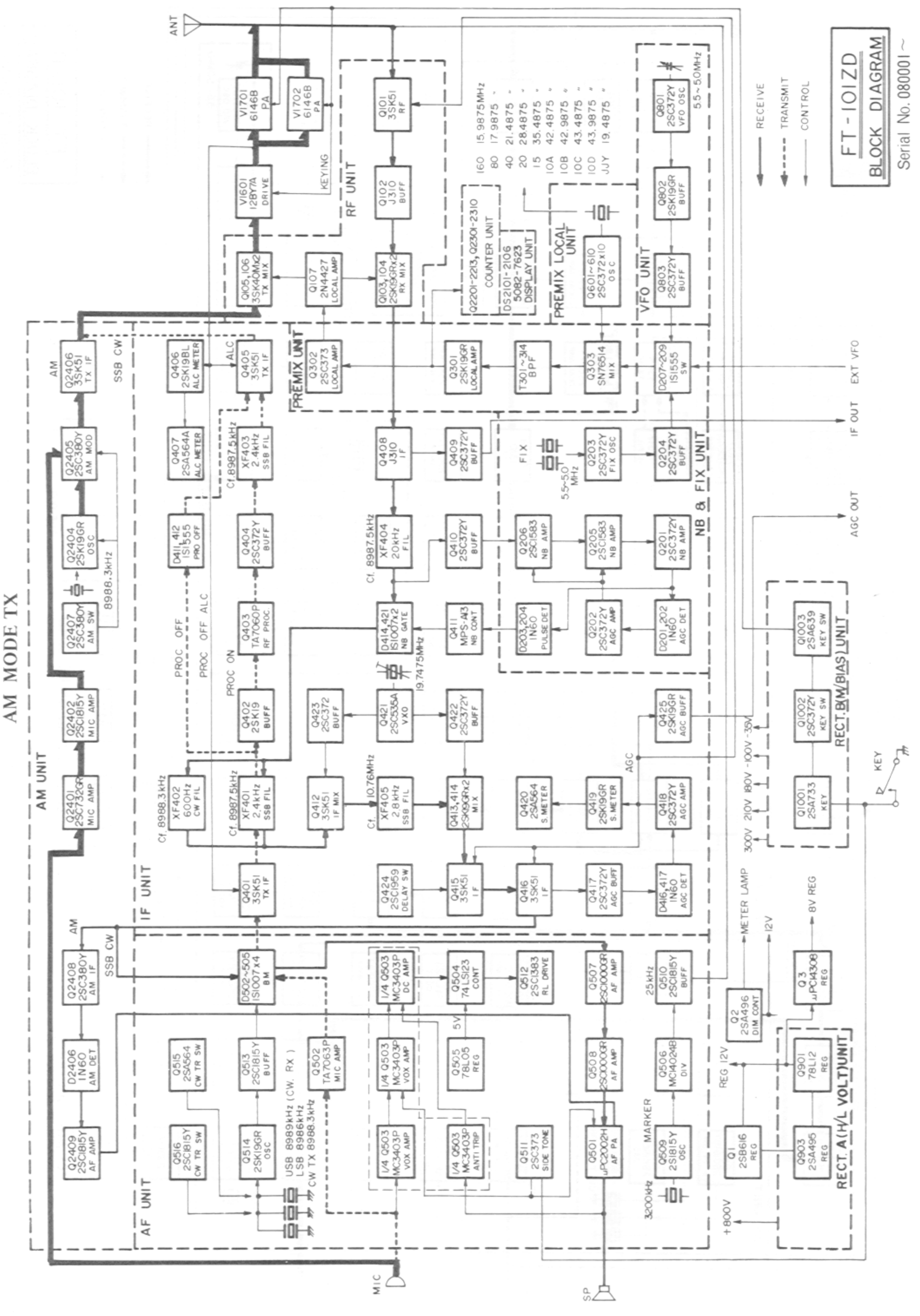
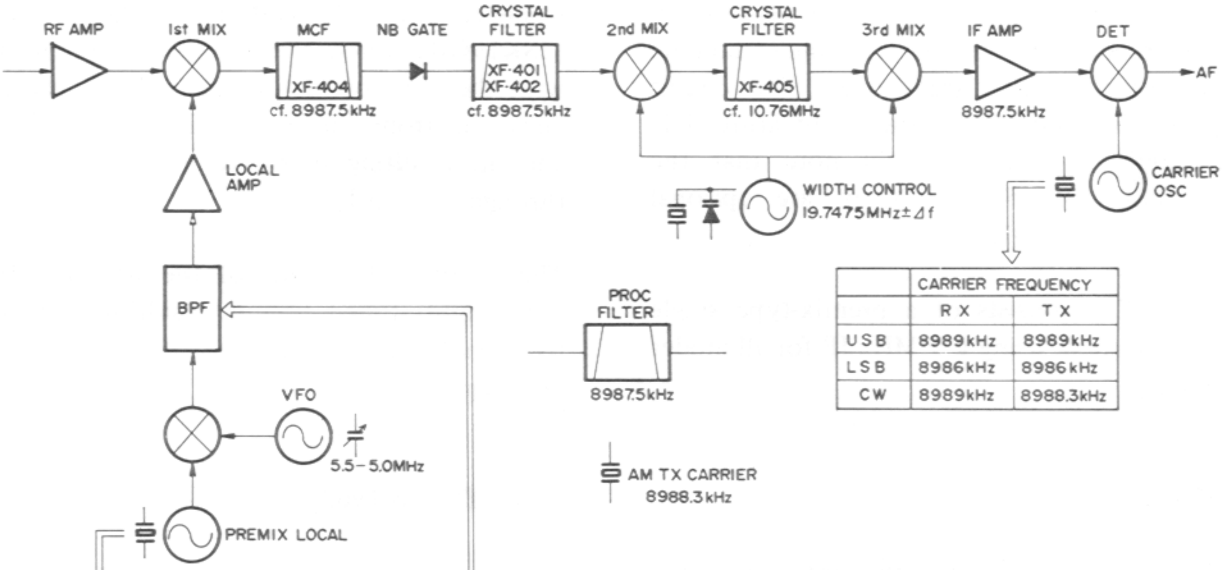
Serial No. 080001~
RECEIVE
TRANSMIT
CONTROL
AM UNIT
IF UNIT
AF UNIT
RF UNIT
PREMIX UNIT
PREMIX LOCAL UNIT
VFO UNIT
NB & FIX UNIT
RECT. B(M/BIAS) UNIT
RECT. A(H/L VOLT) UNIT


FT-101ZD
BLOCK DIAGRAM
Serial No. 080001~
AM MODE TX
RECEIVE
TRANSMIT
CONTROL
RF UNIT
IF UNIT
AF UNIT
AM UNIT
PREMIX UNIT
PREMIX LOCAL UNIT
VFO UNIT
NB & FIX UNIT
COUNTER UNIT
DISPLAY UNIT
RECT. B(M/BIAS) UNIT
RECT. A(H/L VOLT) UNIT
ANT
MIC
SP
KEY
EXT VFO
IF OUT
AGC OUT

FREQUENCY RELATIONSHIPS



	CARRIER FREQUENCY	
	R X	T X
USB	8989kHz	8989kHz
LSB	8986kHz	8986kHz
CW	8989kHz	8988.3kHz

BAND	FREQUENCY
160m	15.9875 MHz
80	17.9875
40	21.4875
20	28.4875
15	35.4875
10A	42.4875
10B	42.9875
10C	43.4875
10D	43.9875

BAND	RANGE
160m	10.4875 – 10.9875MHz
80	12.4875 – 12.9875
40	15.9875 – 16.4875
20	22.9875 – 23.4875
15	29.9875 – 30.4875
10	36.9875 – 38.9875

CRYSTAL DATA FT-101ZD

UNIT	FUNCTION	HOLDER	FREQUENCY (kHz)	MODE	LOAD C (pF)	EFFECTIVE RESISTANCE	DRIVE LEVEL
CRYSTAL	160m	HC-18/U	15987.5	3rd overtone	30	80(Ω)	2 mW
	80m	〃	17987.5	〃	〃	60	〃
	40m	〃	21487.5	〃	〃	45	〃
	20m	〃	28487.5	〃	〃	40	〃
	15m	〃	35487.5	〃	〃	40	〃
	10m (A)	〃	42487.5	〃	〃	40	〃
	10m (B)	〃	42987.5	〃	〃	40	〃
	10m (C)	〃	43487.5	〃	〃	40	〃
	10m (D)	〃	43987.5	〃	〃	40	〃
	WWV(5MHz)	〃	19487.5	〃	〃	40	〃
CARRIER	LSB	HC-18/U	8986	Fundamental	35	30	10mW
	USB	〃	8989	〃	〃	35	〃
	CW	〃	8988.3	〃	〃	35	〃
	AM	〃	8988.3	〃	〃	35	〃
IF	Width	〃	★cf.19747.5	Fundamental	〃	15	2 mW
COUNTER	Local	〃	18000	〃	〃	15	10mW
	Local	〃	18500	〃	〃	15	〃
	Clock	HC-14/W	655.36	〃	23	7K	2 mW
VOX/MARK	Marker	HC-6/W	3200	〃	〃	50	5 mW

★XCO FREQUENCY: 19743 – 19753kHz
Decided by circuit

CIRCUIT DESCRIPTION

The block diagram and following circuit description will provide you with a better understanding of the design of this transceiver. The circuit description is tailored to the full-feature FT-101ZD, and the reader should note that the counter unit and digital display are optional features for the FT-101Z.

The FT-101ZD consists of a premix-type single conversion system, using a 9 MHz IF for all modes of operation.

RECEIVER

The RF input signal from the antenna is fed through antenna relay RL_2, lamp fuse FH_2, attenuator switch S_{2004} (located on the LEVER SW unit, PB-1975), 9 MHz trap L_{2101} and C_{1207} (located on the TRIMMER A UNIT), and input transformer T_1 to pin 3 of the RF UNIT.

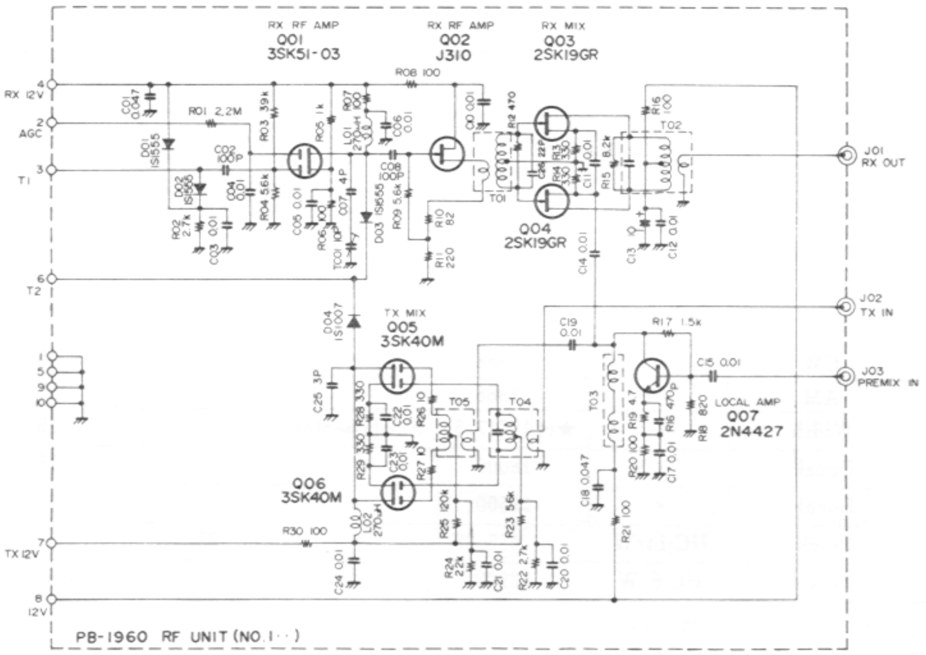
RF UNIT (PB-1960)

The incoming signal is amplified by the RF amplifier, Q_{101} **(3SK51-03)**, a dual-gate MOSFET used in a grounded source configuration. This transistor has superior immunity from intermodulation distortion. The amplified signal is then fed through a source follower, Q_{102} **(J310)**, to the balanced mixer consisting of Q_{103} and Q_{104} **(2SK19GR)**, where the input signal is heterodyned with the local oscillator signal. The local signal is delivered from buffer amplifier Q_{107} **(2N4427)**, and the resulting IF signal of 8.9875 MHz is fed through T_{102} to J_{101}.

The input and output of the RF amplifier are permeability-tuned circuits, resulting in high sensitivity and excellent rejection of unwanted out-of-band signals.

IF UNIT (PB-1963)

The IF signal at pin 9 of J_{403} is amplified by Q_{408} **(J310)** and passed through a monolithic filter, XF_{404}, which has a ±10 kHz bandwidth. The monolythic filter provides early protection from IMD, while providing a wide-bandwidth point for noise blanking. The IF signal is then fed to noise blanker gate D_{404} **(1S1007)**, which functions as an ON/OFF switch controlled by noise blanker driver Q_{411} (MPSA13).



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} **(1S1007)**, depending on the mode of operation.

The IF signal is then fed to the IF first mixer, Q_{412} **(3SK51-03)**, where the incoming signal is heterodyned with a 19.7475 MHz ±Δf local signal delivered from crystal oscillator Q_{421} **(2SC535A)** and buffer amplifier Q_{423} **(2SC372Y)**, resulting in a signal of 10.76 MHz ±Δf.

The new 10.76 MHz ±Δf signal is fed through filter XF_{405} to the IF second mixer, Q_{413}/Q_{414} **(2SK19GR)**, where the filtered signal is heterodyned with the 19.7475 MHz ±Δf signal delivered from Q_{422} **(2SC372Y)**, resulting in an 8.9875 MHz IF signal, the same as the original IF.

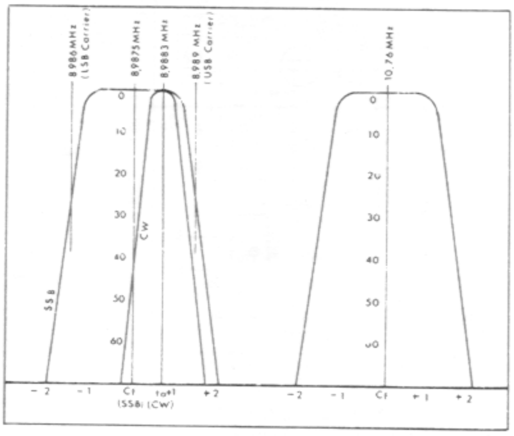
This process varies the IF signal across the passband of the second IF filter. The combination of the two filters, XF_{401} and XF_{405}, provides continuously variable width of the IF passband. The frequency of crystal oscillator Q_{421} is varied by varactor diode D_{418} **(1S2209)**.

The output from the IF second mixer is fed to a two-stage IF amplifier, consisting of Q_{415} and Q_{416} **(3SK51-03)**, and delivered through diode switch D_{401} **(1S1555)** to the AF UNIT.

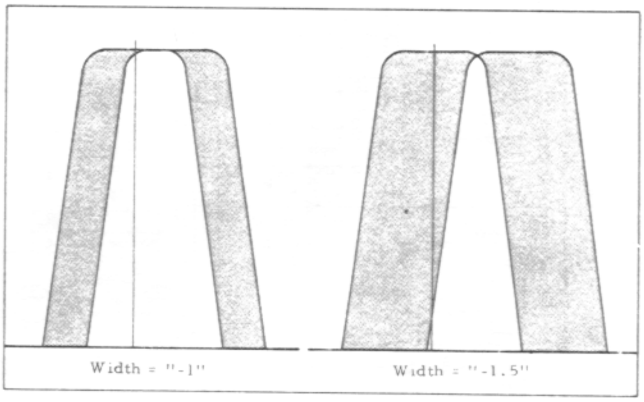
A portion of the output from Q_{416} is rectified by D_{416} and D_{417} **(1N60)** to produce AGC voltage. Q_{417} **(2SC372Y)** provides the necessary buffering between the IF and AGC circuits. The AGC voltage is amplified by Q_{418} **(2SC372Y)**, and applied to gate 2 of the RF and IF amplifiers, to control the gain of these stages. The AGC voltage is also amplified by Q_{419} **(2SK19GR)** for S-meter indication.

For use with the FV-901DM scanning VFO, or other optional equipment, the AGC voltage is fed through buffer Q_{425} **(2SK19GR)** and fed to the AGC OUT terminal on the EXT VFO jack, located on the rear panel.

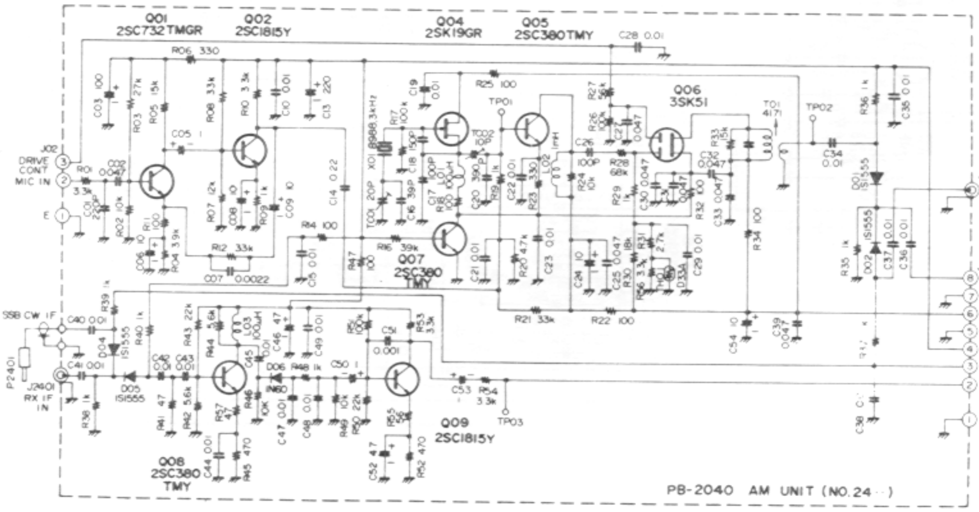
On AM, the output signal from Q_{416} is amplified by Q_{2408} **(2SC380Y)** and passed to the AM detector, D_{2406} **(1N60)**. The resulting audio signal is amplified by Q_{2409} **(2SC1815Y)** and delivered to the final audio stage.

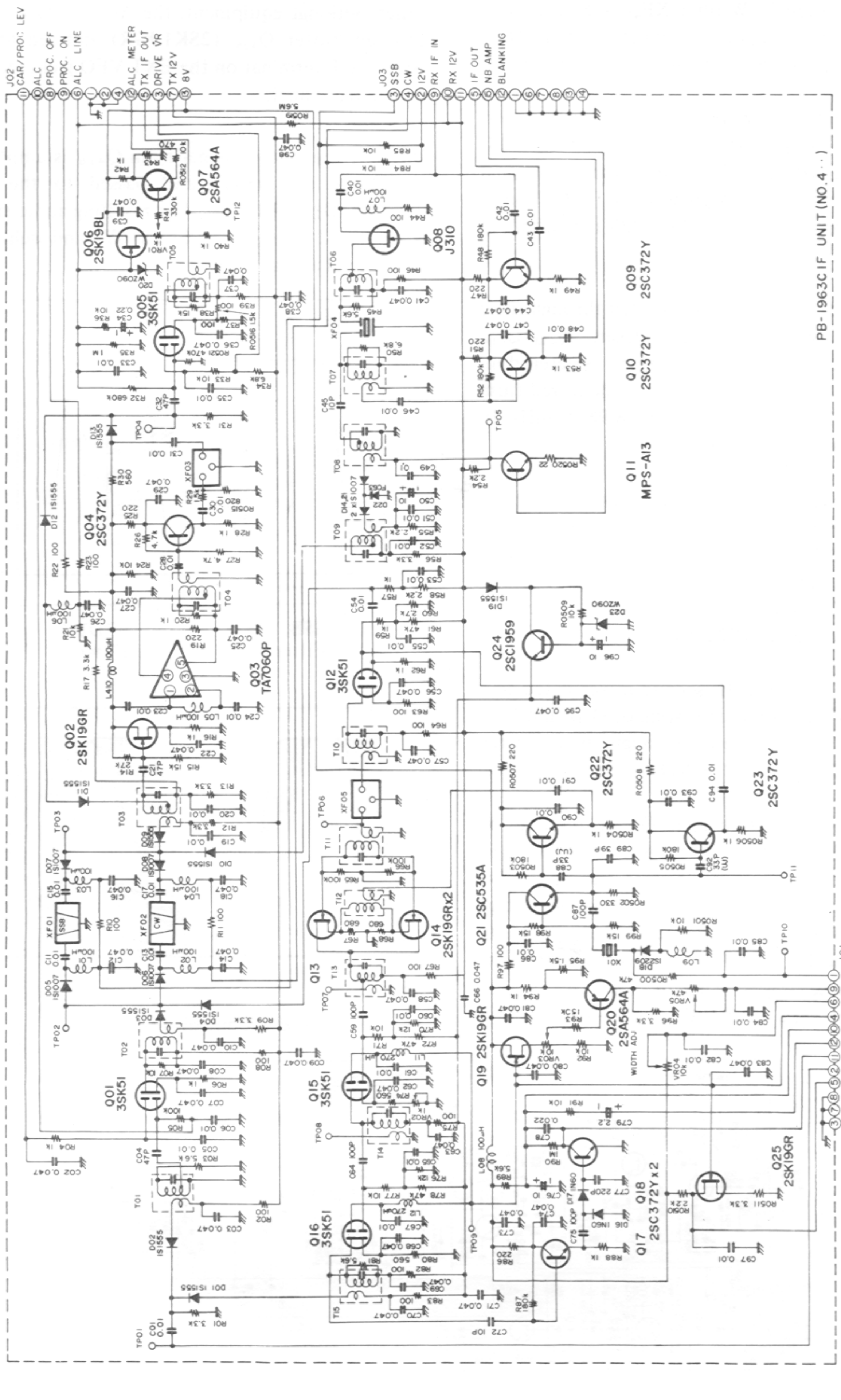


SSB, CW Filters **WIDTH Filter**



Width Control Action




PB-1963C IF UNIT (NO.4...)
J02
CAR/PROC LEV
ALC
PROC. OFF
PROC. ON
ALC LINE
ALC METER
TX IF OUT
DRIVE VR
TX 12V
8V
J03
SSB
CW
12V
RX IF IN
RX 12V
IF OUT
NB AMP
BLANKING
J01
WIDTH SW
ALC METER
WIDTH CONT
AGC LINE
RF GAIN
AGC S
AGC F
B.M
AGC OUT
E
Q01 3SK51
Q02 2SK19GR
Q03 TA7060P
Q04 2SC372Y
Q05 3SK51
Q06 2SK19BL
Q07 2SA564A
Q08 J310
Q09 2SC372Y
Q10 2SC372Y
Q11 MPS-A13
Q12 3SK51
Q13
Q14 2SK19GRx2
Q15 3SK51
Q16 3SK51
Q17
Q18 2SC372Yx2
Q19 2SK19GR
Q20 2SA564A
Q21 2SC535A
Q22 2SC372Y
Q23 2SC372Y
Q24 2SC1959
Q25 2SK19GR
XF01 SSB
XF02 CW

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} **(2SC372Y)**.

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_{503} **(2SC1815Y)**. The carrier signal is generated by oscillator Q_{514} **(2SK19GR)**, and it oscillates at one of the following frequencies:

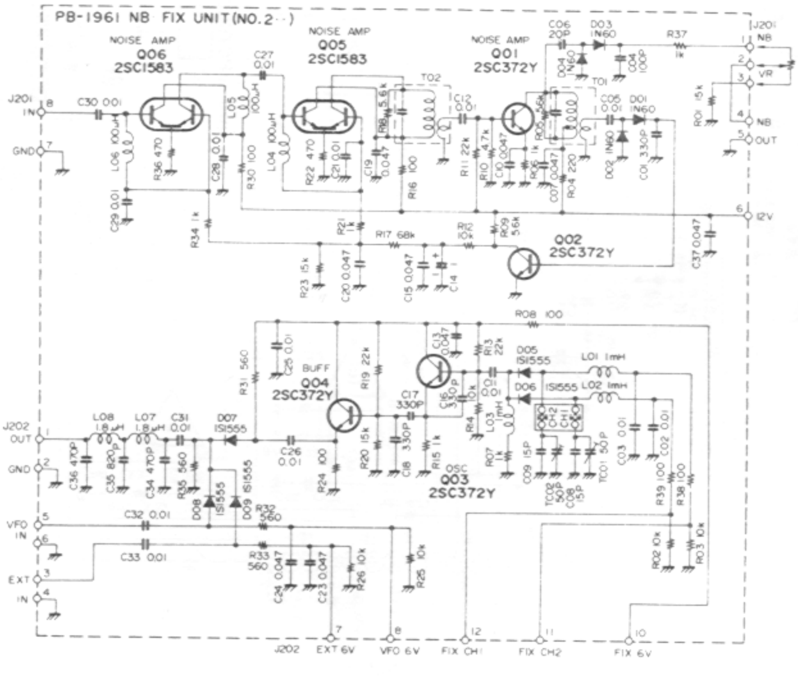
USB, CW·RX	8989 KHz
LSB	8986 KHz
CW·TX	8988.3 KHz

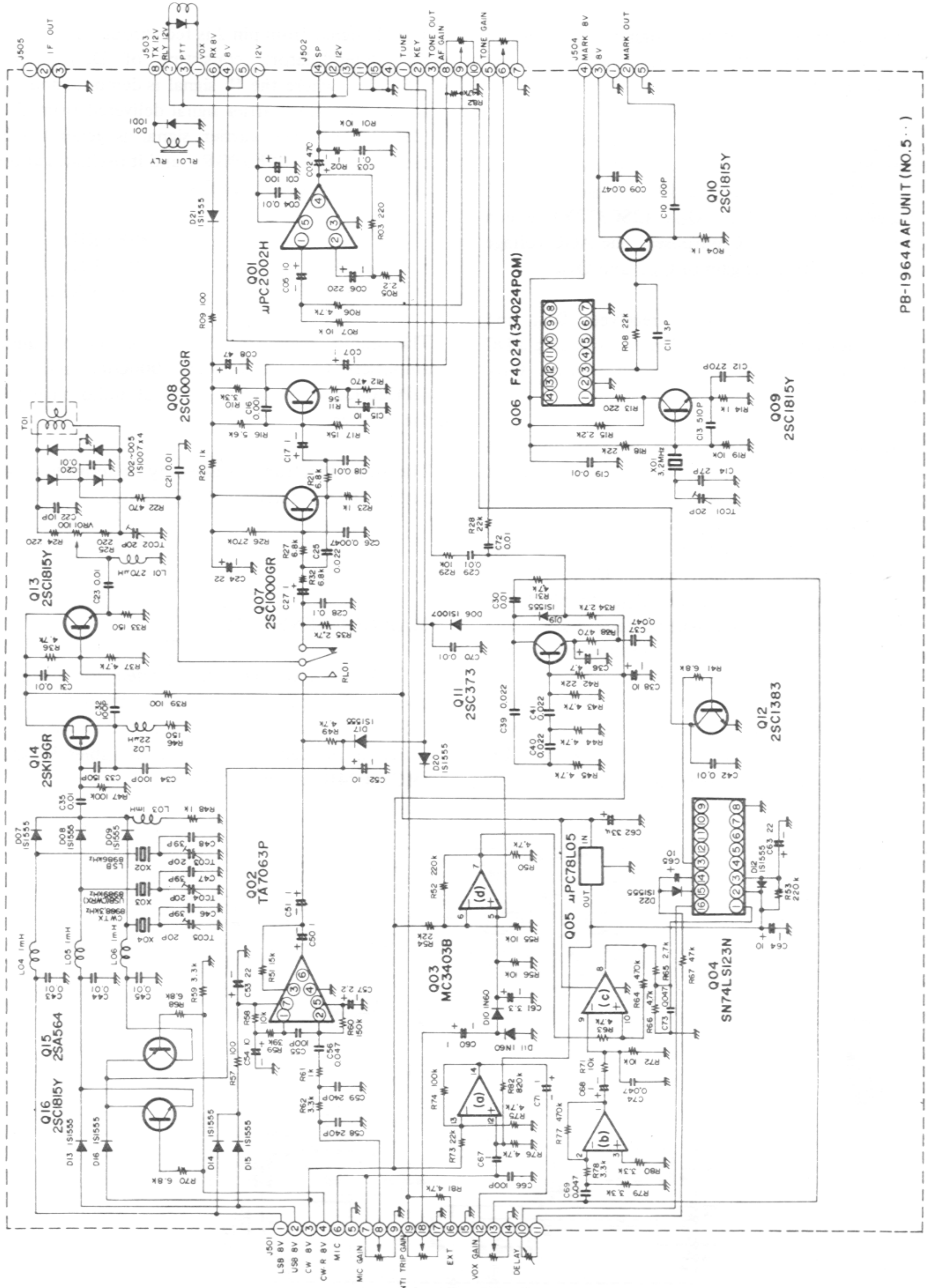
The audio signal is then amplified by audio amplifiers Q_{507}, Q_{508} **(2SC1000GR)**, and Q_{509} **(μPC2002)**, delivering 3 watts of audio output to the speaker.

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.




PB-1964A AF UNIT (NO.5 · ·)

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)

The speech signal from pin 8 is amplified by microphone amplifier Q_{502} **(TA7063P)** and fed through relay RL_{501} to the ring modulator, D_{502} - D_{505}, where the speech signal modulates the carrier signal delivered from Q_{513}. The resulting double sideband signal is fed to the IF UNIT.

IF UNIT (PB-1963)

The 8.9875 MHz double sideband signal is amplified by Q_{401} **(3SK51-03)** and passed through sideband filter XF_{401} by diode switches D_{403}, D_{409} **(1S1555)**, D_{405}, and D_{407} **(1S1007)**. Here the signal is converted to a single sideband signal by removal of the unwanted sideband.

The signal is then fed to buffer amplifier Q_{402} **(2SK19GR)**. When the RF speech processor is OFF, diode switches D_{411} and D_{412} **(1S1555)** feed the IF signal to IF amplifier Q_{405} **(3SK51-03)**. When the RF speech processor is ON, the SSB signal is amplified by buffer amplifier Q_{402} **(2SK19GR)** and further amplified by limiter Q_{403} **(TA7060P)**, where signals that exceed the preset clipping level are sliced out.

This highly clipped SSB signal is amplified by buffer amplifier Q_{404} **(2SC372Y)** and passed through a selective filter, XF_{403}, which removes RF harmonics that result from signal clipping. The signal is then fed to IF amplifier Q_{405}, and subsequently delivered to the RF UNIT. The front panel COMP LEVEL control, VR_4, controls the voltage at gate 2 of Q_{401}, thus setting the processor level.

The return of the grid circuit of the final amplifier tubes is fed to Q_{406} **(2SK19BL)**, which produces ALC voltage. This voltage is fed to gate 1 of Q_{405}, 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)

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 the RF output signal. The RF signal is then fed through diode switch D_{104} **(1S1007)** to the DRIVE UNIT.

DRIVE UNIT (PB-1714), PA UNIT (PB-1715)

The RF signal is amplified by driver V_{1601} **(12BY7A)**, and delivered to PA UNIT final amplifier tubes V_{1701} and V_{1702} **(6146B)**. The output from the final tubes is fed to the antenna jack.

A portion of the RF signal is coupled through C_{14} to the cathode of the 12BY7A driver, for the purpose of improving the linearity of the final amplifier. This technique is known as RF negative feedback.

CW MODE

For CW, the 8.9883 MHz carrier is generated by oscillator Q_{514} at the frequency set by X_{504}. The carrier signal is fed through buffer Q_{513} and fed to the ring modulator. The same carrier frequency is used in the tune mode.

DC voltage is applied through diode switch D_{517} **(1S1555)** and relay RL_{501}, unbalancing the ring modulator for CW operation. The carrier signal is then fed to the IF UNIT. The signal path is identical to that on SSB, up to the DRIVE UNIT.

DRIVE UNIT (PB-1714), PA UNIT (PB-1715)

Keying of the transmitter is accomplished by changing the bias voltage to the driver and final tubes. During "key up," the tubes are cut off by application of –35 volts to V_{1601} and –110 volts to V_{1701} and V_{1702}. These cutoff voltages are reduced to –0.1 volt and –60 volts, respectively, during "key down" conditions.

The key is connected to the KEY 2 terminal on the RECT B board, PB-1968. When the key is closed, the base of Q_{1001} **(2SA733)** is grounded, causing Q_{1002} **(2SC372Y)** to conduct. The base of Q_{1003} **(2SA639)** is thus set to 0 when the transistor conducts. Under these circumstances, the bias voltage applied to V_{1601}, V_{1701}, and V_{1702} places these tubes in the normal operating condition.

VOX circuit

A portion of the microphone input signal is amplified by three stages of Q_{503} **(MC3403P)**, which drive the VOX control gate, Q_{504} **(SN74LS123N)**. The output from pin 13 of Q_{504} is fed to the base of Q_{512} **(2SC1383)**, switching the VOX relay on and off according to the presence or absence of a speech signal.

A portion of the speaker output is detected by D_{510} and D_{511} **(1N60)**, providing a bucking voltage which is fed to Q_{503}, preventing the speaker output from tripping the VOX.

The VOX delay may be set by adjusting VR_{2b} for the desired delay time.

CW SIDETONE

CW sidetone oscillator Q_{511} **(2SC373)** oscillates at a frequency of approximately 800 Hz. The output from Q_{511} is amplified by the final audio amplifier, Q_{501}, for delivery to the speaker. The output from the sidetone oscillator is also fed to VOX amplifier Q_{503}, providing semi-break-in operation for CW.

AM MODE

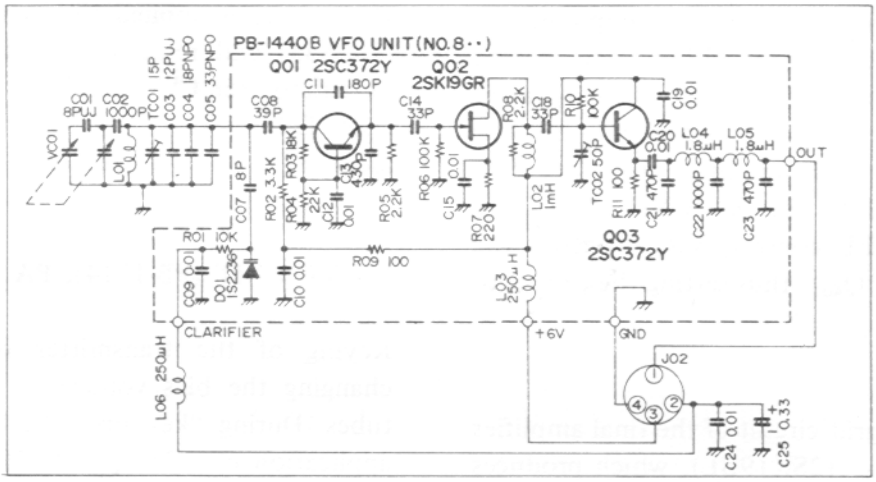
The speech signal from the microphone is amplified by Q_{2401} **(2SC732GR)** and Q_{2402} **(2SC1815Y)** and passed to modulator Q_{2405} **(2SC380Y)**, where the speech signal modulates the AM carrier signal at 8988.3 kHz delivered from Q_{2404} **(2SK19GR)**. The modulated signal is amplified by Q_{2406} **(3SK51)** and delivered to transmit mixer Q_{105}/Q_{106}.

COMMON CIRCUITS

VFO UNIT (PB-1440B-3420)

A modified Colpitts-type oscillator is used to generate a 5.0 - 5.5 MHz VFO signal, thus producing a 500 kHz tuning range. The oscillator signal generated by Q_{801} **(2SC372Y)** is varied by VC_{801}, which is geared to a precision-built dial tuning mechanism. VC_{801} consists of two sections; the sub-blades compensate for the capacitance variation of the main blades, which may result from extreme temperature change.

Varactor diode D_{801} **(1S2209)** may be varied by tuning L_{806}, providing ±2.5 kHz offset from the dial frequency (clarifier).



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)

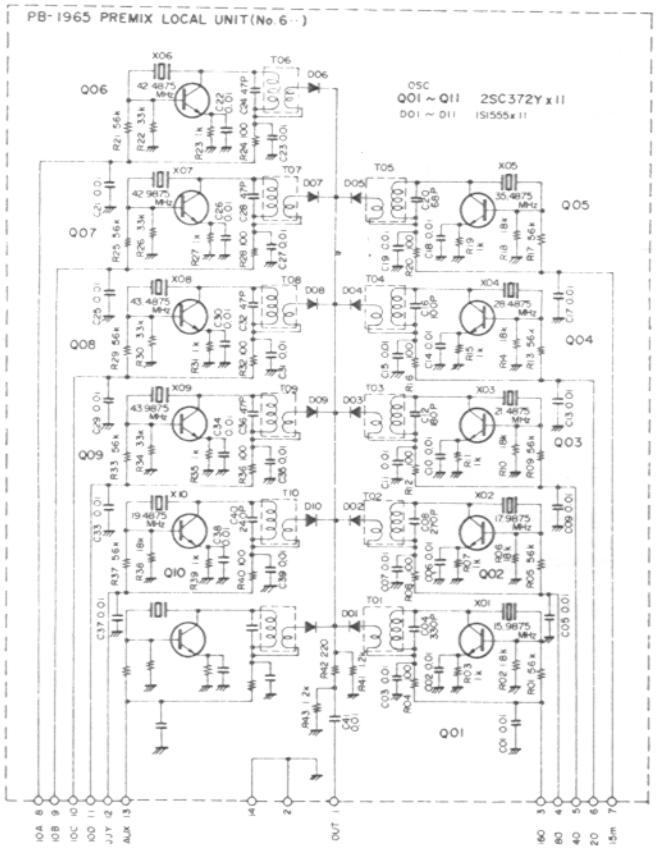
Crystal oscillators Q_{601} - Q_{610} **(2SC372Y)** generate the premix local signal at the frequencies shown in Table 3. Diode switches D_{601} - D_{610} **(1S1555)** select the proper local signal for the band in use. The local signal is then delivered to the PREMIX UNIT.

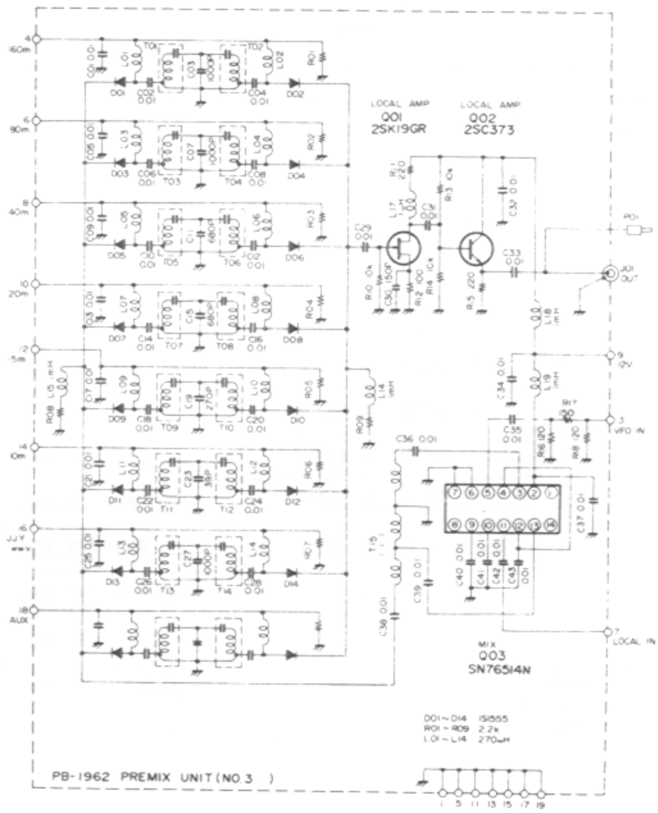
PREMIX UNIT (PB-1962)

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_{304}, 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)

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 divided by a factor of 2^{17}, producing a 5 Hz signal which is fed to the counter gate.

The pulses which pass through the gate are fed to decade counter Q_{2309} **(SN74196N)**, which counts 10 Hz digits. In turn, Q_{2302} - Q_{2307} **(SN74LS196N)** count 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz, and 10 MHz digits. The BCD output signal from Q_{2302} - Q_{2307} is fed through drivers Q_{2208} - Q_{1213} **(MSM561)** to the display digits, DS_{2101} - DS_{2106} **(HP 5082-7623)**.

The system of presetting the counter can best be explained by example. For a frequency of 3.500 MHz LSB, the premix local frequency is 12.486 MHz. The LSB preset code is 91.014.0. 12.486 + 91.0140.0 = 103.500. The "1" digit on the left-hand side is dropped (overflow), and the "0" preceeding the "3" causes a blanking signal to be sent to the 10 MHz digit. The result is a frequency of 3.500 MHz, and this number is displayed.

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.

The preset frequencies are programmed by Q_{2307} and Q_{2308} **(μPA54H)** and diode matrix D_{2306} - D_{2312} **(1S1555)**. Please refer to Table 5 for definition of the premix frequencies for the various bands.

The 5 volt supply is regulated by Q_{2310} **(μPC 14305)** for the TTL circuitry. The DIM control controls the emitter/collector voltage at Q_{2201} **(2SA496Y)**, to control the brightness of the digital display and lamps.

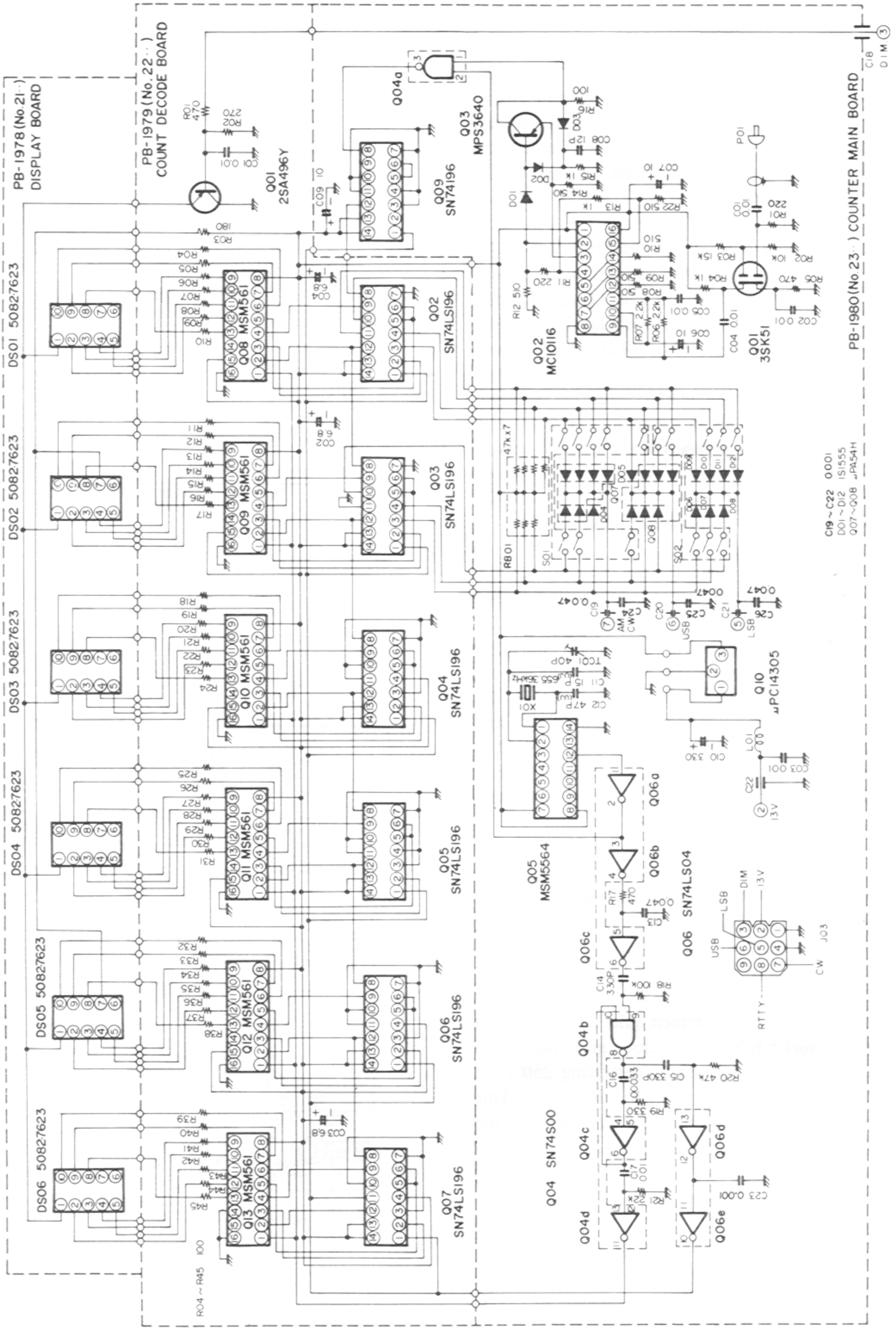
	10MHz	1MHz	100kHz	10kHz	1kHz	100Hz
	(Q_{2207})	(Q_{2206})	(Q_{2205})	(Q_{2204})	(Q_{2203})	(Q_{2202})
LSB	9	1	0	1	4	0
USB	9	1	0	1	1	0
CW AM	9	1	0	1	1	7

Preset Number

Table 4

	Nominal Premix Local Frequency	LSB	USB	CW / AM
160m	10.4875–10.9875(MHz)	10.486–10.986(MHz)	10.489–10.989(MHz)	10.4883–10.9883(MHz)
80m	12.4875–12.9875	12.486–12.986	12.489–12.989	12.4883–12.9883
40m	15.9875–16.4875	15.986–16.486	15.989–16.489	15.9883–16.4883
20m	22.9875–23.4875	22.986–23.486	22.989–23.489	22.9883–23.4883
15m	29.9875–30.4875	29.986–30.486	29.989–30.489	29.9883–30.4883
10mA	36.9875–37.4875	36.986–37.486	36.989–37.489	36.9883–37.4883
10mB	37.4875–37.9875	37.486–37.986	37.489–37.989	37.4883–37.9883
10mC	37.9875–38.4875	37.986–38.486	37.989–38.489	37.9883–38.4883
10mD	38.4875–38.9875	38.486–38.986	38.489–38.989	38.4883–38.9883

Table 5


PB-1978 (No.21··) DISPLAY BOARD
PB-1979 (No.22··) COUNT DECODE BOARD
PB-1980 (No.23··) COUNTER MAIN BOARD
DS01 5082-7623
DS02 5082-7623
DS03 5082-7623
DS04 5082-7623
DS05 5082-7623
DS06 5082-7623
Q01 2SA496Y
Q08 MSM561
Q09 MSM561
Q10 MSM561
Q11 MSM561
Q12 MSM561
Q13 MSM561
Q02 SN74LS196
Q03 SN74LS196
Q04 SN74LS196
Q05 SN74LS196
Q06 SN74LS196
Q07 SN74LS196
Q09 SN74196
Q03 MPS3640
Q02 MC10116
Q01 3SK51
Q10 μPC14305
Q05 MSM5564
Q06 SN74LS04
Q04 SN74S00
R04~R45 100
C19~C22 0.001
D01~D12 1S1555
Q07~Q08 μPA54H
J03

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.

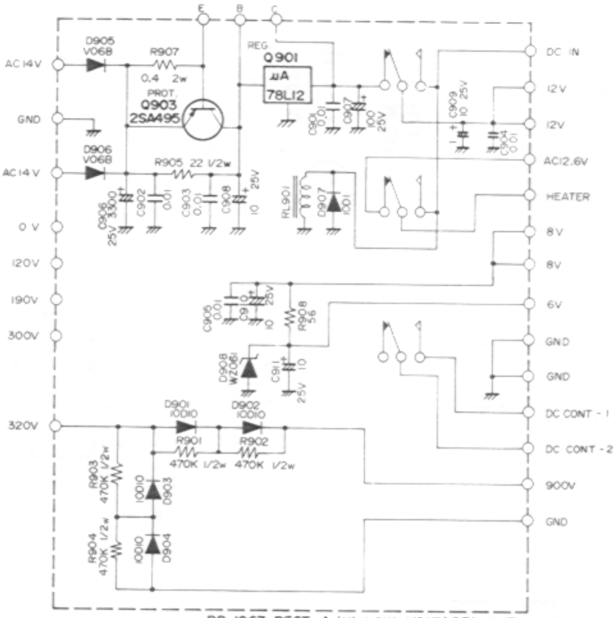
When the transceiver is operated from a DC 13.5 volt power source, using the optional DC-DC converter, transistors Q_{3201} and Q_{3202} **(T20A6)** function as a low frequency oscillator, providing AC voltage at approximately 80 Hz to the power transformer. All of the tube heaters receive their power 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 provided through zener diode D_{908} **(WZ061)**, while the 5 volt supply for the TTL integrated circuits is provided by Q_{505} **(78L05)**.

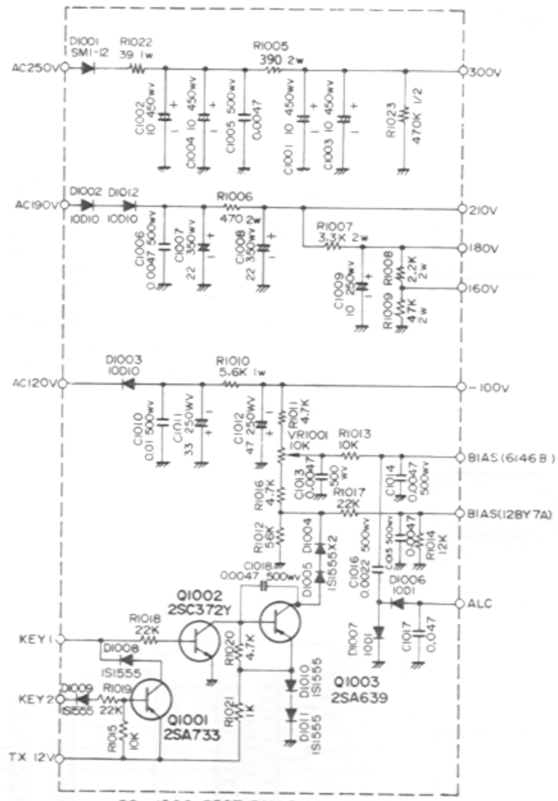
The power amplifier plate voltage of +800 volts is supplied from the bridge-controlled doubler, located on the RECT. A UNIT, and consisting of D_{901} - D_{904} **(10D10)**.

AC 190 volts is rectified by D_{1002} **(10D10)**, producing 210 volts for the screen grid supply of the power amplifier tubes. The screen grid voltage for the driver tube is obtained by rectifying 250 volts AC at D_{1001} **(10D10)**, producing 300 volts. This voltage is dropped to 180 volts by a resistor for delivery to the driver tube screen grid.

The 120 volt AC power from the transformer secondary winding is rectified by D_{1003} **(10D10)** in order to obtain −140 volts for the driver and final amplifier tube grid bias.



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

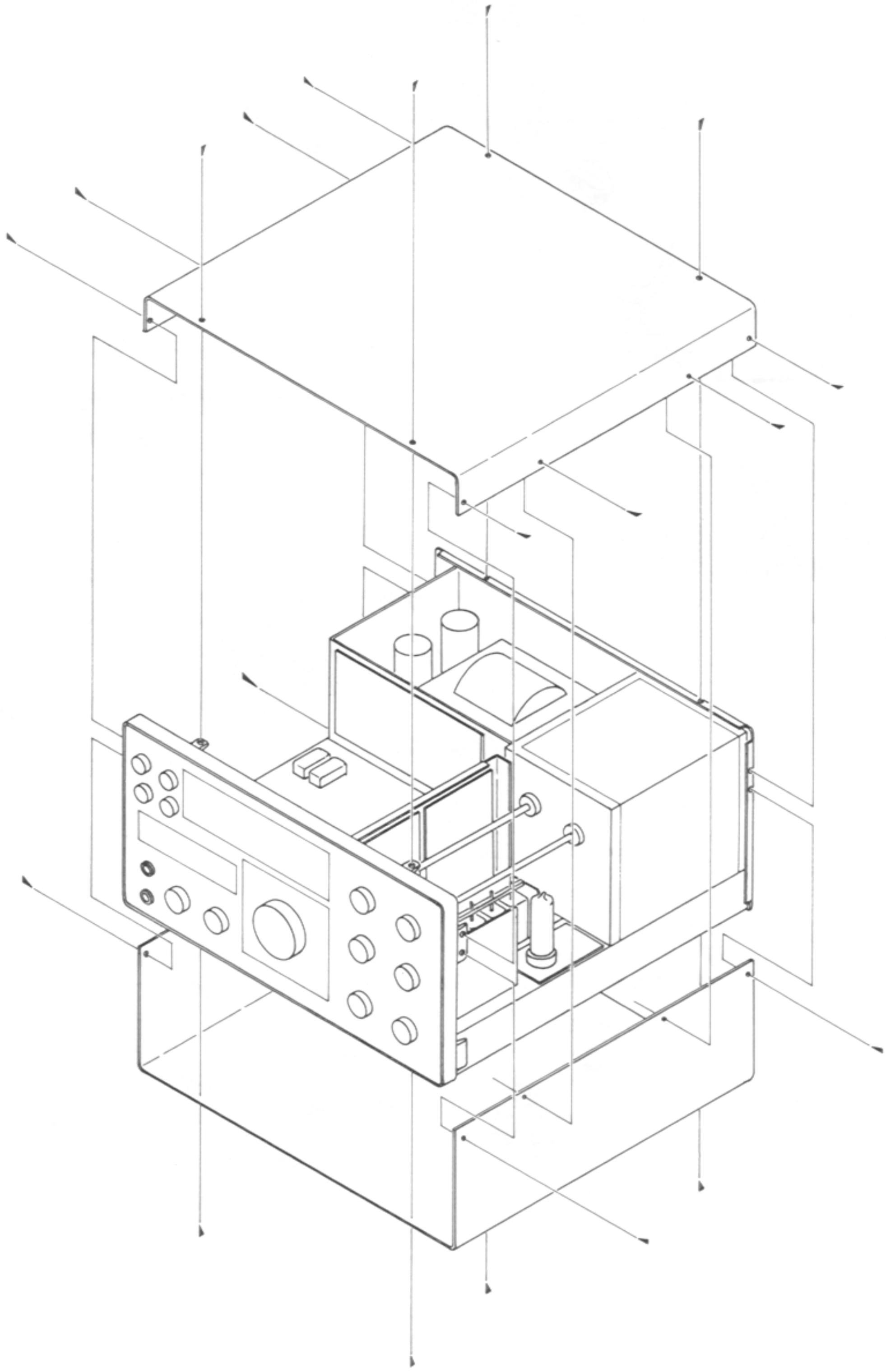


PB-1968 RECT. B(M.BIAS VOLTAGE) UNIT

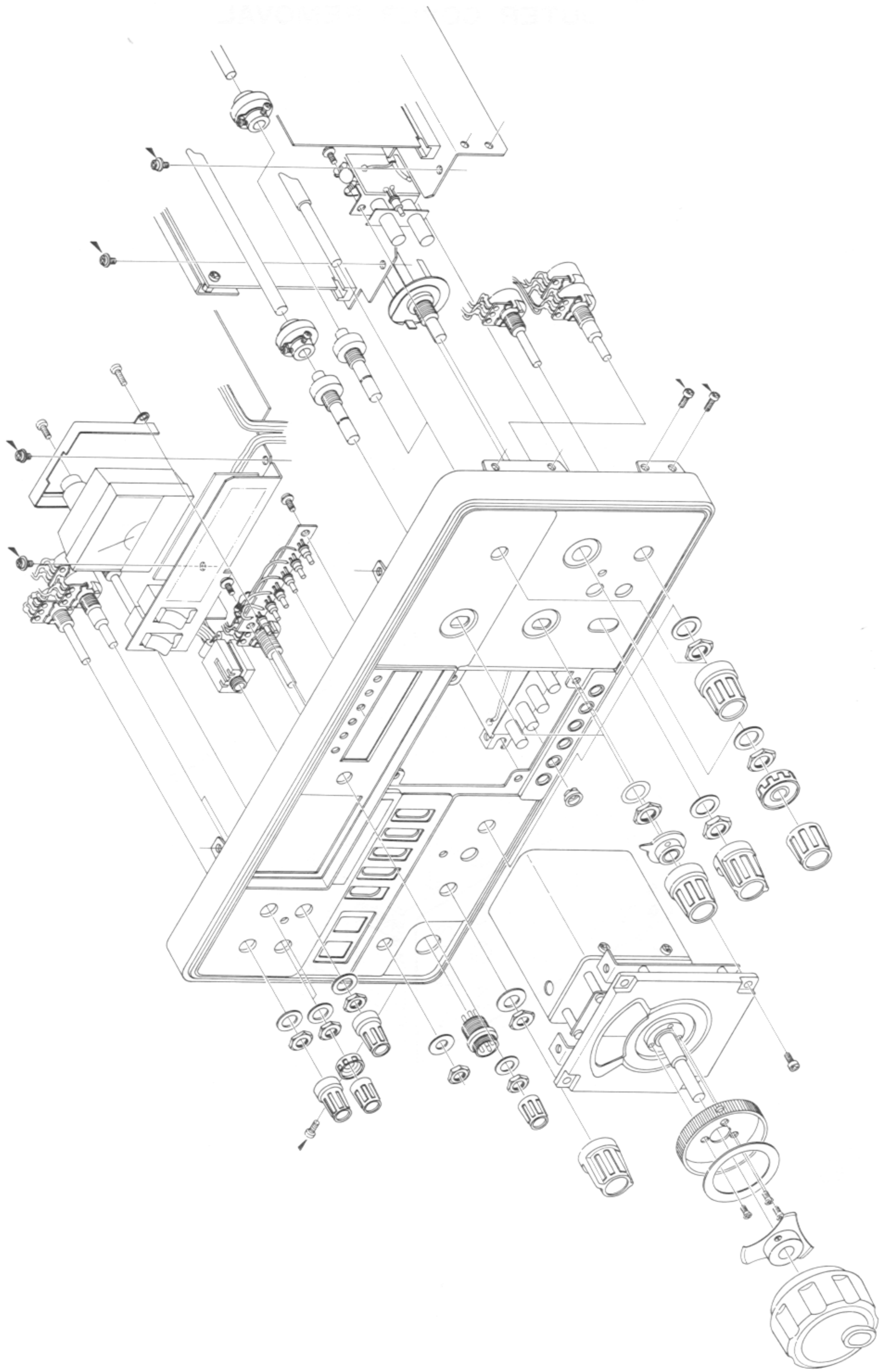
SECTION 3 – SERVICING

CIRCUIT BOARD LAYOUTS AND TEST VOLTAGES

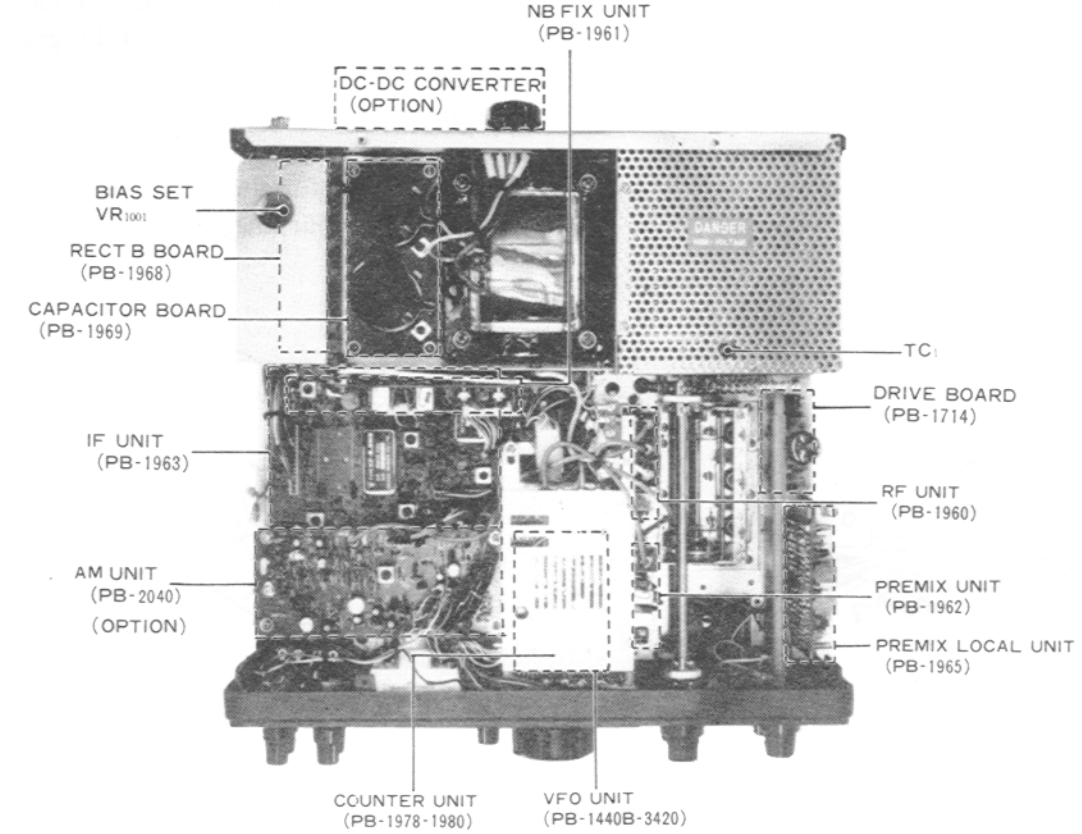
OUTER COVER REMOVAL



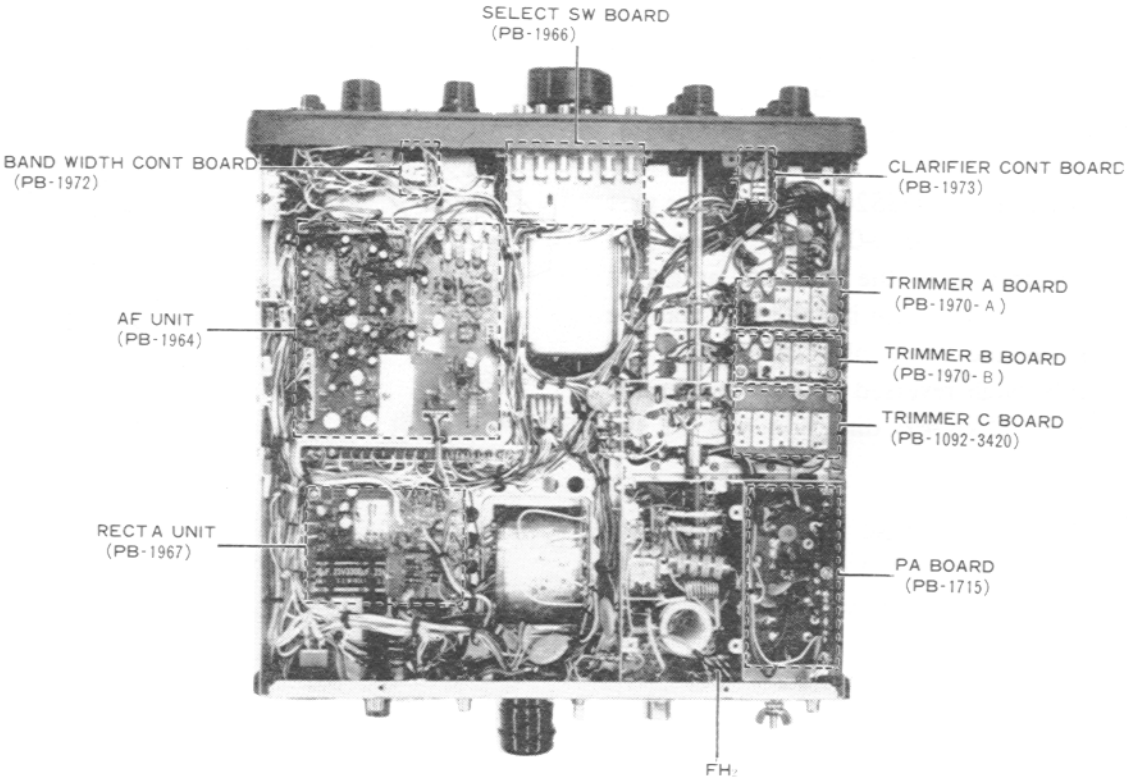
FRONT PANEL REMOVAL



BOARD LAYOUT

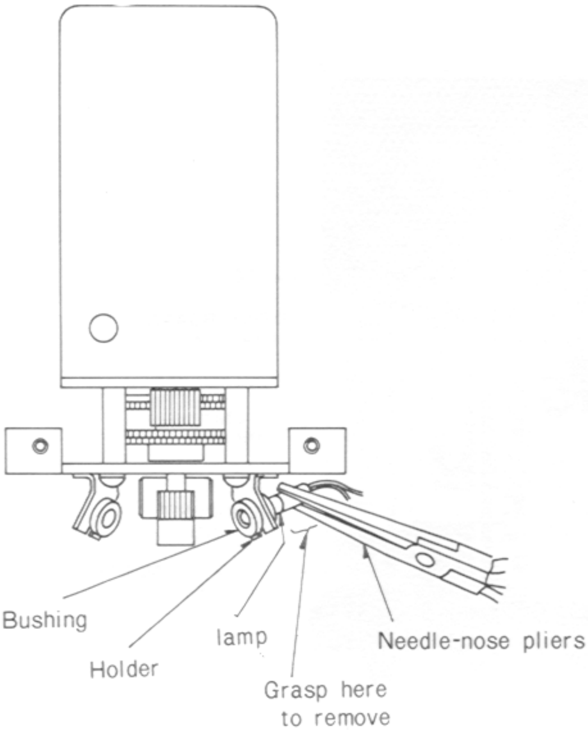


TOP VIEW



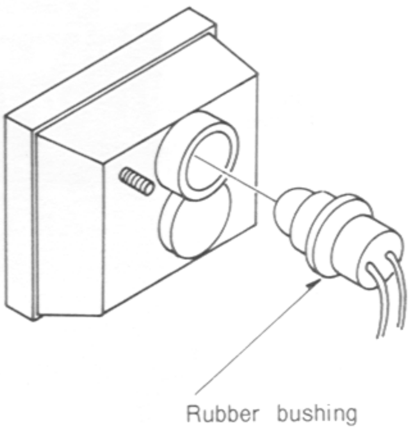
BOTTOM VIEW

PILOT LIGHT REPLACEMENT



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

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

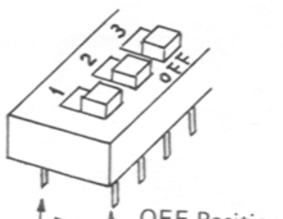


COUNTER PRESET SWITCH REPLACEMENT

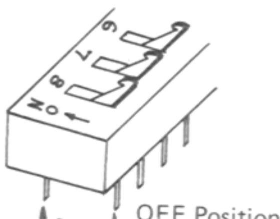
Two types of counter presetting switches are used in the FT-101ZD, and you should take care to install new switches correctly.

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

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



DSS208
P.N. (N7090016)



A10040-008
P.N. (66000005)

CW FILTER INSTALLATION(OPTION)

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

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

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

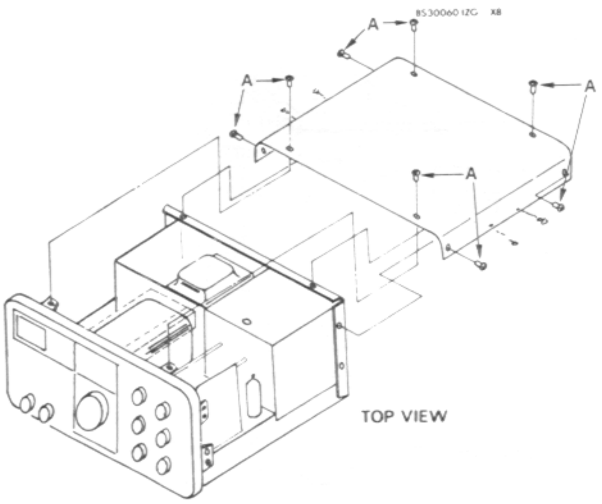


Figure 1

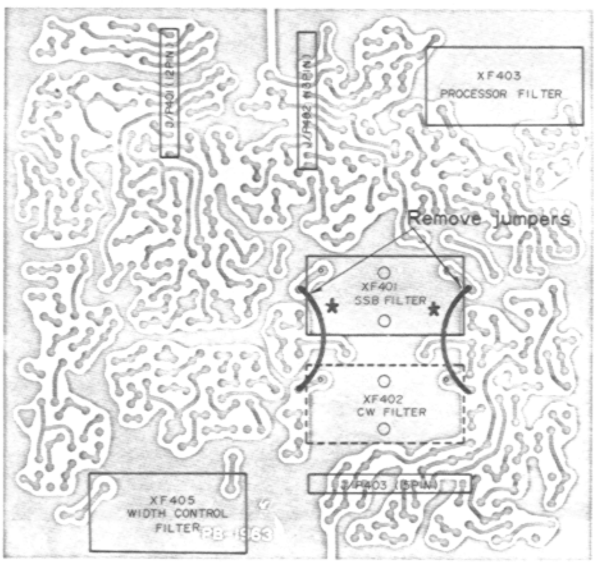


Figure 3

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

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

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

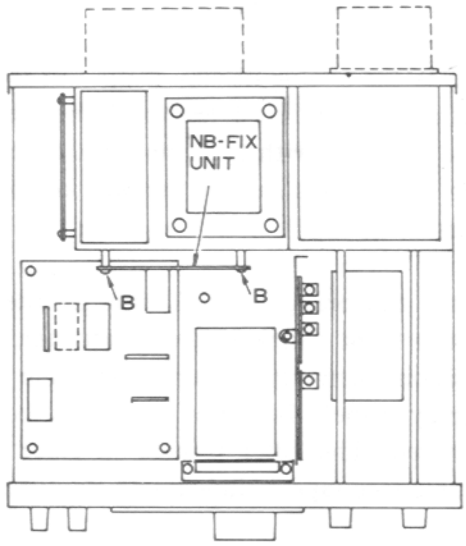


Figure 2

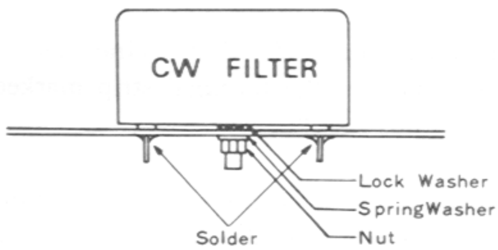


Figure 4

COUNTER UNIT INSTALLATION ON FT-101Z

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

PARTS NEEDED

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

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

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

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

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

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

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

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

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

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

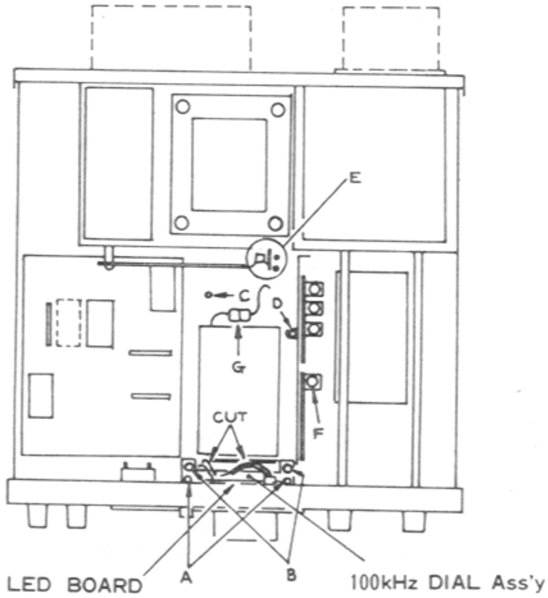
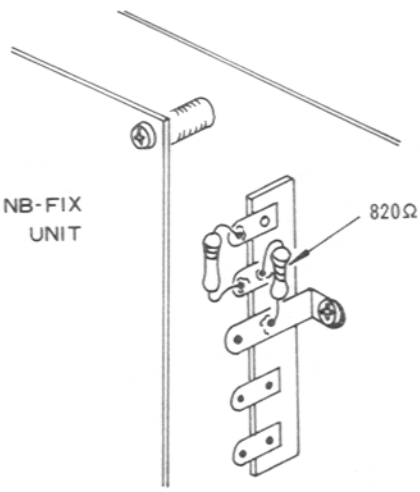


Figure 5.



(Enlarged) Part E

Figure 6.

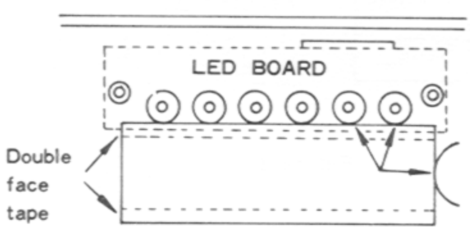


Figure 7.

FT-101Z/ZD AUX BAND INSTALLATION

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

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

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

PARTS NEEDED

For PREMIX UNIT (PB-1962)

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

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

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

MODIFICATION PROCEDURE

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

(2) Refer to Figure 10, and locate the bandswitch wafers S1B and S1C. Cut the lead from AUX to COMMON, and re-install the lead so as to run from AUX to the post corresponding to column 6 of Table 6, "BAND." For example, for 2.0–2.5 MHz operation, the lead goes from AUX to 160. Do this on both wafers S1B and S1C.

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

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

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

ALIGNMENT AFTER MODIFICATION

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

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

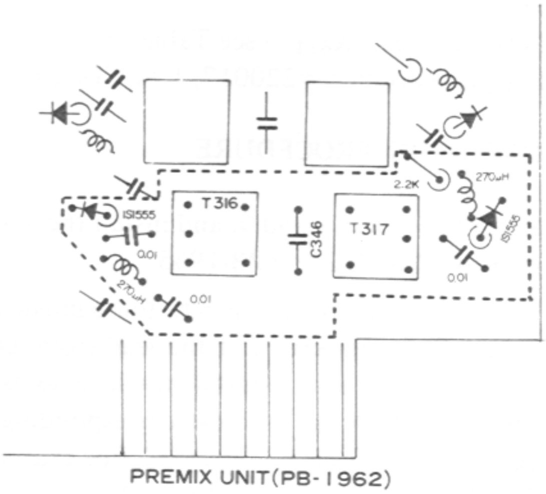


Figure 8.

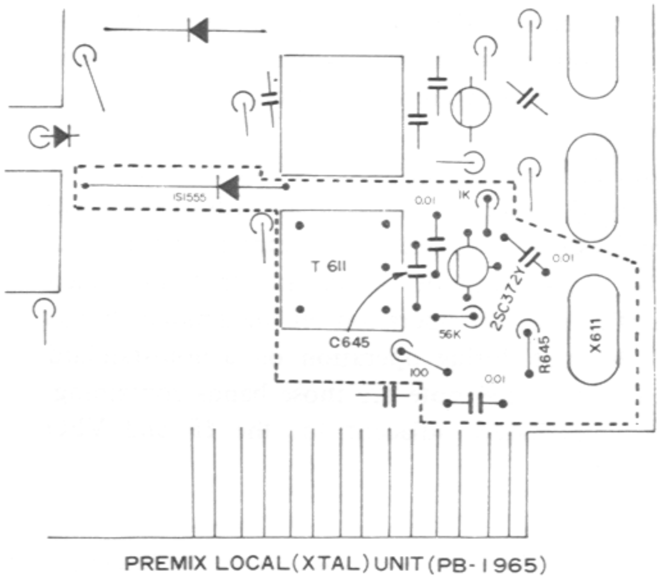
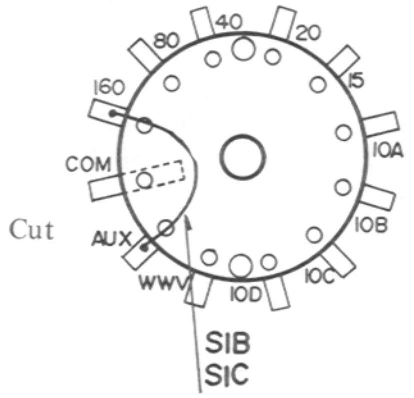


Figure 9



Example for 2.0–2.5 MHz wiring

Figure 10.

Example for 2.0–2.5 MHz wiring

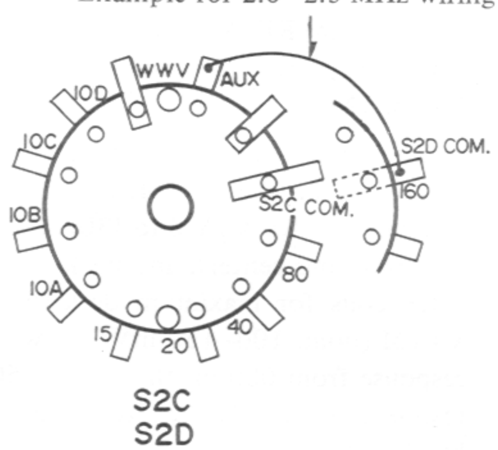


Figure 11.

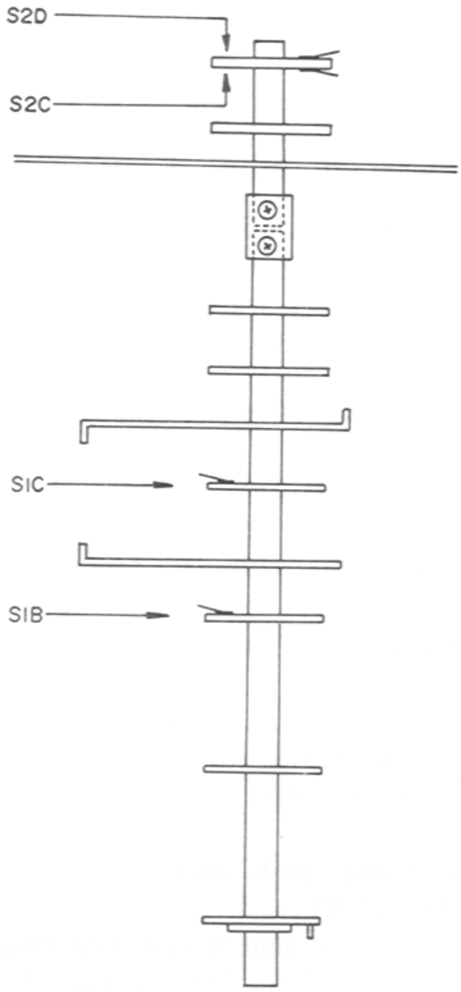


Figure 12.

FT101Z AUX BAND

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

Table 6

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

DC-DC CONVERTER INSTALLATION (OPTION)

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

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

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

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

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

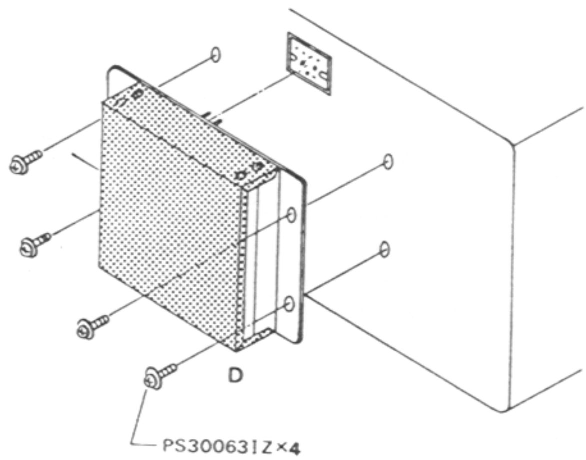
(5) Connect the DC cable to the transceiver. Power connections are made automatically when the DC cable is connected to the POWER jack.

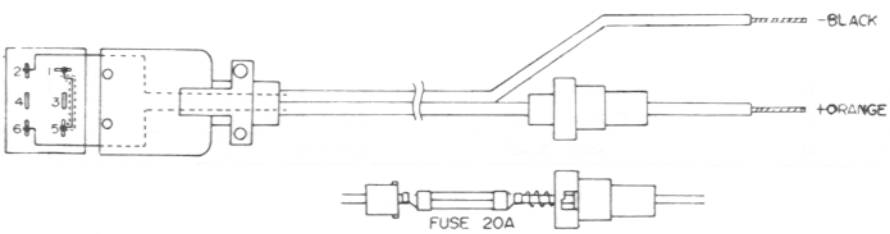
NOTES ON MOBILE INSTALLATION

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

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

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



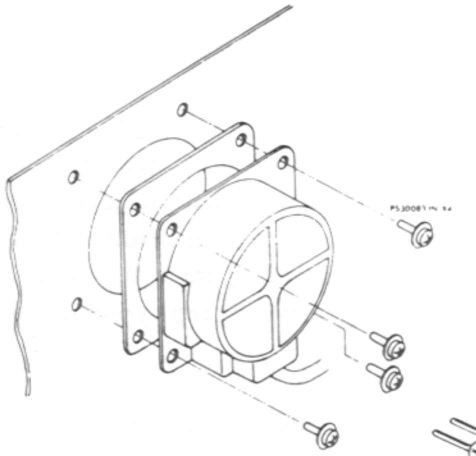


COOLING FAN INSTALLATION (OPTION)

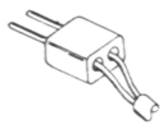
The FT-101ZD cooling fan may be used with other models of Yaesu equipment. Installation is easily accomplished in minutes.

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

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

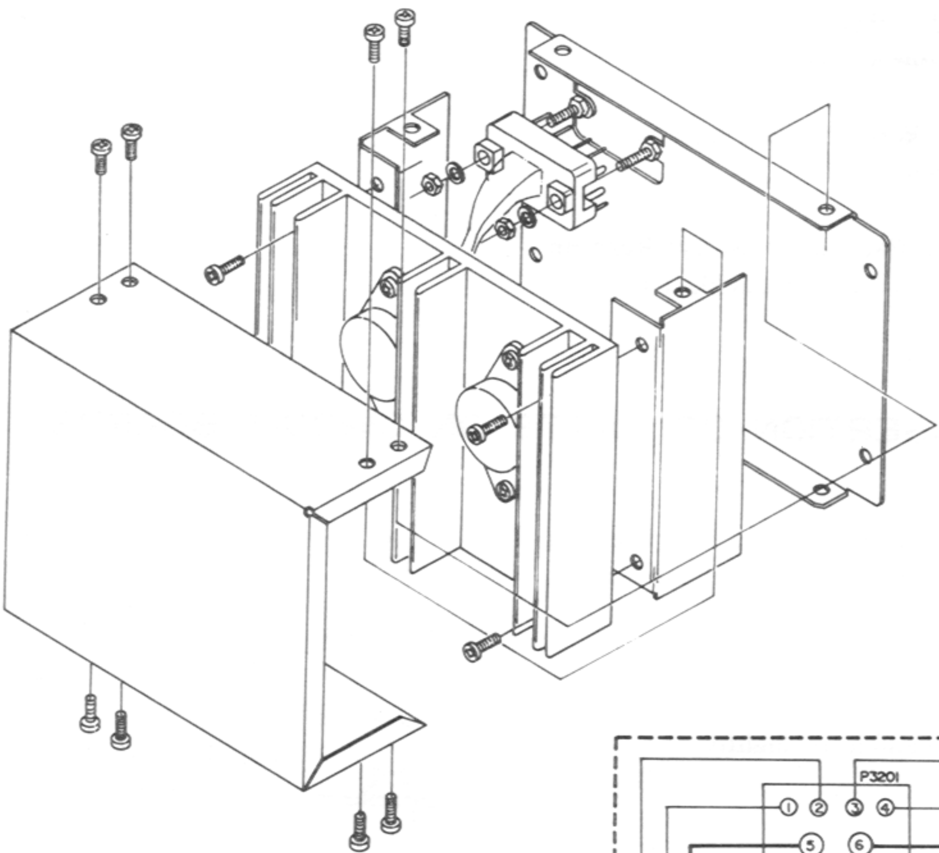


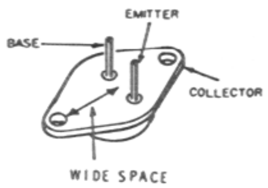
Cooling fan

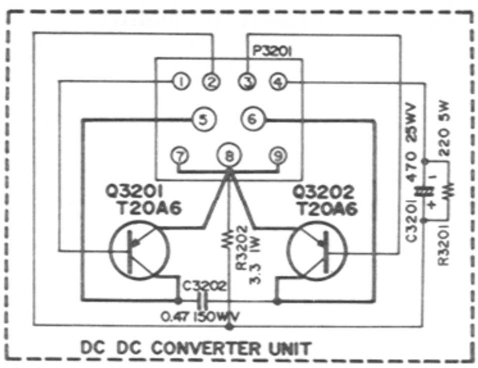


Fan plug

DC-DC CONVERTER (EXPLODED VIEW)







SOLDERING AND DESOLDERING TECHNIQUE ON PRINTED CIRCUIT BOARDS

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

1. Use only a 12 to 30 watt chisel-tip soldering iron. Yes, some "repairmen" have been known to use small blowtorches on cards.
2. Use only a soldering iron equipped with a three-wire cord, with the tip grounded. Also acceptable is a soldering iron isolated through a transformer. An old soldering iron or gun may have 117 volts on the tip, and will certainly cause more damage than it repairs!
3. USE ONLY 60/40 ROSIN CORE SOLDER. Acid core solder should be thrown away if you find it in your radio shop!
4. Use a solder sucker and solder tape to ensure a professional repair job.
5. If you **do** lift a trace, don't worry! Read on to find out how to repair traces like a pro.

NOTES ON USE OF CMOS IC's:

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

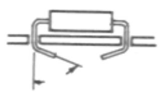
In storage, use only a non-inductive sponge.

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

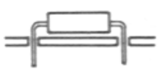
When soldering a CMOS IC onto a circuit board, use a low wattage iron, and be sure to ground the tip with a clip lead, if the tip is not grounded through a three-wire power cord.

INSERTION OF PARTS ON CIRCUIT BOARDS

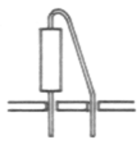
All of the below are acceptable ways of inserting components into circuit board mounting holes.



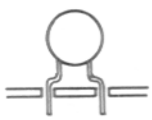
(a) Bend leads slightly



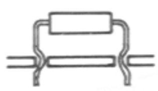
(b) Straight-in mounting



(c) Vertical mounting

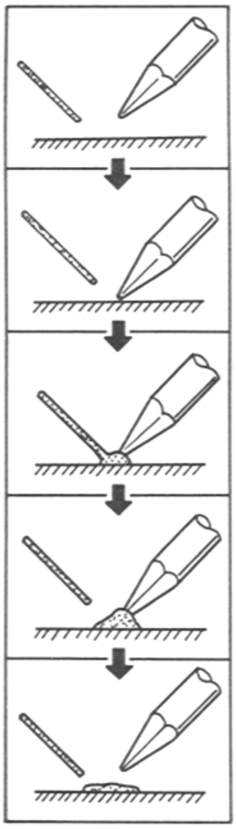


(d) Preformed disc ceramic capacitor



(e) Preformed resistor, diode, etc.

BASIC SOLDERING PRACTICE



(1) Prepare soldering iron and solder.

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

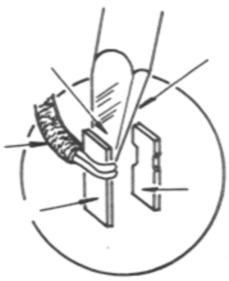
(3) Apply solder to heated surface.

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

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

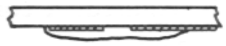
Soldering to terminal posts:

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

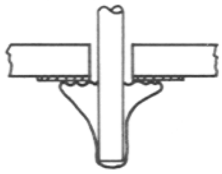


EXAMPLES OF POOR SOLDERING PRACTICE

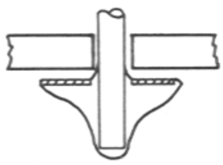
Solder bridge (caused by use of too much solder)



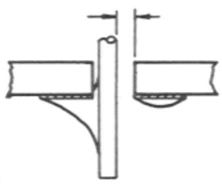
"Cold joint" (caused by insufficient heat to part of work, resulting in poor solder flow)



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

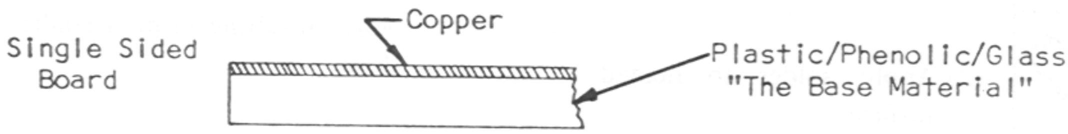


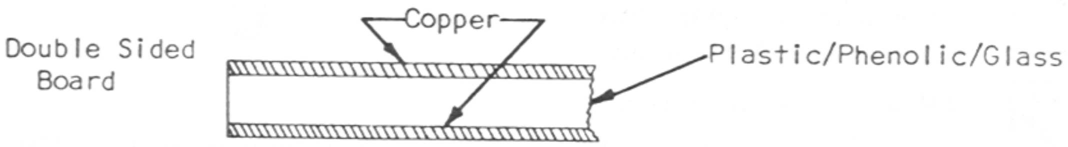
Unstable joint (caused by insufficient heat or solder)

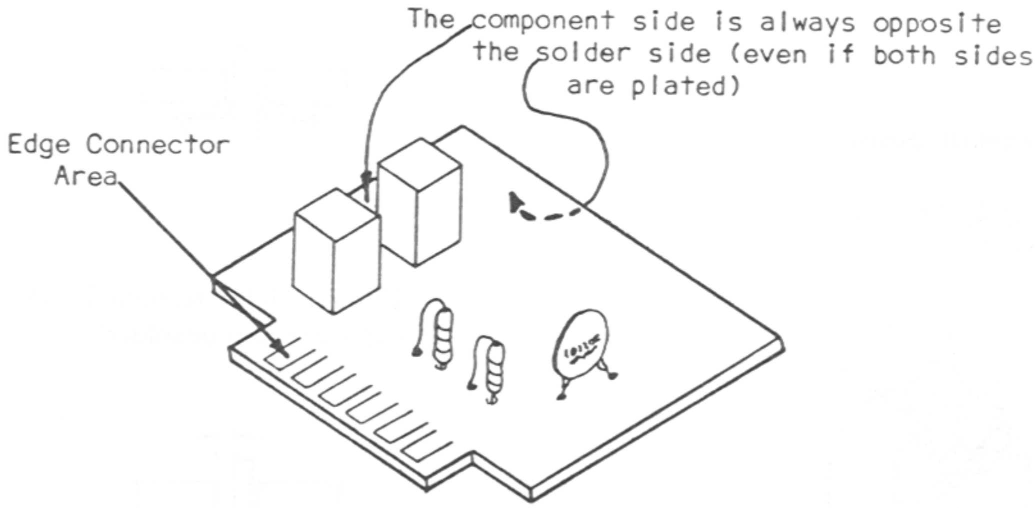


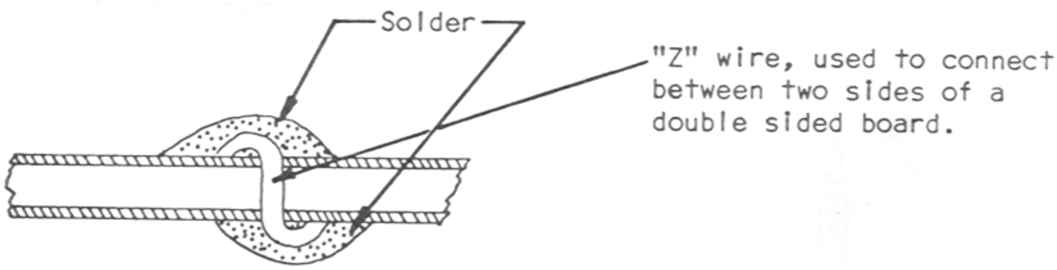
CIRCUIT TRACE REPAIR

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



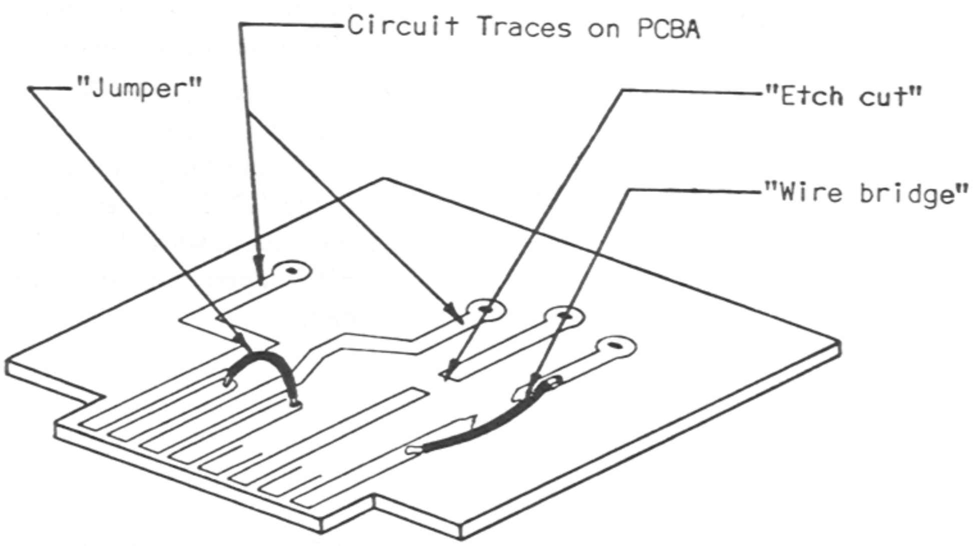


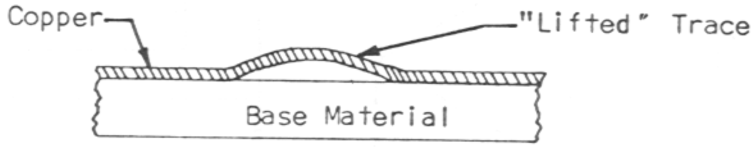




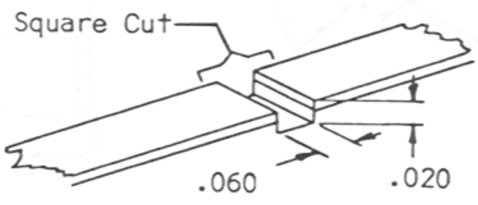
Sometimes, after the design and drafting of a board are completed, a board is produced with an error in it. Though non-technical managers sometimes suffer a stroke at hearing of this situation, it is not unheard of in engineering circles. Thus, should you encounter etch cuts and jumpers on a board, be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

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





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



Coat Cut Area With Eastman 910

MODIFICATIONS

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

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

Modification Procedure:

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

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

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

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

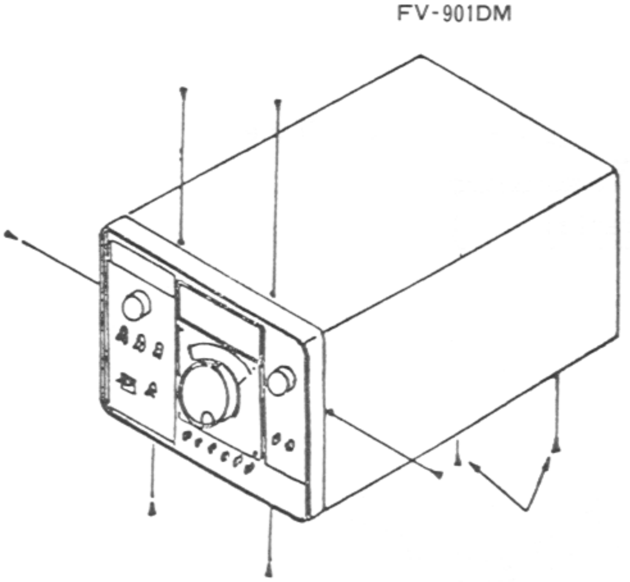


Figure 13.

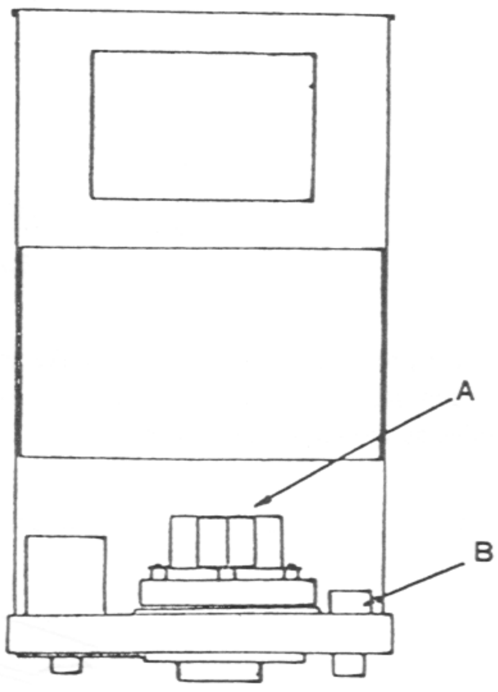


Figure 14

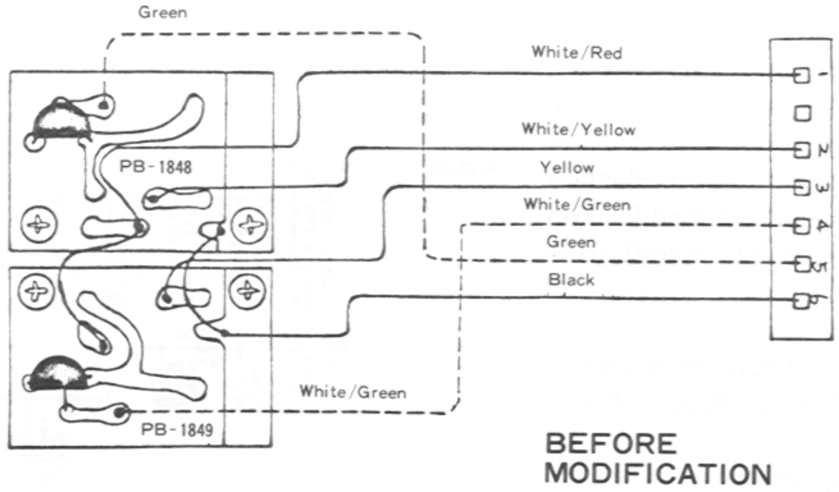


Figure 15.

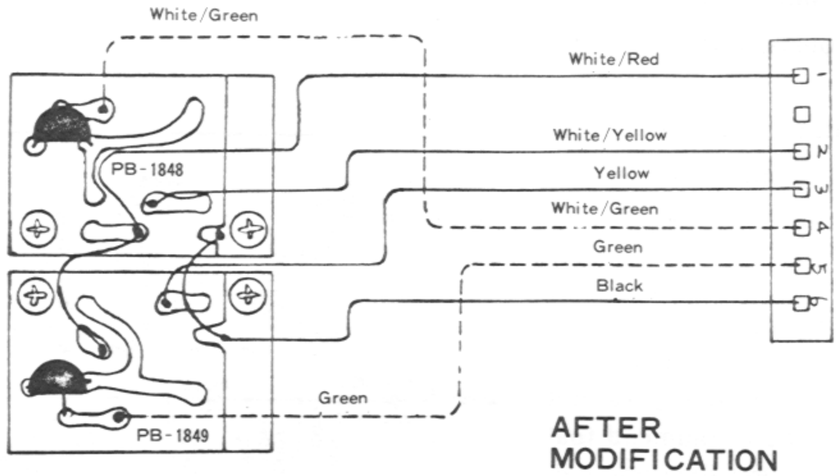


Figure 16.

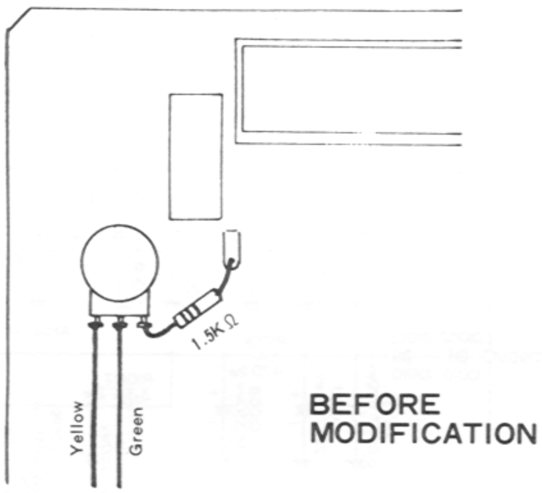


Figure 17.

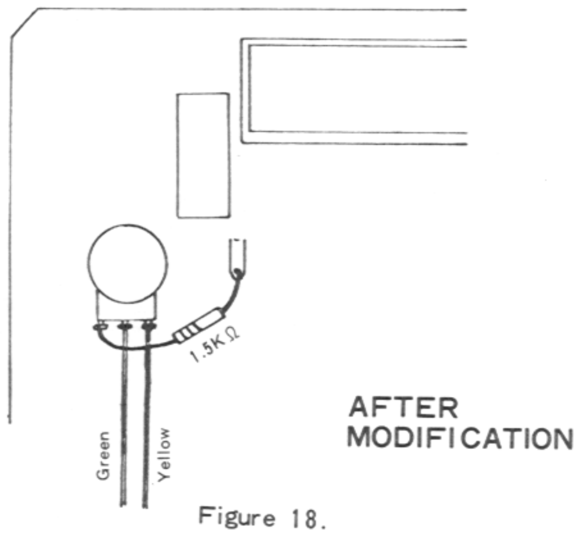


Figure 18.

RECTIFIER B UNIT MODIFICATIONS

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

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

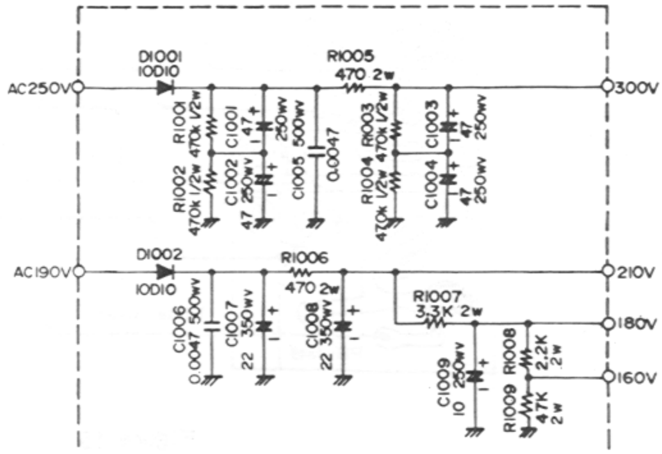
(2) Change R_{1005} to 390 ohms, 2 watts.

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

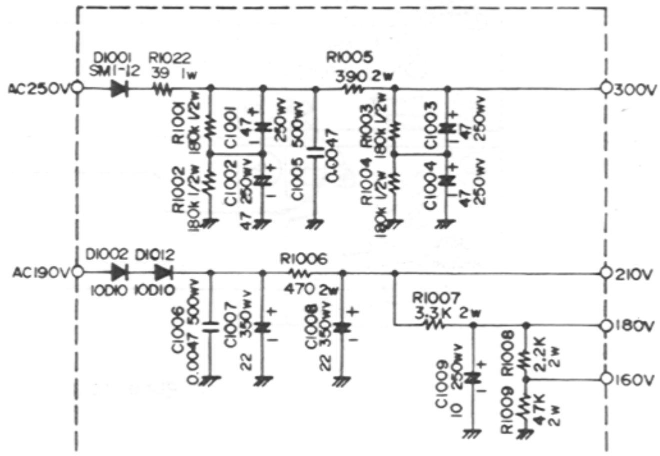
(4) Add a new 10D10 diode in series with D_{1002}.

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

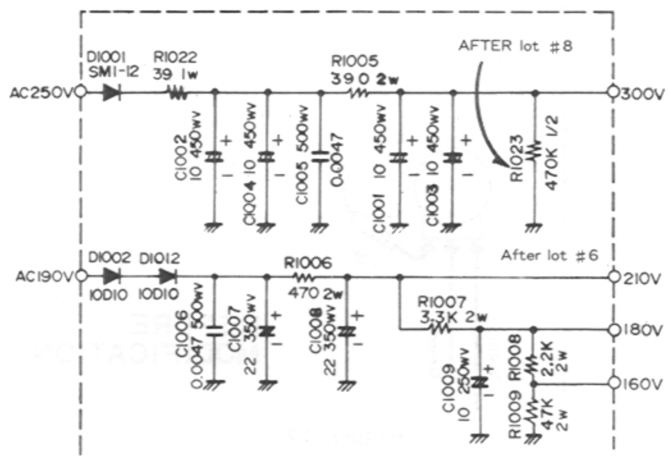
Beginning with production lot 6, the circuit was consolidated. The circuit used after lot 6 is shown at C, with the following exception: R_{1023} was not installed in lots 6 and 7, and we recommend that it be installed in the field the next time you perform service. The purpose of R_{1023} is to provide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



A: BEFORE MODIFICATION

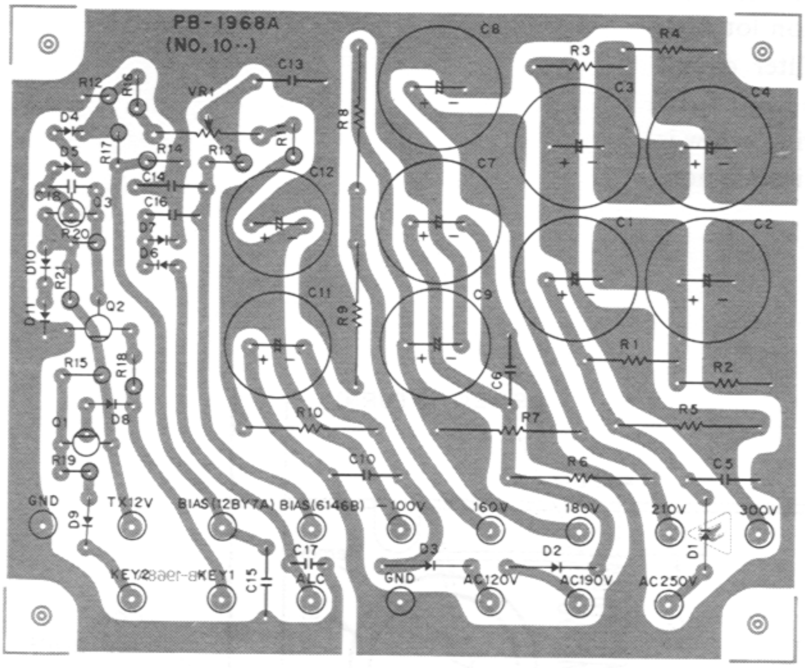


B: AFTER MODIFICATION

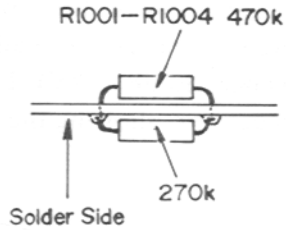


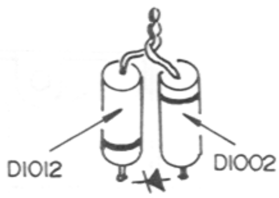
C: AFTER LOT #6

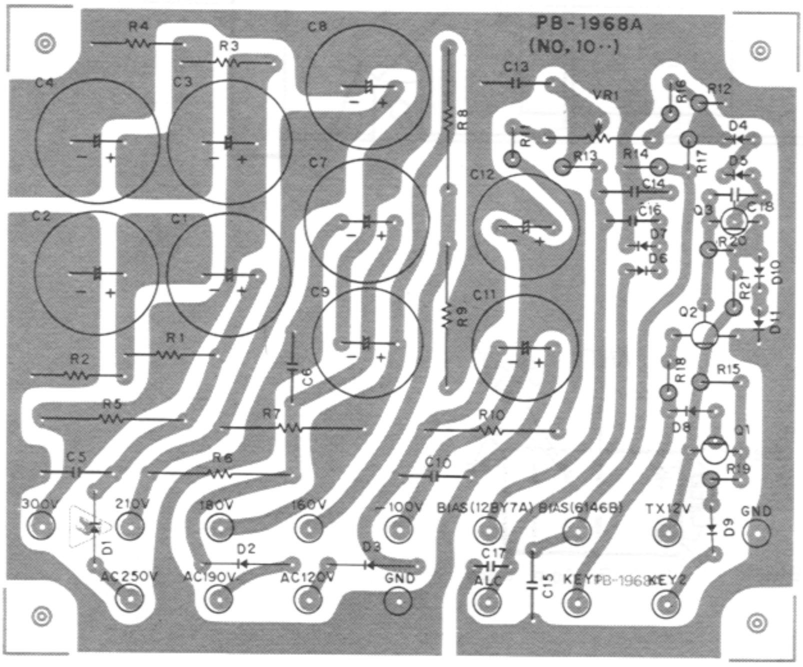
RECT B UNIT PARTS LAYOUT



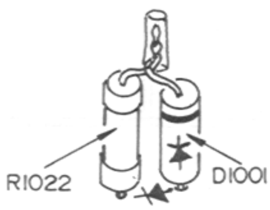
Viewed from component side





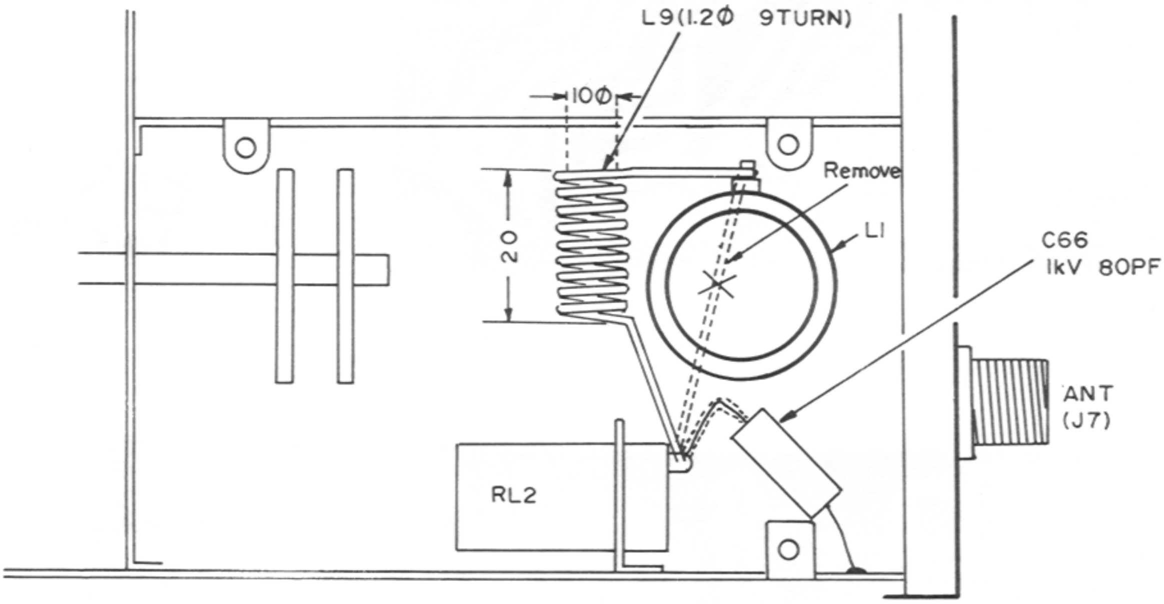


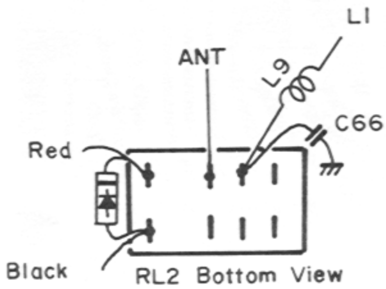
Viewed from solder side



LOW-PASS FILTER ADDITION

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





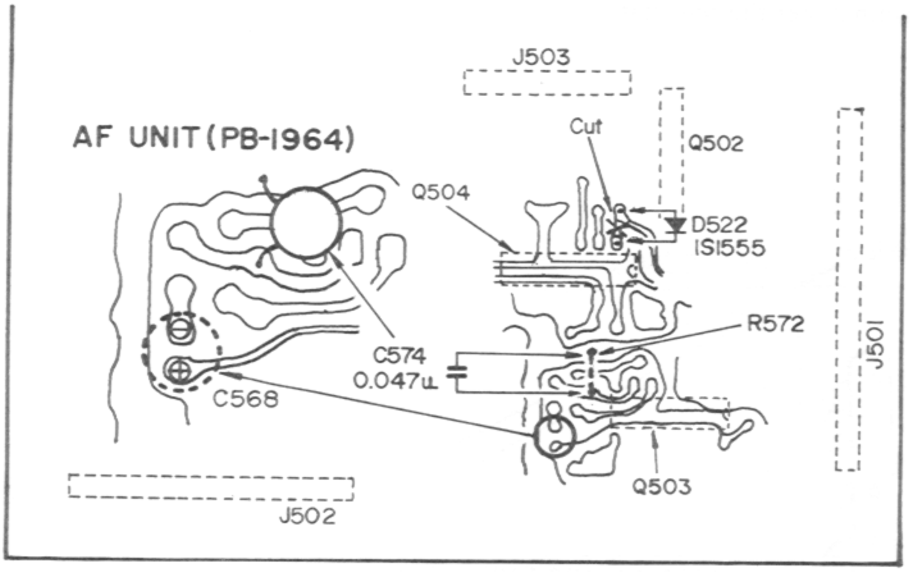
VOX CIRCUIT MODIFICATION

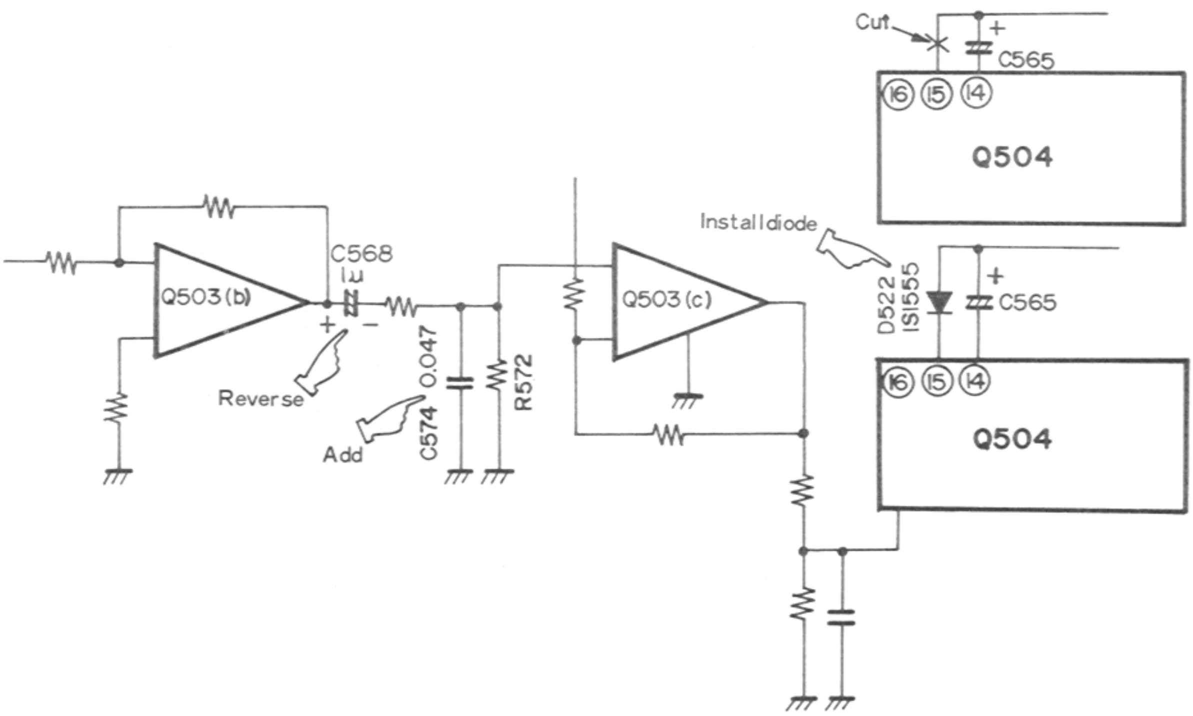
In order to ensure reliable VOX operation, the following modifications were adopted as of production lot number 7, and may be of help if you have a problem with inconsistent VOX timing.

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

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

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





COUNTER CIRCUIT MODIFICATIONS

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

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

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

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

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

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

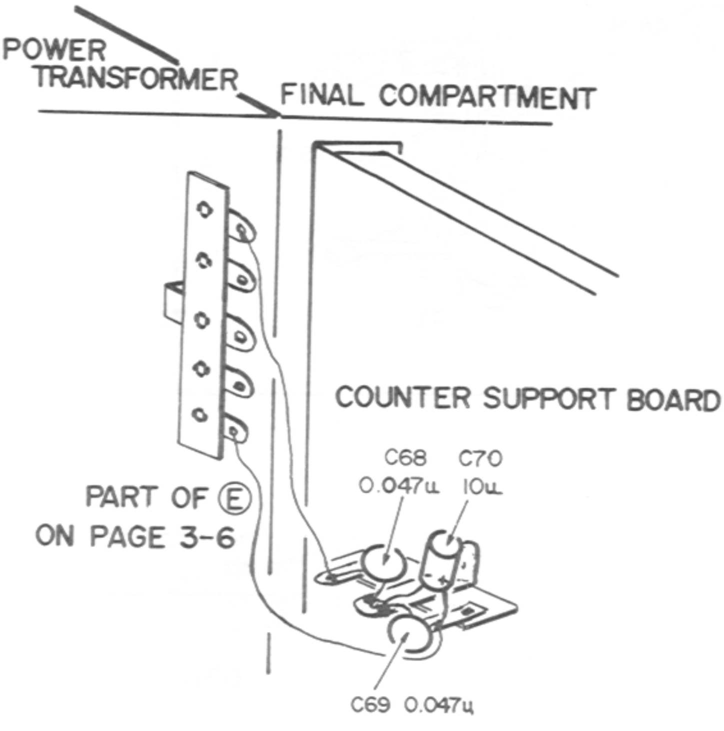
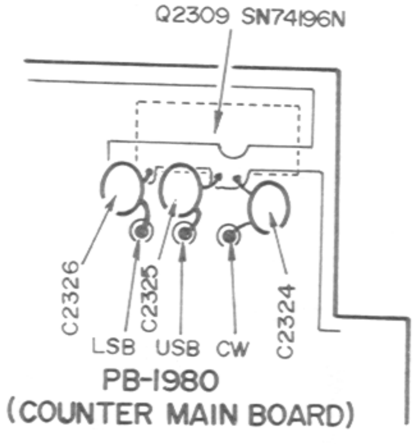


Figure 19.



(C2324/2325/2326 0.047μf)

Figure 20

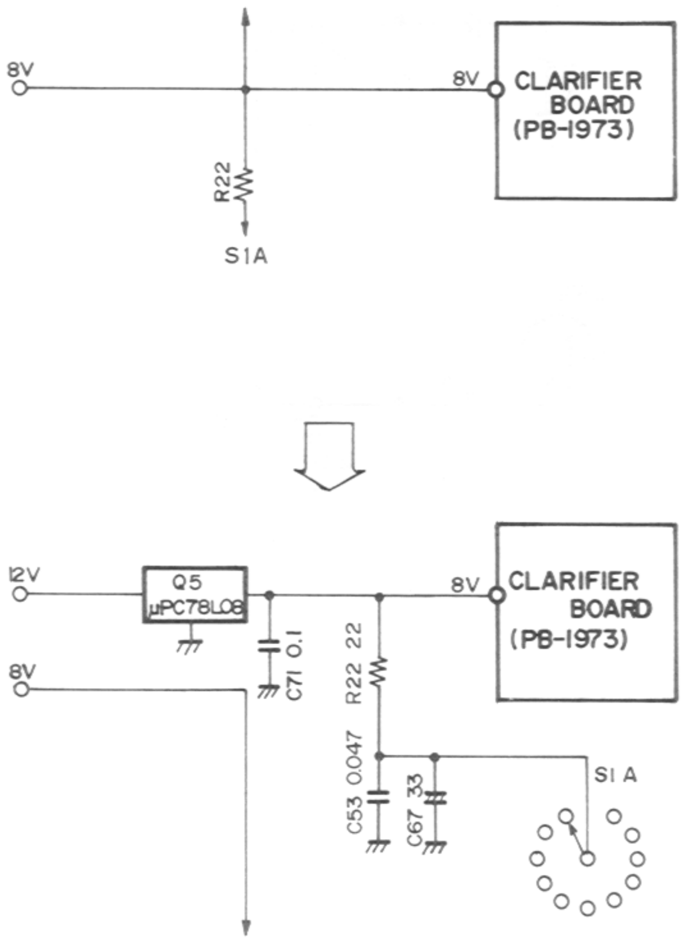
VFO DRIFT IN CONJUNCTION WITH DIMMER CONTROL

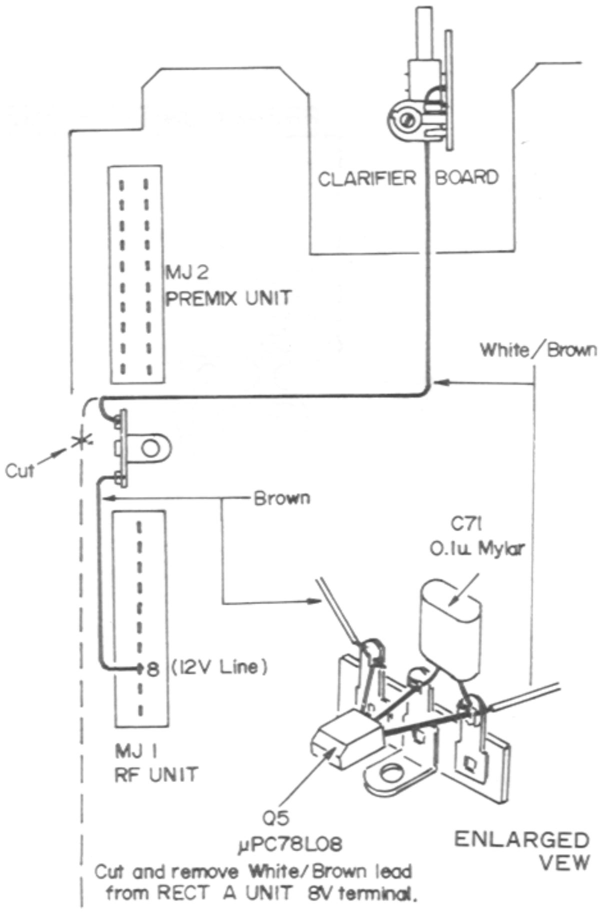
Some FT-101ZD transceivers from the first 6 production lots displayed a slight drift of the VFO when the dimmer control was rotated. In order to clear up this problem, the 8 volt line for the clarifier board was separated from the other 8 volt lines, and the following section will describe the correct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

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

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

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



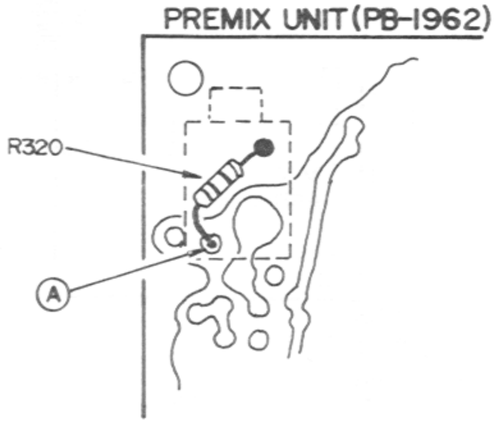


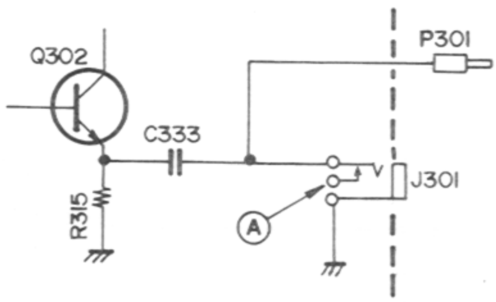
21.2 MHz SPURIOUS SUPPRESSION ON FT-101Z(ANALOG DIAL)

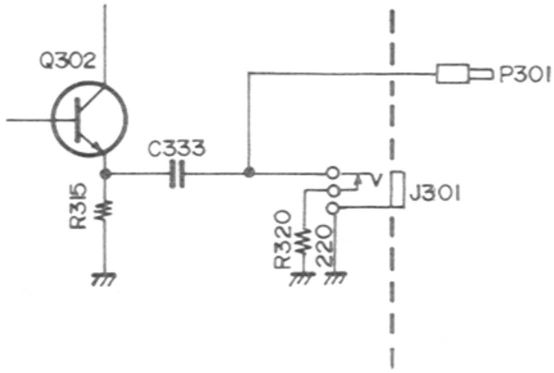
On the analog FT-101Z, a lingering spurious signal could sometimes be heard at 21.2 MHz. With the counter unit installed, the beat is inaudible, and the following modification will eliminate this weak spur in analog versions.

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

No further modification is required.







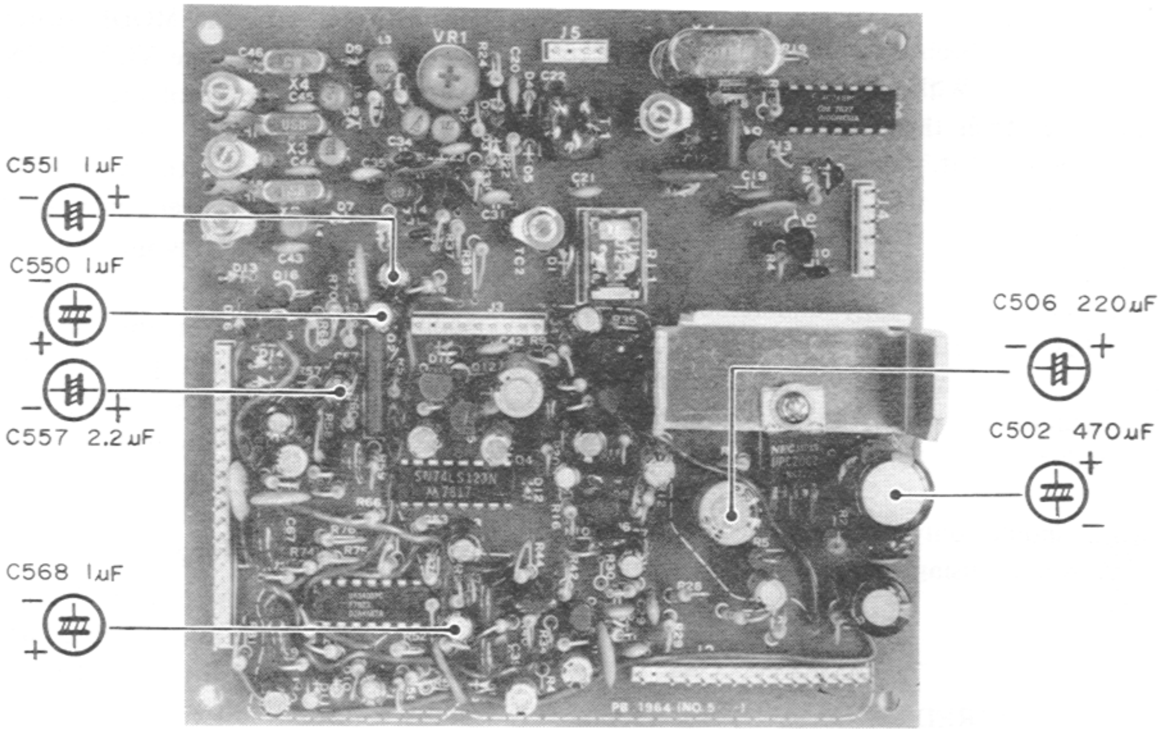
AF UNIT CAPACITOR POLARITY CHECK

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

The capacitors affected are:

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

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



MAINTENANCE AND ALIGNMENT

WARNING

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

CAUTION

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

GENERAL

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

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

EQUIPMENT REQUIRED

(1) RF Signal Generator: Hewlett-Packard Model 606A or equivalent, with one volt output at 50 ohms, and frequency coverage to 30 MHz.

(2) Vacuum Tube Voltmeter (VTVM): Hewlett-Packard Model 410B or equivalent, with an RF probe good to 40 MHz.

(3) Dummy Load: Yaesu Model YP-150 or equivalent, with 50 ohm non-reactive load impedance, rated to 150 watts average power.

(4) AF Signal Generator: Hewlett-Packard Model 200AB or equivalent.

(5) A general coverage receiver covering 3 to 30 MHz, with a 100 kHz crystal calibrator.

(6) A frequency counter, Yaesu Model YC-500 or equivalent, with resolution to 0.01 kHz and frequency coverage to 30 MHz.

(7) An oscilloscope, Hewlett-Packard Model 1740A or equivalent.

AF UNIT ALIGNMENT

VOX Circuit

A. Antitrip level setting

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

B. VOX relay delay setting

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

CW Sidetone

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

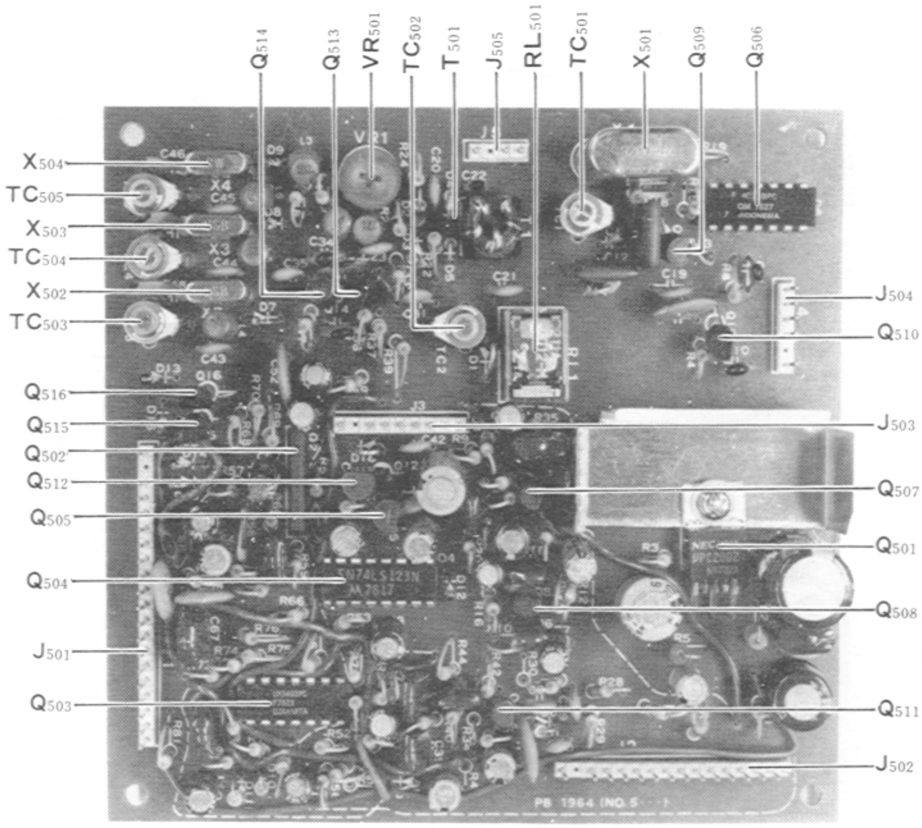
Marker Frequency setting

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

Carrier Frequency Adjustment

A. SSB Carrier Point

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



AF UNIT(PB-1964)

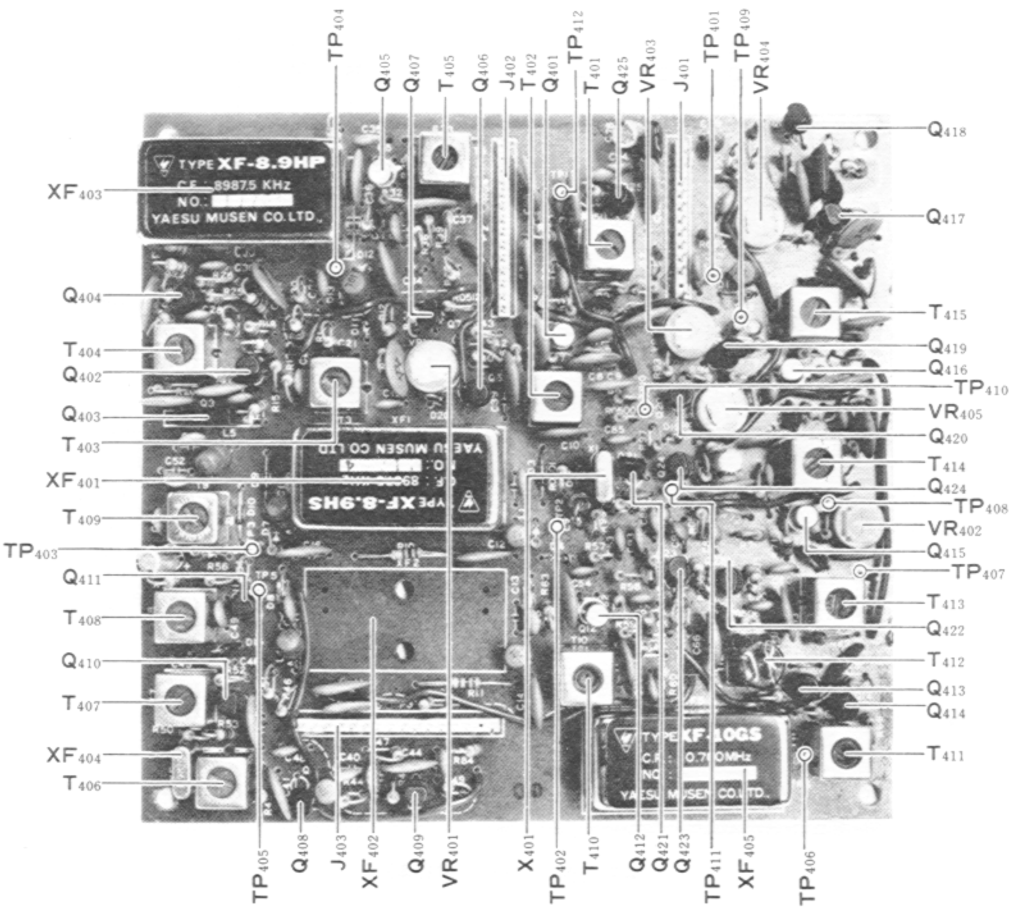
4. Recheck the LSB adjustment, as well as the carrier balance adjustment, after performing the carrier point alignment. The background noise, when switching between USB and LSB, should not change.

B. Carrier Balance

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

C. CW Carrier Point

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



IF UNIT(PB-1963)

IF UNIT ALIGNMENT

S-Meter Sensitivity Adjustment

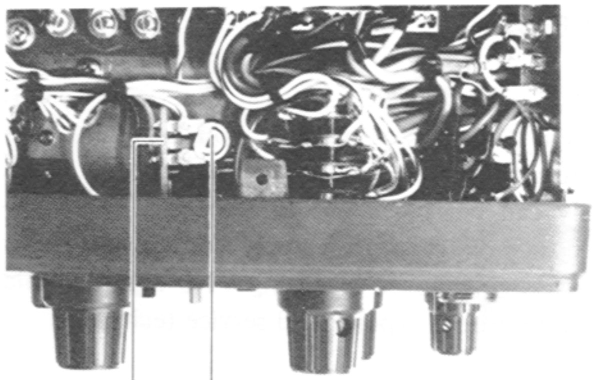
1. Set the BAND switch to 20 meters, the main dial to 14.250 MHz, and set the RF GAIN fully clockwise.
2. Set the signal generator to 14.250 MHz, and set its output to 6 dB. Tune the signal generator signal on the receiver, and peak the preselector for maximum signal strength. The S-meter should just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

Variable IF Bandwidth Alignment

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

ALC Meter Alignment

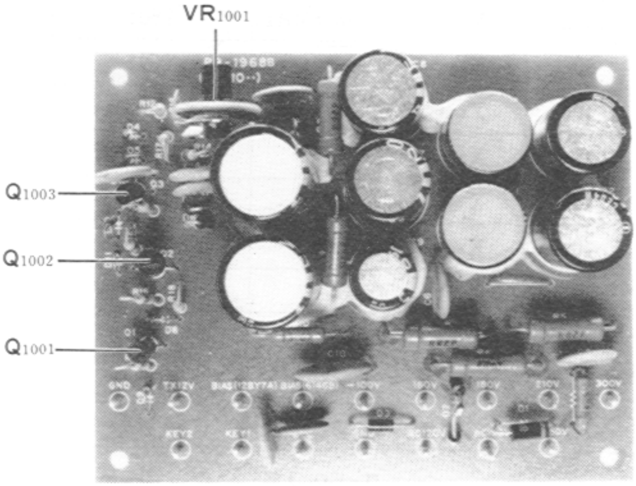
1. On any band, set the MODE switch to USB. Set the meter switch to ALC.
2. With no speech input, activate the transmitter. Adjust VR_{401} for a 0 reading on the ALC meter scale.



RECTIFIER B UNIT

Bias Adjustment

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



RECT.B UNIT(PB-1968)

VFO UNIT

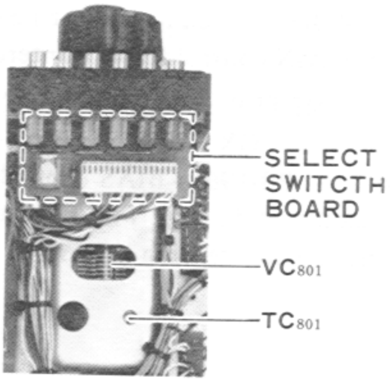
The VFO UNIT is very critical in its adjustment. As well, this is not an area which should ever require alignment. Questions regarding drift, etc., usually can be traced to other areas of the transceiver (instability in the supply voltage, etc.). For this reason, all cases regarding VFO repair should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

The following components are of interest from a service standpoint:

TC_{801} is the band set trimmer.

TC_{802} is the VFO level set trimmer.

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



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

Table 7

NB-FIX UNIT

Fixed Channel Frequency Alignment

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

PREMIX LOCAL UNIT

Premix Local Alignment.

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

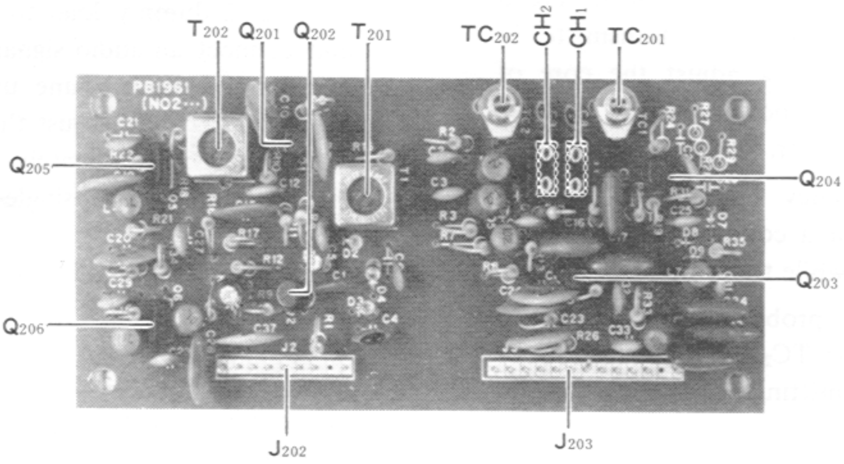
PREMIX UNIT

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

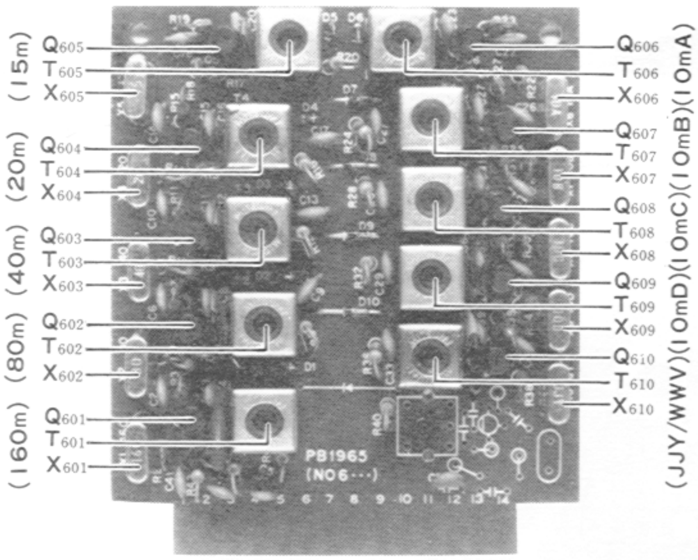
1. Press the EXT select switch. Apply 5.0 - 5.5 MHz sweep output to the VFO output terminal at the rear apron external VFO jack. Connect a high-impedance probe of an oscilloscope to J_{301}.
2. Adjust the transformers shown in Table 8 for a flat response across the entire passband. If you have never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

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

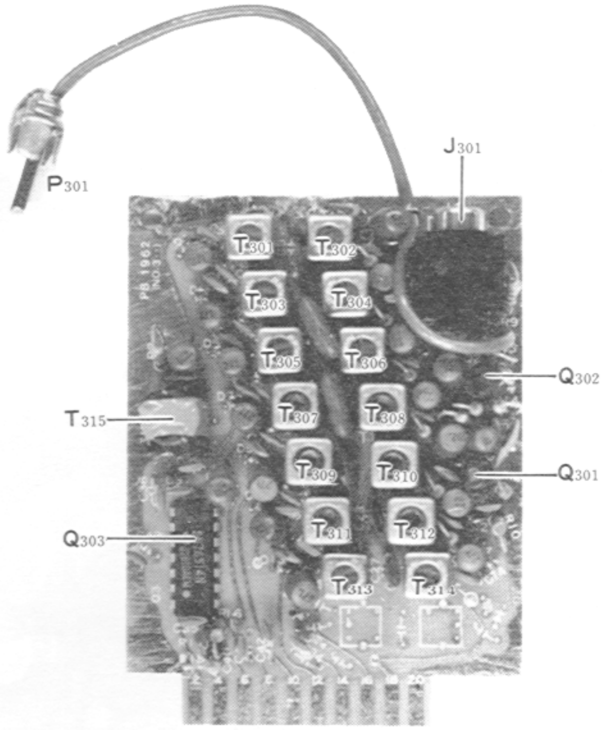
Table 8



NB·FIX UNIT(PB-1961)



PREMIX LOCAL(XTAL)UNIT(PB-1965)



PREMIX UNIT(PB-1962)

AM UNIT (After production lot #8)

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

TRANSMIT RF/IF TRANSFORMER ALIGNMENT

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

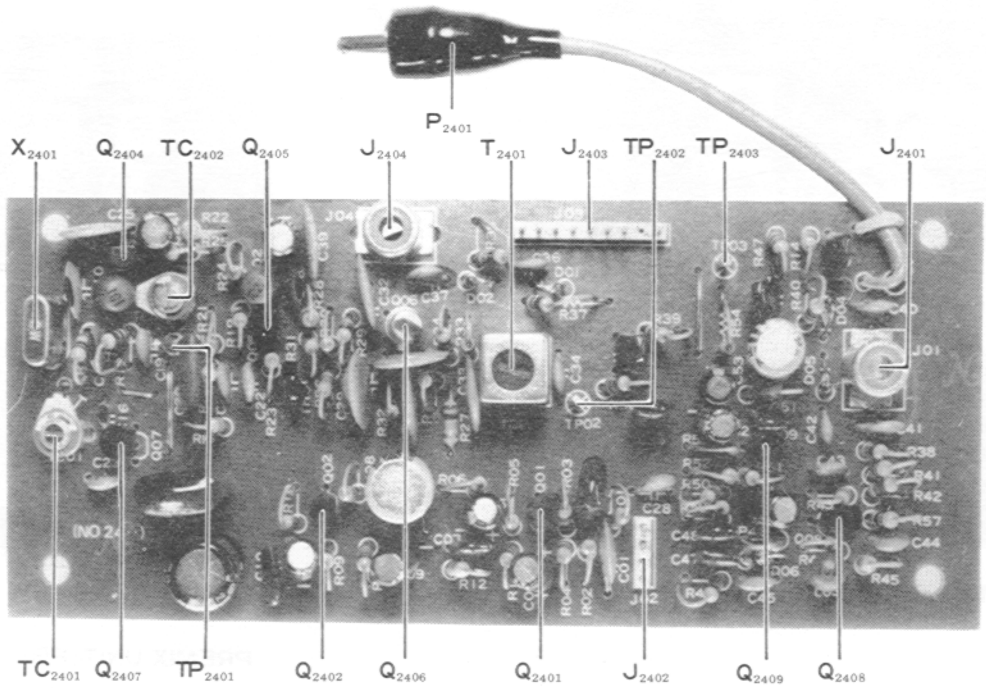
(2) Peak T_{104} (RF UNIT) for maximum power output.

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

RECEIVER RF/IF/NB TRANSFORMER ALIGNMENT

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

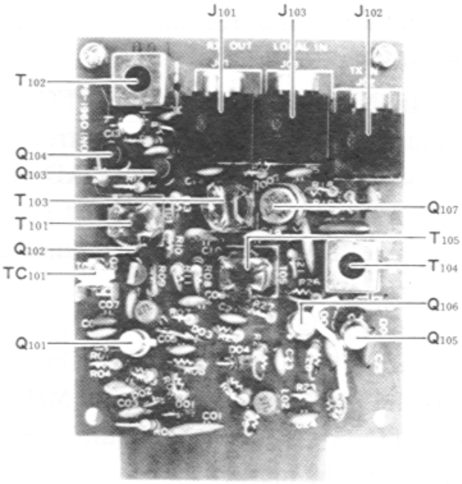
(2) Peak T_{102} (RF UNIT) for maximum S-meter indication.



AM UNIT (PB-2040)

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

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



RF UNIT(PB-1960)

ALIGNMENT OF TRANSMITTER MIXER/ DRIVER AND RECEIVER FRONT END STAGES

CAUTION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

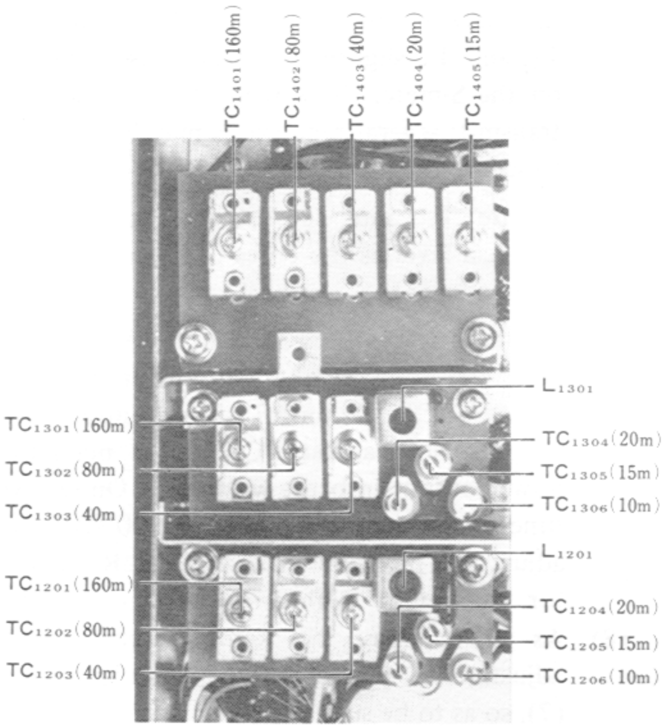


Figure 21

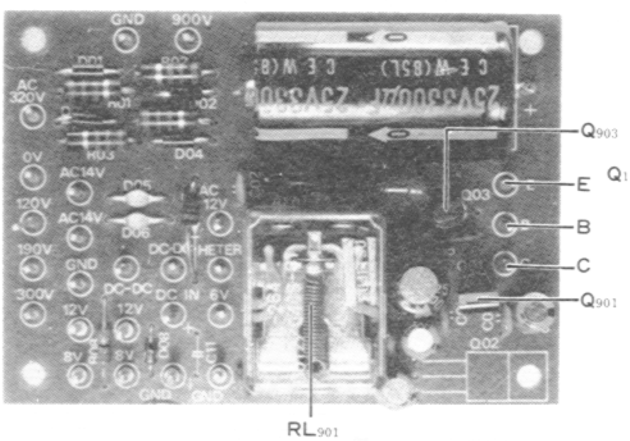
ADVICE ON TROUBLESHOOTING THE DRIVER/FINAL AMPLIFIER STAGES

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

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

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

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



RECT A UNIT(PB-1967)

FINAL AMPLIFIER NEUTRALIZATION

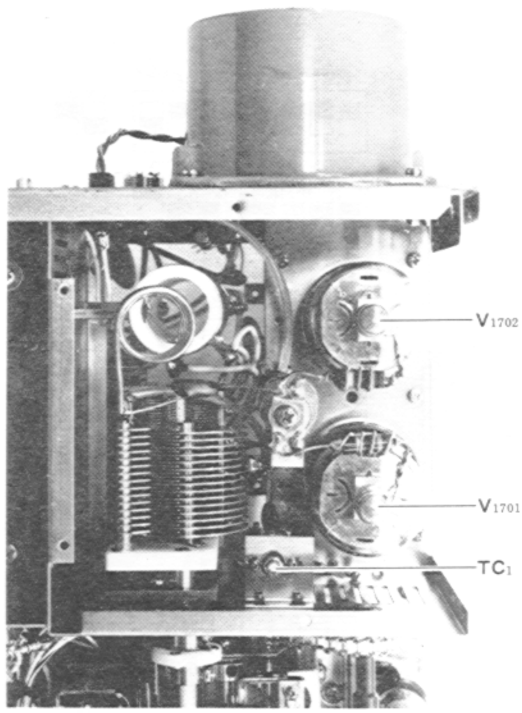
Important Note: For this alignment, use a NON-METALLIC tuning wand.

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

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

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

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



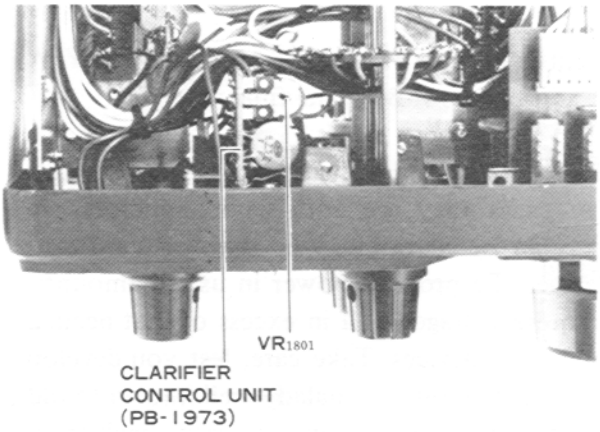
Final Amplifier Compartment

CLARIFIER ALIGNMENT

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

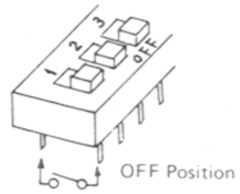
(2) With the CLARIFIER control OFF, make sure that the CLARIFIER knob is exactly at the 12 o'clock position. Note the tone of the marker signal.

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

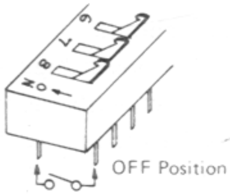


COUNTER UNIT

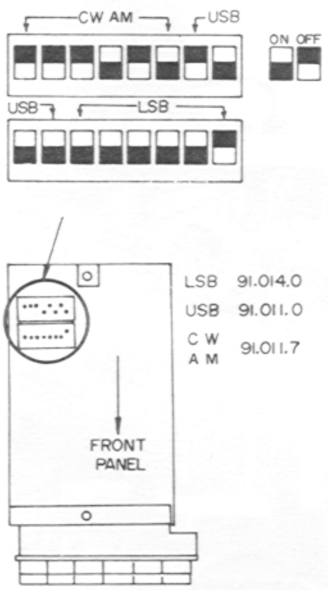
The carrier points for USB, LSB, and CW are preset as follows: USB = 91.011.0; LSB = 91.014.0; CW or AM = 91.011.7. If, for some reason, it is desired to set these frequencies elsewhere, refer to the "Frequency Counter Preset Switch Position" drawing and chart. Adjustment of ±200 Hz is possible as shown.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



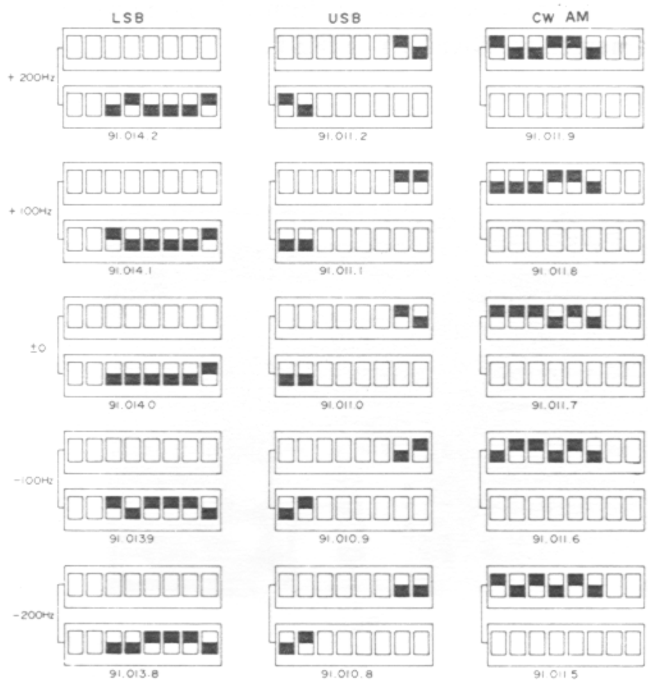
DSS208
P.N. (N7090016)



A10040-008
P.N. (66000005)



FREQUENCY COUNTER PRESET SWITCH POSITION



FAULT LOCALIZATION

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

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

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

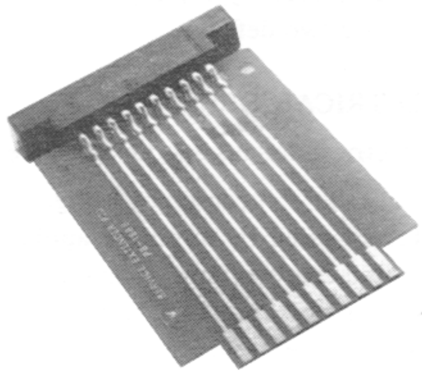
Initially, turn on the receiver, and check out only the RX side. Any malfunctions you detect on the receiver side should be repaired before you check out the transmitter. In doing this, you may well cure the entire problem, as much circuitry is shared on TX and RX.

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

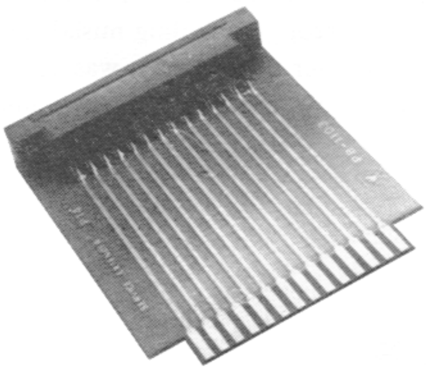
If, after the receiver inspection is completed, all is OK, switch to the transmit side, following the same logical procedure (function-board-circuit-component). Concentrate on those sections unique to the transmit side, as you have already performed a thorough checkout of all receiver and shared circuits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

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

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



10 PIN EXTENDER BOARD



14 PIN EXTENDER BOARD

TROUBLESHOOTING

A FUNDAMENTAL ANALYSIS OF THE TROUBLE

The failure may be caused by one of the following:

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

1. MECHANICAL DEFECTS

Typical mechanical defects encountered by the technician are:

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

2. ELECTRICAL DEFECTS

Typical electrical defects encountered are:

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

3. OTHERS

Among the miscellaneous types of failures or difficulties encountered are:

a) Antenna troubles – poor connectors, use of cheap coax not made to withstand weather, and sabotage by neighbors (nail driven through coax, etc.).
b) "Cockpit error:" including mislabeled coax lines to coax switch, or attempt to use transceiver on frequencies other than those it was designed for.
c) Murphy's Law: use of a non-Yaesu microphone with different connections, for example (See page 1-11)

TYPICAL PART FAILURES, CAUSES, AND SYMPTOMS

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

RECEIVE MODE

TROUBLESHOOTING CHART

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

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

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

TRANSMITTER

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

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

COMMON CIRCUITS

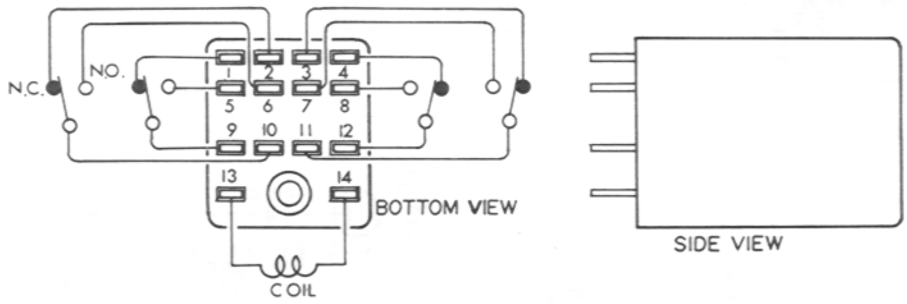
Problem	Condition	Probable Cause(s)
(1) Counter circuit	(a) Digital display does not work	* Defective Q_{2310} * 5 V line in Counter Unit grounded * Defective display LED * Defective Q_{2208}–Q_{2213} * Defective R_{2204}–R_{2245}
	(b) Six digits to the right read below: LSB "91.014.0" USB "91.011.0"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

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

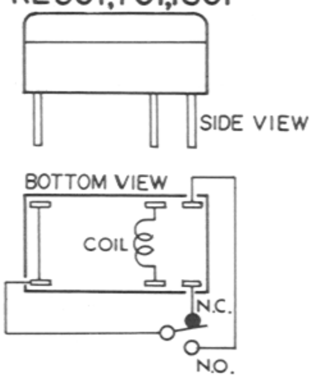
RELAY CONNECTION INFORMATION

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

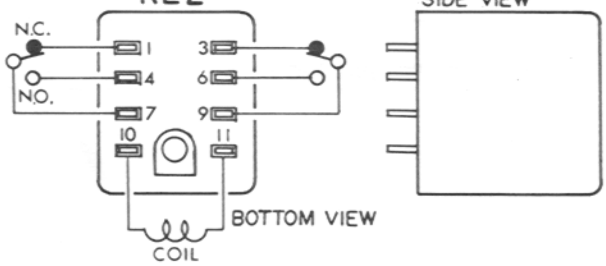
RL-1,901



RL-501,701,1801

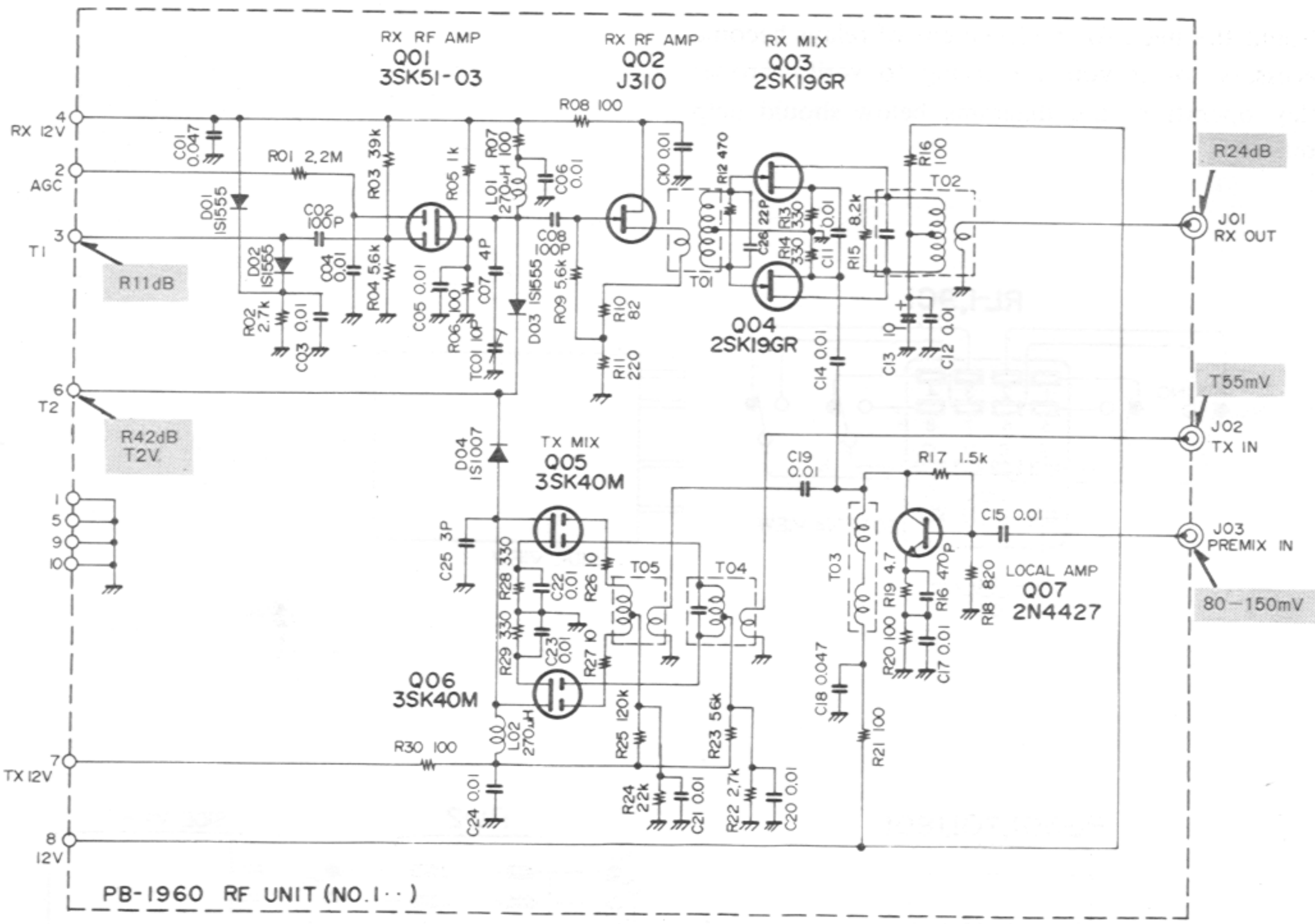


RL-2



RF UNIT (PB-1960A)

PB-2154A (no1)

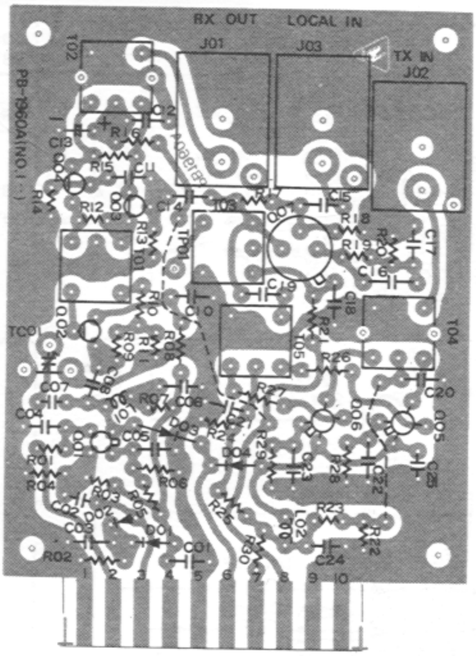


DC VOLTAGES

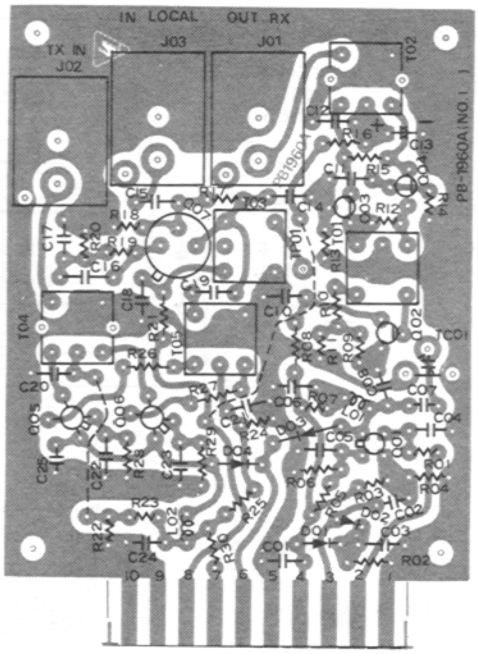
(V)

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

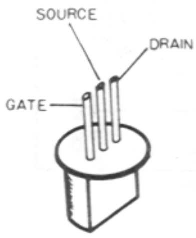
RF UNIT PARTS LAYOUT



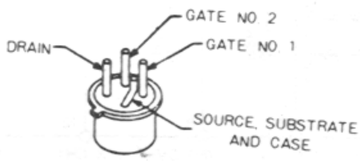
Viewed from component side



Viewed from solder side



2SK19GR



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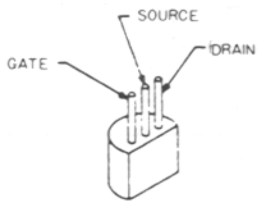
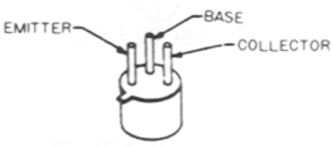
3SK51-03

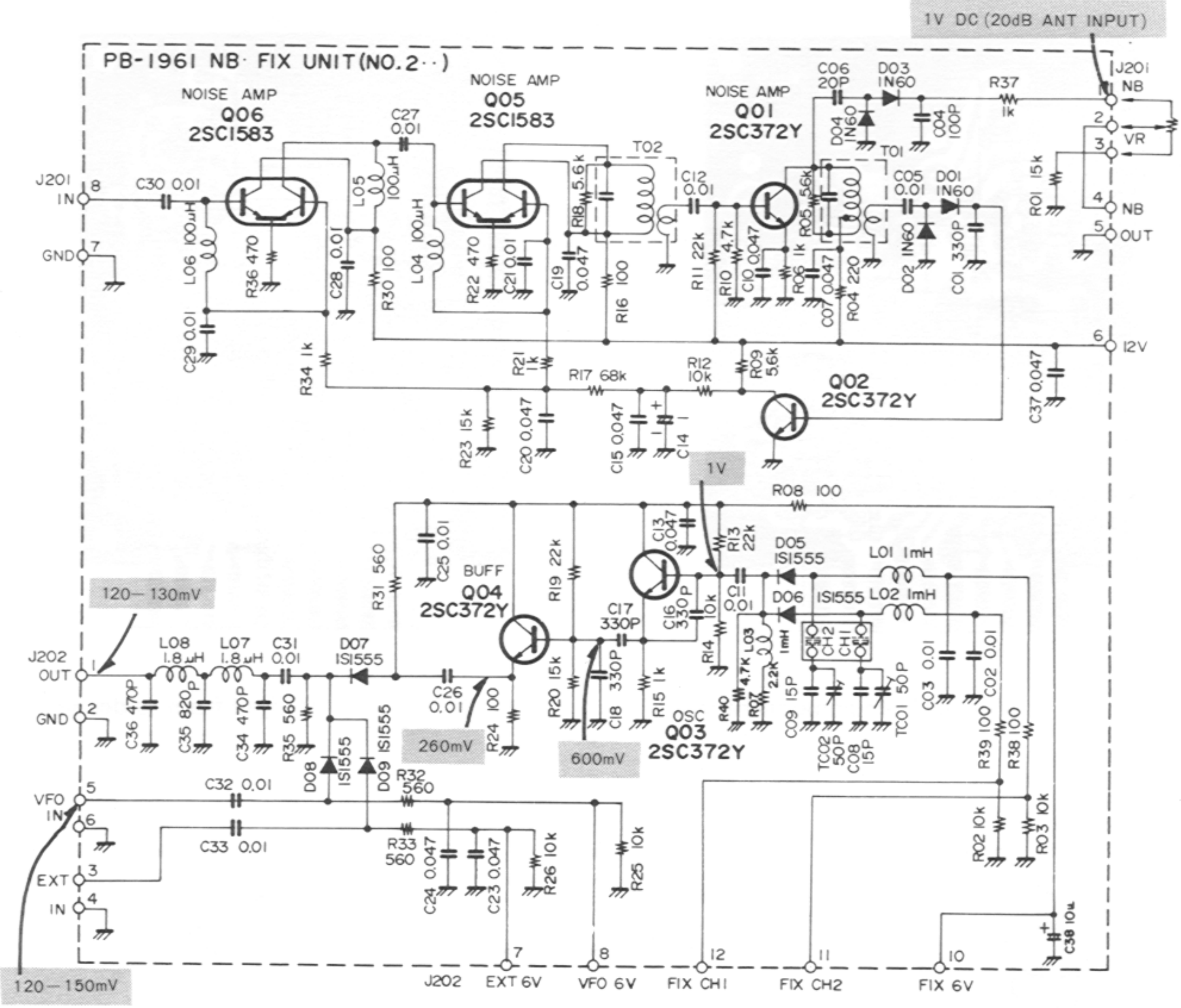


J310



2N4427

NB/FIX UNIT (PB1961B)



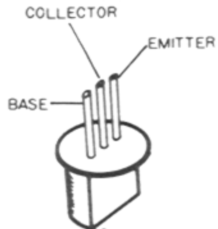
DC VOLTAGES

(V)

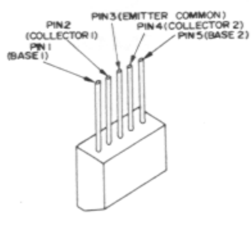
	E	C	B	
Q201	1.5	11.9	2.1	NB ON (NB OFF 0V)
Q202	0	11.4	0.2	
Q203	0.8	4.7	1.4	FIX ON (FIX OFF 0V)
Q204	1.0	4.7	1.5	

(V)

	1(B1)	2(C1)	3(E)	4(C2)	5(B2)	
Q205	1.7	12.0	1.1	12.0	1.7	NB ON (NB OFF 0V)
Q206	1.7	12.0	1.1	12.0	1.7	

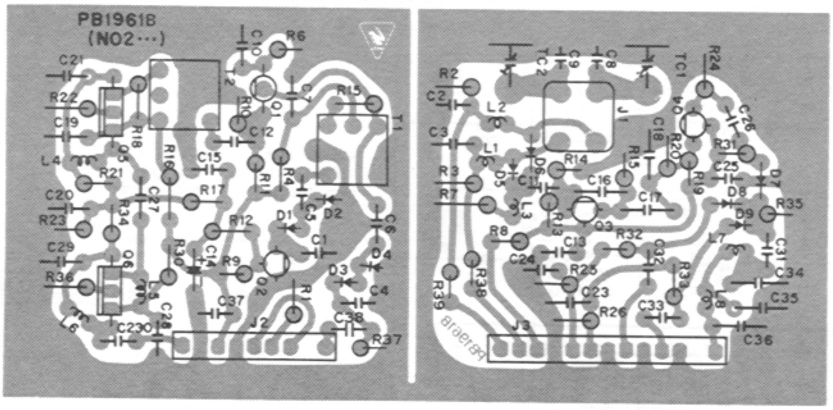


2SC372Y

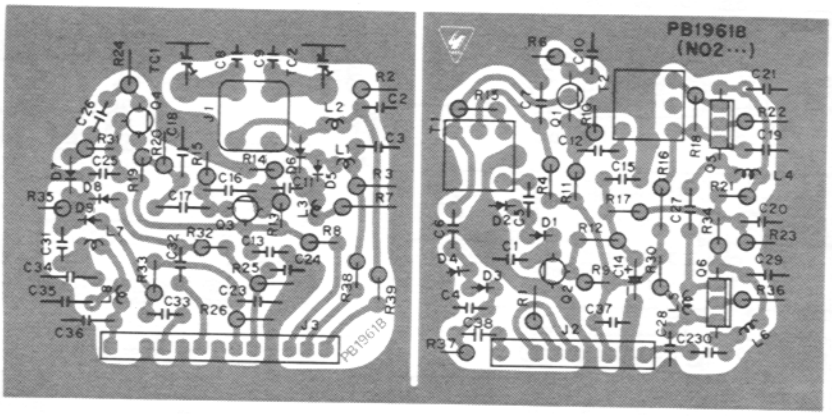


2SC1583

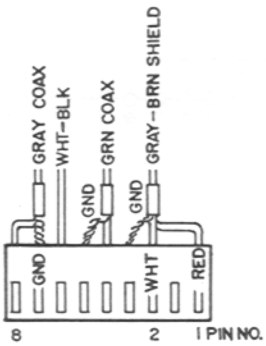
NB／FIX UNIT PARTS LAYOUT



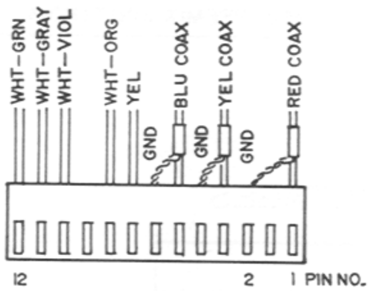
Viewed from component side



Viewed from solder side

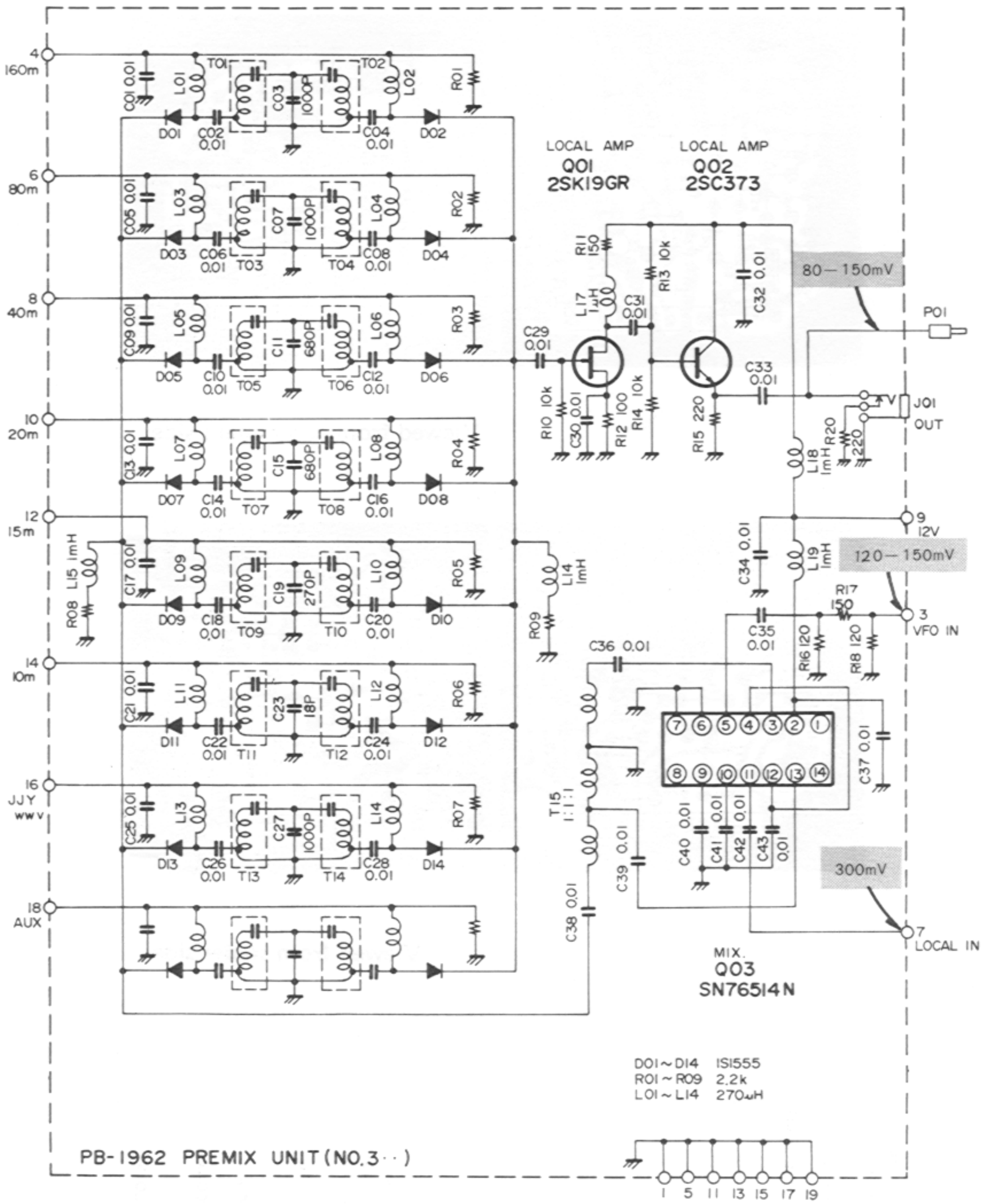


P8 (J201)



P9 (J202)

PREMIX UNIT (PB1962A)



DC VOLTAGES

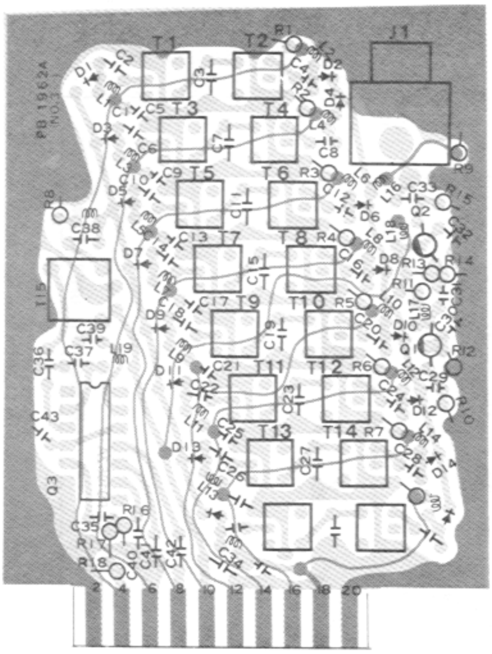
(V)

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

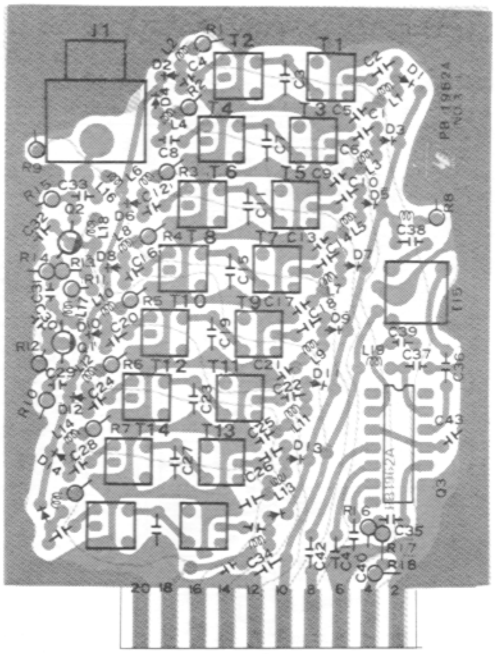
(V)

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

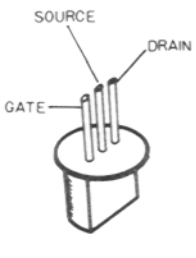
PREMIX UNIT PARTS LAYOUT



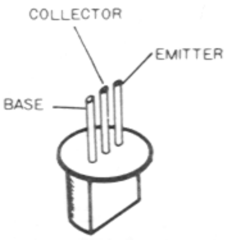
Viewed from component side



Viewed from solder side



2SK 19GR



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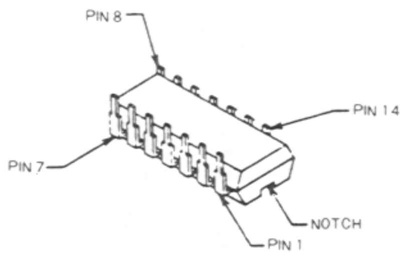
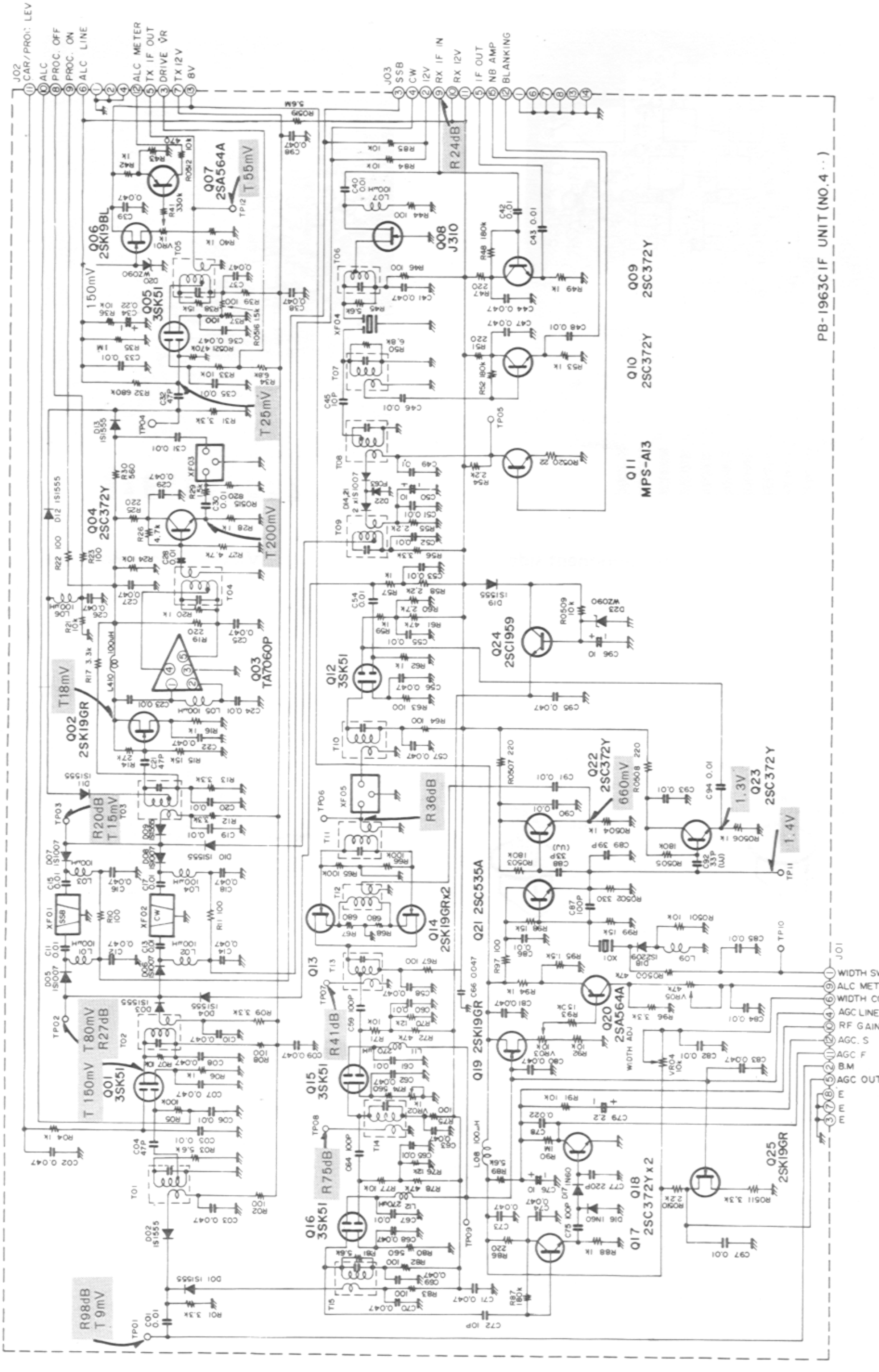


SN76514N

IF UNIT (PB-1963C)



IF UNIT VOLTAGE CHARTS

DC VOLTAGES

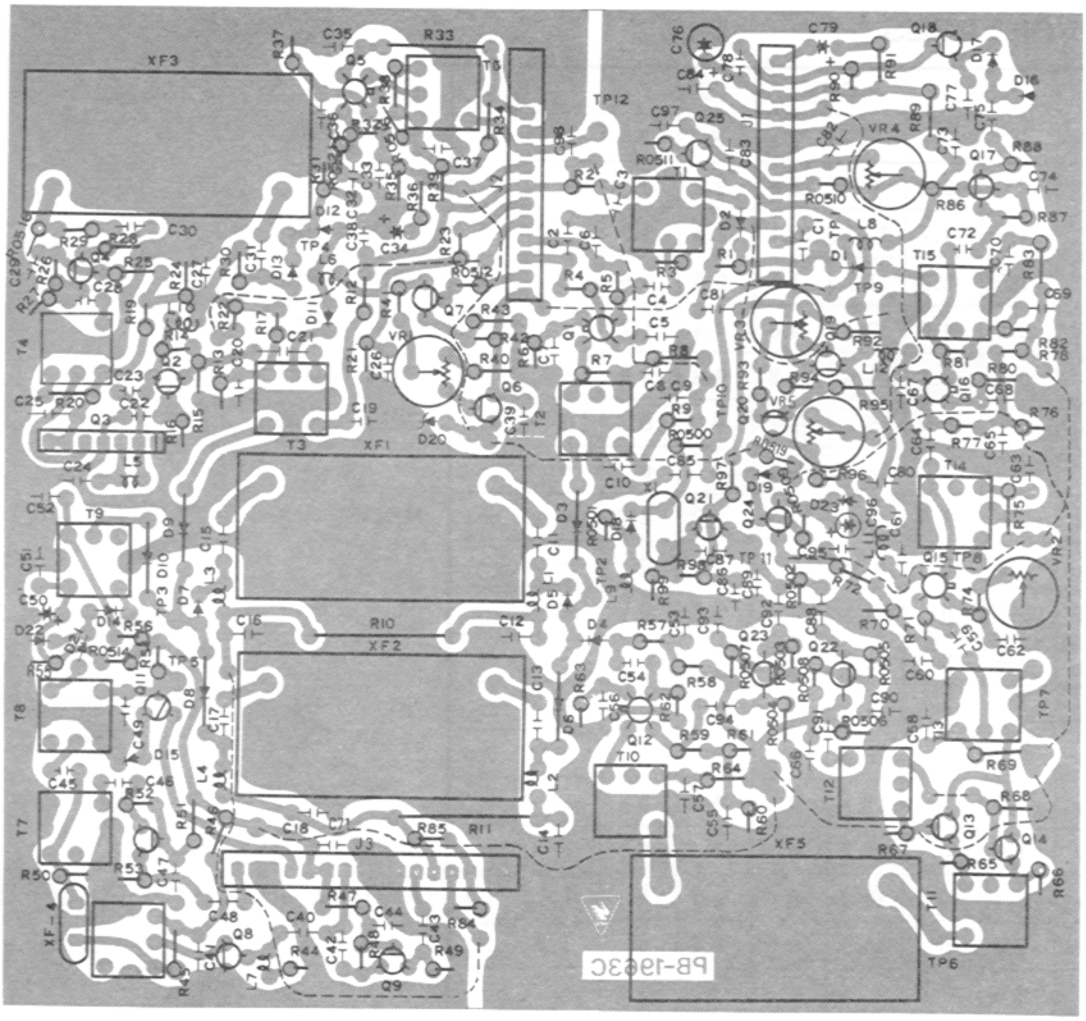
(V)

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

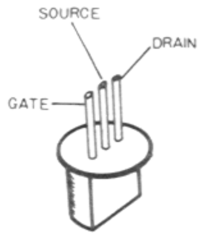
(V)

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

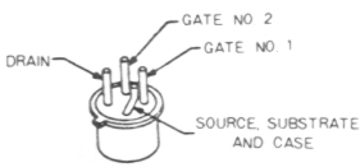
IF UNIT PARTS LAYOUT (1)



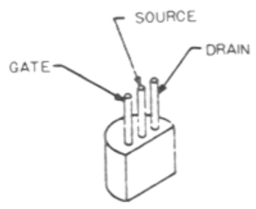
Viewed from component side



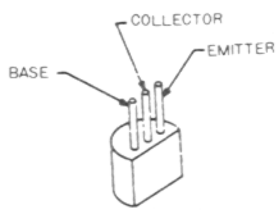
2SK19BL
2SK19GR



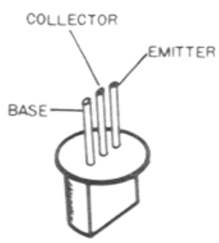
3SK51-03



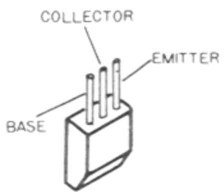
J310



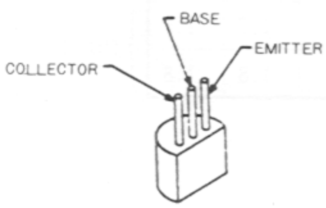
2SA564A



2SC372Y



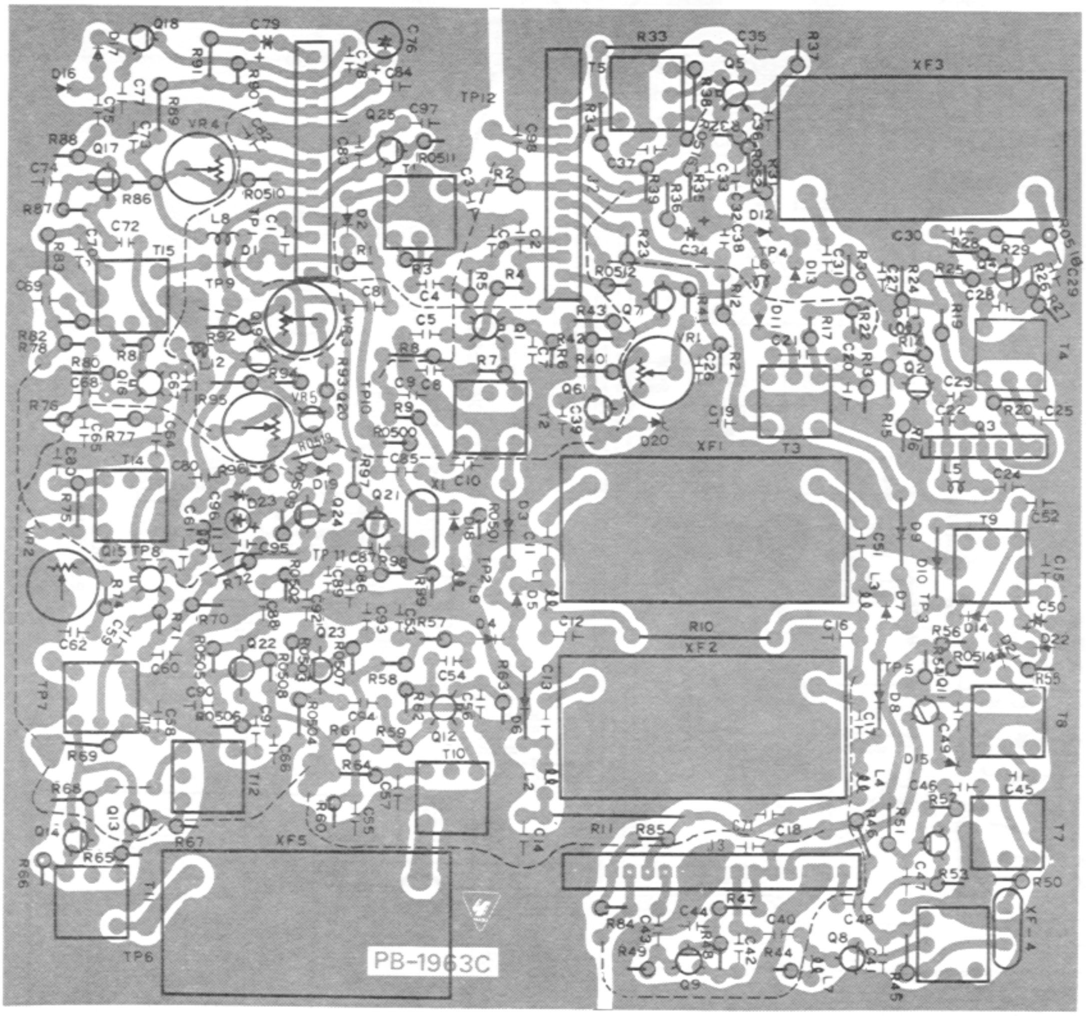
2SC535A



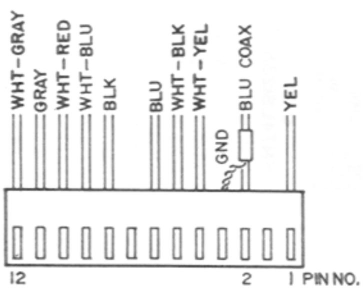
MPSA13

TA7060P

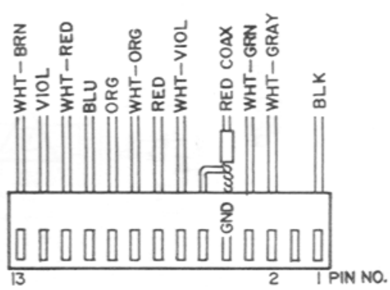
IF UNIT PARTS LAYOUT (2)



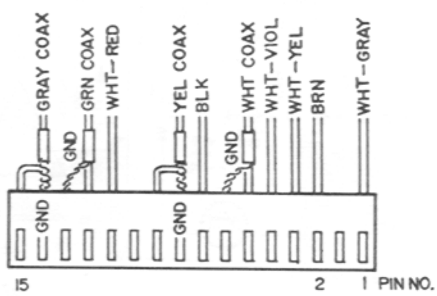
Viewed from solder side



P1(J401)

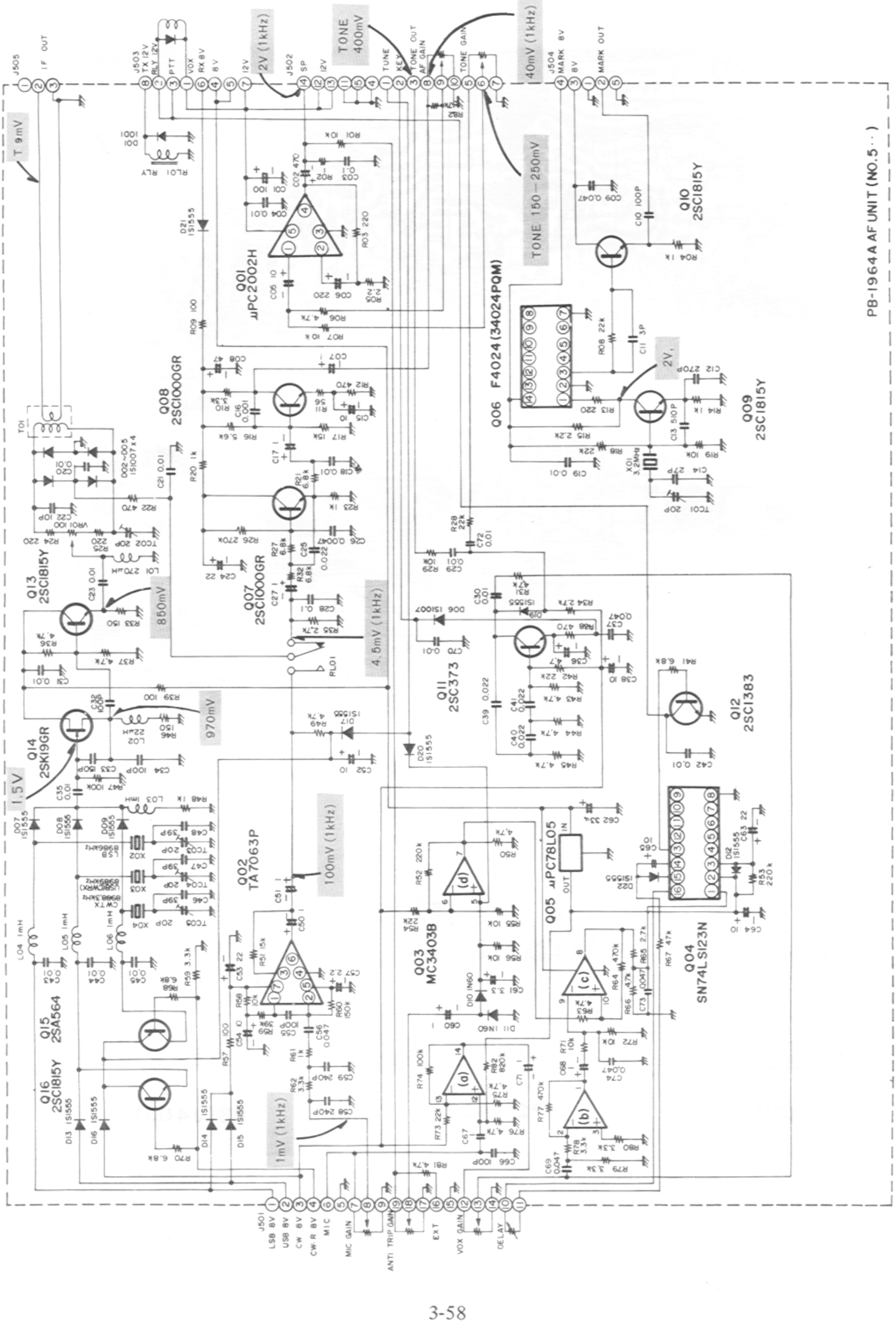


P2(J402)



P3(J403)

AF UNIT (PB-1964)



AF UNIT VOLTAGE CHARTS

DC VOLTAGES

(V)

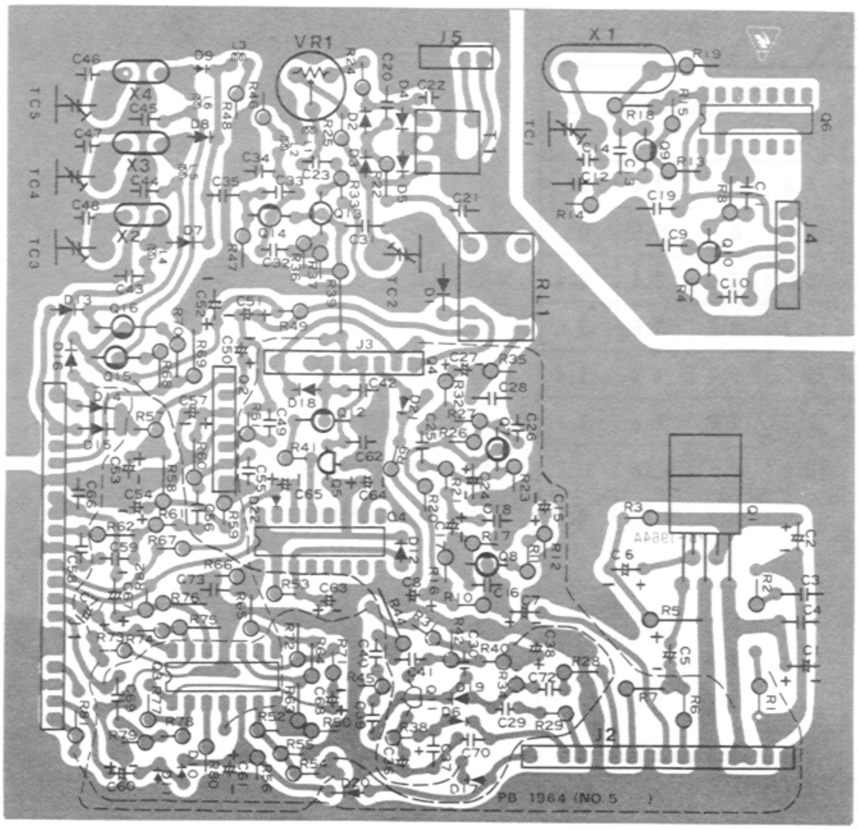
	E(S)		C(D)		B(G)		
	R	T	R	T	R	T	
Q_{507}	2.2	0	4.8	0	2.4	0	
Q_{508}	1.4	0	1.6	0	0.8	0	
★★ Q_{509}	1.8	1.8	3.5	3.5	2.4	2.4	MARKER ON
Q_{510}	★★ 5.5	★★ 5.5	8.2	8.2	★★ 3.6	★★ 3.6	〃 〃
Q_{511}	0.9	0.7	7.7	6.1	1.4	1.4	CW KEY DOWN (MARK)
	0.9	0.7	7.7	7.7	1.4	1.4	〃 UP (SPACE)
Q_{512}	0	0	12.2	0	0.12	0.7	PTT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

(V)

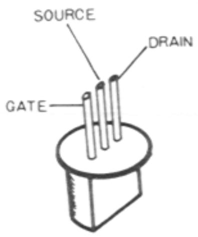
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Q_{501}	0.5	0.7	0	5.6	12.2	—	—	—	—	—	—	—	—	—	—	—
★ Q_{502}	1.3	0.6	0.02	0	0.7	4.8	7.3	—	—	—	—	—	—	—	—	—
Q_{503}	0	0	0	8.1	7.5	0.1	6.7	6.7	0	6.6	0	0	0	1.0	—	—
Q_{504}	4.2	5.0	3.5	4.3	0.1	0	0.4	0	1.2	0	5.0	4.3	0.1	0	1.2	5.0
Q_{505}	8.1	0	5.0	—	—	—	—	—	—	—	—	—	—	—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

★SSB(CW 0V) ★★MARKER ON(OFF 0V)

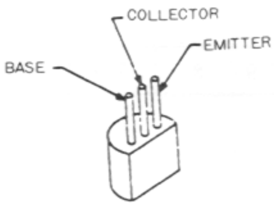
AF UNIT PARTS LAYOUT (1)



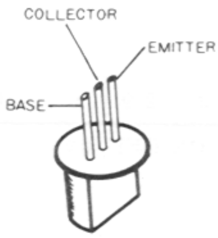
Viewed from component side



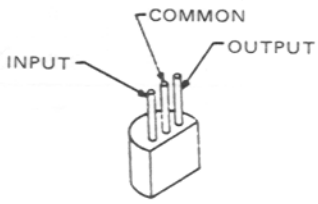
2SK19GR



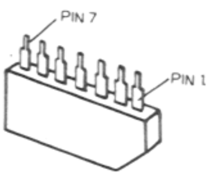
2SA564A
2SC1383
2SC1815Y



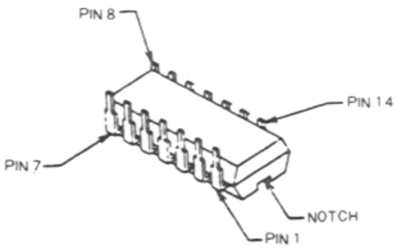
2SC373
2SC1000GR



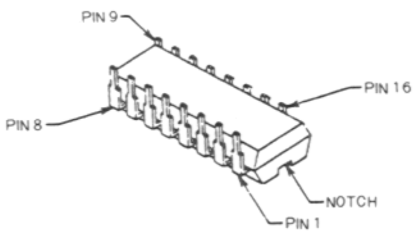
µPC78L05



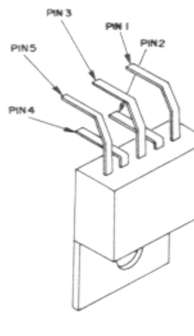
TA7063P



34024PCQM

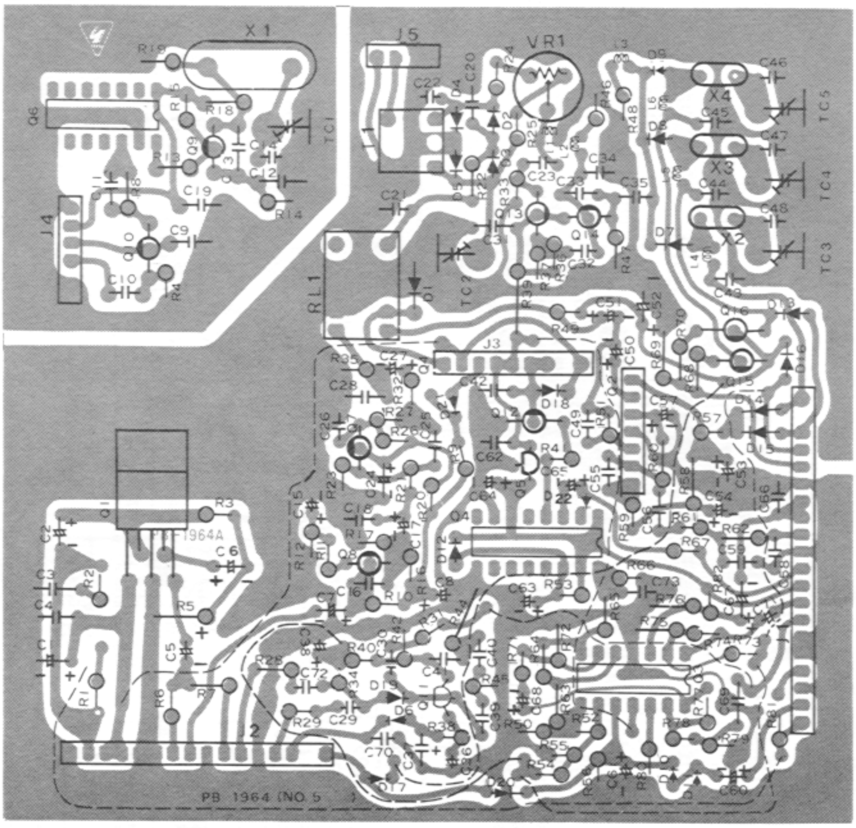


SN74LS123N

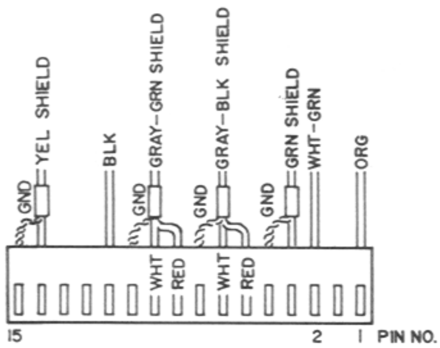


µPC2002H

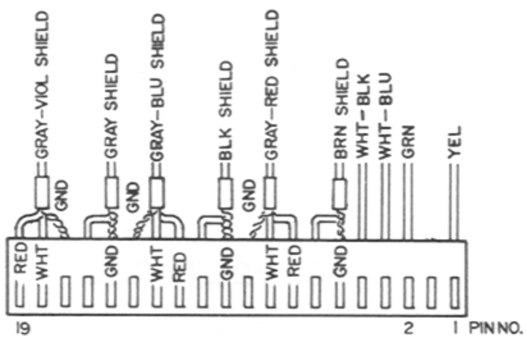
AF UNIT PARTS LAYOUT (2)



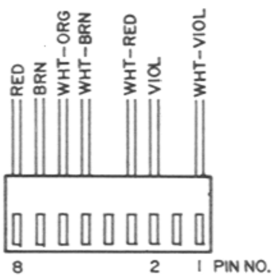
Viewed from solder side



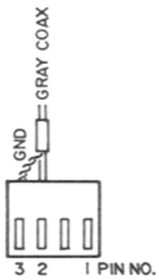
P5(J502)



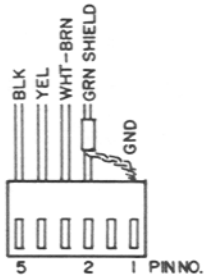
P4(J501)



P6(J503)

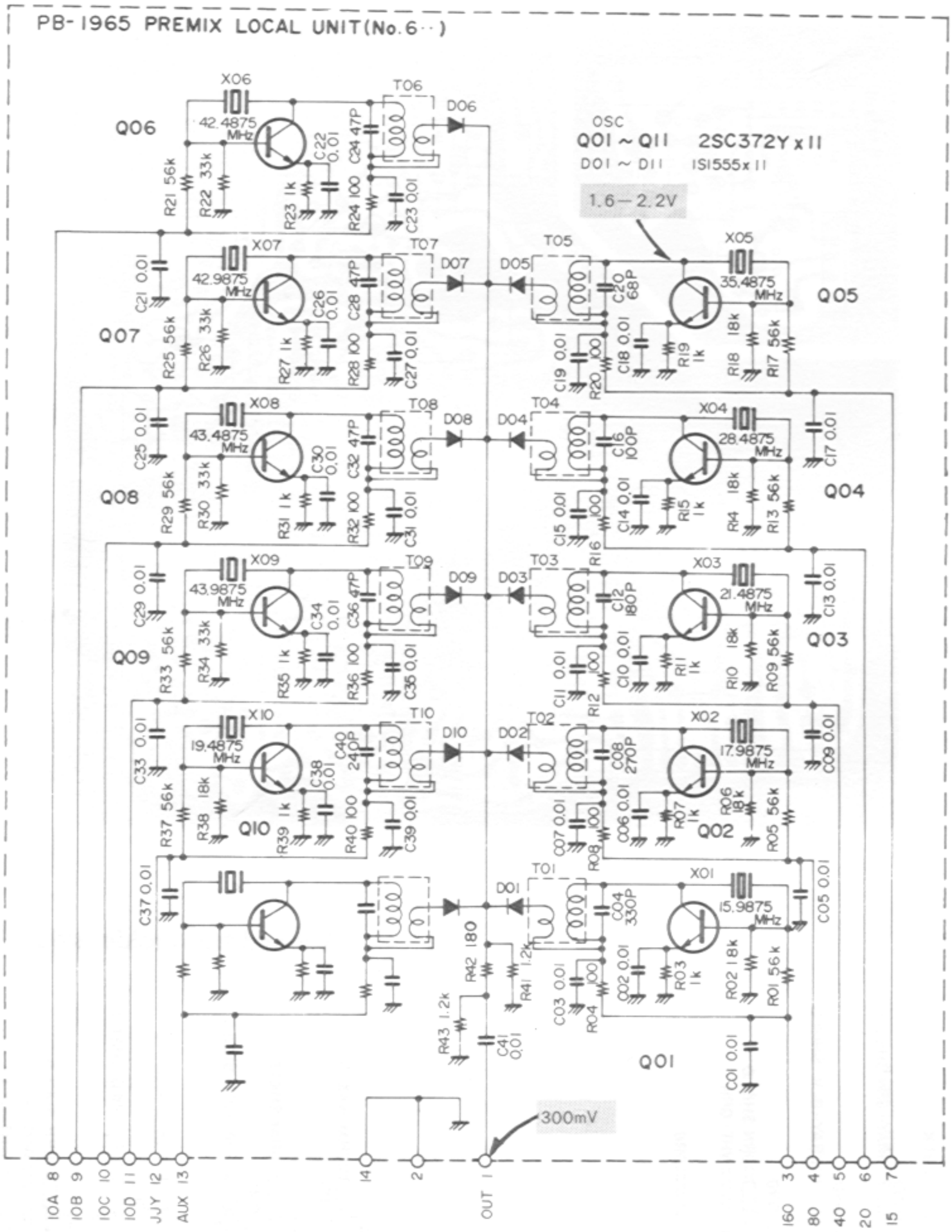


P18(J505)



P7(J504)

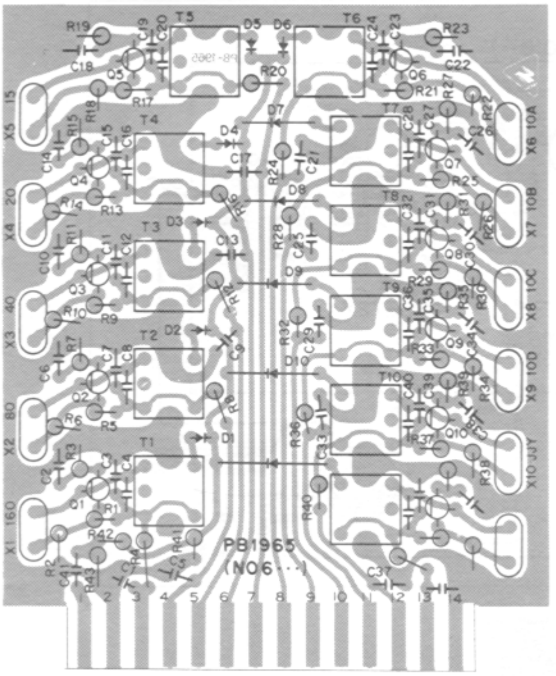
PREMIX LOCAL UNIT (PB1965)



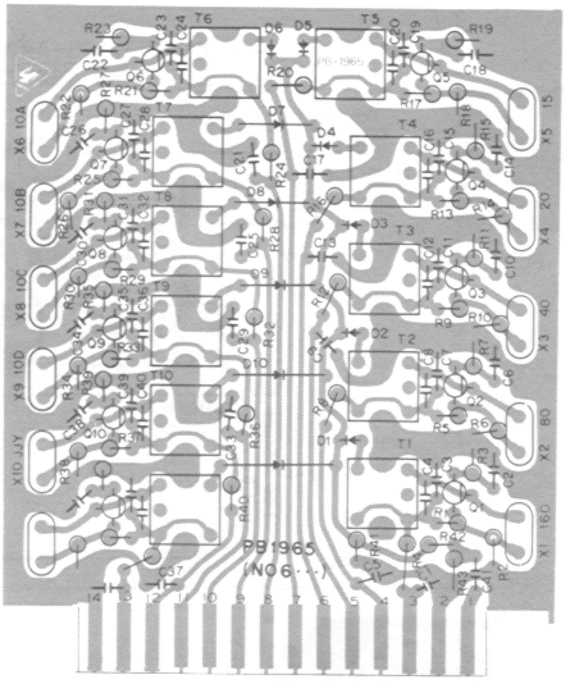
DC VOLTAGES (V)

	E	C	B
Q601	3.1	6.7	1.5
Q602	3.1	6.7	1.5
Q603	3.0	6.7	1.5
Q604	2.6	6.7	1.5
Q605	2.5	6.7	1.0
Q606	1.9	6.7	1.3
Q607	2.8	6.6	1.9
Q608	2.7	6.6	2.1
Q609	2.5	6.6	1.7
Q610	3.2	6.7	1.5
Q611	2.6	6.7	1.5

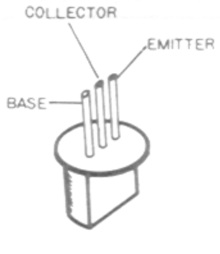
PREMIX LOCAL UNIT PARTS LAYOUT



Viewed from component side



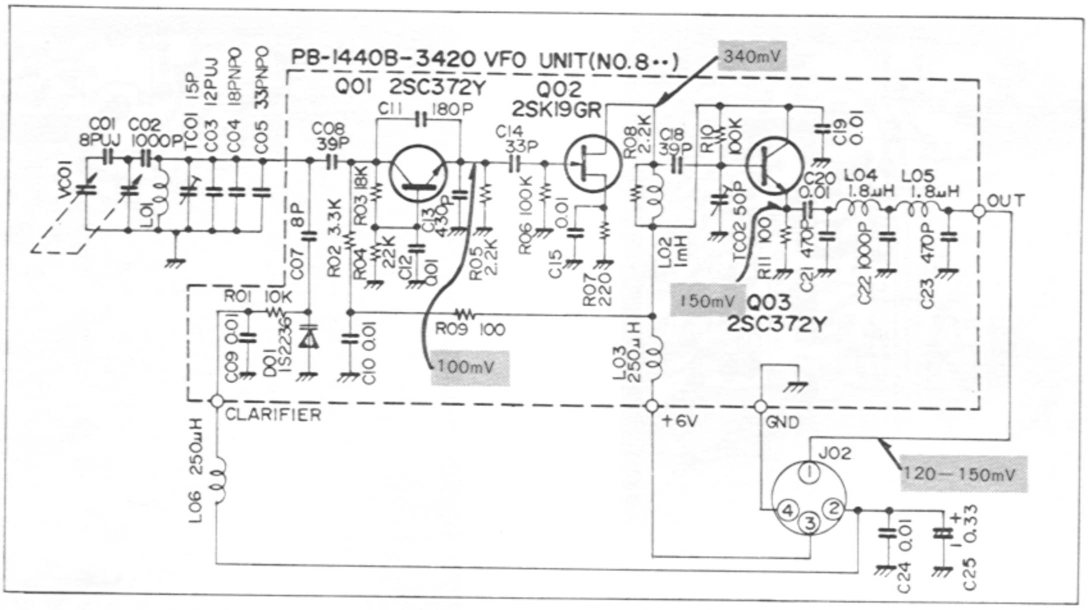
Viewed from solder side

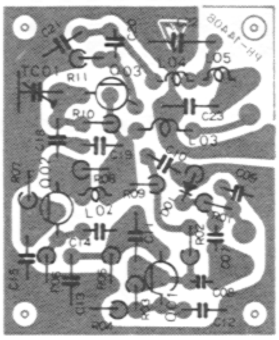


2SC372Y

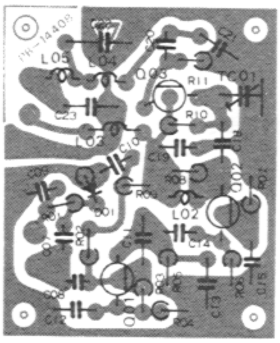
VFO ASSEMBLY

VFO BOARD (PB-1440B-3420)





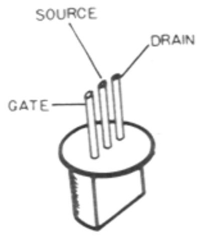
Viewed from component side



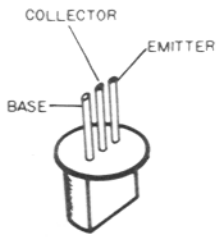
Viewed from solder side

DC VOLTAGES (V)

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

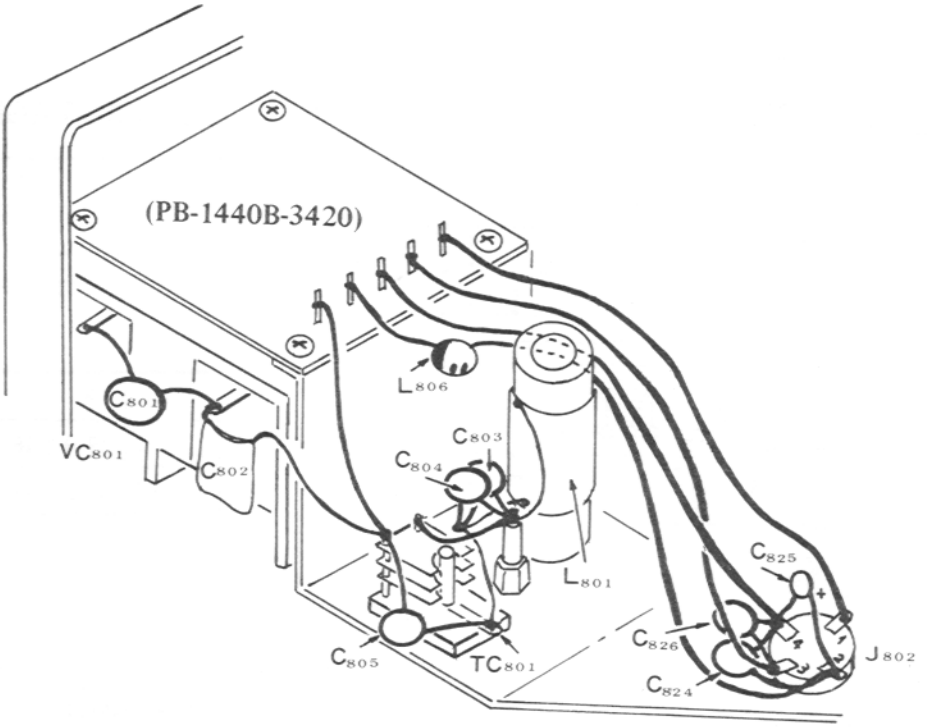


2SK19GR

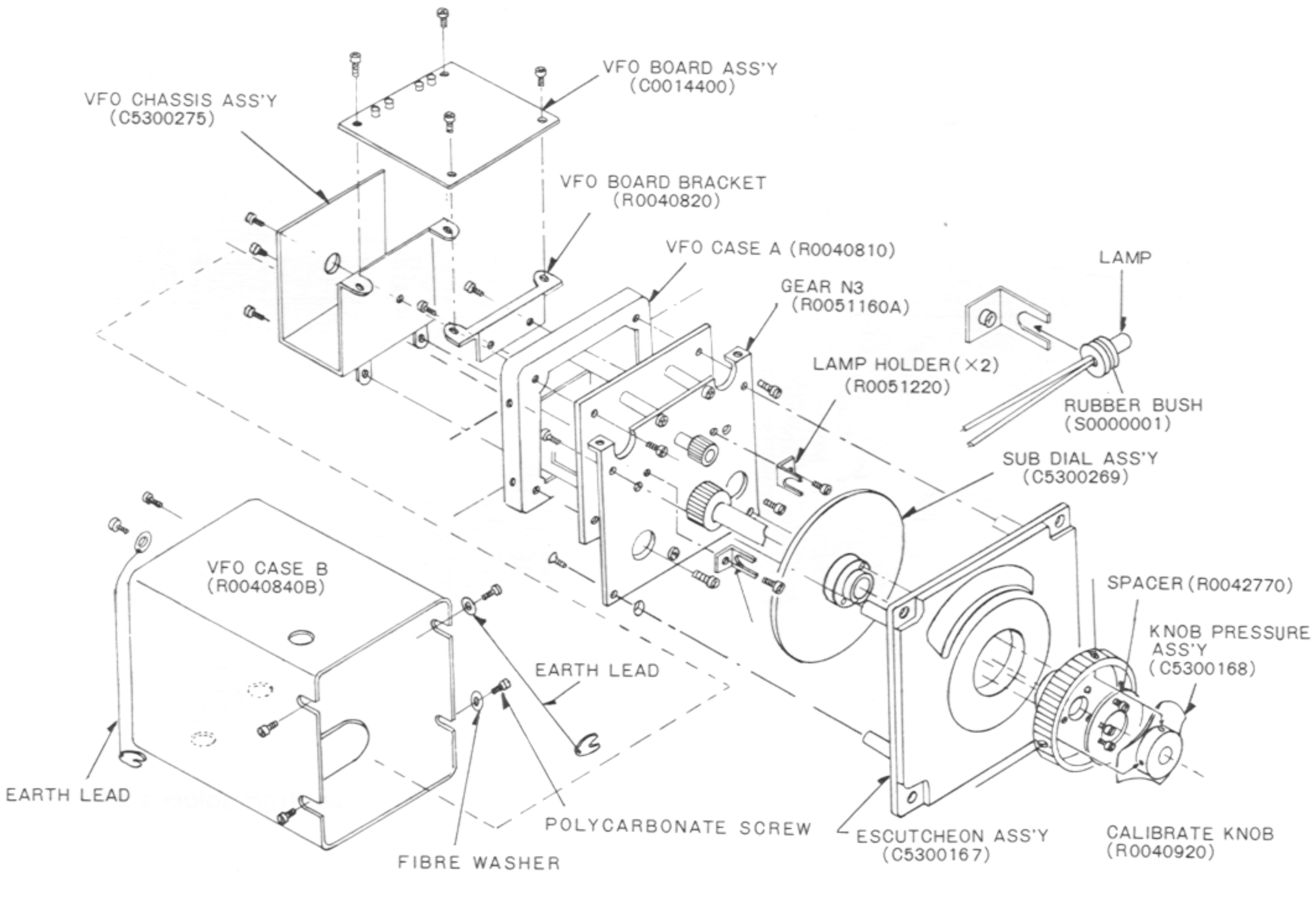


2SC372Y

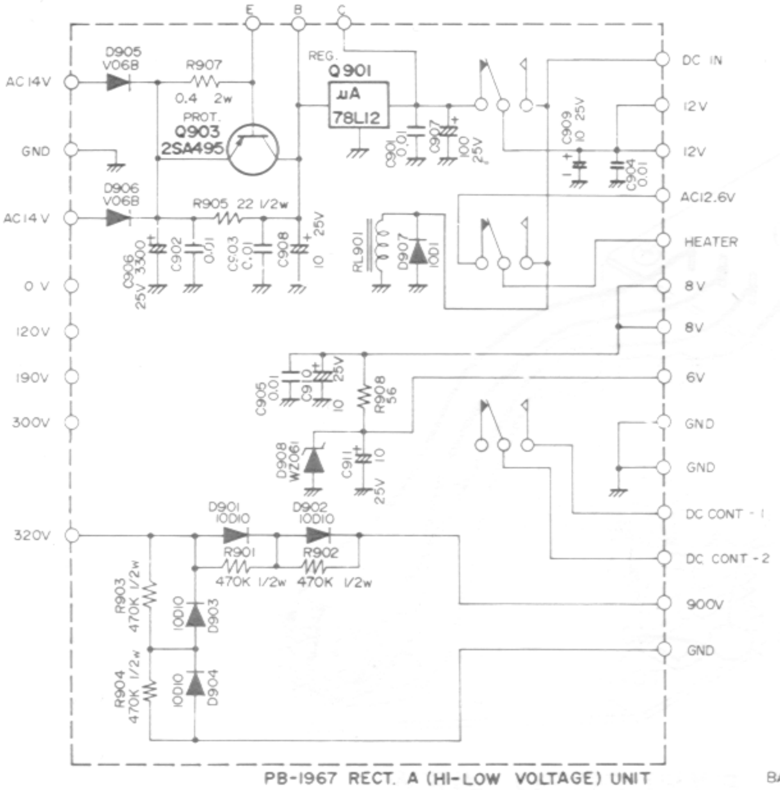
VFO ASSEMBLY PARTS LAYOUT



VFO UNIT EXPLODED VIEW



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



DC VOLTAGES

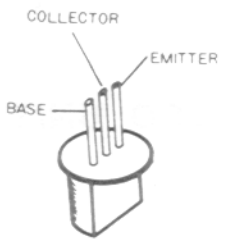
(V)

	IN	OUT
Q_{901}	★18.1	12.0

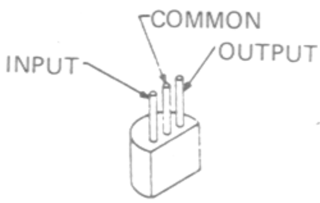
RECEIVE(★TRANSMIT 17.4V)

(V)

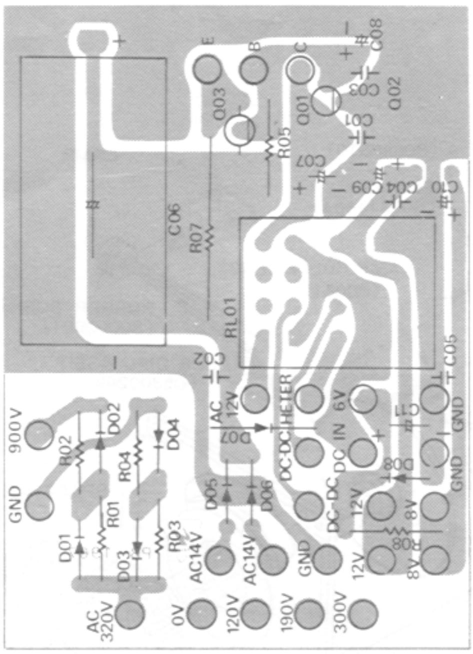
		E	C	B
Q_{903}	R	19.0	18.1	18.7
	T	18.5	17.4	18.2



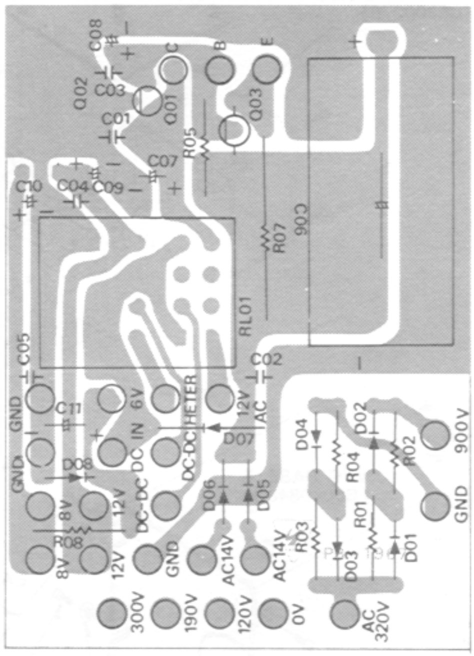
2SA495



μA78L08

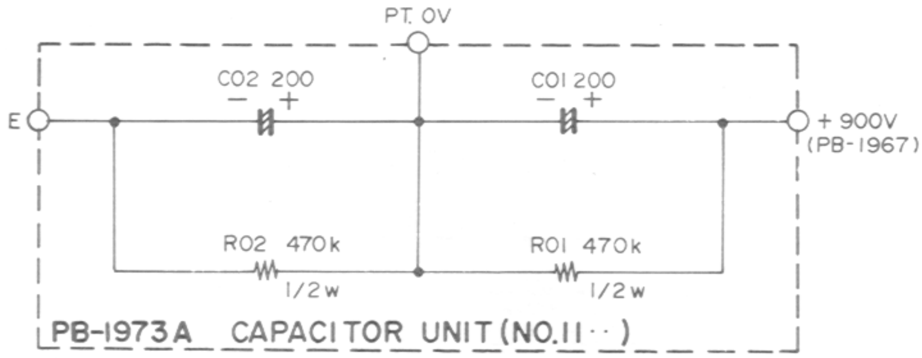


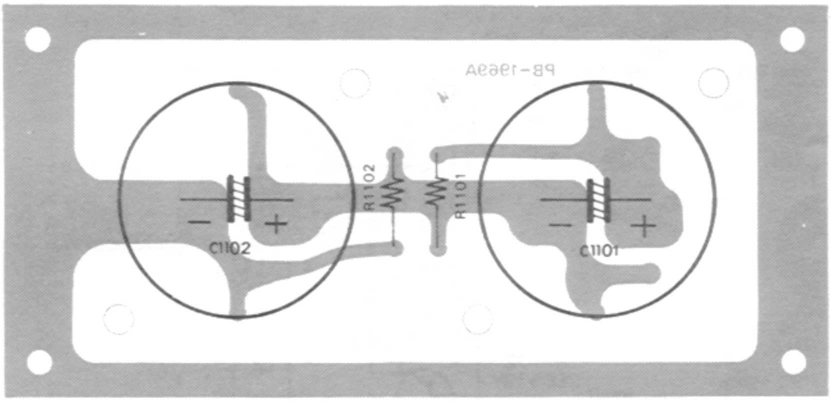
Viewed from component side



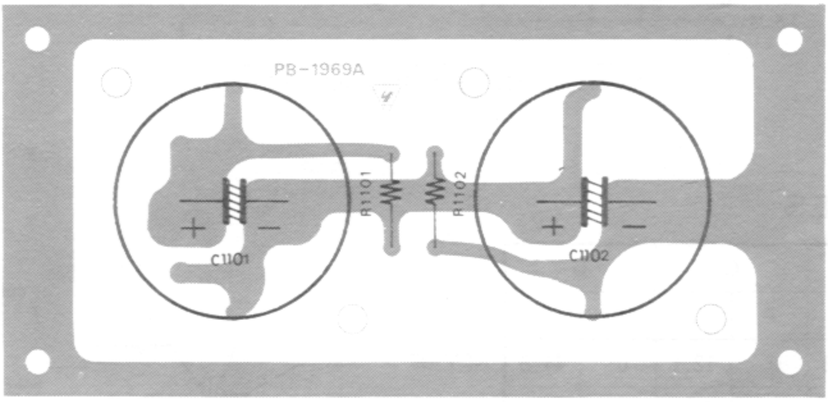
Viewed from solder side

CAPACITOR UNIT (PB-1969A)



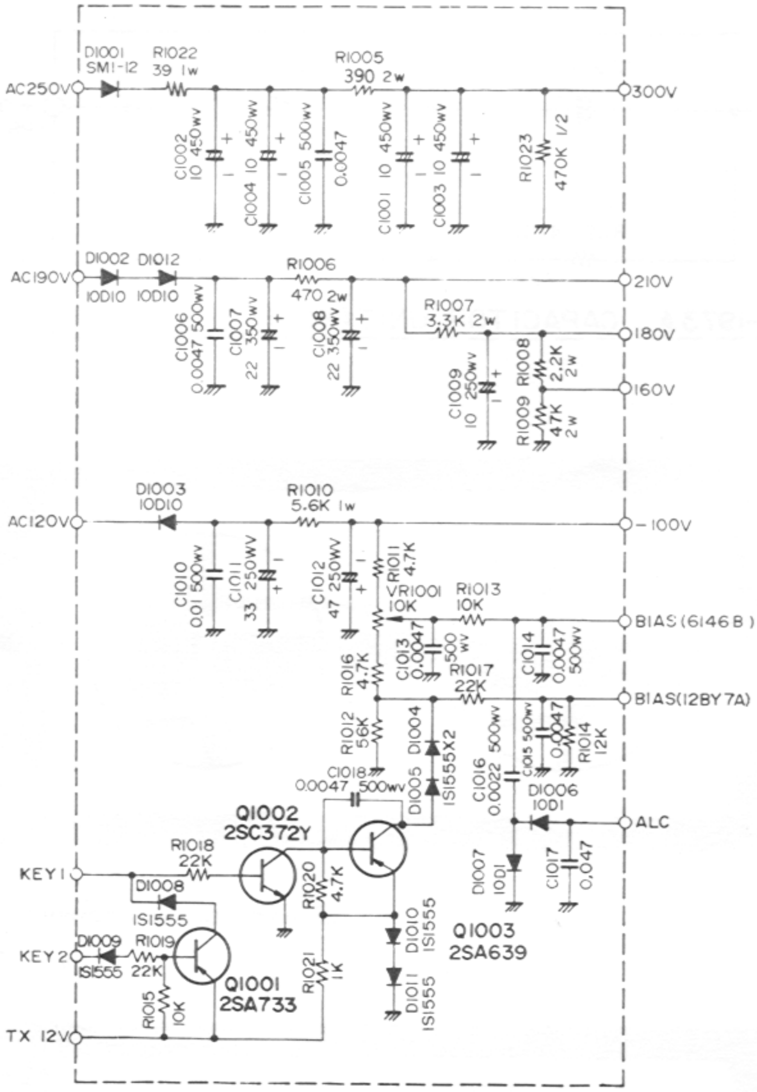


Viewed from component side



Viewed from solder side

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

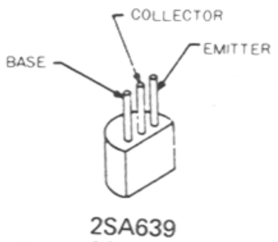


PB-1968 RECT. B(M. BIAS VOLTAGE) UNIT

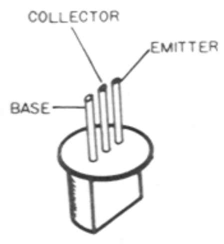
DC VOLTAGES

(V)

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

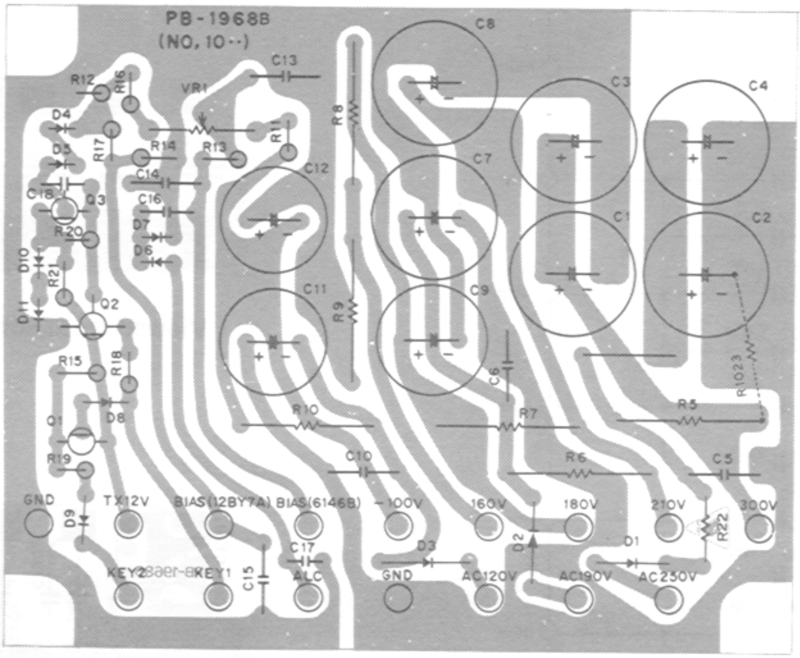


2SA639
2SA733

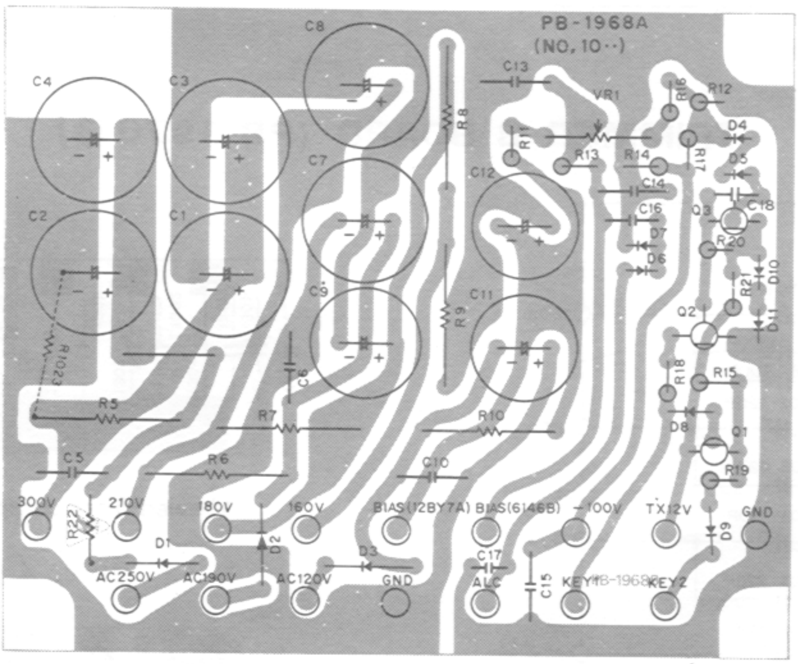


2SC372Y

RECT B UNIT PARTS LAYOUT

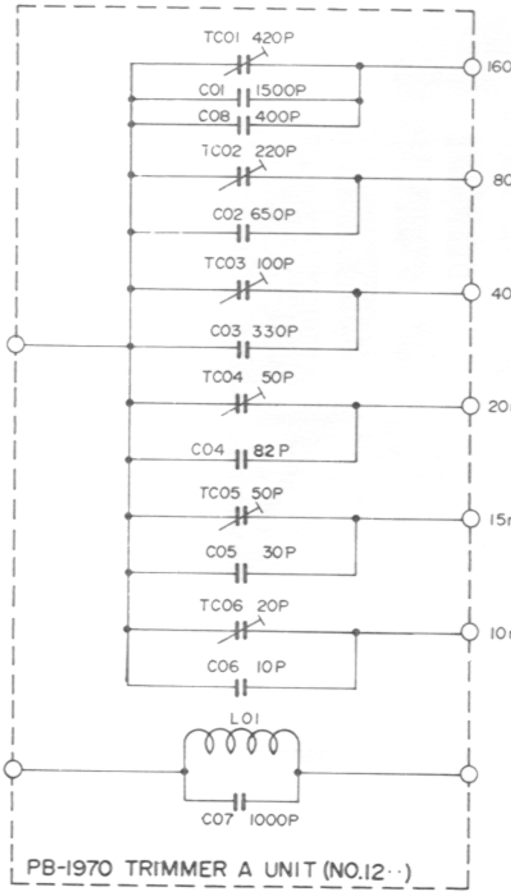


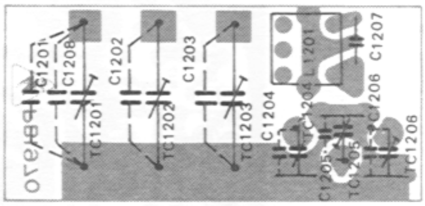
Viewed from component side



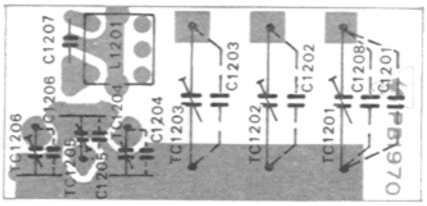
Viewed from solder side

TRIMMER A BOARD (PB-1970Ⓐ)



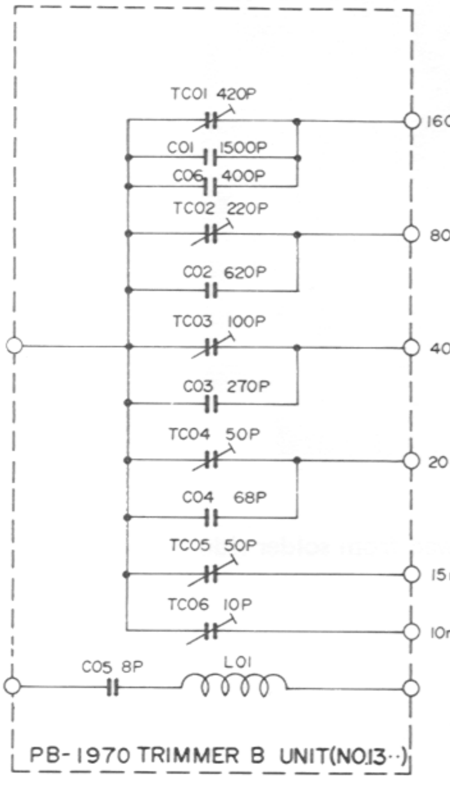


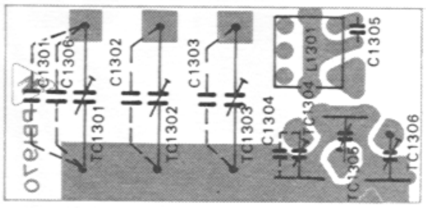
Viewed from component side



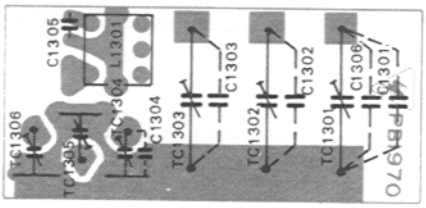
Viewed from solder side

TRIMMER B BOARD (PB-1970Ⓑ)



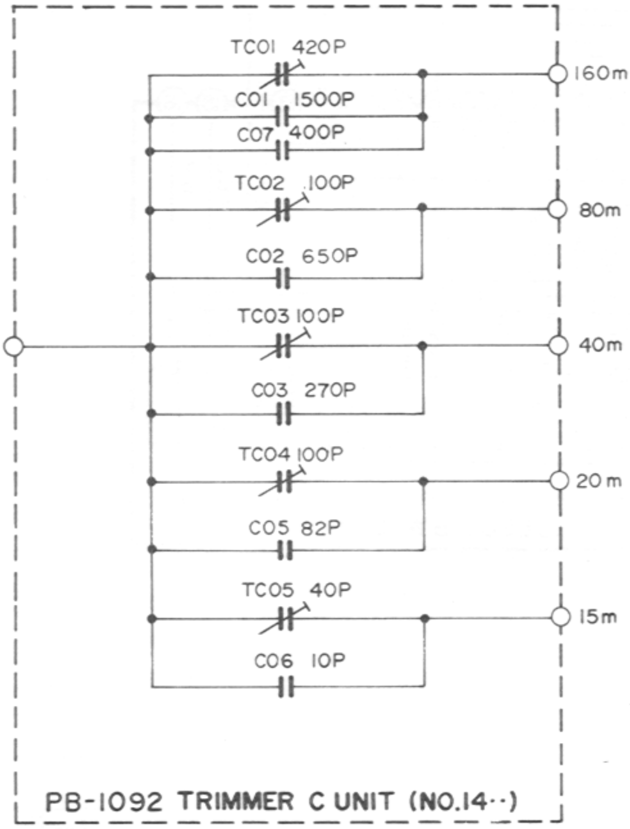


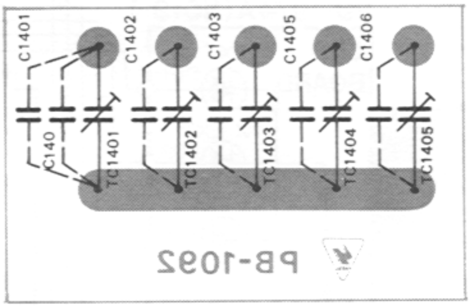
Viewed from component side



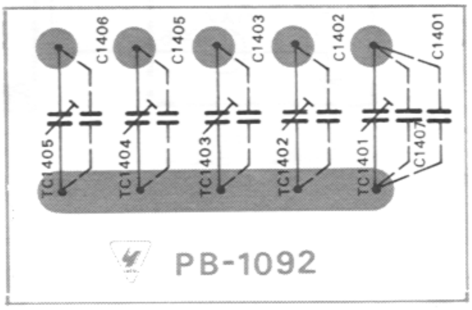
Viewed from solder side

TRIMMER C BOARD (PB-1092)



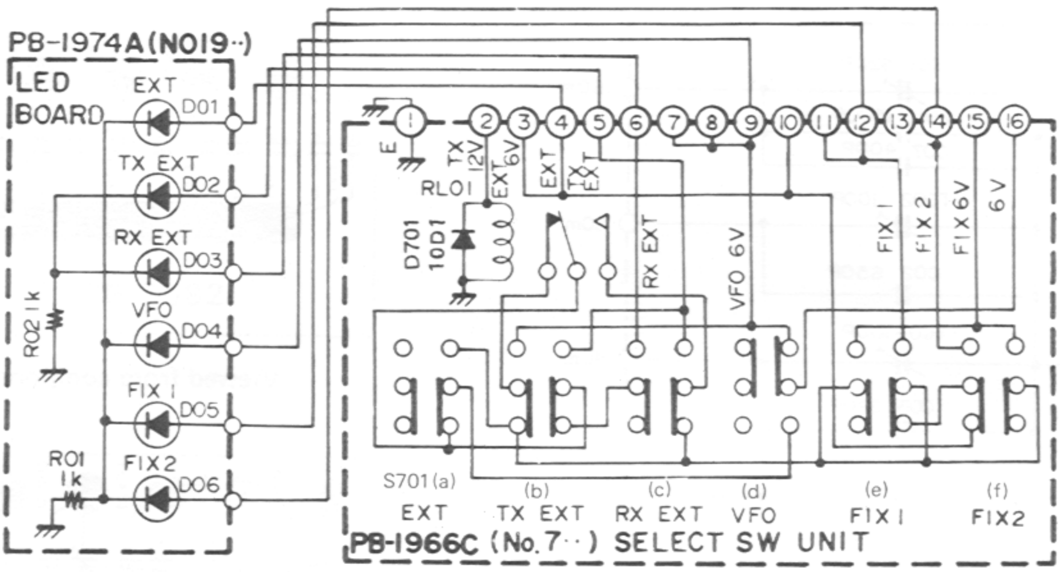


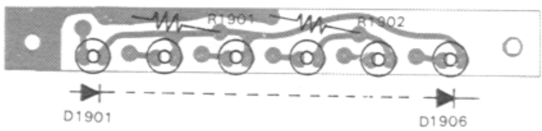
Viewed from component side

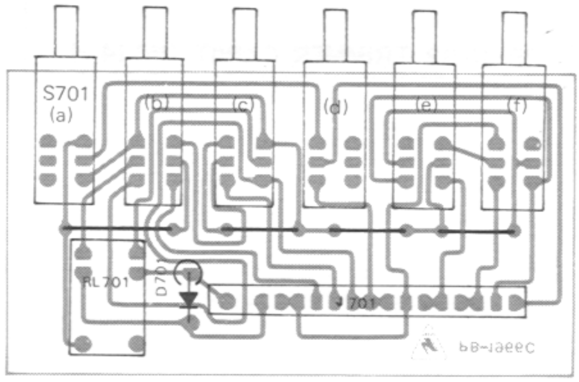


Viewed from solder side

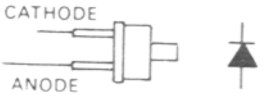
LED UNIT(PB-1974A) SELECT SWITCH UNIT(PB-1966C)



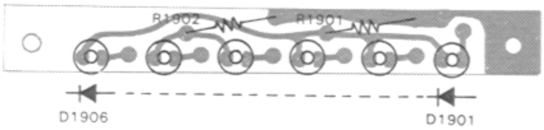


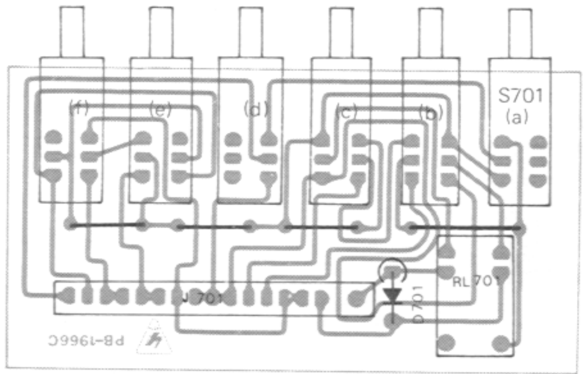


Viewed from component side



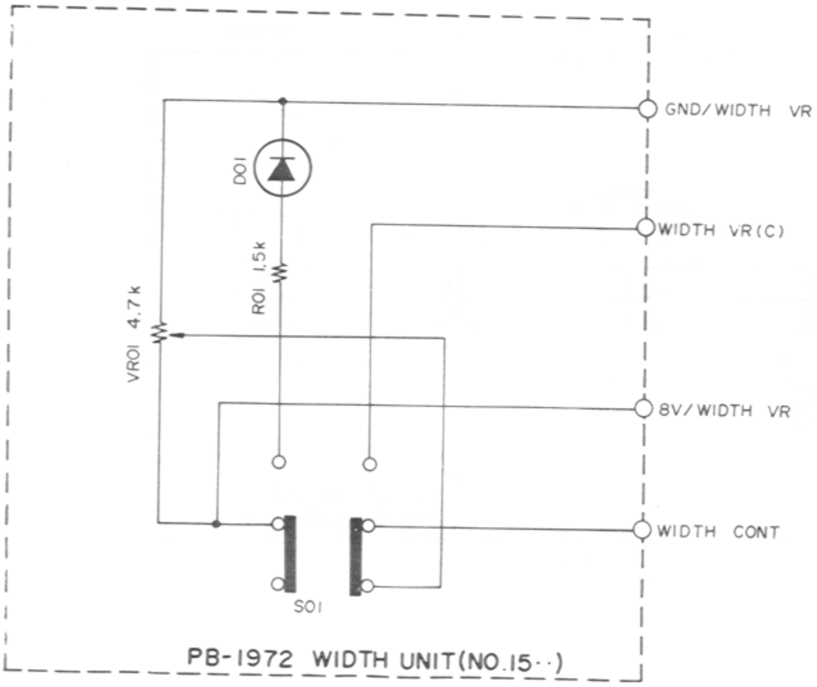
LED Connection

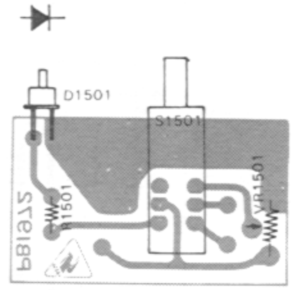




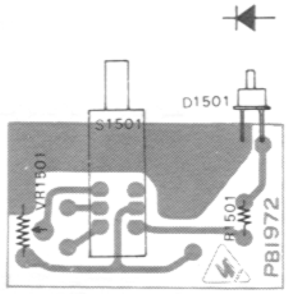
Viewed from solder side

BAND WIDTH CONTROL UNIT (PB-1972)

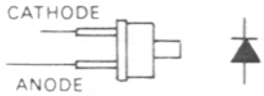




Viewed from component side

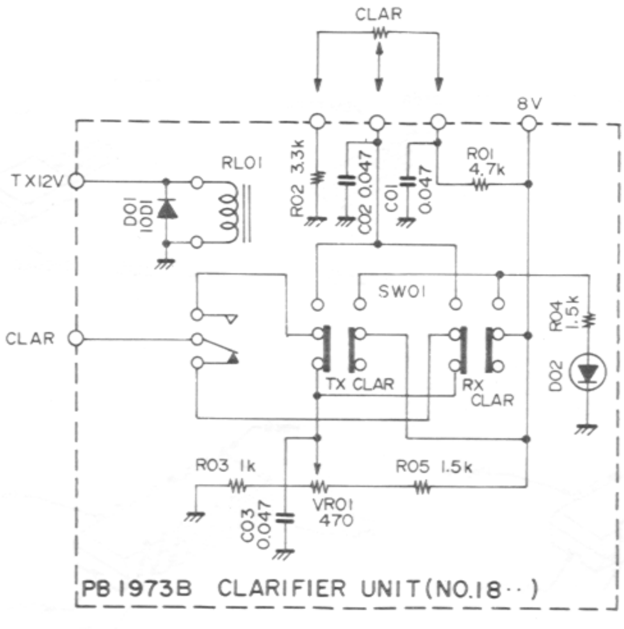


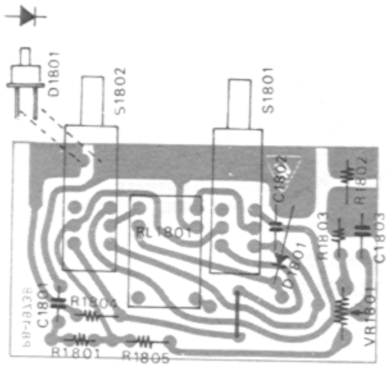
Viewed from solder side



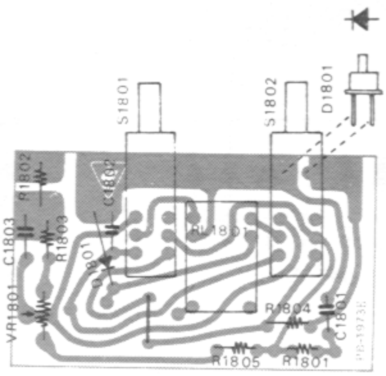
LED Connection

CLARIFIER UNIT (PB-1973)



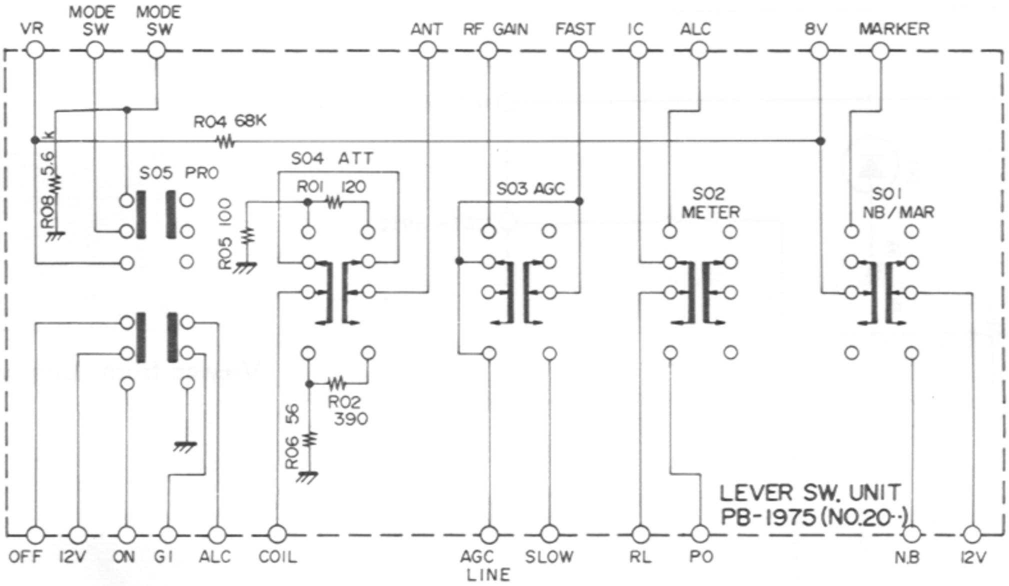


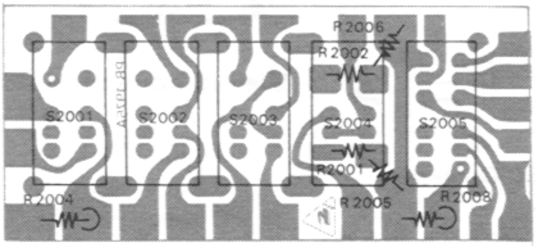
Viewed from component side



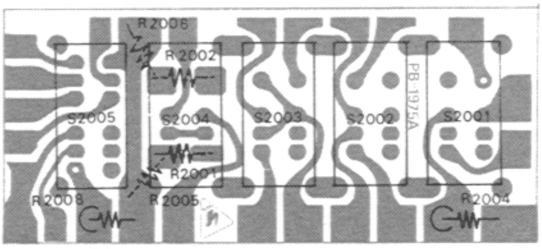
Viewed from solder side

LEVER SWITCH UNIT (PB-1975A)

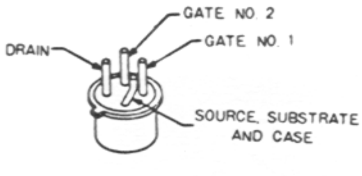




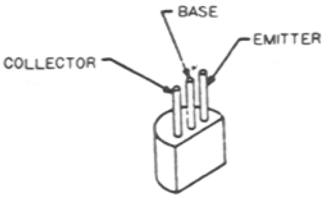
Viewed from component side



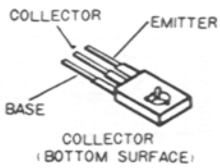
Viewed from solder side



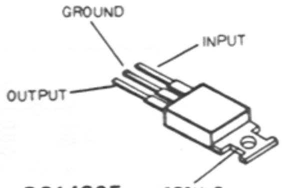
3SK40M
3SK51-03



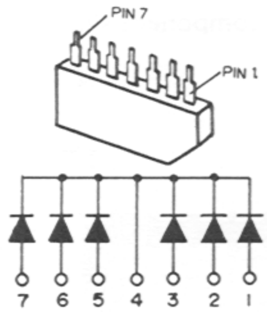
MPS3640



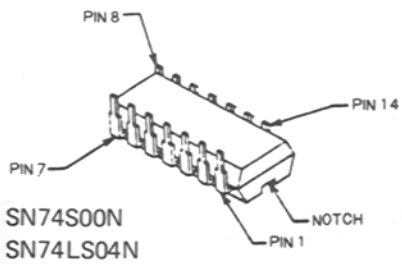
2SA496 O



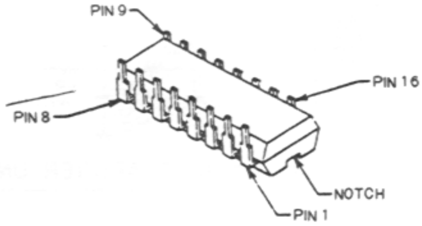
μPC14305



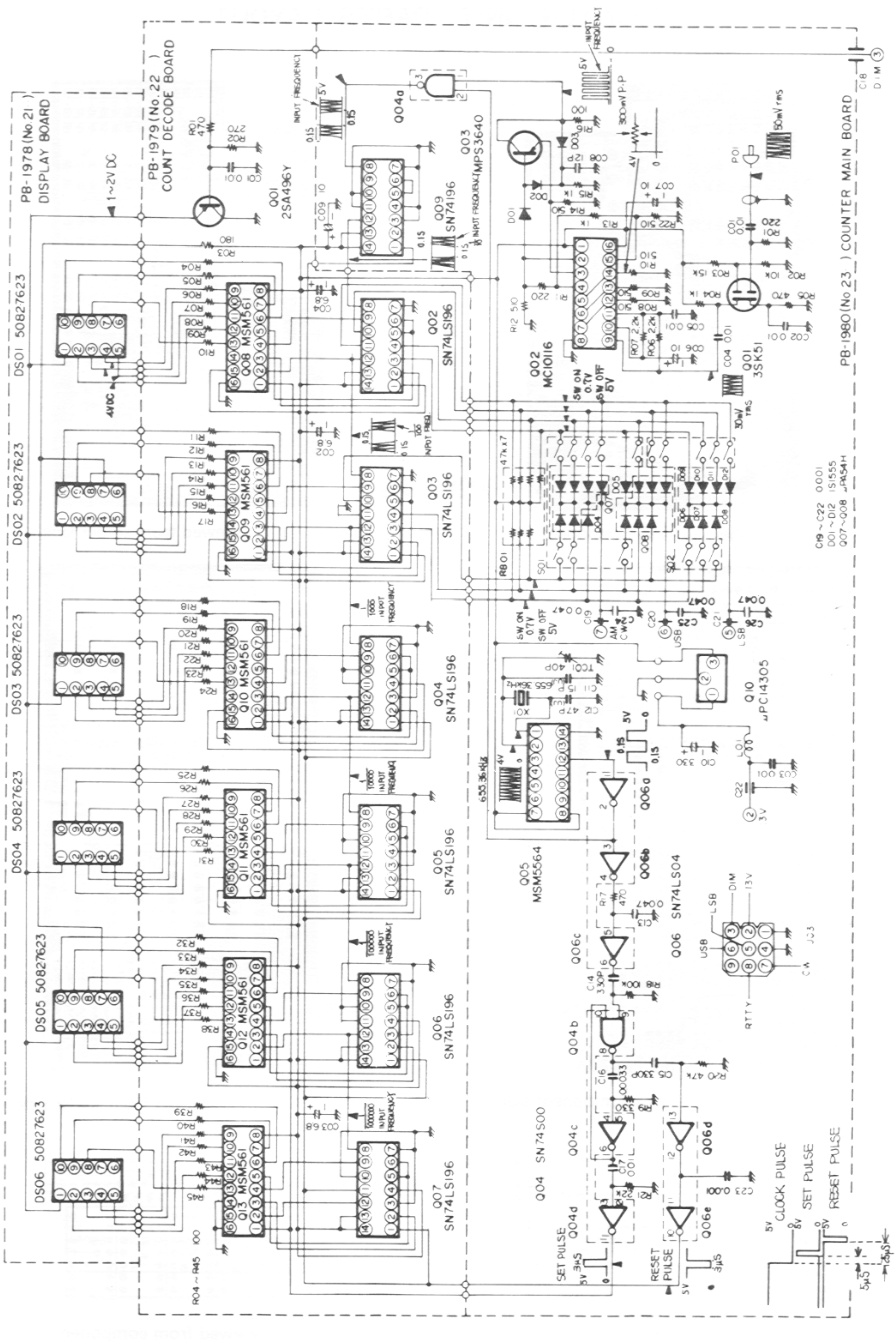
μPA54H



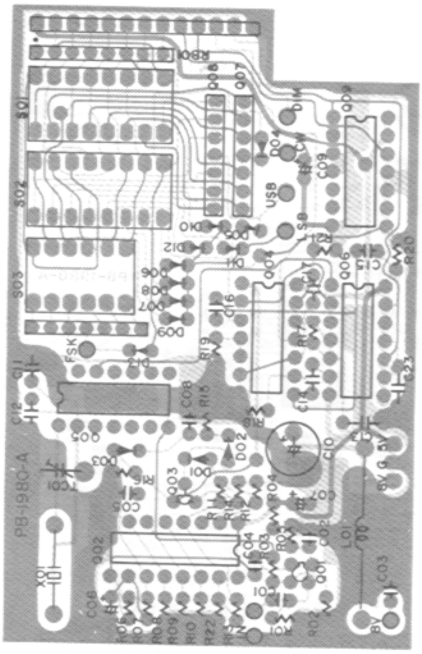
SN74S00N
SN74LS04N
SN74196N
SN74LS196N   MSM5564



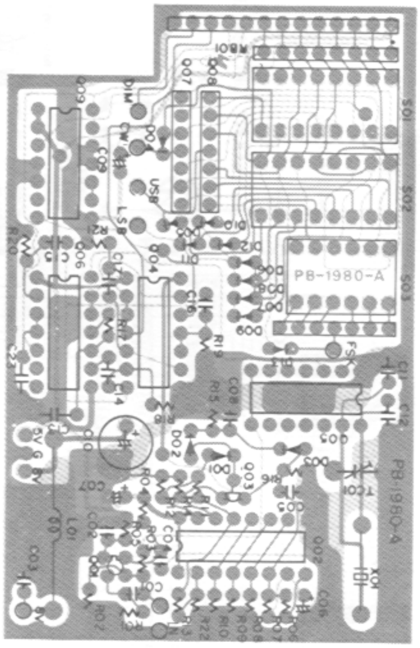
MSM561   MC10116


PB-1978 (No.21) DISPLAY BOARD
PB-1979 (No.22) COUNT DECODE BOARD
PB-1980 (No.23) COUNTER MAIN BOARD

COUNTER UNIT PARTS LAYOUT

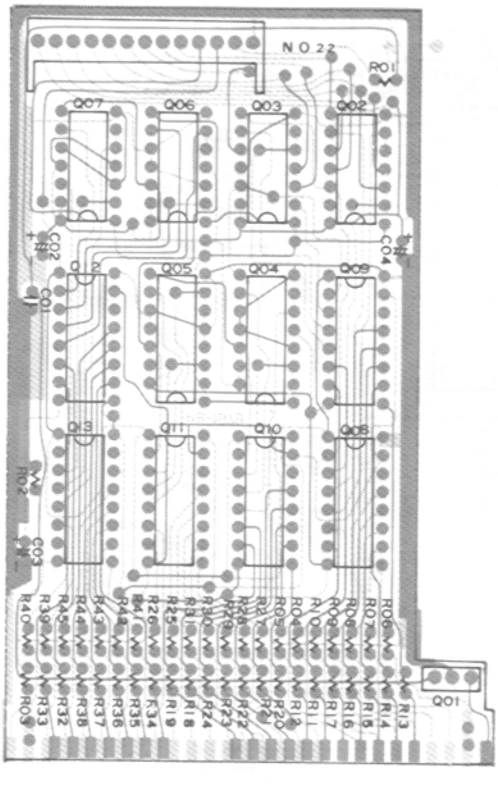


Viewed from component side

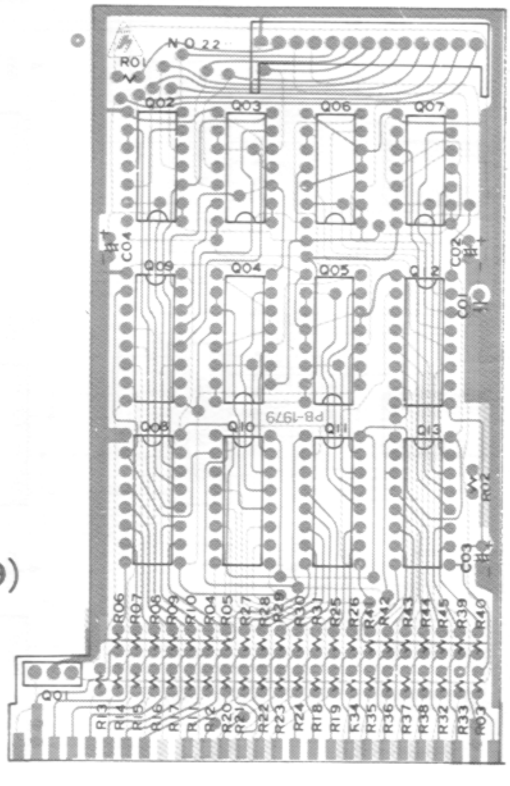


Viewed from solder side

(PB-1980)

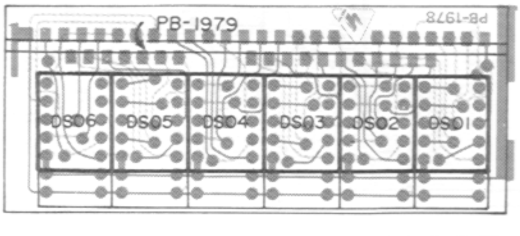


Viewed from component side

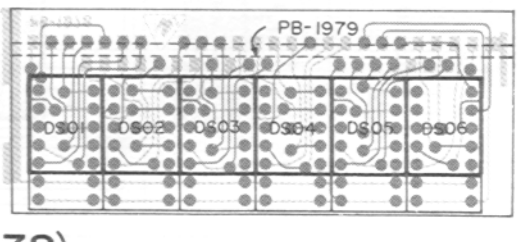


Viewed from solder side

(PB-1979)



Viewed from solder side



Viewed from component side

(PB-1978)

REMOVAL OF COUNTER AND DISPLAY UNITS

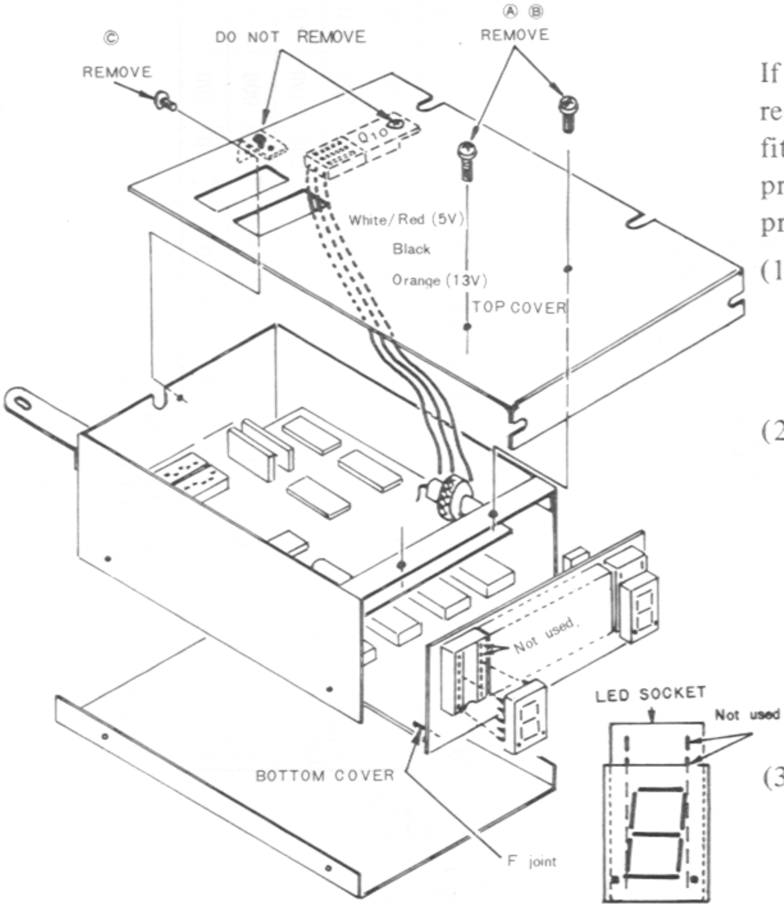


Figure 22.

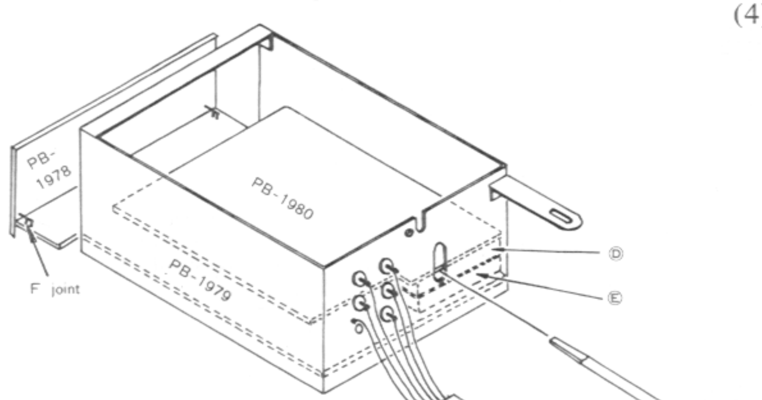


Figure 23.

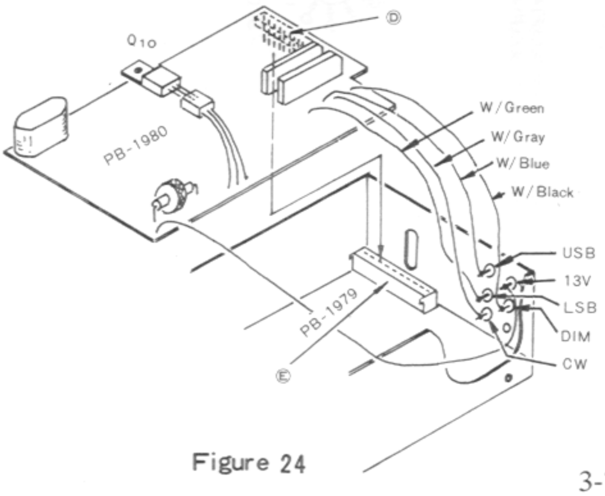


Figure 24

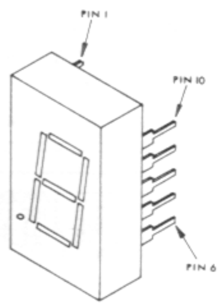
If servicing of the counter or display unit is required, some caution is required, as the physical fit of the two units is quite precise. However, the process is not difficult, if you follow the directions presented herein.

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

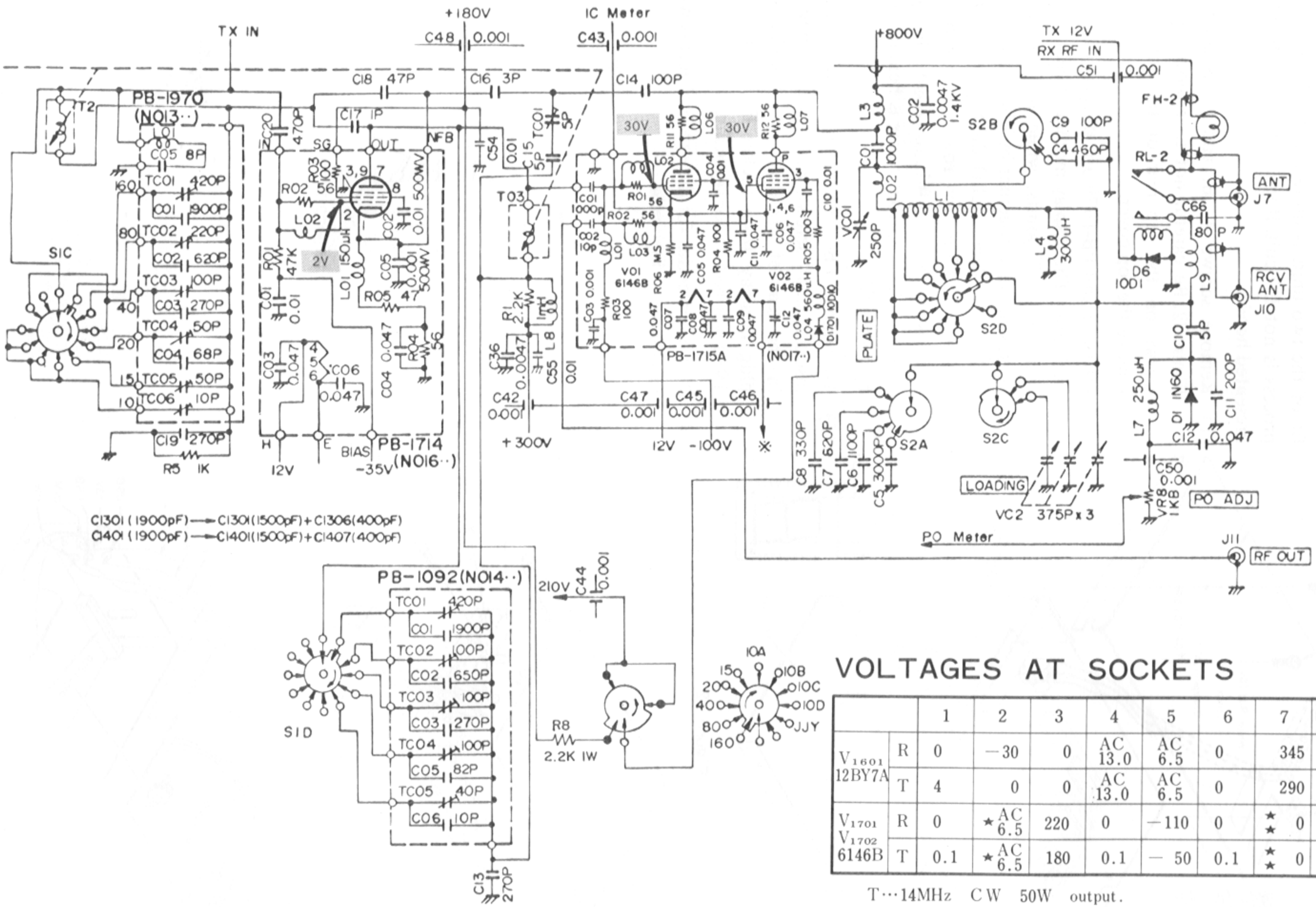
(2) PB-1980 and PB-1979 are stacked within the enclosure. The display module is held in place with two "F" joints, while the two circuit boards are held together by plug D and socket E. When replacing LED digits, note that the top two pins on each row of the socket are not used; be careful to align the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

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

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



HP5082-7623



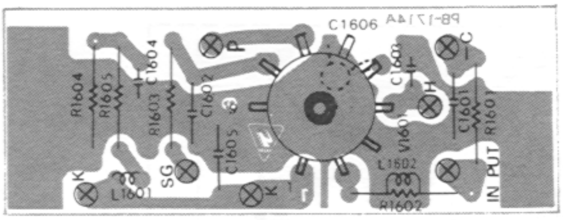
VOLTAGES AT SOCKETS

(V)

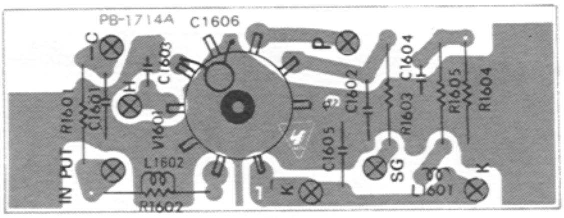
		1	2	3	4	5	6	7	8	9
V_{1601} 12BY7A	R	0	−30	0	AC 13.0	AC 6.5	0	345	235	0
	T	4	0	0	AC 13.0	AC 6.5	0	290	190	0
V_{1701} V_{1702} 6146B	R	0	★AC 6.5	220	0	−110	0	★★ 0	900	—
	T	0.1	★AC 6.5	180	0.1	− 50	0.1	★★ 0	790	—

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

DRIVER BOARD (PB-1714A)

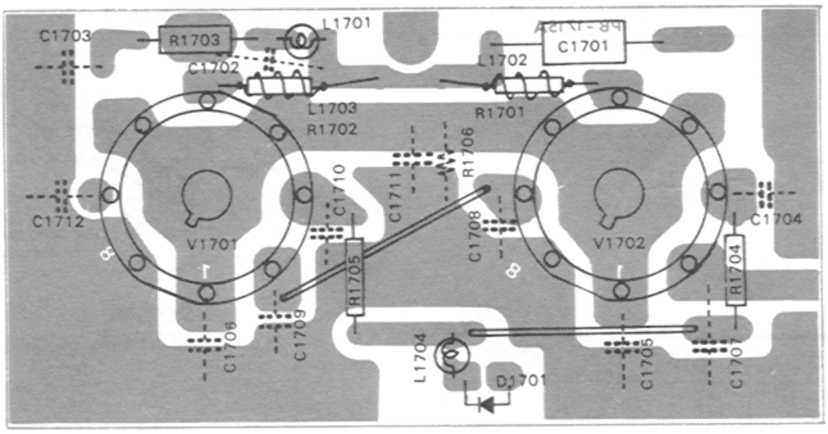


Viewed from component side

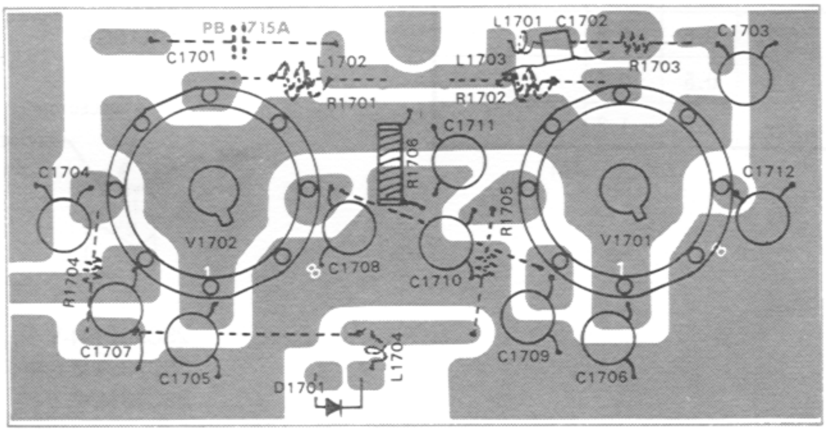


Viewed from solder side

FINAL BOARD (PB-1715A)

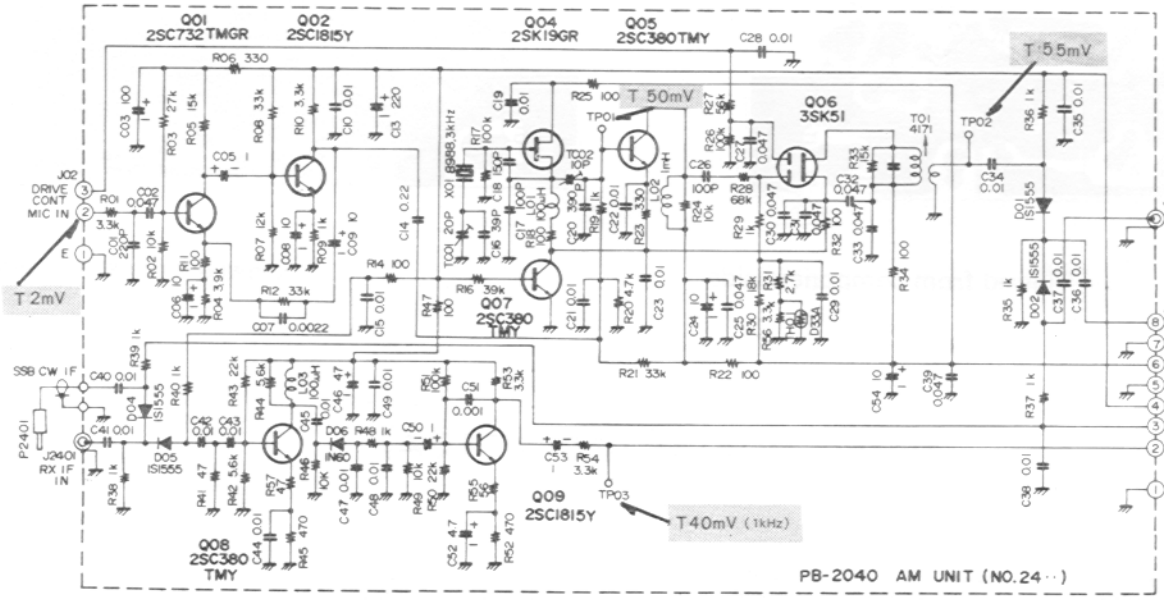


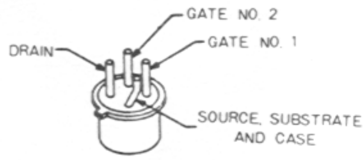
Viewed from component side



Viewed from solder side

AM UNIT (PB-2040)





3SK40M
3SK51-03

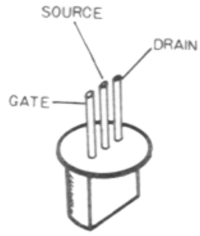
DC VOLAGES

(V)

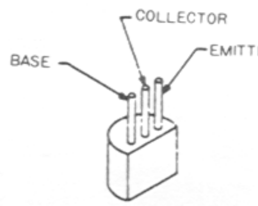
	E(S)		C(D)		B(G₁)		(G₂)	
	R	T	R	T	R	T	R	T
Q2401	1.4	1.4	2	2	2	2	—	—
Q2402	1.3	1.3	3.5	3.5	2	2	—	—
Q2404	0	0.6	0	7.5	0	−2.5	—	—
Q2405	0	0.3	0	8	0	1	—	—
Q2406	0	1.3	0	6.5	0	3	0	1.5
Q2407	0	0	0	0.15	0.6	0.8	—	—
Q2408	0.8	0.8	7.5	7.5	0.5	0.5	—	—
Q2409	0.6	0.6	3.9	3.9	1.2	1.2	—	—

DRIVE MAX (Q2406)

MODE AM

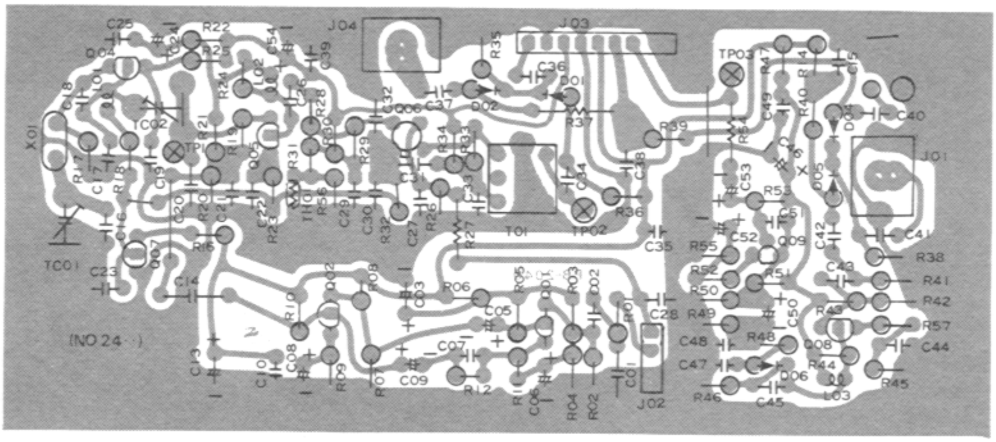


2SK19GR

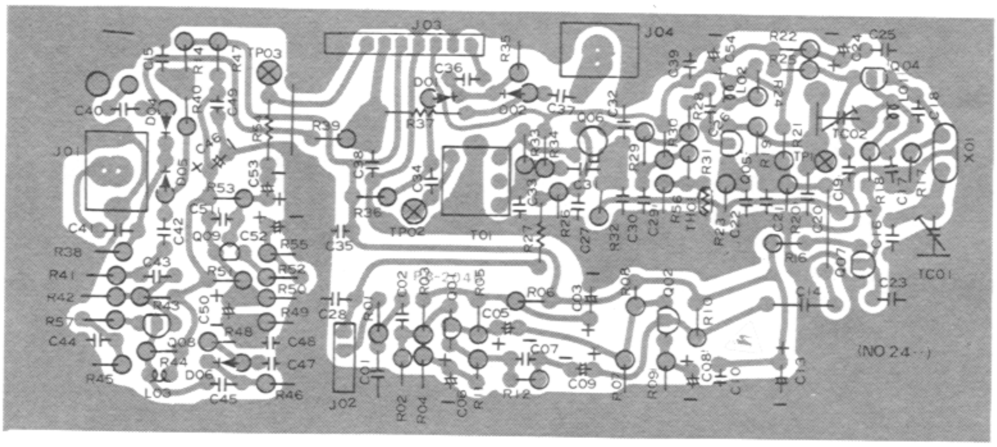


2SC380TM-Y
2SC732TM-GR
2SC1815Y

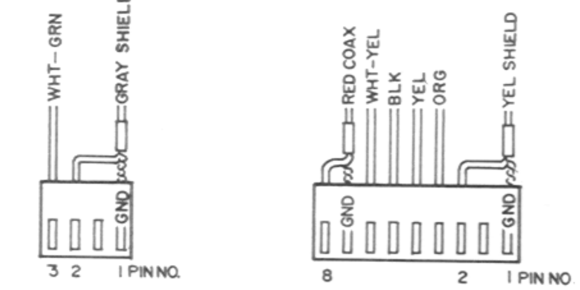
AM UNIT PARTS LAYOUT



Viewed from component side



Viewed from solder side



P19(J2402) P20(J2403)

SECTION 4 – REPAIR PARTS

PARTS LIST AND ORDERING DATA

If you live in the United States, you may order parts from Yaesu Electronics Corporation. In other countries, you should order parts from the Yaesu agent for your country. In countries where Yaesu is not currently represented, you may order spare parts directly from Yaesu Musen Company, Ltd. in Tokyo.

When ordering, please specify the exact model number of the transceiver that the part is for. Many parts are standard, such as resistors and disc ceramic capacitors, but you should use particular care when ordering such items as electrolytics, tantalum capacitors, and the like.

The parts list to follow identifies the board that the parts belong to, as well as the circuit designation and part description. A "Part Number" is also specified, and this number will allow immediate identification by our parts department of the item you require. (**See note below.)

Shipment of parts from Yaesu USA is usually made by UPS, COD. Allow at least a week for the parts department to process your order. You will receive prompt notification that your order has been received, and if parts are back ordered, or if additional information is required, you will be so informed.

PARTS ORDER EXAMPLE

QUANTITY	TRANSCEIVER IDENTIFICATION	LOCATION	**PART NUMBER	CIRCUIT DESIGNATION
1	FT-101ZD	PB-1960A	G4800510C	Q_{101} (3SK51-03)

**Note: In earlier transceivers, no part numbering system was used in the manual. For this reason, the nomenclature "3SK51" will suffice for the part number. All FT-101ZD transceivers have a part number for each component.

(cut here)

YAESU MUSEN COMPANY, LTD. – C.P.O. BOX 1500, TOKYO, JAPAN
YAESU ELECTRONICS CORPORATION – 15954 Downey Avenue, 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: (Print or Type)

Name: ____________________
Address: ____________________
City: ____________ State: ________ Zip: ________
Country: ____________________

YAESU MUSEN COMPANY, LTD. – C.P.O. BOX 1500, TOKYO, JAPAN
YAESU ELECTRONICS CORPORATION – 15954 Downey Avenue, 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: (Print or Type)

Name: ____________________
Address: ____________________
City: ____________ State: ________ Zip: ________
Country: ____________________

. . . .
(cut here)

YAESU MUSEN COMPANY, LTD. – C.P.O. BOX 1500, TOKYO, JAPAN
YAESU ELECTRONICS CORPORATION – 15954 Downey Avenue, 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: (Print or Type)

Name: ____________________
Address: ____________________
City: ____________ State: ________ Zip: ________
Country: ____________________

PARTS LIST

MAIN CHASSIS

Symbol No.	Parts No.	Description
		IC, TRANSISTOR
Q2	22104960	2SA496
Q1	22206160	2SB616
Q3	25000116	μPC14308
		DIODE
D1	21090115	Ge 1N60
D2–5	21015550	Si 1S1555
D6	21090011	" 10D1
		RESISTOR
R22	40143220	Carbon film 1/4W TJ 22Ω
R14	41143560	" " " " 56Ω
R7,11	41143101	" " " " 100Ω
R18	41143821	" " " " 820Ω
R4,5	41143102	" " " " 1kΩ
R6	41143152	" " " " 1.5kΩ
R19	41143182	" " " " 1.8kΩ
R17	41143222	" " " " 2.2kΩ
R20	41143474	" " " " 470kΩ
R2	42124100	Carbon composition 1/2W GK
		10Ω
R9,10	42124560	" " " " 56Ω
(with L5,L6)		
R3	42124101	" " " " 100Ω
R1	42124222	" " " " 2.2kΩ
R21	42204229	Wire wound 1W 2.2Ω
		POTENTIOMETER
VR1	49800140	VM11AB06A5M1112 10kΩB
VR2	49800123	DM10A039A 500kΩB/20kΩB
VR3	49800124	DM10A039A 5kΩA/5kΩB
VR4	49800141	VM10A592A 5kΩA
VR5,6	49800125	VM10A592A 5kΩB
VR7	49800126	DM10A039A 5kΩB/5kΩA
VR8	49800127	VM10A654A 1kΩB
VR9,10	49800128	VM10A654A 5kΩB
VR11	49800129	VM10AB08A 5kΩB
		CAPACITOR
	33834050	Dipped mica 500WV 5pF
C13	33834271	" " " 270pF
		(Z18D 271K5)
C8	33834331	" " " 330pF
		(DM-15-331K5)
C7	33834621	" " 500WV 620pF
		(DM19D621K5)
C6	33834112	" " 500WV 1100pF
		(DM19 112K5)
C5	33834302	" " 500WV 3000pF
		(DM19 302K5)
	33834681	" " 500WV 680pF
		(LCQ21 681K5)
	33834122	" " 500WV 1200pF
		(LCQ21 122K5)

C17	31830010	Ceramic 500WV 1pF
C10	31830050	" " 5pF
C18	31830470	" " 47pF
C11	31830201	" " 200pF
C19,21	31830271	" " 270pF
C20	31830471	" " 470pF
C16	31844030	" 1KV 3pF
C15	31844050	" " 5pF
C14	31844101	" " 100pF
C3	31249461	1.5KWV 460pF
C9	31249101	" 3KV 100pF
C1	31249102	" " 1000pF
C29,34,35,41,	30820103	" 50WV 0.01μF
C12,22–24,39,	30820473	" " 0.047μF
40,56,58,60		
C27,28,36	30830472	" 500WV 0.0047μF
C30,32,33,54,	30830103	" " 0.01μF
55, 61		
C2,25,26	30240472	" 1.4KV 0.0047μF
C31,37,38,64	30240103	" " 0.01μF
C42–51	32830102	Feed thru 500WV 0.001μF
		(ECK-L2H102PE)
C63	34220476	Electrolytic 16WV 47μF
C62	34220228	" " 2200μF
		VARIABLE CAPACITOR
VC1	39000083	YB-230 230pF
VC2	39000061	C134E125
		TRIMMER CAPACITOR
TC1	39000072	TSN120C 10Px2
		INDUCTOR
L1	55003396	#220534A
L2	55003398	#220611
L3	54000050	#220065
L4	54000040	#220064
L5,L6	55003216	#220308
(R9,R10)		
L7	53010003	250μH
L8	53020001	1mH FL-5H-102J
		TRANSFORMER
T1	55003398	#220544
T2	55000460	#220011
T3	55000500	#220074
		METER
M1	74000430	Y-45-02 #250042
		SPEAKER
SP1	76000019	SA-92Y 4Ω 3W

		POWER TRANSFORMER
PT1	52000054	52-74 (#230028)
		RELAY
RL1	70000037	FRL-263 D012/04CS01
RL2	70000002	MX2P
		RELAY SOCKET
RLS1	69000011	263H204
RLS2	69000003	PX08
		SWITCH
S1	61000620	#250041
S2	61000630	#250044
S3	62000031	ESR-E485R20
S4,5	64000006	WD9223
		COOLING FAN
FAN1	75000004	2SB10A
		RECEPTACLE
J1,3	68030002	SG7814
J2	68040003	FM144S
J4	67060006	D6-701B00
J5 (with wire)	68090039	1625-09R-1 (#240128)
J6	68020010	SI7501-1
J7	68000011	M-BR-06B
J8	68110001	SA602B00
J9–14	68020001	STR-01
J15	68020012	SG-8050
J16	67090003	AC9-PF
J17	68060021	QS-DB6-ML
		MULTI JACK
MJ1	68100009	121S-10B-105A
MJ2	68200002	220D-20B-205A
MJ3	68140010	121S-14B-105A
		PLUG
P1 (with wire)	68120011	5047-12A #240129
P2 (")	68130003	5047-13A #240130
P3 (")	68150009	5047-15A #240131
P4 (")	68190001	5047-19A #240132
P5 (")	68150010	5047-15A #240133
P6 (")	68080010	5047-08A #240134
P7 (")	68050009	5047-05A #240135
P8 (")	68080009	5047-08A } #240137
P9 (")		5047-12A } #240137
P10 (")		5047-16A } #240137

P18 (with wire)	68030008	5047-03A #240129
P11,14	67020007	SQ4052
P15	67040002	SI5908
P16	67020009	SI-7502
		FUSE
F1	73000004	5A (100V–117V)
	73000003	3A (200V–234V)
		FUSE HOLDER
FH1	69030007	SN1001 #2
FH2	69030001	F3265
		PILOT LAMP
PL1	14000027	BF311-04071A
PL2–5	14000037	BQ054-32732B
	91100001	Thru terminal FT-SM1
	91001339	" A339 (HV)
	92200007	Terminal block ML-3182 20P
	90010001	Terminal board 1L2PS
	90010002	" 1L3PS
	90020002	" 1L4PS
		LED B BOARD
PB-1390	60413900	P.C.Board
D9	21090140	GD4-203-SRD

RF UNIT

Symbol No.	Parts No.	Description
	019601AZ	RF unit with components
PB-1960A	60419601	P.C. Board
		FET & TRANSISTOR
Q103,104	22800195	FET 2SK19GR
Q105,106	23800401	" 3SK40M
Q101	23800513	" 3SK51-03
Q102	22890021	" J310
Q107	22390006	TR 2N4427
		DIODE
D104	21010070	Ge (GB) 1S1007
D101–103	21015550	Si 1S1555

		RESISTOR
R119	40143479	Carbon film 1/4W VJ 4.7Ω
R110	40143820	" " " " 82Ω
R106–108, 116,120,121, 130	40143101	" " " " 100Ω
R111	40143221	" " " " 220Ω
R113, 114, 128,129	40143331	" " " " 330Ω
R112	40143471	" " " " 470Ω
R118	40143821	" " " " 820Ω
R105	40143102	" " " " 1kΩ
R117	40143152	" " " " 1.5kΩ
R102,109,122	40143272	" " " " 2.7kΩ
R104,	40143562	" " " " 5.6kΩ
R115	40143822	" " " " 8.2kΩ
R124	40143223	" " " " 22kΩ
R103	40143393	" " " " 39kΩ
R123	40143563	" " " " 56kΩ
R125	40143124	" " " " 120kΩ
R101	42124225	Carbon composition 1/2W GK 2.2MΩ
		CAPACITOR
C125	33821030	Dipped mica 50WV 3pF
C107	33821040	" " " 4pF
C116	33821471	" " " 470pF
C102,108	31829101	Ceramic 50WV SL 100pF
C103–106, 110–112, 114,115,117, 119–124	30821103	" 50WV 0.01μF
C101,118	30820473	" " 0.047μF
C113	34220106	Electrolytic 16WV TT 10μF
		TRIMMER CAPACITOR
TC101	39000006	ECV-1ZW 10x40 10pF
		INDUCTOR
L101,102	53020027	FL-5H 271K 270μH
		TRANSFORMER
T101,103,105	55003174	#220209
T102,104	55003175	#220221
		JACK
J101–103	68020021	SQ3081

NB·FIX UNIT

Symbol No.	Parts No.	Description
	019612AZ	NB.FIX unit with components
PB-1961B	60419612	P.C. Board
		TRANSISTOR
Q201–204	22303724	2SC372Y
Q205,206	22315830	2SC1583
		DIODE
D201–204	21090115	Ge 1N60
D205–209	21015550	Si 1S1555
		RESISTOR
R208,216,224, 230,238,239	40143101	Carbon film 1/4W VJ 100Ω
R204	40143221	" " " " 220Ω
R222,236	40143471	" " " " 470Ω
R231–233,235	40143561	" " " " 560Ω
R206,207,215, 221,234,237	40143102	" " " " 1kΩ
R210	40143472	" " " " 4.7kΩ
R205,209,218	40143562	" " " " 5.6kΩ
R202,203,212, 214,225,226	40143103	" " " " 10kΩ
R201,220,223	40143153	" " " " 15kΩ
R211,213,219	40143223	" " " " 22kΩ
R217	40143683	" " " " 68kΩ
		CAPACITOR
C216–218	33821331	Dipped mica 50WV 330pF
C234,236	33821471	" " " 470pF
C235	33821821	" " " 820pF
C208,209	31820150	Ceramic 50WV NPO 15pF
C206	31829200	" " SL 20pF
C204	31829101	" " SL 100pF
C201	31829331	" " " 330pF
C202,203,205, 211,212,221, 225–227, 229–233	30820103	" " 0.01μF
C207,210,213, 215,219,220, 223,224,228, 237	30820473	" " 0.047μF
C214	34820105	Electrolytic 50WV 1μF
		TRIMMER CAPACITOR
TC201,202	39000005	ECV-1ZW 50x32 50pF

		INDUCTOR
L207,208	53020014	FL-4H 1R8K 1.8μH
L204–206	53020023	FL-5H 101K 100μH
L201–203	53020001	FL-5H 102K 1mH
		TRANSFORMER
T201,202	54141700	R12-4170
		CRYSTAL SOCKET
XS201	69010007	S-14 2P
		MINI CONNECTOR
J201	67080006	5048-08A
J202	67120010	5048-12A

PREMIX UNIT

Symbol No.	Parts No.	Description
	019621AZ	PREMIX unit with components
PB-1962A	60419621	P.C. Board
		IC. FET. TRANSISTOR
Q303	25000104	IC SN76514N
Q301	22800195	FET 2SK19GR
Q302	22303730	TR 2SC373
		DIODE
D301–314	21015550	Si 1S1555
		RESISTOR
R312	40143101	Carbon film 1/4W VJ 100Ω
R316,318	40143121	〃 〃 〃 〃 120Ω
R317	40143151	〃 〃 〃 〃 150Ω
R311,315	40143221	〃 〃 〃 〃 220Ω
R301–309	40143222	〃 〃 〃 〃 2.2kΩ
R310,313,314	40143103	〃 〃 〃 〃 10kΩ
		CAPACITOR
C323	33824390	Dipped mica 50WV 39pF
C319	33824271	〃 〃 〃 270pF
C311,315	33824681	〃 〃 〃 680pF
C330	31820151	Ceramic 50WV CH 150pF
C301, 302	30820103	〃 〃 0.01μF
304–306,		
308–310,		
C312–314,	30820103	Ceramic 50WV 0.01μF
316–318,		
320–322,		
324–326,		
328, 329		
331–343		
C303,307,327	36825102	Mylar 〃 0.001μF
		INDUCTOR
L317	53020035	FL-4H 1R0M 1μH
L301–314	53020027	FL-5H 271K 270μH
L315,316,318,	53020001	FL-5H 102K 1mH
319		
		TRANSFORMER
T301,302	55003399	#220500
T303,304	55003400	#220501
T305,306	55003401	#220502
T307,308	55003403	#220504
T309,310	55003405	#220505
T311,312	55003406	#220506
T313,314	55003407	#220507
T315	55003409	#220210
		JACK
J301	68020021	SQ3081
P301	67020007	SQ4052

IF UNIT

Symbol No.	Parts No.	Description
	019632AZ	IF unit with components
PB-1963B	60419632	P.C. Board
		IC. FET. TRANSISTOR
Q403	25000105	IC TA7060P
Q406	22800196	FET 2SK19BL
Q402,413,414,	22800195	〃 2SK19GR
419,425		
Q401,405,412,	23800513	〃 3SK51-03
415,416		
Q408	22890021	〃 J310
Q407,420	22105641	TR 2SA564A
Q404,409,410,	22303724	〃 2SC372Y
417, 418,		
422–424		
Q421	22305351	〃 2SC535A
Q411	22390001	〃 MPSA13
		DIODE
D416,417	21090150	Ge 1N60
D405–408,	21010070	" (GB) 1S1007
414, 421		

D401–404,	21015550	Si 1S1555	
409–413,			
419			
D418	21022090	Varactor 1S2209	
D422	21090137	〃 FC63	
D420, 423	21090034	Zener WZ090	
		CRYSTAL	
X401	71800111	HC-18/U 19.7475MHz	
		CRYSTAL FILTER	
XF401	71000023	XF8.9HS	
XF402	71000021	XF8.9HC	
(OPTION)			
XF403	71000040	XF8.9HP	
XF404	71200017	8.9M20A	
XF405	71000024	XF10GS	
		RESISTOR	
R0517,0518,0520	40143220	Carbon film 1/4W VJ	22Ω
R410, 411	41143101	〃 〃 〃 TJ	100Ω
R402,408,419,	40143101	〃 〃 〃 VJ	100Ω
422,423,437,			
439,444,446,			
463,464,469,			
475,482,483,			
497,0514			
R425,447,451,	40143221	〃 〃 〃 〃	220Ω
486, 0507,			
0508			
R0502	40143331	〃 〃 〃 〃	330Ω
	40143391	〃 〃 〃 〃	390Ω
R443	40143471	〃 〃 〃 〃	470Ω
R430,474,480	40143561	〃 〃 〃 〃	560Ω
R467,468	40143681	〃 〃 〃 〃	680Ω
R0515	40143821	〃 〃 〃 〃	820Ω
R406,416,428,	40143102	〃 〃 〃 〃	1kΩ
437,440,442,			
449,453,457,			
459,462,488,			
494,0504,			
0506			
R429,495,	40143152	〃 〃 〃 〃	1.5kΩ
R0516	41143182	〃 〃 〃 TJ	1.8kΩ
R454,455,458,	40143222	〃 〃 〃 VJ	2.2kΩ
0510			
R460	40143272	〃 〃 〃 〃	2.7kΩ
R401,409,412,	40143332	〃 〃 〃 〃	3.3kΩ
413,417,431,			
456,496,0511			
R426,427	40143472	〃 〃 〃 〃	4.7kΩ
R403,445,481,	40143562	〃 〃 〃 〃	5.6kΩ
489			
R434, 450	40143682	〃 〃 〃 〃	6.8kΩ
R404,420,421,	40143103	〃 〃 〃 〃	10kΩ
424,436,470,			
471,477,484,			
485,491,492,			
0501, 0509,			
0512			
R433	41143103	〃 〃 〃 TJ	10kΩ

R407,415,438,	40143153	〃 〃 〃 VJ	15kΩ
476,498,499			
	40143223	〃 〃 〃 〃	22kΩ
R414	40143273	Carbon film 1/4W TJ	27kΩ
R461,472,478,	40143473	〃 〃 〃 〃	47kΩ
0500			
R405,432,441,	40143104	〃 〃 〃 〃	100kΩ
465,466			
R493	49143154	〃 〃 〃 〃	150kΩ
R448,452,487,	40143184	〃 〃 〃 〃	180kΩ
0503,0505			
	40143224	〃 〃 〃 〃	220kΩ
R435, 490	40143105	〃 〃 〃 〃	1MΩ
	40143225	〃 〃 〃 〃	2.2MΩ
R0519	42144566	〃 Composition GK	5.6MΩ
		POTENTIOMETER	
VR401,402	49905102	SR-19R	1kΩB
VR403,404	49905103	〃	10kΩB
VR405	49905473	〃	47kΩB
		CAPACITOR	
C477	33824221	Dipped mica 50WV	220pF
C445,472	31820100	Ceramic 50WV CH	10pF
C488,492	31827330	〃 〃 UJ	33pF
C489	31827390	〃 〃 UJ	39pF
C404,421,432	31820470	〃 〃 CH	47pF
C487	31827101	〃 〃 UJ	100pF
C459,464,475	31820101	〃 〃 CH	100pF
C401,405,406,	30820103	〃 〃	0.01μF
411,413,415,			
417,419,420,			
423,424,428,			
430,431,433,			
435,440,442,			
443,446,448,			
451–455,			
460,465,482,			
484–486,			
490,491,493,			
494,497			
C402,403,407,	30820473	〃 〃	0.047μF
408,410,412,			
414,416,418,			
422,425–427,			
429,436–438,			
441,444,447,			
457,458,462,			
463,468–471,			
473,474,495,			
498			
C449	30820104	〃 〃	0.1μF
C461,467	36825103	Mylar 50WV	0.01μF
C478	36825223	〃 〃	0.022μF
C409,439,456,	36825473	〃 〃	0.047μF
466,480,481,			
483			
C434	36526224	Tantalum 35WV	0.22μF
C479	36526225	〃 〃	2.2μF
C450,476,496	34220106	Electrolytic 16WV	10μF
	34220336	〃 〃	33μF

		INDUCTOR
L401–408,	53020023	FL-5H 101K 100μH
410		
L411, 412	53020027	FL-5H 271K 270μH
L409	55003178	5.2μH #220145
		TRANSFORMER
T410	54140740	R12-4074
T402,403,404,	54141700	R12-4170
407,409,413,		
414		
T401,406,408,	54141710	R12-4171
415		
T405	55003177	#220221
T411	55003410	#220460
T412	55003174	#220209
		MINI CONNECTOR
J401	67120010	5048-12A
J402	67130001	5048-13A
J403	67150010	5048-15A
TP401–412	91100008	Wrapping terminal

AF UNIT

Symbol No.	Parts No.	Description
	019641AZ	AF unit with components
PB-1964A	60419641	P.C. Board
		IC. FET. TRANSISTOR
Q503	25000125	IC MC3403P
Q506	25000177	" MC14024B
Q504	25000151	" SN74LS123N
Q502	25000134	" TA7063P
Q501	25000210	μPC2002H
Q505	25000172	" 78L05
Q514	22800195	FET 2SK19GR
Q515	22105640	TR 2SA564
Q511	22303730	" 2SC373
Q507,508	22310005	" 2SC1000GR
Q512	22313830	" 2SC1383
Q509,510,513,	22318154	" 2SC1815Y
516		
		DIODE
D506,510,511	21090115	Ge 1N60
D502–505	21010070	Ge (GB) 1S1007
D507–509,	21015550	Si 1S1555
512–517,		
520,519,521		
D501,518	21090011	" 10D1

		CRYSTAL
X501	71600032	HC-6/W 3200kHz #210026
X502	71800085	HC-18/U 8986kHz #210042-1
X503	71800086	" 8989kHz #210042-2
X504	71800087	" 8988.3kHz #210042-3
		RESISTOR
R511	40143479	Carbon film 1/4W VJ 4.7Ω
R509,539,557	40143101	" " " " 100Ω
R533,546	40143151	" " " " 150Ω
R503,513,524,	40143221	" " " " 220Ω
525		
R512,522,538	40143471	" " " " 470Ω
R504,514,520,	40143102	" " " " 1kΩ
523,548,561		
R515	40143222	" " " " 2.2kΩ
R534,535,565	40143272	" " " " 2.7kΩ
R510,562,569,	40143332	" " " " 3.3kΩ
571,578–580		
	40143392	3.9kΩ
R501,506,507,	40143472	" " " " 4.7kΩ
531,536,537,		
542,544,545,		
549,550,563,		
566,575,576,		
581		
R521,527,532,	40143682	" " " " 6.8kΩ
541,568,570		
R519,529,555,	40143103	" " " " 10kΩ
556,558,572		
R517,551	40143153	" " " " 15kΩ
R508,518,528,	40143223	" " " " 22kΩ
540,554,573		
R559	40143393	" " " " 39kΩ
R567	40143473	" " " " 47kΩ
R516	40143563	" " " " 56kΩ
R547,574	40143104	" " " " 100kΩ
R560	40143154	" " " " 150kΩ
R553	40143224	" " " " 220kΩ
R526	40143274	" " " " 270kΩ
R552,564,577	40143474	" " " " 470kΩ
R582	40143824	" " " " 820kΩ
R505	42124229	" composition 1/2W GK 2.2Ω
R502	44104010	Wire wound 1W 1Ω
		POTENTIOMETER
VR501	49918101	CR-19R 100ΩB
		CAPACITOR
C512	33824271	Dipped mica 50WV 270pF
C513	33824510	" " " 510pF
C511	31820030	Ceramic 50WV CH 3pF
C522	31820100	" " 10pF
C514	31820270	" " 27pF

C546–548	31820390	Ceramic 50WV 39pF
C510,532,534,	31820101	" " 100pF
555,566		
C533	31820151	" " 150pF
C558,559	31820241	" " 240pF
C504,519–521,	30820103	" " 0.01μF
523,531,535,		
542–545,		
562,570		
C509,537	30820473	" " 0.047μF
C516	36825102	Mylar " 0.001μF
C526	36825472	" " 0.0047μF
C518,529,530,	36825103	" " 0.01μF
572		
C525,539–541	36825223	" " 0.022μF
C556,567,569,	36825473	" " 0.047μF
573		
C503,528	36825104	" " 0.1μF
C507,517,527,	34820105	Electrolytic " 1μF
550,551,560,		
568,571		
C557	34320225	" 25WV 2.2μF
C561	34320335	" " 3.3μF
C536	34320475	" " 4.7μF
C505,515,538,	34220106	" 16WV 10μF
552,554,564,		
565		
C524,553,563	34220226	" " 22μF
C508	34220476	" " 47μF
C501	34220107	" " 100μF
C506	34220227	" " 220μF
C502	34220477	" " 470μF
		TRIMMER CAPACITOR
TC501–505	39000002	ECV-1ZW 20x32 20pF
		INDUCTOR
L502	53020019	FL-5H 220 22μH
L501	53020027	FL-5H 271 270μH
L503–506	53020001	FL-5H 102 1mH
		TRANSFORMER
T501	55003174	#220209
		RELAY
RL501	70000031	FBR211A D012M
		MINI CONNECTOR
J501	67190001	5048-19A
J502	67150010	5048-15A
J503	67080006	5048-08A
J504	67050005	5048-05A
J505	67030005	5048-03A
	80042800	**HEAT SINK**

PREMIX LOCAL UNIT

Symbol No.	Parts No.	Description
	019650AZ	PREMIX LOCAL unit with components
PB-1965	60419650	P.C. Board
		TRANSISTOR
Q601–610	22303724	2SC372Y
		DIODE
D601–610	21015550	Si 1S1555
		RESISTOR
R604,608,612,	40143101	Carbon film 1/2W VJ 100Ω
616,620,624,		
628,632,636,		
640		
R642	40143181	" " " " 180Ω
R603,607,611,	40143102	" " " " 1kΩ
615,619,623,		
627,631,635,		
639		
R641,643	40143122	" " " " 1.2kΩ
R602,606,610,	40143183	" " " " 18kΩ
614,618,638		
R622,626,630,	40143333	" " " " 33kΩ
634		
R601,605,609,	40143563	" " " " 56kΩ
613,617,621,		
625,629,633,		
637		
		CAPACITOR
C624,628,632,	31820470	Ceramic 50WV CH47pF
636		
C620	31820680	" " " 68pF
C616	31820101	" " " 100pF
C612	31820181	" " " 180pF
C640	31820241	" " " 240pF
C608	31820271	" " " 270pF
C604	31820331	" " " 330pF
C601–603,	30820103	" " 0.01μF
605–607,		
609–611,		
613–615,		
617–619,		
621–623,		
625–627,		
629–631,		
633–635,		
637–639,641		

		CRYSTAL
X601	71800113	HC-18/U 15.9875MHz #210147
X602	71800114	" 17.9875 " #210148
X603	71800115	" 21.4875 " #210149
X604	71800116	" 28.4875 " #210150
X605	71800117	" 35.4875 " #210151
X606	71800118	" 42.4875 " #210152
X607	71800119	" 42.9875 " #210153
X608	71800120	" 43.4875 " #210154
X609	71800121	" 43.9875 " #210155
X610	71800122	" 19.4875 " #210156
		TRANSFORMER
T601–610	55003217	#220017

SELECT SWITCH UNIT

Symbol No.	Parts No.	Description
	019663AZ	SELECT SW unit with components
PB-1966C	60419663	P.C. Board
		DIODE
D701	21090011	Si 10D1
		RELAY
RL701	70000031	FBR211A D012M
		SWITCH
S701	65000047	6B0003CC2060
		MINI CONNECTOR
J701	67160003	5048-16A

VFO UNIT (3420)

Symbol No.	Parts No.	Description
		VFO assembly 3420
	014402BZ	PCB with components
PB-1440B-3420	60414402	P.C. Board
		FET & TRANSISTOR
Q802	22800195	FET 2SK19GR
Q801, 803	22303724	Transistor 2SC372Y

		DIODE	
D801	21022360	Varactor	1S2236
		RESISTOR	
R809, 811	40143101	Carbon film 1/4W VJ	100Ω
R807	40143221	" " " "	220Ω
R805, 808	40143222	" " " "	2.2kΩ
R802	40143332	" " " "	3.3kΩ
R801	40143103	" " " "	10kΩ
R803	40143183	" " " "	18kΩ
R804	40143223	" " " "	22kΩ
R806, 810	40143104	" " " "	100kΩ
		CAPACITOR	
C807	31820080	Ceramic disc 50WV	8pF CH
C801	31827080	" " "	8pF UJ
C803	31827120	" " "	12pF UJ
C804	31820180	" " "	18pF CH
C814,	31820330	" " "	33pF CH
C805, 808, 818	31820390	" " "	39pF CH
C809, 810, 812, 815, 819, 820, 824, 826	30820103	" " "	0.01μF
C811	33824181	Dipped mica "	180pF
C813	33824431	" " "	430pF
C821, 823	33824471	" " "	470pF
C802, 822	33824102	" " "	1000pF
C825	36226334	Tantalum 10WV	0.33μF
		VARIABLE CAPACITOR	
VC801	39000027	C521	
		TRIMMER CAPACITOR	
TC801	39000070	TSN-100D15	15pF
TC802	39000005	ECV-1ZW 50x32	50pF
		INDUCTOR	
L801	55003184	#220268	
L804, 805	53020014	Micro inductor FL-4H	1.8μH
L803, 806	53010003	" "	250μH
L802	53030001	" " S4 102K	1mH
		RECEPTACLE	
J801	68040001	SI-6303-1	
		TERMINAL	
	90000000	Lighthouse type	
	91100008	Wrapping terminal C	

RECT. A UNIT

Symbol No.	Parts No.	Description
	019670AZ	RECT. A unit with components
PB-1967	60419670	P.C. Board
		IC. TRANSISTOR
Q901	25000209	IC μPC78L12
Q903	22104950	TR 2SA495
		DIODE
D907	21090011	Si 10D1
D901–904	21090019	" 10D10
D905,906	21090022	" V06B
D908	21090154	Zener WZ061
		RESISTOR
R908	40143560	Carbon film 1/4W VJ 56Ω
R905	42124100	" composition 1/2W GK 10Ω
R901–904	42124474	" " " " 470kΩ
R907	43204049	Metallic film 2W 0.4Ω
		CAPACITOR
C901–905	30820103	Ceramic 50WV 0.01μF
C908–911	34320106	Electrolytic 25WV 10μF
C907	34320107	" " 100μF
C906	34320338	" " 3300μF
		RELAY
RL901	70000036	FRL-264 D012/04CS-01
	91100008	Wrapping terminal
	91100005	Test point D

RECT. B UNIT

Symbol No.	Parts No.	Description
	019680AZ	RECT. B unit with components
PB-1968A	60419681	P.C. Board
		TRANSISTOR
Q1003	22106390	2SA639
Q1001	22107330	2SA733
Q1002	22303724	2SC372Y
		DIODE
D1004, 1005, 1008–1011	21015550	Si 1S1555
D1001–1003	21090019	" 10D10
D1006, 1007	21090011	" 10D1
		RESISTOR
R1021	40143102	Carbon film 1/4W VJ 1kΩ
R1011,1016, 1020	40143472	" " " " 4.7kΩ
R1013,1015	40143103	" " " " 10kΩ
R1014	40143123	" " " " 12kΩ
R1017–1019	40143223	" " " " 22kΩ
R1012	40143563	" " " " 56kΩ
R1001–1004	42143474	" composition 1/2W GK 470kΩ
R1010	43104562	Metallic film 1W 5.6kΩ
R1005,1006	43204471	" " 2W 470Ω
R1008	43204222	" " " 2.2kΩ
R1007	43204332	" " " 3.3kΩ
R1009	43204473	" " " 47kΩ
		POTENTIOMETER
VR1001	49910103	V18K3-2 10kΩB
		CAPACITOR
C1017	30820473	Ceramic 50WV 0.047μF
C1016	30830222	" 500WV 0.0022μF
C1005,1006, 1013–1015, 1018	30830472	" " 0.0047μF
C1010	30830103	" " 0.01μF
C1009	34330106	Electrolytic 250WV 10μF
C1011	34330226	" " 22μF
C1001–1004, 1012	34330476	" " 47μF
C1007,1008	34350226	" 350WV 22μF
	91100008	Wrapping terminal

CAPACITOR UNIT

Symbol No.	Parts No.	Description
	019691AZ	CAPACITOR unit with components
PB-1969A	60419691	P.C. Board
		RESISTOR
R1101,1102	42124474	Carbon composition 1/2W GK 470kΩ

		CAPACITOR
C1101,1102	34839904	Electrolytic 500WV 200μF (CE-62L)

TRIMMER A UNIT

Symbol No.	Parts No.	Description
	019700AZ	TRIMMER A unit with components
PB-1970	60419700	P.C. Board
		CAPACITOR
C1203	33824331	Dipped mica 50WV 330pF
C1208	33824401	〃 〃 〃 400pF
C1202	33824651	〃 〃 〃 650pF
C1207	33824102	〃 〃 〃 1000pF
C1201	33824152	〃 〃 〃 1500pF
C1206	31820100	Ceramic 50WV CH 10pF
C1205	31820300	〃 〃 〃 30pF
C1204	31820820	〃 〃 〃 82pF
		TRIMMER CAPACITOR
TC1203	39000016	B2PY 100pF
TC1202	39000077	B4PY 220pF
TC1201	39000018	B7PY 420pF
TC1206	39000002	ECV-1ZW 20x32 20pF
TC1204,1205	39000005	〃 50x32 50pF
		INDUCTOR
L1201	55003397	Trap coil #220545

TRIMMER B UNIT

Symbol No.	Parts No.	Description
	019700BZ	TRIMMER B unit with components
PB-1970	60419700	P.C. Board
		CAPACITOR
C1303	33824281	Dipped mica 50WV 280pF
C1306	33824401	〃 〃 〃 400pF
C1302	33824621	〃 〃 〃 620pF
C1301	33824152	〃 〃 〃 1500pF
C1305	31820080	Ceramic 50WV CH 8pF
C1304	31820680	〃 〃 〃 68pF
		TRIMMER CAPACITOR
TC1303	39000016	B2PY 100pF
TC1302	39000077	B4PY 220pF
TC1301	39000018	B7PY 420pF
TC1306	39000002	ECV-1ZW 10x32 10pF
TC1304,1305	39000005	〃 50x32 50pF
		INDUCTOR
L1301	55003222	Trap coil #220261

TRIMMER C UNIT (3420)

Symbol No.	Parts No.	Description
	010920CZ	TRIMMER C unit with components
PB-1092	60410920	P.C. Board
		CAPACITOR
C1406	33834100	Dipped mica 500WV 10pF
C1405	33834820	〃 〃 〃 82pF
C1403	33834281	〃 〃 〃 280pF
C1407	33834401	〃 〃 〃 400pF
C1402	33834651	〃 〃 〃 650pF
C1401	33834152	〃 〃 〃 1500pF
		TRIMMER CAPACITOR
TC1403, 1405	39000017	B1PY 40pF
TC1402, 1404	39000016	B2PY 100pF
TC1401	39000018	B7PY 420pF

BAND WIDTH CONTROL UNIT

Symbol No.	Parts No.	Description
	019720AZ	B.W CONT. unit with components
PB-1972	60419720	P.C. Board
		LED
D1501	20900140	GD4-203 SRD
		RESISTOR
R1501	40143152	Carbon film 1/4W VJ 1.5kΩ
		POTENTIOMETER
VR1501	49915502	V10K8-1-2 5kΩB

		SWITCH
S1501	65000034	1B0001AC2060

DRIVER BOARD

Symbol No.	Parts No.	Description
	017140AZ	Driver board with components (without vacuum tube)
PB-1714A	60417141	P.C. Board
		VACUUM TUBE
V1601	10000020	12BY7A
		VACUUM TUBE SOCKET
VS1601	68090006	SB-9403
		RESISTOR
R1605	42124470	Carbon composition 1/2W GK 47Ω
R1602,1604	42124560	" " " " 56Ω
R1603	42124101	" " " " 100Ω
R1601	42124473	Carbon composition 1/2W GK 47kΩ
		CAPACITOR
C1601,1602	30830103	Ceramic disc 500WV 0.01μF
C1603,1604, 1606	30820473	" " 50WV 0.047μF
C1605	33834102	Dipped mica 500WV 1000pF
		INDUCTOR
L1601	53020013	Micro inductor FL5H 150μH
L1602(R1602)	55003219	#220029
	91100008	Wrapping terminal B

FINAL BOARD

Symbol No.	Parts No.	Description
	017151AZ	Final board with components (without vacuum tube)
PB-1715A	60417151	P.C. Board

		VACUUM TUBE
V1701,1702	10000026	6146B
		VACUUM TUBE SOCKET
VS1701,1702	68080006	SB-3606
		RESISTOR
R1701,1702 (L1702,1703)	42124560	Carbon composition 1/2W GK 56Ω
R1703,1704, 1705	42124100	" " " " 100Ω
R1706	44201010	Meter shunt 2W 1Ω
		CAPACITOR
C1703,1704, 1710	30830103	Ceramic disc 500WV 0.01μF
C1705–1709, 1711,1712	30820473	" " 50WV 0.047μF
	30830102	" " 500WV 1000pF
C1701	33147102	Moulded mica 1kWV 1000pF
C1702	33831050	Dipped mica 500WV 5pF
		INDUCTOR
L1701	53020013	Micro inductor 150μH
L1704	53020015	Micro inductor 560μH
L1702,1703 (R1701,1702)	53003220	RF choke #220307
	91100008	Wrapping terminal C

CLARIFIER CONTROL UNIT

Symbol No.	Parts No.	Description
	019731AZ	CLAR CONT. unit with components
PB-1973A	60419731	P.C. Board
		DIODE
D1801	21090011	Si 10D1
D1802	20900140	LED GD4-203SRD
		RESISTOR
R1803	40143102	Carbon film 1/4W VJ 1kΩ
R1804,1805	40143152	" " " " 1.5kΩ
R1802	40143332	" " " " 3.3kΩ
R1801	40143472	" " " " 4.7kΩ

Symbol No.	Parts No.	Description
		POTENTIOMETER
VR1801	49915471	V10K8-1-2 470ΩB
		CAPACITOR
C1801–1803	30820473	Ceramic 50WV 0.047μF
		RELAY
RL1801	70000031	FBR211A D012M
		SWITCH
SW1801	65000046	2B0005FC206

LED BOARD

Symbol No.	Parts No.	Description
	019741AZ	LED board with components
PB-1974A	60419741	P.C. Board
		LED
D1901–1906	20900140	GD4-203SRD
		RESISTOR
R1901,1902	41143102	Carbon film 1/4W TJ 1kΩ

LEVER SWITCH BOARD

Symbol No.	Parts No.	Description
	019751AZ	LEVER SW board with components
PB-1975A	60419751	P.C. Board
		RESISTOR
R2006	41143560	Carbon film 1/4W TJ 56Ω
R2005	41143101	〃 〃 〃 〃 100Ω
R2001	41143121	〃 〃 〃 〃 120Ω
R2002	40143391	〃 〃 〃 VJ 390Ω
R2008	41143562	〃 〃 〃 TJ 5.6kΩ
R2007	40143103	〃 〃 〃 VJ 10kΩ
R2004	40143683	〃 〃 〃 〃 68kΩ

Symbol No.	Parts No.	Description
		SWITCH
S2001–2005	64000109	SLE62351
S2006	64000108	SLE64251

COUNTER UNIT

Symbol No.	Parts No.	Description
	019800AZ	COUNTER unit assembly
PB-1978	–	(Display board)
PB-1979	–	(Count, decode board)
PB-1980	–	(Main board)
	DISPLAY board	
PB-1978	60419780	P.C. Board
		DISPLAY LED
DS2101–2106	21090153	HP5082-7623
		SOCKET
QS2101–2106	68140005	314AG-37D
	COUNT. DECODE board	
PB-1979	60419790	
		IC. TRANSISTOR
Q2208–2213	25000085	IC MSM561RS
Q2202–2207	25000204	〃 SN74LS196N
Q2201	22104964	TR 2SA496Y
		RESISTOR
R2204–2245	40143101	Carbon film 1/4WS VJ 100Ω
R2203	40143181	〃 〃 〃 〃 180Ω
R2202	40143271	〃 〃 〃 〃 270Ω
R2201	40143471	〃 〃 〃 〃 470Ω
		(ALL RD¼F(R2) TYPE)
		CAPACITOR
C2201	30820103	Ceramic 50WV 0.01μF (2222-662-02-103)
C2202–2204	36326685	Tantalum 6.3WV 6.8μF (CS99E0J6R8M)

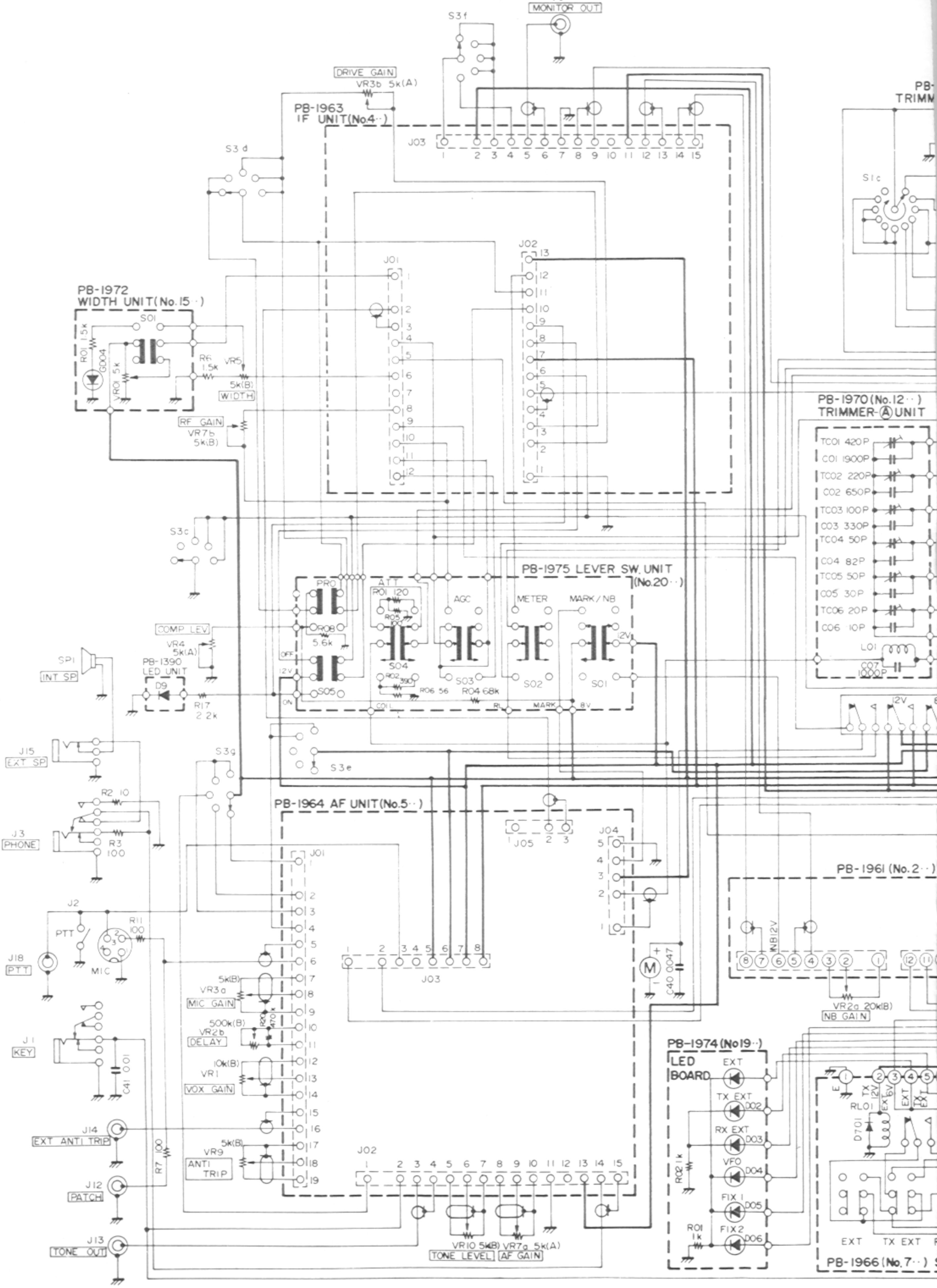
		CONNECTOR
J2201	68130004	3024-13C
	67200003	Board Joint 163740
		COUNTER MAIN board
PB-1980	60419800	P.C. Board
		IC. FET. TRANSISTOR
Q2301	25000205	IC MC10116
Q2305	25000080	" MSM5564
Q2309	25000206	" SN74196N
Q2304	25000207	" SN74S00N
Q2306	25000141	" SN74LS04N
Q2307,2308	25000208	" μPA54H
Q2310	25000109	" μPC14305
Q2301	23800513	FET 3SK51-03
Q2303	22390015	TR MPS3640
		DIODE
D2301–2312	21015550	Si 1S1555
		CRYSTAL
X2301	71400001	HC-14/W 655.36kHz #210025
		RESISTOR
R2316	40143101	Carbon film 1/4WS VJ 100Ω
R2311	40143221	" " " " 220Ω
R2319	40143331	" " " " 330Ω
R2305,2317	40143471	" " " " 470Ω
R2308–2310, 2312,2314, 2322	40143511	" " " " 510Ω
R2304,2313, 2315	40143102	" " " " 1kΩ
R2306,2307	40143222	" " " " 2.2kΩ
R2302	40143103	" " " " 10kΩ
R2303	40143153	" " " " 15kΩ
R2321	40143223	" " " " 22kΩ
R2301,2320	40143473	" " " " 47kΩ
R2318	40143104	" " " " 100kΩ
		(ALL RD¼F (R2) Type)
		BLOCK RESISTOR
RB2301	47000004	RK1/16B8R 4.7kΩK
		CAPACITOR
C2308	31820120	Ceramic 50WV CH 12pF
C2311,2312	31820470	" " " 47pF
C2301–2305	30820103	" " 0.01μF
C2314,2315	36824331	Styrol " 330pF

C2316	36825332	Mylar " 0.0033μF
C2317	36825103	" " 0.01μF
C2313	36825473	" 50WV 0.047μF
C2306,2307, 2309	36226106	Tantalum 16WV 10μF
C2310	34220107	Electrolytic " 100μF
C2318–2322	32821102	Feed thru 50WV 0.001μF
		INDUCTOR
L2301	55003069	35μH #220012
		SWITCH
S2301,2302	66000005	A10040-008
		PLUG
P2301	67020007	SQ4052
P2302 (with wire)	67090004	1625-09P-1 #240136
		CONNECTOR
J2301	67130002	3022-13A
J2302	67030006	3021-03

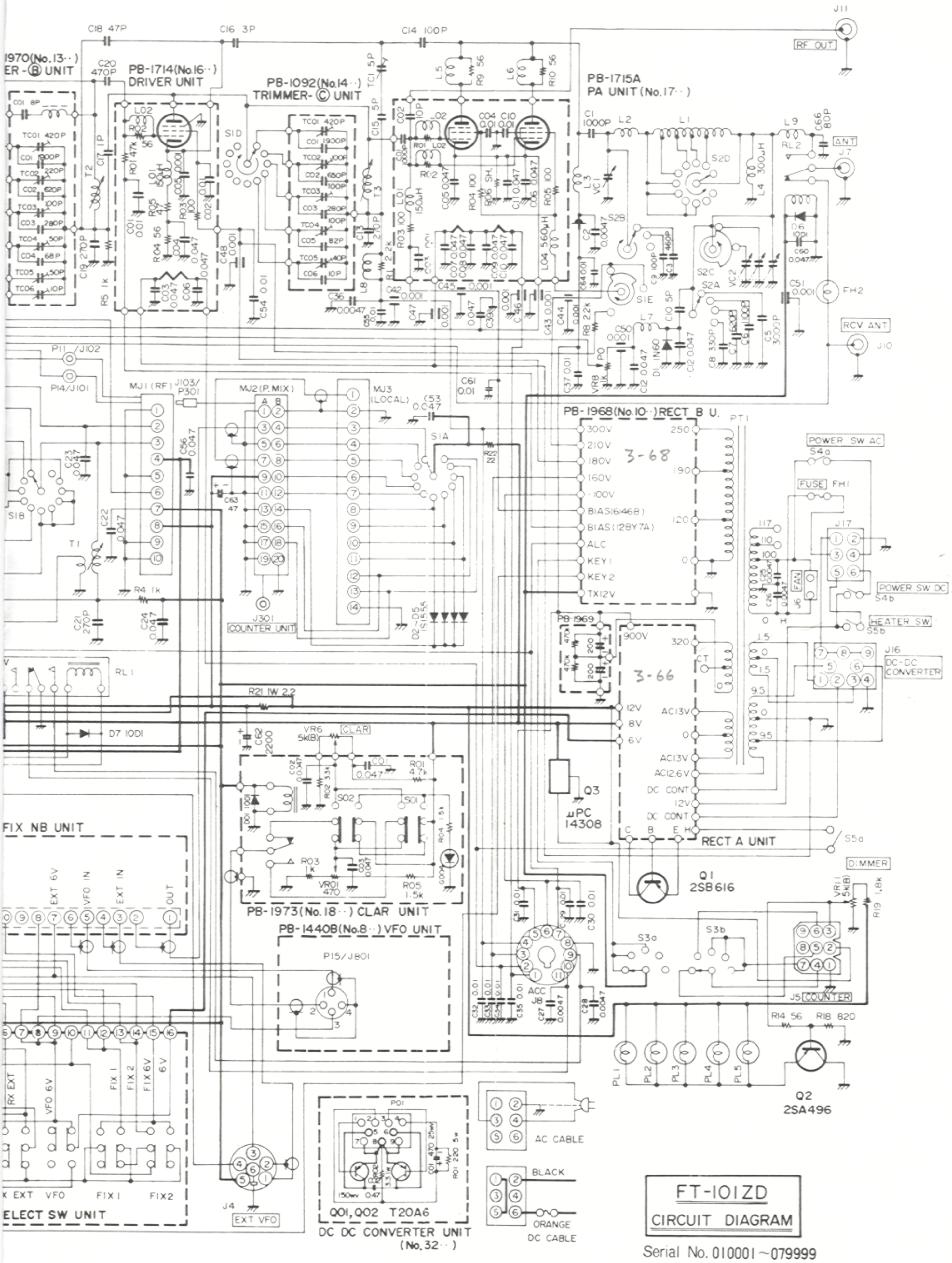
DC-DC CONVERTER (OPTION)

Symbol No.	Parts No.	Description
		TRANSISTOR
Q3201,3202	22290020	T20A6 with insulator
		RESISTOR
R3202	43104332	Wire wound 1W 3.3Ω
R3201	43504221	Metallic film 5W 220Ω
		CAPACITOR
C3202	38235473	Metallized paper 150WV 0.047μF
C3201	34320227	Electrolytic 25WV 220μF
		CONNECTOR
P3201	68090038	AC9M
	T9012720	DC POWER CORD
	73000007	FUSE 20A

ACCESSORIES		
Symbol No.	Parts No.	Description
		AC POWER CORD
	T9012380A	2 wire, 2 prong plug
	T9012481A	3 wire without plug
	T9012582A	3 wire, 3 prong plug (UL)
	T9012484	3 wire, 3 prong Australian plug
	T9012683A	3 wire, 2 prong EU plug
	67060008	CONNECTOR PLUG QS-P6FL
	67020001	**PIN PLUG** STP58
	67110007	**ACC PLUG** PA602B01
	73000004	**FUSE** (100V–117V) 5A
	73000003	" (200V–234V) 3A



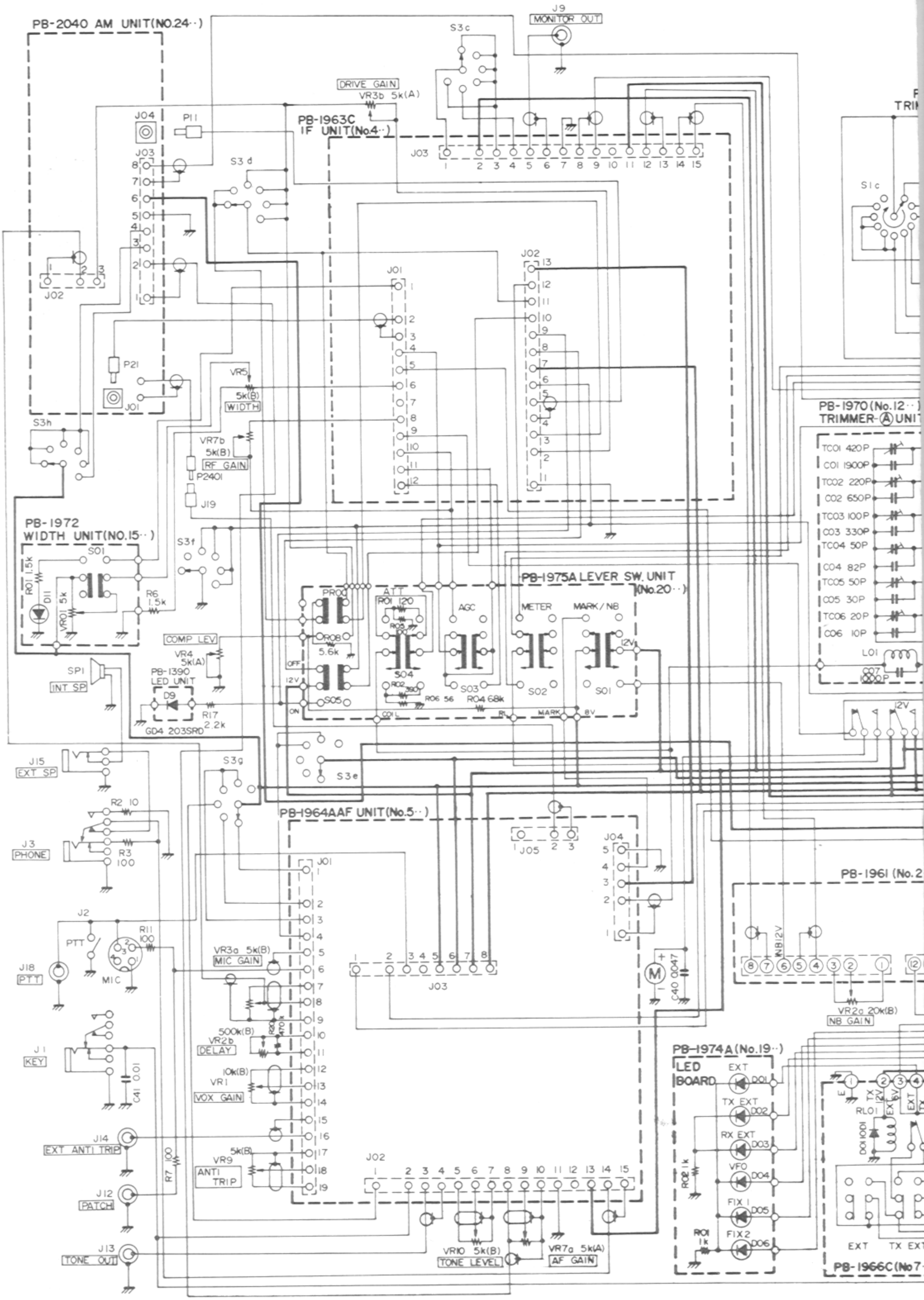
J9
MONITOR OUT
S3f
DRIVE GAIN
VR3b 5k(A)
PB-1963
IF UNIT(No.4··)
J03
S3 d
J02
J01
PB-1972
WIDTH UNIT(No.15··)
S01
R01 1.5k
GD04
VR01 5k
R6 1.5k
VR5
5k(B)
WIDTH
RF GAIN
VR7b
5k(B)
S3c
PB-1975 LEVER SW. UNIT
(No.20··)
PRO
ATT
R01 120
R05
AGC
METER
MARK / NB
COMP LEV
VR4
5k(A)
R08
5.6k
SP1
INT SP
PB-1390
LED UNIT
D9
R17
2.2k
S04
S05
S03
S02
S01
R02 390
R06 56
R04 68k
COIL
RL
MARK
8V
12V
OFF
ON
J15
EXT SP
S3g
S3e
R2 10
J3
PHONE
R3
100
PB-1964 AF UNIT(No.5··)
J05
J04
J2
PTT
R11
100
MIC
J18
PTT
5k(B)
VR3a
MIC GAIN
500k(B)
VR2b
DELAY
R20
470k
10k(B)
VR1
VOX GAIN
J1
KEY
C41 .001
J14
EXT ANTI TRIP
R7 100
5k(B)
VR9
ANTI
TRIP
J12
PATCH
J13
TONE OUT
VR10 5k(B)
TONE LEVEL
VR7a 5k(A)
AF GAIN
M
C40 .0047
PB-1970(No.12··)
TRIMMER-Ⓐ UNIT
TC01 420P
C01 1900P
TC02 220P
C02 650P
TC03 100P
C03 330P
TC04 50P
C04 82P
TC05 50P
C05 30P
TC06 20P
C06 10P
L01
C07
1000P
S1c
PB-1961 (No.2··)
NB12V
VR2a 20k(B)
NB GAIN
PB-1974 (No19··)
LED
BOARD
EXT
TX EXT
D02
RX EXT
D03
VFO
D04
FIX 1
D05
FIX2
D06
R02 1k
R01
1k
RL01
D701
PB-1966 (No.7··)



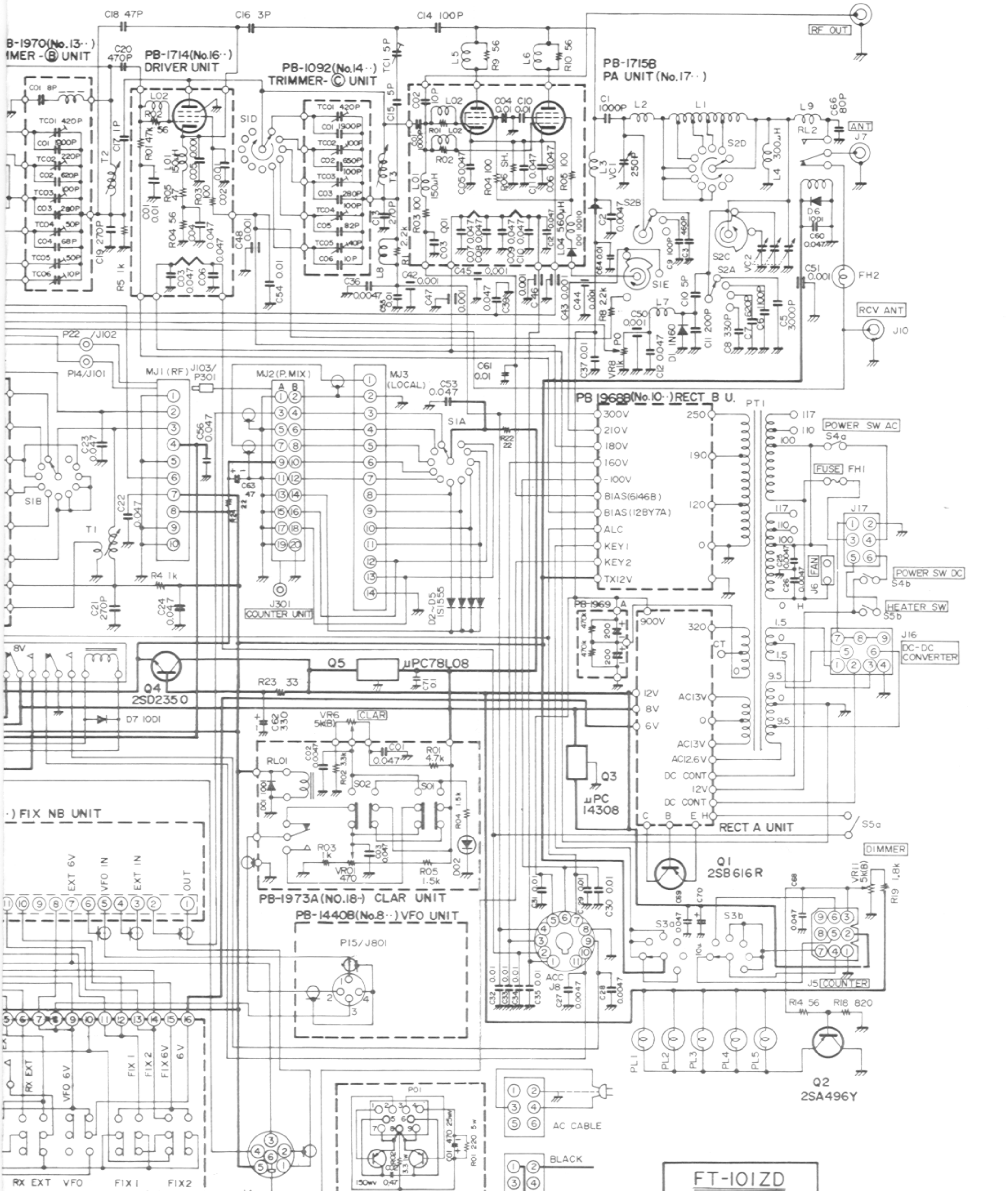
FT-101ZD

CIRCUIT DIAGRAM

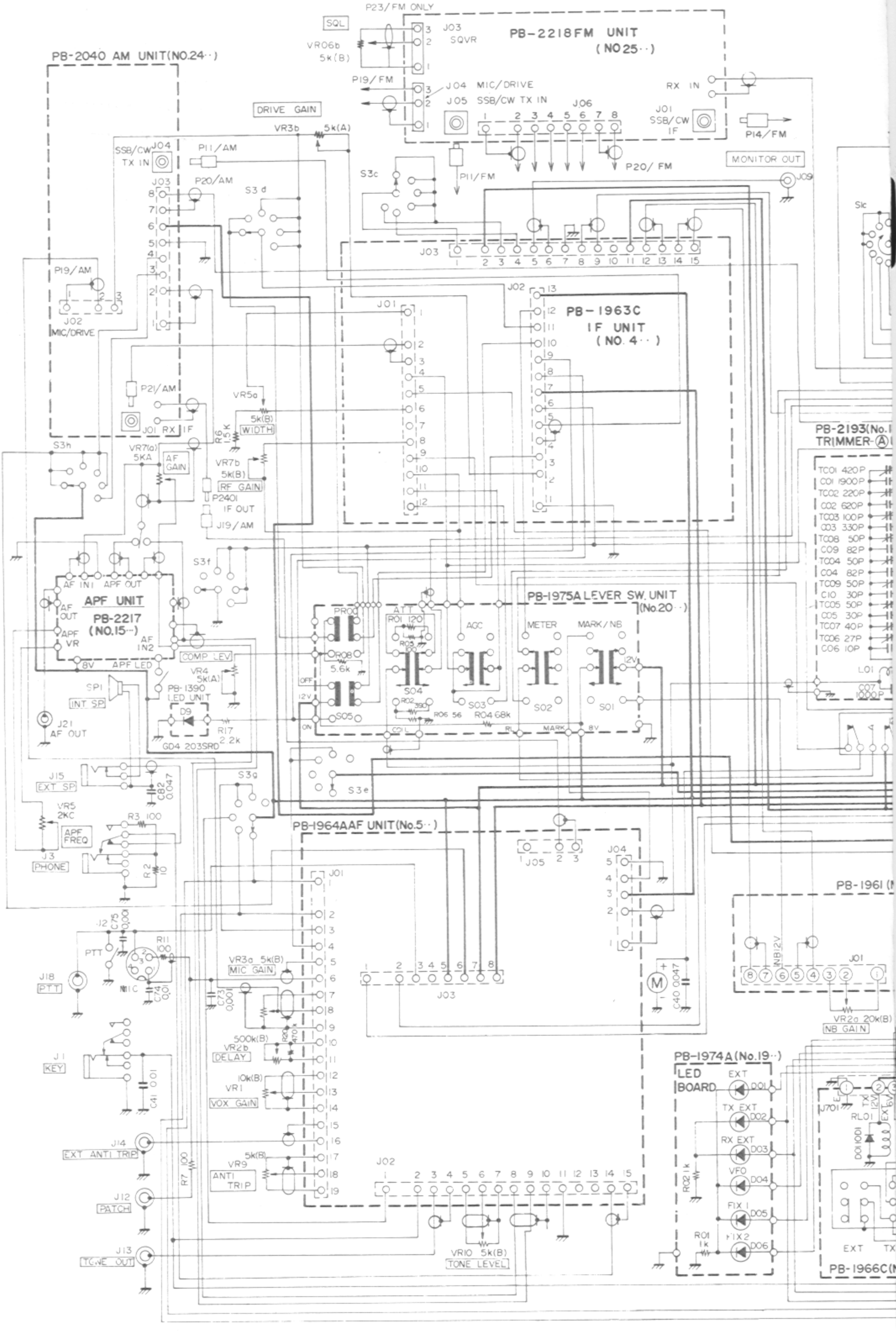
Serial No. 010001~079999

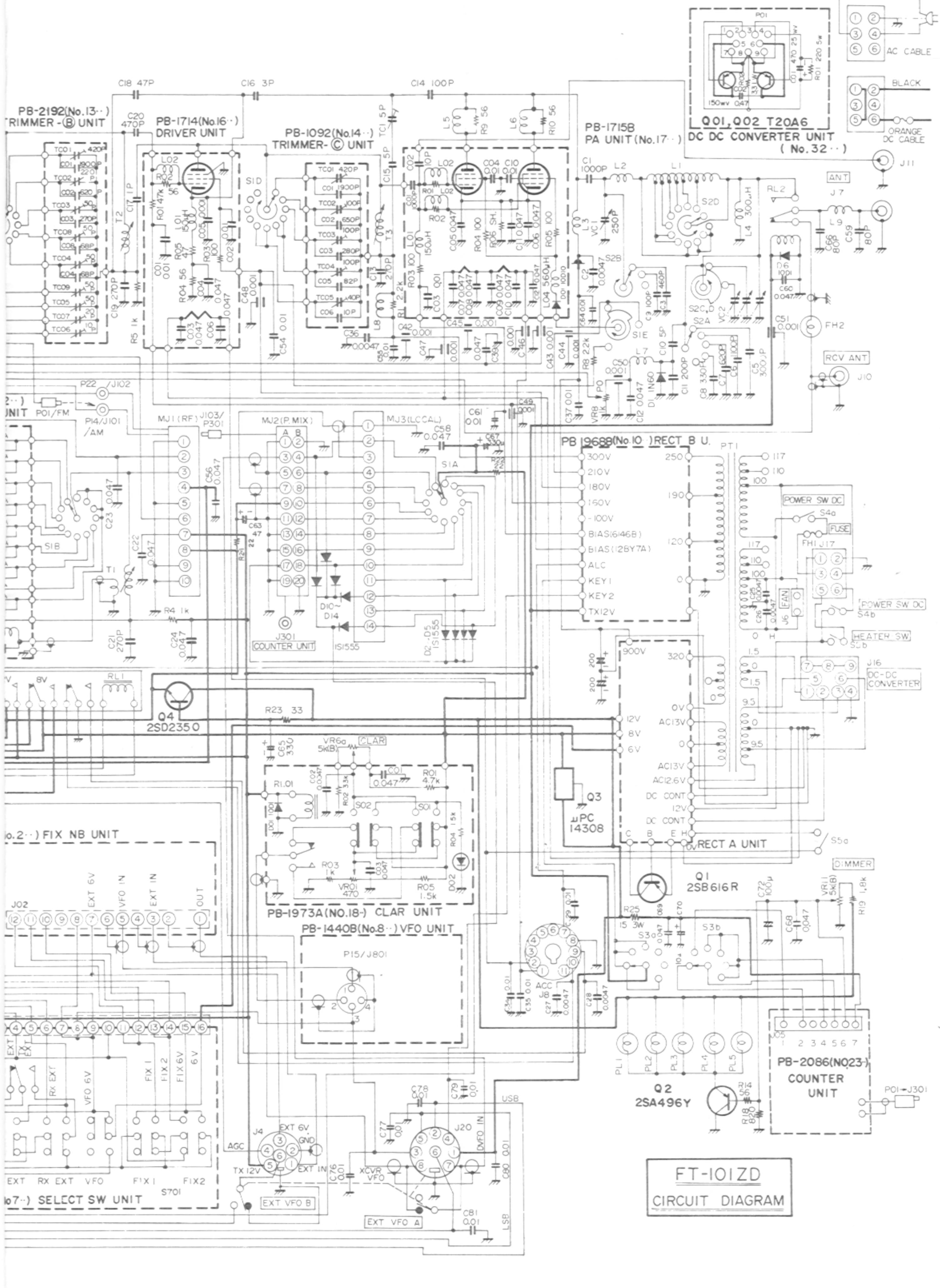


PB-2040 AM UNIT(NO.24··)
PB-1963C IF UNIT(No.4··)
DRIVE GAIN
VR3b 5k(A)
J9
MONITOR OUT
PB-1972 WIDTH UNIT(NO.15··)
PB-1975A LEVER SW. UNIT (No.20··)
PROC
ATT
AGC
METER
MARK/NB
COMP LEV
PB-1390 LED UNIT
GD4 203SRD
WIDTH
RF GAIN
INT SP
EXT SP
PHONE
PTT
MIC
KEY
EXT ANTI TRIP
PATCH
TONE OUT
PB-1964AAF UNIT(No.5··)
MIC GAIN
DELAY
VOX GAIN
ANTI TRIP
VR10 5k(B)
TONE LEVEL
VR7a 5k(A)
AF GAIN
PB-1970(No.12··)
TRIMMER-Ⓐ UNIT
PB-1961 (No.2
VR2a 20k(B)
NB GAIN
PB-1974A(No.19··)
LED BOARD
EXT
TX EXT
RX EXT
VFO
FIX 1
FIX 2
PB-1966C(No7



FT-101ZD
CIRCUIT DIAGRAM
Serial No. 080001~


PB-2218FM UNIT
(NO25··)
P23/FM ONLY
SQL
VR06b
5k(B)
J03
SQVR
P19/FM
J04 MIC/DRIVE
J05 SSB/CW TX IN
J06
RX IN
J01
SSB/CW
IF
P14/FM
P11/FM
P20/FM
MONITOR OUT
DRIVE GAIN
VR3b 5k(A)
PB-2040 AM UNIT(NO.24··)
SSB/CW TX IN
J04
P11/AM
P20/AM
J03
P19/AM
J02
MIC/DRIVE
P21/AM
J01 RX IF
S3d
S3c
S3h
S3f
S3g
S3e
PB-1963C
IF UNIT
(NO. 4··)
J01
J02
VR5a
5k(B)
WIDTH
R6 1.5k
VR7(a)
5KA
AF GAIN
VR7b
5k(B)
RF GAIN
P2401
IF OUT
J19/AM
APF UNIT
PB-2217
(NO.15··)
AF IN1
APF OUT
AF OUT
APF VR
AF IN2
8V
APF LED
COMP LEV
VR4
5k(A)
PB-1390
LED UNIT
D9
GD4 203SRD
R17
2.2k
SP1
INT SP
J21
AF OUT
PB-1975A LEVER SW. UNIT
(No.20··)
PROC
ATT
R01 120
R05
R08
5.6k
S04
R02
390
R06 56
R04 68k
AGC
S03
METER
S02
MARK/NB
S01
12V
OFF
ON
S05
COIL
RL
MARK
8V
J15
EXT SP
C82
0.047
VR5
2KC
APF FREQ
R3 100
J3
PHONE
R2 10
PB-1964AAF UNIT(No.5··)
J05
J04
J01
J03
J02
J2
C75
0.001
PTT
R11
100
MIC
C74
0.01
J18
PTT
VR3a 5k(B)
MIC GAIN
C73
0.001
500k(B)
VR2b
DELAY
R24
470k
10k(B)
VR1
VOX GAIN
5k(B)
VR9
ANTI TRIP
J1
KEY
C41 0.01
J14
EXT ANTI TRIP
R7 100
J12
PATCH
J13
TONE OUT
VR10 5k(B)
TONE LEVEL
M
C40 0.047
PB-2193(No.1
TRIMMER-Ⓐ
TC01 420P
C01 1900P
TC02 220P
C02 620P
TC03 100P
C03 330P
TC08 50P
C09 82P
TC04 50P
C04 82P
TC09 50P
C10 30P
TC05 50P
C05 30P
TC07 40P
TC06 27P
C06 10P
L01
C07
1000P
S1c
J05
PB-1961
INB12V
J01
VR2a 20k(B)
NB GAIN
PB-1974A (No.19··)
LED BOARD
EXT
D01
TX EXT
D02
RX EXT
D03
VFO
D04
FIX 1
D05
FIX 2
D06
R02 1k
R01 1k
J701
RL01
D01001
EXT
TX
PB-1966C


PB-2192(No.13··) TRIMMER-Ⓑ UNIT
PB-1714(No.16··) DRIVER UNIT
PB-1092(No.14··) TRIMMER-Ⓒ UNIT
PB-1715B PA UNIT(No.17··)
Q01,Q02 T20A6
DC DC CONVERTER UNIT (No.32··)
AC CABLE
BLACK
ORANGE DC CABLE
ANT
RCV ANT
PB 1968B(No.10) RECT B U.
POWER SW DC
FUSE
HEATER SW
DC-DC CONVERTER
RECT A UNIT
Q4 2SD235O
Q1 2SB616R
Q3 μPC 14308
Q2 2SA496Y
FIX NB UNIT
PB-1973A(NO.18-) CLAR UNIT
PB-1440B(No.8··) VFO UNIT
CLAR
DIMMER
J301 COUNTER UNIT
PB-2086(NO23-) COUNTER UNIT
SELECT SW UNIT
S701
EXT VFO B
EXT VFO A
FT-101ZD
CIRCUIT DIAGRAM