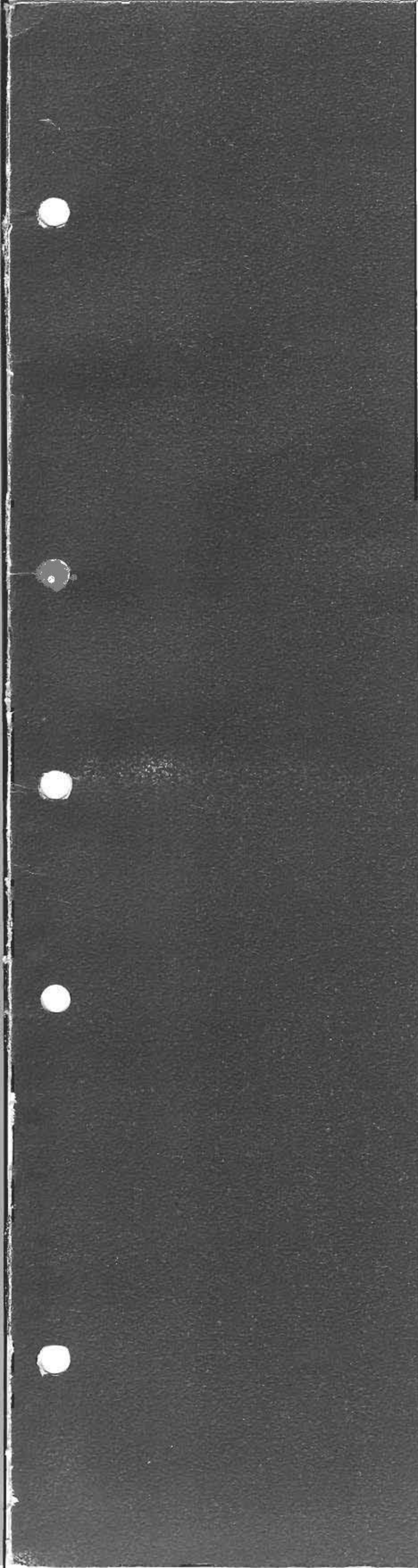


MAINTENANCE SERVICE MANUAL

CPU-2500R

http://www.foxtango.org

YAESU MUSEN CO., LTD.

C.P.O. BOX 1500

TOKYO, JAPAN

YAESU ELECTRONICS CORP.

P.O. BOX 498

PARAMOUNT, CALIFORNIA, 90723

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 CPU-2500R 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 CPU-2500R 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,

Chip Margelli, K7JA
Public Relations Manager
Yaesu Musen Company, Ltd.
Tokyo, Japan

CPU-2500R
2 METER FM TRANSCEIVER
WITH
CENTRAL PROCESSING UNIT

GENERAL DESCRIPTION

The CPU-2500R is a revolutionary, ultimate performance transceiver for the most demanding 2 meter FM operator. Controlled by a central processing unit, the CPU-2500R features full PLL synthesis in 5 kHz steps, thus producing 800 channels between 144 and 148 MHz. An optical coupling frequency selection system utilizes photo-interrupters, eliminating ordinary rotary switches which can become oxidized and noisy.

The central processing unit allows never-before-possible operating flexibility. As many as four memory channels may be programmed for simplex or repeater operation, and an additional channel may be programmed for split operation on any frequency. The CPU-2500R PLL scanner will sweep up or down the band, and will also scan only the four memory channels, per your instructions.

Two microphones are available for use with the CPU-2500R. The standard microphone features the normal PTT switch plus up/down scanning controls. A versatile keyboard microphone allows remote input of memory or dial frequencies, up/down scanning control, auxiliary repeater split selection of up to 4 MHz, and two-tone input for autopatch or control link purposes.

Among the other exciting features of the CPU-2500R are automatic or manual tone burst/tone call operation, selectable power output of 25W/3W, and a memory backup feature for holding memorized frequencies when the transceiver is turned off. A fully adjustable subaudible tone guarded squelch (TGS) is available as an option.

Famous Yaesu design features include automatic final protection for the output transistors, as well as reversed polarity protection for the supply input. The CPU-2500R is supplied complete with all mounting hardware, cables, and accessories required for mobile use, as well as a stand for base station use. The solid state devices used in the space-age CPU-2500R assure you of many years of trouble-free operation.

SPECIFICATIONS

Frequency range:
144 – 148 MHz*
144.000 – 147.995 MHz receive
144.010 – 147.995 MHz transmit
*Factory modified to 144 – 146 MHz, if required by local regulations.

Synthesizer steps:
10 kHz, with 5 UP switch for intermediate steps.

Emission type:
F3 variable reactance frequency modulation.

Deviation:
± 5 kHz factory preset, ± 16 kHz maximum

Power output:
25 watts (HI), 3 watts (LOW) @ 13.6 VDC into 50 ohm load.

Spurious emissions:
Better than 60 dB down.

Antenna impedance:
50 ohms nominal.

Microphone impedance:
600 ohms

Tone burst frequency:
1800 Hz (USA model),
1750 Hz (Europe, etc.)

Receiver type:
Double conversion superheterodyne.

Receiver sensitivity:
0.3 μV for 20 dB QS

Selectivity:
±6 kHz at 6 dB down, ±12 kHz at 60 dB down.

First IF:
10.7 MHz

Second IF:
455 kHz

Audio output:
1.5 watts @ 10% THD.

Audio output impedance:
8 ohms.

Voltage requirement:
13.6 volts ± 10%

Current consumption:
0.5 A receive
6.0 A transmit (HIGH), 2.5 A (LOW)

Case dimensions:
180 (W) x 72 (H) x 270 (D) mm.

Weight:
3.2 kg.

SEMICONDUCTOR COMPLEMENT

Integrated Circuits

MN9003 (CPU)	1
MC14011B	5
MC14042B	1
MC14069B	1
MC14410	1
MC14556B	1
MSM5576	1
TA7060P	1
TC5081P	1
μPC575C2	1
μPC577H	1
μPC14305	1
μPC14308	2
μPD857C	1
78L05	2
VP-20A	1

Field-Effect Transistors

2SK19BL	1
2SK19GR	3
2SK30AY	1
3SK40M	3
3SK51	3

Transistors

2SA496Y	1
2SA564Q	9
2SA719P	4
2SC373	1
2SC535A	3
2SC741	1
2SC1000GR	1
2SC1815Y	32
2SD235-O	1

Photo-Interrupter

ON1105	2

Germanium Diodes

1S188FM	11

Silicon Diodes

1S1555	28
V05B	1

Varactor Diodes

1S2209	5
1SV50	1

Varistor Diode

MV103	1

LED Display

5082-7740	7

Specifications subject to change without notice or obligation.

ACCESSORIES

1. MICROPHONE 1 ea.

The standard microphone comes with a flexible, coiled cord and 6 pin connector for insertion into the front panel microphone jack. The microphone includes a PTT switch and UP/DOWN scanner controls. The keyboard microphone includes a tone pad and remote programming controls.

2. MICROPHONE HANGER 1 ea.

The hanger may be installed wherever convenient for easy access to the microphone.

3. POWER CORD 1 ea.

The power cord comes equipped with a 10 ampere fuse in the DC line.

4. SPARE FUSES 1 ea.

These fuses are for replacement if the line fuse blows. When replacing fuses, be absolutely certain to use a replacement fuse of 10 amps rating.

WARRANTY DOES NOT COVER DAMAGE CAUSED BY IMPROPER FUSE REPLACEMENT.

5. MOBILE MOUNTING BRACKET 1 ea.

For mobile installations, a universal mounting bracket is supplied.

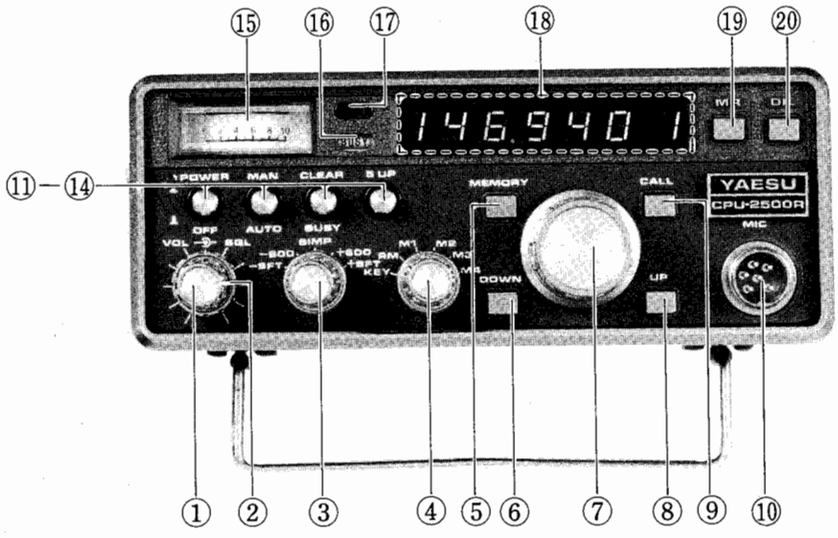
6. STAND 1 ea.

For easy viewing in base station use.

7. MINIATURE PHONE PLUG 1 ea.

For use of headphones or an external speaker.

FRONT PANEL CONTROLS AND SWITCHES



(1) VOL

This is the AF gain (volume) control for the transceiver. Clockwise rotation increases the audio output.

(2) SQL

This is the squelch threshold adjustment control. With no signal present, it should be adjusted to the point where receiver noise just disappears, to provide silent listening.

(3) TX OFFSET SELECTOR

SIMP – This position chooses simplex operation on the main dial frequency or memory frequencies M1–M4.

+600, –600 – These positions select the normal plus or minus 600 kHz repeater offset on the dial or M1–M4 frequencies.

+SFT, –SFT – When the keyboard microphone is used, these switch positions select remotely programmed auxiliary offset frequencies for transmit. In this way, unusual repeat splits may be accommodated.

(4) MEMORY CHANNEL SELECTOR

This six-position switch allows selection of the memorized frequencies as desired by the operator.

KEY – When the keyboard microphone is used, placing the switch in the KEY position allows programming and recall of memory frequencies from the keyboard.

RM (RECEIVE MEMORY) – When this position is selected, split operation throughout the range of the transceiver is possible. Memory position RM is used for reception, while transmission is on the dial frequency. Refer to the "Operation" section for details.

M1–M4 – These are the four main memory channels which may be programmed and recalled.

(5) MEMORY

This switch is used for programming a frequency into memory.

(6) DOWN

This button activates the CPU scanner for scanning lower in frequency. When the lower band edge is reached, the scanner's next step will be to 147.990 MHz (145.990 MHz on the European model), thus assuring in-band operation at all times.

(7) CHANNEL SELECTOR

This is the main tuning dial for the transceiver. It is activated when the DIL button is pushed. Each tuning step is 10 kHz, with the intermediate 5 kHz steps being provided via the 5 UP switch. When the transceiver is initially turned on, the display will indicate 147.000 MHz (145.000 on the European model), and the dial may be tuned from that point to the desired operating frequency. Tuning is via an optical coupling photo-interrupter circuit.

(8) UP

This button activates the CPU scanner for scanning higher in frequency. When the upper band edge is reached, the scanner's next step will be to 144.000 MHz.

(9) CALL

When pushed, this button activates the tone burst and PTT circuit for as long as it remains depressed. In this way, a number of differing repeater access requirements may be accommodated.

(10) MIC

This is the microphone receptacle for the standard microphone. Microphone impedance is 600 ohms.

(11) POWER

Pushing this switch supplies power to all transceiver circuits.

(12) SCAN STOP

When this switch is pressed (MANUAL scan mode), the scanning feature of the CPU-2500R will scan continuously until the microphone PTT switch or the front panel CALL switch is pressed.

When this switch is not pushed (AUTO mode), the scanner will hold on a busy or clear channel, according to the position of the SCAN STOP MODE switch.

(13) SCAN STOP MODE

When using the AUTO scanner, pressing this switch (CLEAR position) will cause the scanner to halt when a clear channel is found. This is very useful when searching for an unused frequency for simplex operation, etc.

In the BUSY position, (switch not pushed), the scanner will stop and hold on an occupied channel. This feature is useful for checking a number of channels for activity.

(14) 5 UP

This switch, when pressed, shifts the operating frequency 5 kHz up from the normal 10 kHz channel spacing.

(15) METER

On receive, signal strength is displayed, and on transmit, relative power output is displayed.

(16) BUSY

This lamp lights when the squelch is tripped by an incoming signal, thus indicating that the frequency is occupied.

(17) ON AIR

This lamp lights up during transmission.

(18) DISPLAY

Full frequency readout is provided by the digital display. As well, the memory channel selected is displayed at the right-hand side.

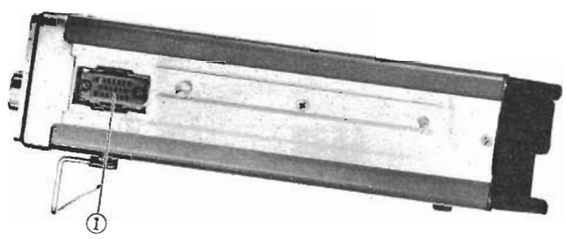
(19) MR (MEMORY RECALL)

This button transfers control from the main dial to the memory channels.

(20) DIL (DIAL)

This switch, when pressed, transfers control from the memory channels to the main tuning dial.

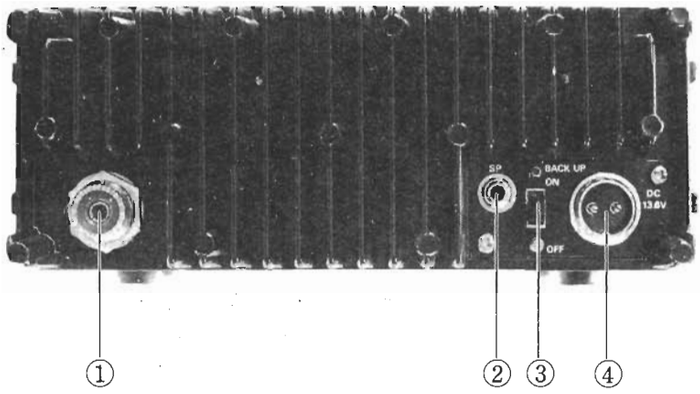
CABINET RIGHT SIDE



(1) KEYBOARD MIC JACK

When the keyboard microphone is used, its input is through this jack.

REAR APRON CONNECTIONS AND SWITCH



(1) ANT

This is the main antenna connector.

(2) EXT SP

This is a miniature phone jack for accommodation of an external speaker. Audio output impedance is 8 ohms, and the internal speaker will be cut off when an external speaker is used via this jack.

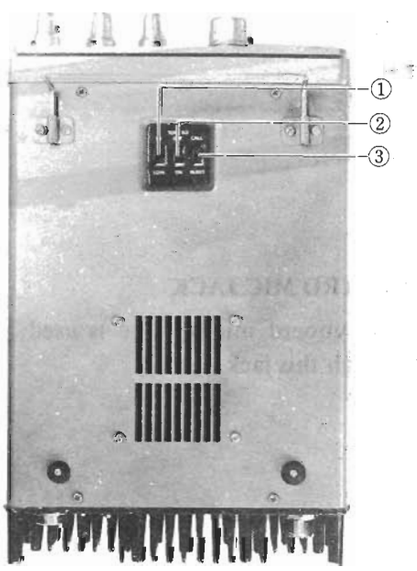
(3) BACKUP switch

When this switch is placed in the ON position, and DC power is still connected to the POWER connector, the memory circuits will still be held in operating condition. If DC power is removed, though, the memorized frequencies will be lost.

(4) POWER

This receptacle accommodates the power cord. A fuse is located in the power cord, rated at 10 amps. WHEN REPLACING FUSES, BE CERTAIN TO USE A FUSE OF 10 AMPS RATING. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY IMPROPER FUSE REPLACEMENT.

UNDERSIDE CABINET SWITCHES



(1) LOW POWER SWITCH

In the LOW position, power output will be approximately 3 watts, and in the HIGH position, power output will be approximately 25 watts.

(2) TONE SQ

When the optional tone squelch unit is installed, placing this switch in the ON position will activate the subaudible encoder/decoder.

(3) BURST/CALL

When this switch is placed in the BURST position, a ½ second tone burst will be generated whenever the PTT switch is activated. In the CALL position, pressing the PTT switch will not cause a tone to be sent. The front panel CALL button will send a tone and activate the PTT circuit for as long as the switch is pushed, regardless of the position of the BURST/CALL switch.

INSTALLATION

MOBILE INSTALLATION

For mobile service, the CPU-2500R should be installed where the digital display, controls, and microphone are easily accessible for operation. The transceiver may be installed in any position without loss of performance. A suitable location would be atop the transmission tunnel. A universal bracket is supplied with your transceiver for mobile installation. Refer to Fig. 1 for mounting details.

1. Use the universal mounting bracket as a template for positioning the mounting holes. Use a 3/16" diameter bit for drilling these holes, allowing clearance for the transceiver, its cables and microphone, and its controls. Secure the mounting bracket with the screws, washers, and nuts supplied, as shown in the drawing.

2. Ease the transceiver into the guide rail, and slide it into the desired position. Tighten the knobs on the outside of the universal bracket to secure the transceiver.

3. The microphone hanger may be installed wherever convenient for access to the microphone.

Power connections should be made directly to the automobile battery. Routing through the cigarette lighter may cause the lighter fuse to blow if the fuse is not of sufficient rating. As well, connection directly to the battery allows the memory circuits to remain activated when the ignition is turned off, using the BACK UP switch.

Connect the RED lead of the power cord to the POSITIVE (+) battery terminal, and connect the BLACK lead to the NEGATIVE (–) terminal. If it is necessary to extend the power cable, use #16 AWG insulated copper wire, and use the minimum length practicable to reduce voltage drop.

CAUTION

BEFORE CONNECTING THE POWER CABLE TO THE TRANSCEIVER, CHECK THE BATTERY VOLTAGE WITH THE ENGINE RUNNING (BATTERY CHARGING). IF THE VOLTAGE EXCEEDS 15 VOLTS DC, THE REGULATOR SHOULD BE READJUSTED SO THAT THE HIGHEST CHARGING RATE DOES NOT EXCEED 15 VOLTS. ALSO, BE ABSOLUTELY CERTAIN THAT THE CORRECT BATTERY POLARITY IS OBSERVED WHEN MAKING CONNECTIONS. REVERSED POLARITY WILL NOT DAMAGE THE CPU-2500R BECAUSE OF THE PROTECTIVE CIRCUITRY INCORPORATED IN DESIGN. HOWEVER, THE CPU-2500R WILL NOT OPERATE UNDER CONDITIONS OF REVERSED SUPPLY POLARITY.

Connect the power cable to the POWER receptacle on the rear apron, connect the coaxial cable from the antenna to the rear apron ANT receptacle, and connect the microphone to the jack appropriate for the microphone in use. An external speaker may be connected to the rear apron SP jack, if desired. Use the speaker plug supplied with the transceiver. Insertion of a plug into this jack automatically cuts off the internal speaker.

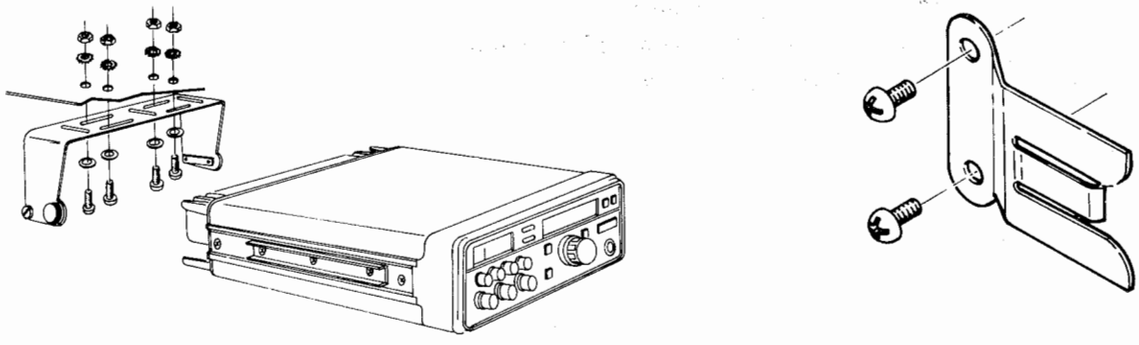


Figure 1

OPERATION

Operation instructions for the keyboard are adequately described in the Instruction Manual for the CPU-2500R, and they will not be repeated here. A summary of keyboard microphone and repeater operation is found below.

KEYBOARD MICROPHONE OPERATION

(1) To enter a frequency from the keyboard, enter the last three digits of the operating frequency, and press ENT/DIL. An example for entry of 146.940 MHz is shown. See Example 1.

Press	Display	Comments
	146.520	Original frequency.
6	14 . 60	Now program 146.940 MHz.
9	14 .690	
4	146.940	
ENT/DIL	146.940	Correctly entered.

Example 1

(2) To enter a frequency into memory, complete the above entry procedure, then press the desired memory channel number key (1 through 4), then press M. See Example 2.

Press	Display	Comments
	146.520	Original frequency.
6	14 . 60	Now program 146.940 MHz.
9	14 .690	
4	146.940	
ENT/DIL	146.940	Correctly entered.
1	14 . 10	Enter 146.940 into memory position 1.
M	146.940	Correctly stored in M1.

Example 2

(3) To recall a frequency from memory, press the desired memory channel number key, then press MR. See Example 3.

(4) To return to the main dial frequency after completing memory operation, simply press ENT/DIL.

Press	Display	Comments
	146.520	Original frequency.
1	14 . 10	Recall 146.940 stored in memory position 1.
MR	146.940	Correctly recalled.

Example 3

(5) To transmit and receive on different frequencies (using the memory instead of the standard repeater shift), enter a frequency into memory channel 0 (zero). Dial in the desired transmit frequency on the keyboard, then press MR. See Example 4.

Press	Display	Comments
	146.520	Original frequency.
6	14 . 60	Program 146.940 into Receive Memory (M0).
9	14 .690	
4	146.940	
ENT/DIL	146.940	Frequency now entered.
0	14 . 00	Store frequency in M0.
M	146.940	Frequency now stored correctly.
6	14 . 60	Program 146.240 as transmit frequency.
2	14 .620	
4	146.240	
ENT/DIL	146.240	Transmit frequency entered.
MR	146.940	SELECT sw. to RM. RX on 146.940.
PTT sw.	146.240	On the air, TX on 146.240.

Example 4

REPEATER OPERATION

(1) Set the TX OFFSET control to +600 or −600 to select automatic repeater shift of +600 kHz or −600 kHz, respectively.

(2) To select automatic repeater shift of other than 600 kHz, you may use the keyboard microphone. Enter the first two digits of the desired split, push SET, then set the TX OFFSET control to + or −, to select repeater shift in that direction. See Example 5.

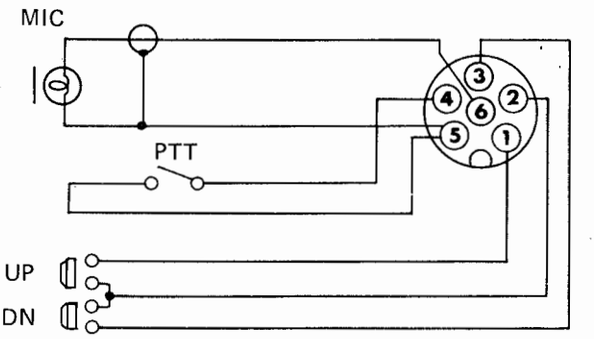
(3) To program unusual splits when the keyboard microphone is not used, you must use the RM (Receive Memory) feature; the auxiliary shift feature cannot be programmed manually from the main dial.

Press	Display	Comments
	146.940	Original frequency.
7	14 . 70	Set automatic shift of 700 kHz.
0	14 .700	TX OFFSET SELECTOR TO −SFT.
SET	146.940	Shift of −700 kHz now programmed.
PTT sw.	146.240	On the air, TX on 146.240.

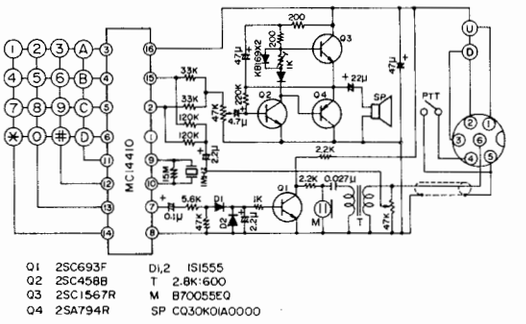
Place TX OFFSET SELECTOR to +SFT for +700 kHz shift.

Example 5

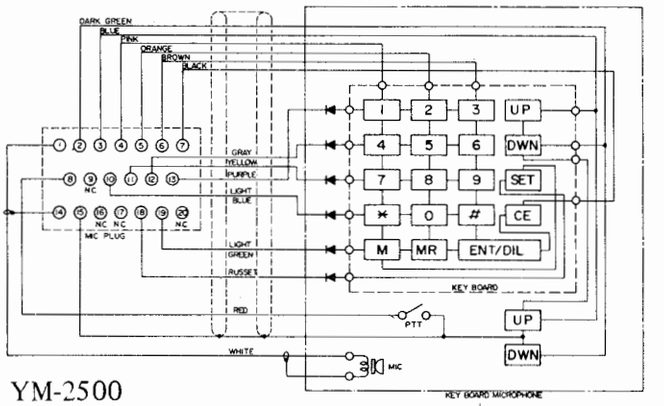
MICROPHONE CONNECTIONS



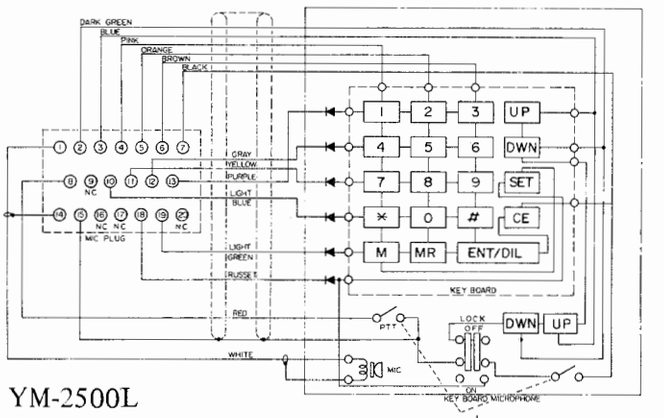
SCANNING MICROPHONE YE-17



KEYBOARD (TONE PAD) MICROPHONE YM-22

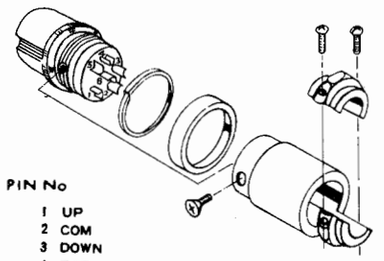


YM-2500



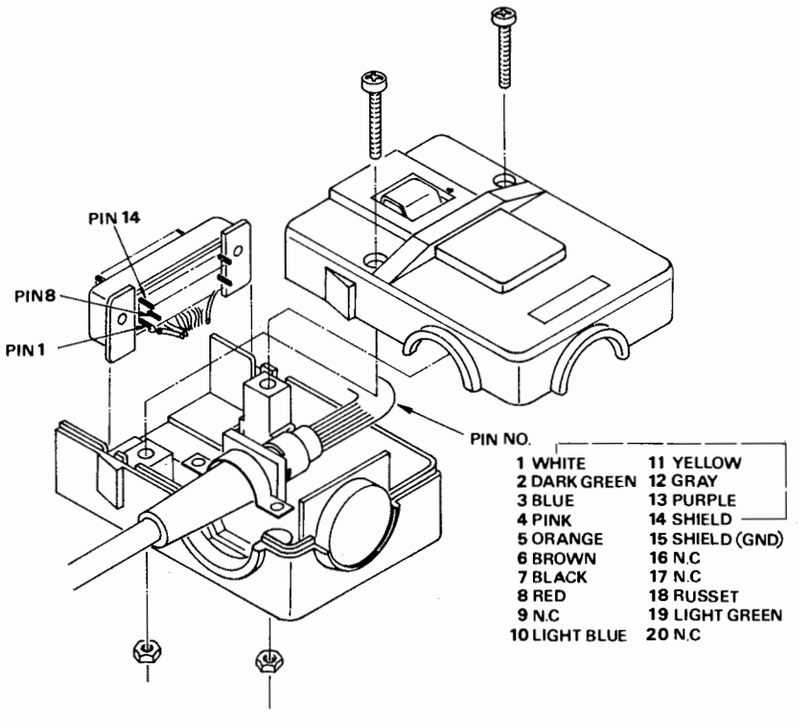
YM-2500L

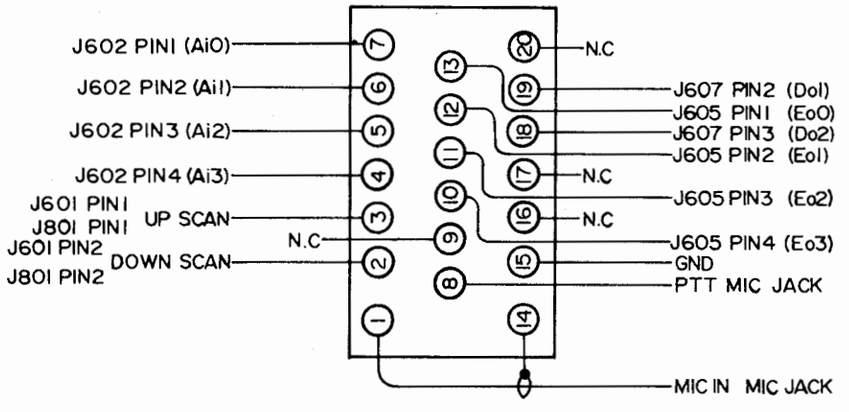
KEYBOARD (TONE PAD AND REMOTE PROGRAMMING CONTROL) MICROPHONE YM-2500



PIN No

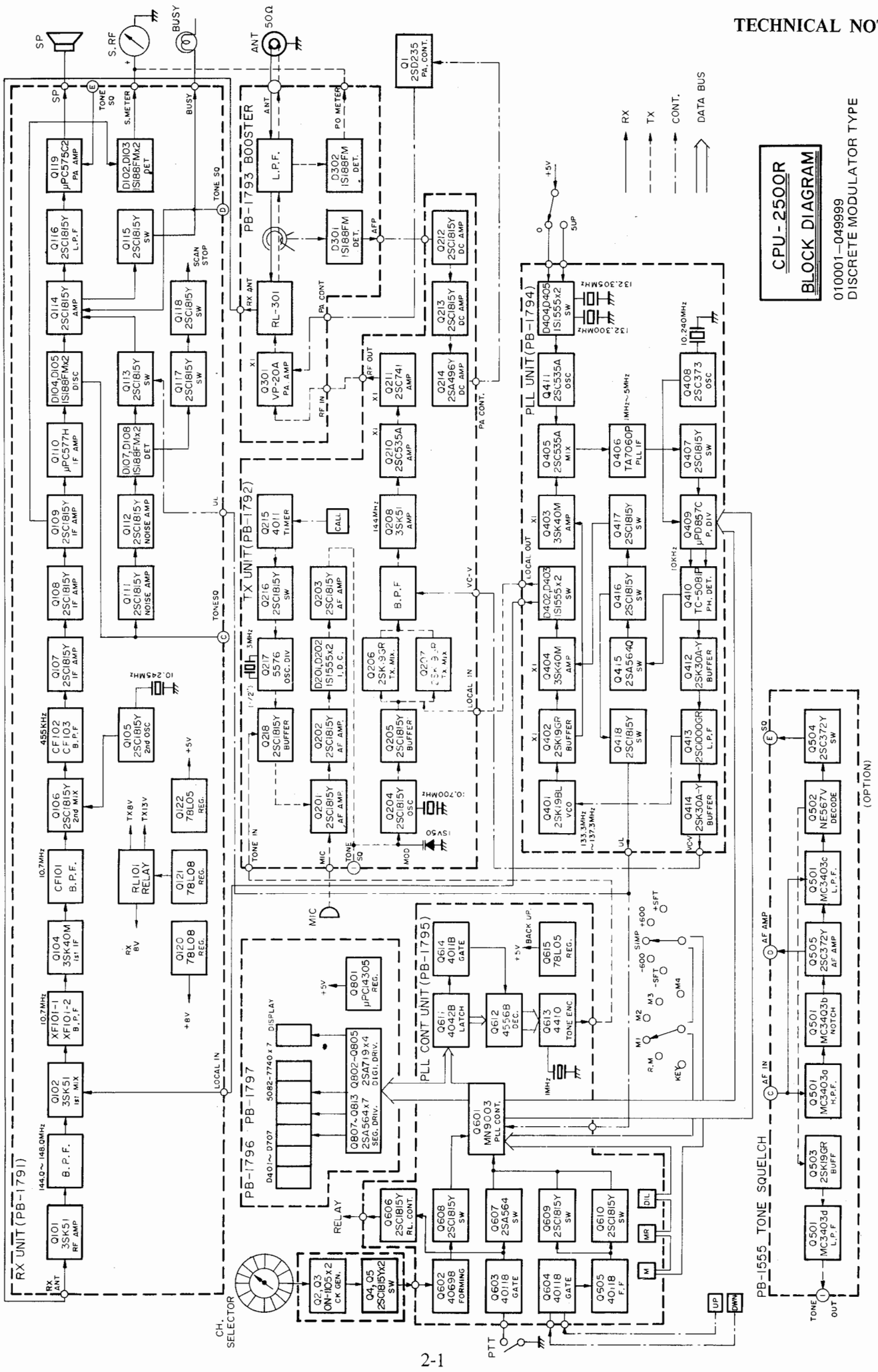
1 UP
2 COM
3 DOWN
4 PTT
5 GND
6 MIC

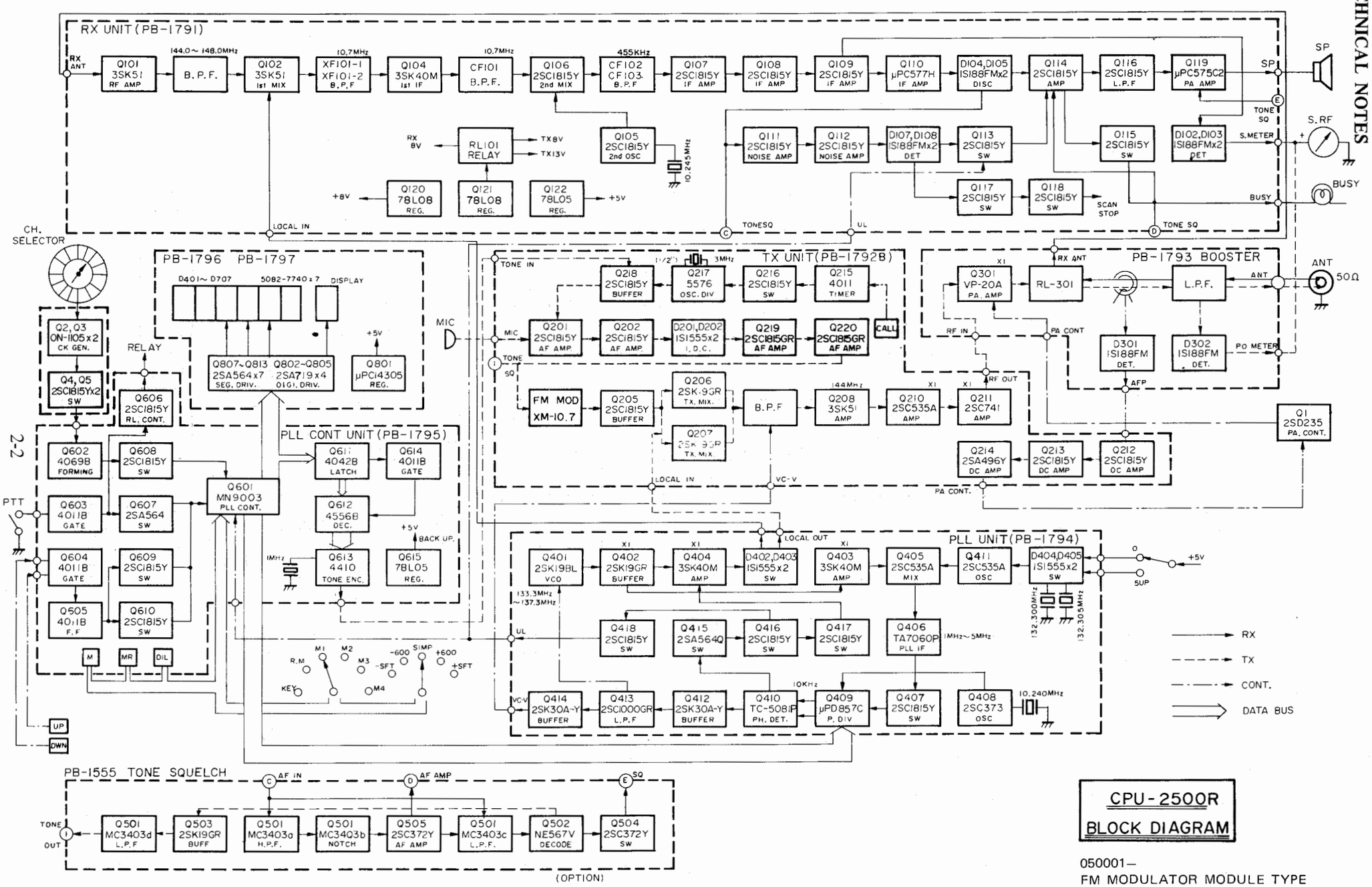




MEMO

SECTION 2-TECHNICAL NOTES





2-2

CPU-2500R
BLOCK DIAGRAM

050001–
FM MODULATOR MODULE TYPE

CIRCUIT THEORY

The block diagram and circuit description to follow will provide you with a better understanding of this transceiver. Refer to the schematic diagram for specific component details.

The CPU-2500R consists of a transmitter and a double-conversion superheterodyne receiver. A phase lock loop synthesizer provides channel selection over the entire 144–148 MHz band, in conjunction with the optical coupling system. The frequency range may be limited at the factory to 144–146 MHz or 144–148 MHz, to conform to local regulations. Solid state circuitry is employed throughout the CPU-2500R, which is designed for operation from a 13.6 VDC ± 10% negative ground power source.

TRANSMITTER

The transmitter produces a frequency modulated signal. The audio signal from the microphone is set to a proper level by VR_{201}, and is amplified by Q_{201}, Q_{202}, and Q_{203} (2SC1815Y). The audio output from Q_{202} is coupled to the instantaneous deviation control (IDC), where both positive and negative peaks are clipped by diodes D_{101} and D_{102} (1S1555). The output from Q_{203} is fed through a low-pass filter consisting of C_{213}, L_{201}, and C_{214}, thus eliminating harmonics above the speech range caused by clipping. The deviation level is set by VR_{202}, and it is adjusted at the factory for a nominal deviation of ± 5 kHz.

The speech signal is then applied to a phase modulator varactor diode, D_{203} (1SV50), which varies the frequency of the 10.7 MHz crystal controlled oscillator, Q_{204} (2SC1815Y). The frequency modulated 10.7 MHz signal is then amplified by buffer amplifier Q_{205} (2SC1815Y) and fed to a balanced mixer consisting of Q_{206} and Q_{207} (2SK19GR). Here the signal is converted up to 144–148 MHz by mixing with the 133.3–137.3 MHz signal supplied from the VCO (voltage controlled oscillator) on the PLL UNIT. The output from the balanced mixer is fed through a bandpass filter consisting of T_{203}–T_{206} to amplifiers Q_{208} (3SK51), Q_{201} (2SC535A), and Q_{211} (2SC741), providing 200 mW of drive to the RF POWER UNIT. T_{203}–T_{206} are tuned to the transmitting frequency by varactor diodes D_{205}–D_{208} (1S2209). PA amplifier module Q_{301} (VP-20A) provides 25 watts of RF energy through a diode switch and low-pass filter into a 50 ohm load.

A small portion of the RF output is rectified by diode D_{302} (1S188FM); the resulting DC voltage is fed to the front panel meter for an indication of the relative power output from the transmitter. VR_{303} allows setting of the relative power output meter deflection range. The DC output from D_{302} is also fed to the control unit for activation of the ON AIR lamp while transmitting.

If the transmitter is activated without an antenna being connected, or if a high VSWR is present at the antenna receptacle, the reflected power is detected through T_{301} and D_{301} (1S188FM), producing a DC voltage. Q_{212} (2SC1815Y) conducts with the application of DC voltage through VR_{302}, causing a decrease in the collector current of Q_{213} (2SC1815Y). As a result, the collector voltage of Q_{214} (2SA496Y) drops, causing Q_{212} to decrease current and supply voltage to the PA transistor, thus protecting that component. The threshold level is set by VR_{302}. This circuit is also used to switch the power output down to 3 watts when the HIGH/LOW switch is placed in the LOW position. The amount of power reduction is set by VR_{204}.

The tone burst circuit consists of a timing generator and a gated multivibrator. With the BURST/CALL switch in the BURST position, a DC voltage is applied to trigger Q_{215} (4011), which generates a pulse of 0.5–1 second duration. The pulse switches Q_{216} (2SC1815Y) to supply DC voltage to Q_{217} (MSM5576), where the clock signal is divided by 1024, 2048, or 4096, producing an accurate tone burst signal. The burst signal is fed to the base of microphone amplifier Q_{201}. The front panel CALL button provides a manual switch for actuation of the audio tone, as well as the transceiver PTT. The tone level is set by VR_{206}, while the burst length is set by VR_{205}.

RECEIVER

The input signal from the antenna is fed through a low-pass filter consisting of L_1, L_{301}, C_2, C_{301}–$_{303}$, and C_{313}, and T/R relay RL_{301}, to RF amplifier Q_{101} (3SK51), a dual-gate FET. The amplified signal is then fed through a four-stage high-Q coaxial resonator to the first mixer, Q_{102} (3SK51).

This front end configuration provides high immunity from cross modulation and other spurious responses, while providing a low system noise figure.

The 144–148 MHz signal is heterodyned with the first local oscillator, producing a 10.7 MHz first IF signal. The first local oscillator signal is delivered from the PLL VCO circuit. The first IF signal is fed through crystal filter XF-101, which has a passband of ±15 kHz, and amplified by IF amplifier Q_{104} (3SK51). The amplified IF signal is fed through CF-101, and then delivered to the second mixer, Q_{106} (2SC1815Y), where the heterodyne signal of 10.245 MHz from Q_{105} (2SC1815Y) is injected; the result is a 455 kHz second IF signal. CF-101, with a bandwidth of ±200 kHz, prevents image responses (produced by mixing) from degrading receiver performance.

Cascaded ceramic filters CF_{102} and CF_{103} provide a ±7.5 kHz bandwidth for the receiver. IF amplifiers Q_{107}–Q_{109} (2SC1815Y) deliver the 455 kHz IF signal to Q_{110} (μPC577H), where any amplitude variation is eliminated. The signal is then delivered to ceramic descriminator CD_{101} and diodes D_{104} and D_{105} (1S188FM).

The discriminator produces an audio output in response to a corresponding frequency shift in the IF signal. The audio output signal is amplified by Q_{114} and Q_{116} (2SC1815Y) for application across the VOLUME control $VR1_a$ to the input of Q_{119} (μPC575C2), which delivers 1.5 watts of audio to the loudspeaker. The audio response is shaped by the low pass filter at Q_{116}.

A portion of the 455 kHz IF signal is rectified by D_{102} and D_{103} (1S188FM) for S-meter indication. VR_{101} provides calibration of the S-meter deflection level.

When no carrier is present in the 455 kHz IF, the high frequency noise at the discriminator output is amplified by Q_{111} and Q_{112} (2SC1815Y) and detected by D_{107} and D_{108} (1S188FM), producing a DC voltage. This voltage activates switch Q_{113} (2SC1815Y). As Q_{113} conducts, the base of Q_{114} is grounded, thus disabling the audio amplifier. When a carrier is present in the 455 kHz IF, the noise is removed from the discriminator output; the audio amplifier then returns to normal operation.

When the squelch circuit opens (Q_{114} conducting), lamp driver Q_{115} (2SC1815Y) draws current, causing the BUSY lamp to light up. The squelch is preset by VR_{102}, and VR_{1b} is the front panel SQL control.

HETERODYNE OSCILLATOR

The heterodyne signal is generated by the PLL (phase lock loop) circuit consisting of a voltage controlled oscillator (VCO), a reference crystal oscillator, a programmable divider, and a phase comparator.

VCO oscillator Q_{401} (2SK19GR) generates a 133.3–137.3 MHz signal. The oscillator frequency is controlled by varactor diode D_{401} (1S2209), which varies the capacitance of a tuned circuit consisting of L_{401}, TC_{401}, and C_{404}, C_{406} in accordance with a DC voltage supplied from phase comparator Q_{401}(TC5081).

The output signal from Q_{401} is amplified by buffer amplifiers Q_{402} (2SK19GR) and Q_{404} (3SK40M) and fed through diode switch D_{402}/D_{403} (1S1555) to the receiver or transmitter mixers.

A portion of the output from Q_{404} is fed through buffer amplifier Q_{403} (3SK40M) to a PLL mixer Q_{405} (2SC535A), producing a 1–5 MHz PLL IF signal through mixing with the PLL heterodyne signal.

The PLL heterodyne signal is generated by an overtone-crystal-controlled oscillator, Q_{411} (2SC535A).

Diode switches D_{404} and D_{405} (1S1555) select the appropriate crystal in accordance with the TX OFFSET SELECTOR switch and the 5 UP switch. The output from Q_{411} is fed to the PLL mixer Q_{405}.

Crystal oscillator Q_{312} (2SC373) generates a 10.24 MHz signal, and its output is fed to scaler/divider Q_{409} (μPD857C), where a 10 kHz reference signal is produced.

Digital phase comparator Q_{401} (TC5081P) compares the phase of the PLL IF signal with that of the reference signal, and any phase difference is converted into an error correcting voltage. This

error correcting voltage is fed through buffer Q_{412} (2SK30AY) and amplifier Q_{413} (2SC1000-GR) to varactor diode D_{401}, which changes the output signal phase to lock with that of the reference signal.

When the VCO is locked, the constant voltage at pin 4 of Q_{410} is applied to Q_{415} (2SA564Q), causing it to conduct; in turn, Q_{416} (2SC1815Y) cuts off. The "H" voltage at the collector of Q_{416} turns Q_{417} (2SC1815Y) ON, supplying DC voltage to the earlier exciter stages, Q_{402} and Q_{404}. When the VCO is unlocked, the DC voltage at the emitter of Q_{417} drops, preventing normal operation of Q_{402} and Q_{404}.

The output voltage from Q_{416} is reversed in polarity by Q_{417} (2SC1815Y) and applied to Q_{418} (2SC1815Y), keeping the collector of Q_{418} "H" in order to drive the digital display. The voltage is also applied to Q_{113} (2SC1815Y), which supplies DC voltage to audio amplifier Q_{114}.

When the VCO is unlocked, the collector DC voltage drops, causing the LED's to turn off; simultaneously, audio amplifier Q_{114} is muted, silencing the receiver. The receiver remains muted until VCO lock is achieved.

DISPLAY

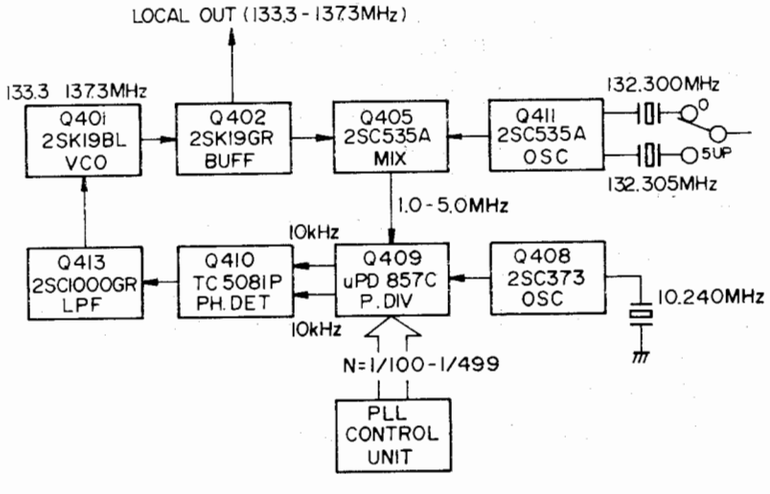
The digital display consists of 7 seven-segment light emitting diode display digits, D_{701}–D_{707} (5082–7740). Drivers Q_{802}–Q_{805} (2SA719) and segment drivers Q_{807}–Q_{813} (2SA564) provide the necessary input to drive the display correctly.

POWER SUPPLY

A DC 13.6 VDC is required for operation of the transceiver. DC 13.6 VDC is used for audio PA Q_{119}, relay RL_{301}, and the lamps. The supply voltage to the driver and transmitter PA is fed through voltage regulator Q_1 (2SD235), which is controlled by the HIGH/LOW switch and the automatic final protection circuit.

Voltage regulator Q_{801} (μPC14305) regulates the supply voltage at 5 VDC to supply the memory backup circuit, thus holding the memorized frequencies when the transceiver is turned off. Q_{120} (2SC496Y) provides a regulated 8 VDC for the control circuitry. Q_{121} (2SC496Y) provides 8 volts for the receiver strip and the transmitter low level circuits. Q_{122} provides 5 VDC for the logic circuits.

PLL CIRCUIT FREQUENCY RELATIONSHIPS



OPTIONAL TONE SQUELCH CIRCUIT

The tone squelch circuitry permits selective calling and listening on otherwise busy channels. The encoder transmits a subaudible low-frequency tone, and the decoder mutes the receiver until a similar subaudible tone is received on an incoming signal. The tone signal can be set to any frequency within the range of 70–250 Hz.

The tone signal is generated by Q_{502} (NE567); its frequency is set by R_{516}, VR_{502}, and C_{516}. The level of the tone signal is set by VR_{504} and fed through buffer amplifier Q_{503} (2SK19GR) to a low-pass filter consisting of the "d" unit of operational amplifier Q_{501} (MC3403). The tone signal is then superimposed on the speech signal. The constants for setting the frequency are obtained from Table 1.

The audio output from the receiver discriminator is fed to unit "a" of Q_{501}. Unit "a" forms a high-pass filter, while unit "b" forms a T-notch filter. Both filters remove the tone signal from the audio signal which subsequently is fed through audio amplifier Q_{505} (2SC372Y) to the receiver audio amplifier Q_{114}.

The tone signal passes through a low-pass filter at unit "c" of Q_{501}, and is fed to Q_{502}. When the tone frequency on the incoming signal matches that of the transmitted signal from the CPU-2500R, the voltage at pin 8 of Q_{502} becomes low, causing Q_{504} (2SC372Y) to switch off. In turn, proper bias is applied to Q_{119} for normal operation.

Without a proper tone signal, Q_{504} conducts, removing bias from Q_{119}, and hence disabling the audio circuit.

As the conventional squelch circuit is operative when the tone squelch is switched in, the BUSY lamp will light up when the channel is occupied, indicating that no transmission should be made out of courtesy to the other operators.

CRYSTAL DATA

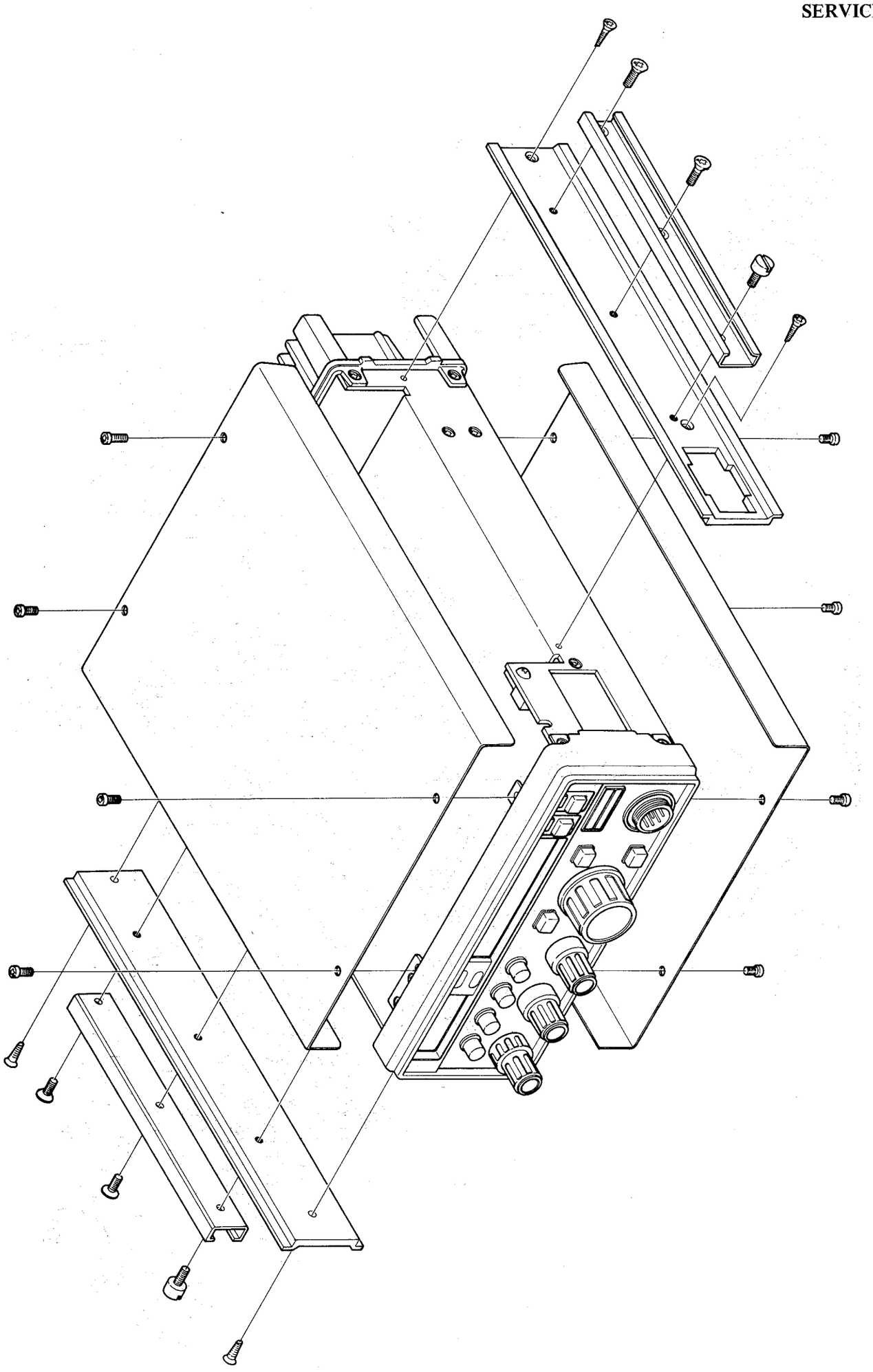
FUNCTION	HOLDER	RANGE (MHz)	MODE	LOAD C	SERIES R	DRIVE LEVEL
REFERENCE (X_{401})	HC-18/U	10.240	Fundamental	30 pF	25 Ω	2 mW
2nd Local (X_{101})	HC-18/U	10.245	Fundamental	30 pF	25 Ω	2 mW
Carrier (X_{202})	⁑HC-18/U	*10.700	Fundamental	30 pF	20 Ω	2 mW
PLL Local (X_{402})	HC-18/U	44.100	3rd overtone	20 pF	40 Ω	2 mW
PLL Local (X_{403})	HC-18/U	44.10166	3rd overtone	20 pF	40 Ω	2 mW
1800 Hz Tone (X_{201})	HC-25/U	3.6864	Fundamental	30 pF	100 Ω	3 mW
1750 Hz Tone (X_{201})	HC-25/U	3.584	Fundamental	30 pF	100 Ω	3 mW
Tone encoder (X_{601})	HC-43/UT	1.000	Fundamental	Series resonance	5k Ω	0.5 mW

* ACTUAL FREQUENCY: 10.740 MHz
Load Capacitor: 30 pF, 40 kHz UP (Decided by circuit)

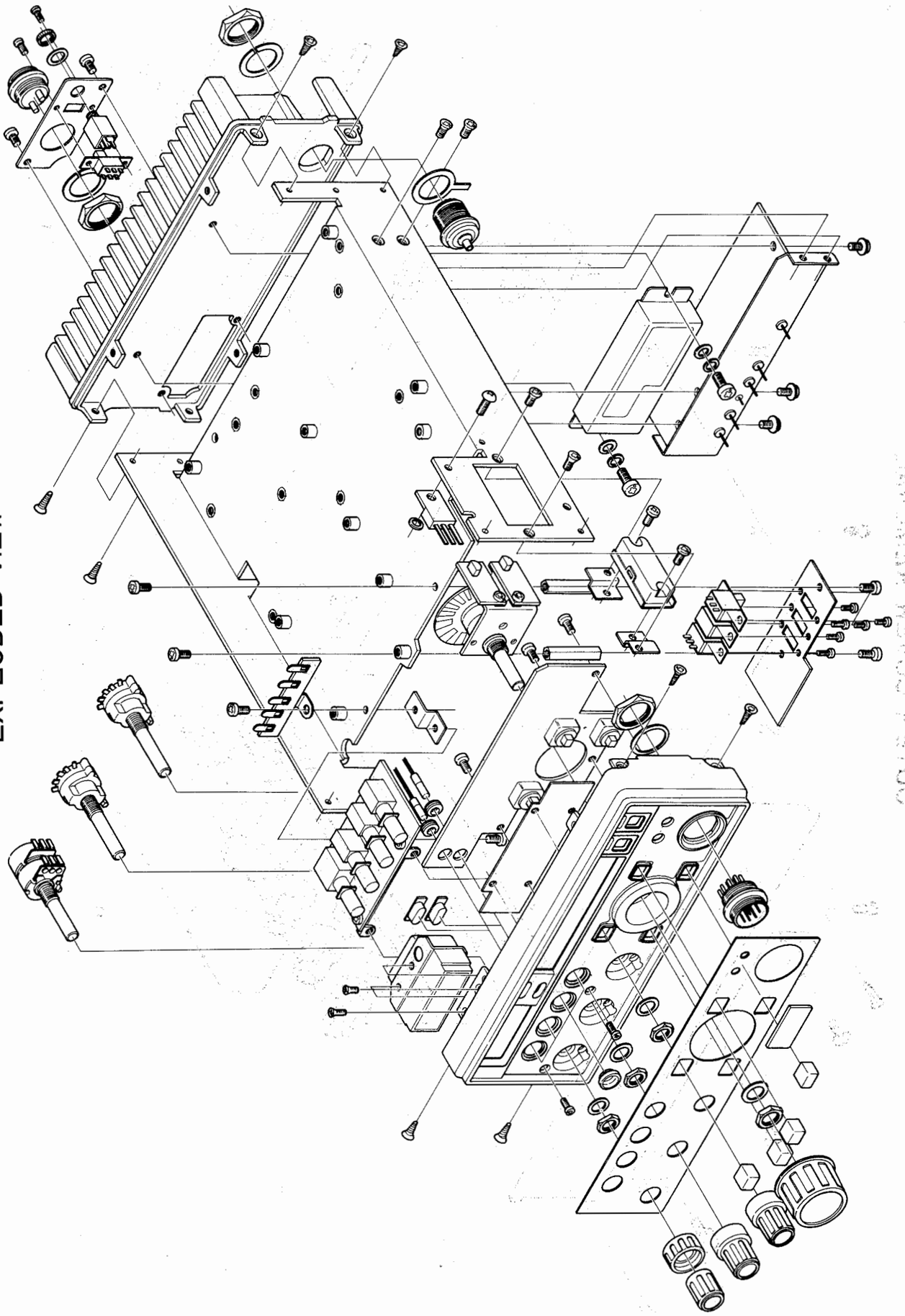
** Grounded case

SECTION 3-SERVICING

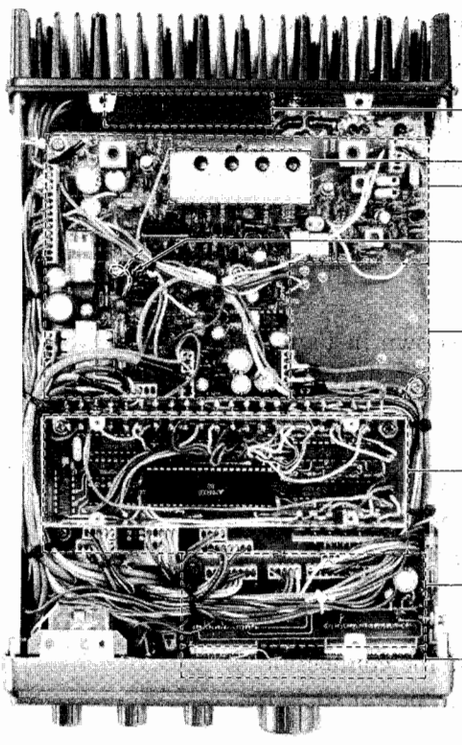
OUTER COVER REMOVAL



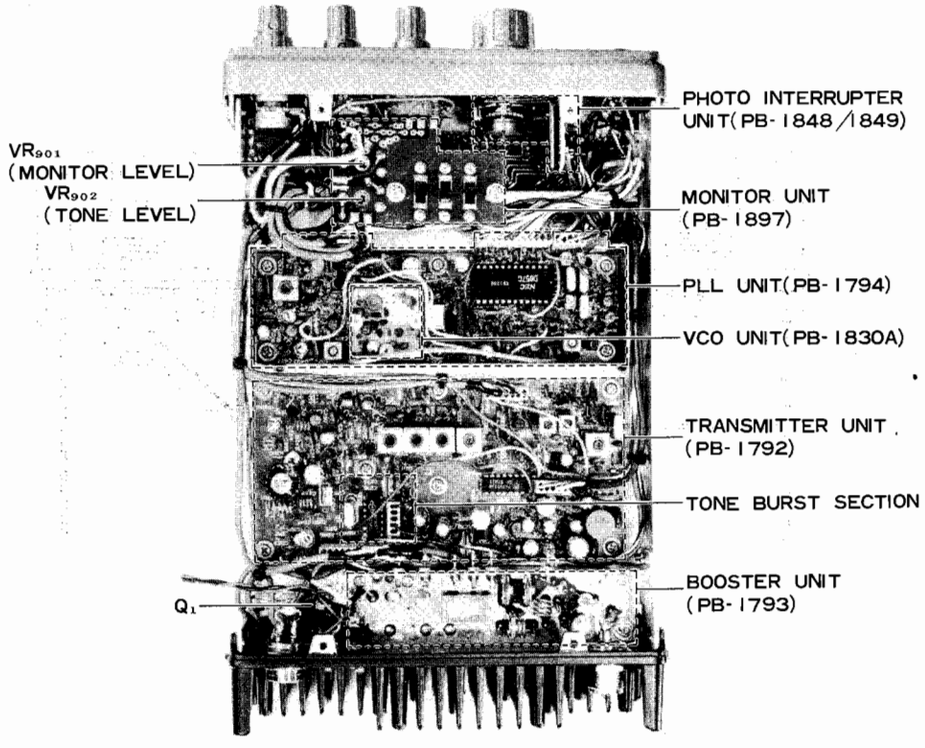
EXPLODED VIEW



BOARD LAYOUT



TOP VIEW



BOTTOM VIEW

MODIFICATIONS

MODIFICATION TO POWER SOCKET

In some CPU-2500R sets bearing serial numbers 039999 and down, high current across the ground lead at J_{103} would cause the Molex connector to overheat. The small modification below, made to the power socket, will cure the problem.

MODIFICATION PROCEDURE

(1) Locate the power socket, as shown in Figure 2. Locate the negative lead. The drawing is a bottom view.

(2) Install a 1 mm diameter wire from the negative terminal of the power socket to the shield plate on the BOOSTER Unit, as shown in the drawing.

(3) Be certain that you have made the connection to the negative terminal of the power socket, and close up the transceiver.

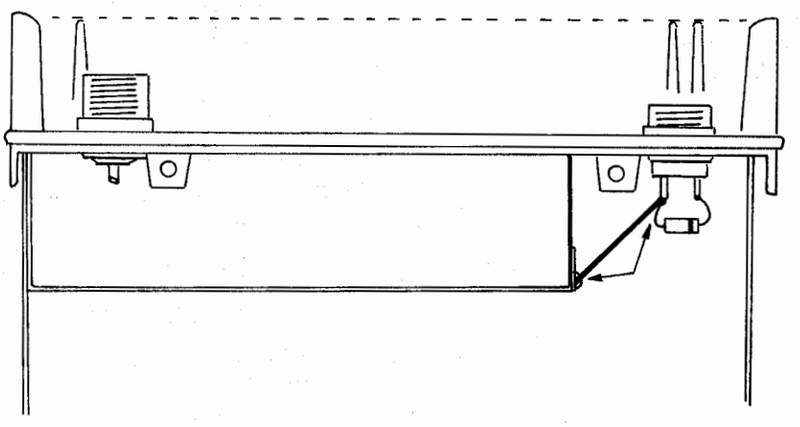


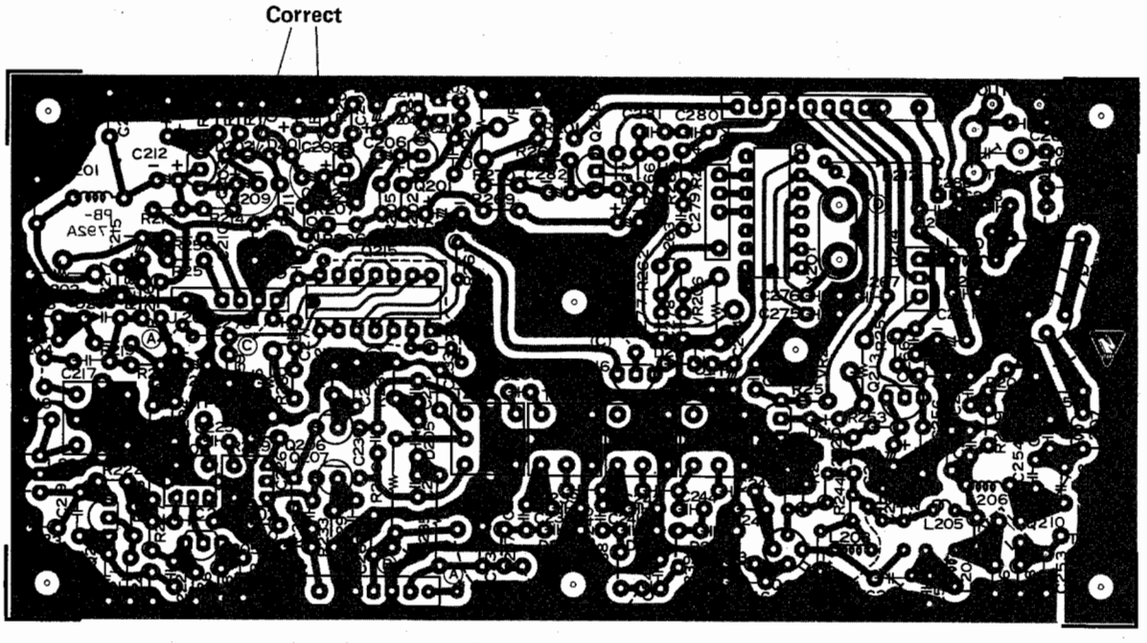
Figure 2

REVERSED CAPACITOR CHECK

Early in the production of the CPU-2500R, a mistake was found in the printing on a circuit board. The effect of this mistake was to cause C_{208} and C_{209} to be reversed upon installation, because there were two slots marked C_{208}.

C_{208} should be rated 1 μF at 50 WV, while C_{209} should be rated 10 μF at 16 WV.

The correct drawing of the parts layout is shown in Figure 3. All transceivers with the capacitors reversed should be modified accordingly. This error should not be found in sets bearing serial numbers 030001 and up.



Viewed from component side

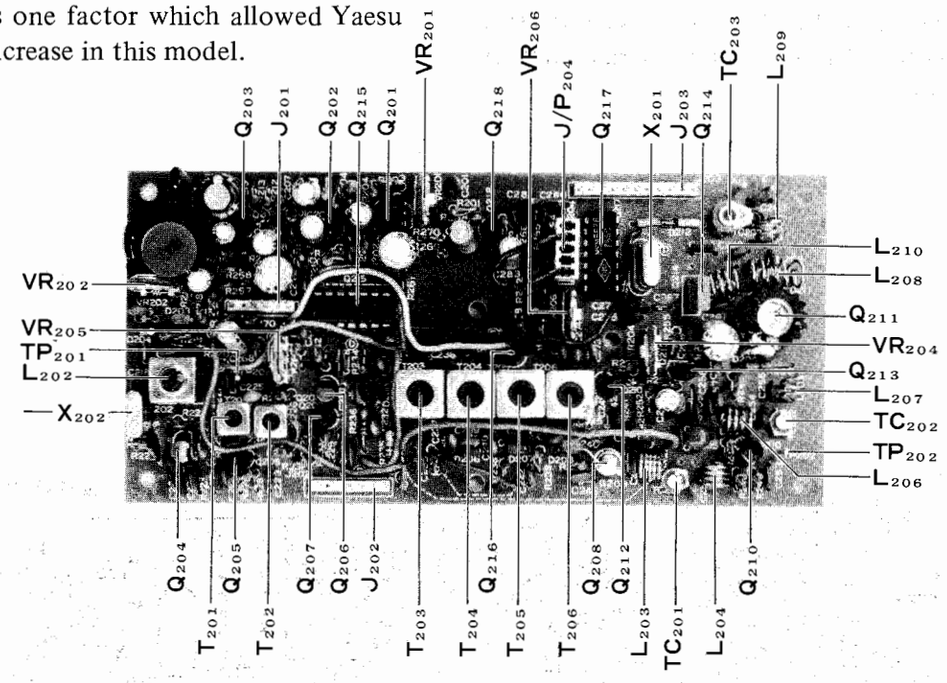
Figure 3

MODULATOR CHANGE

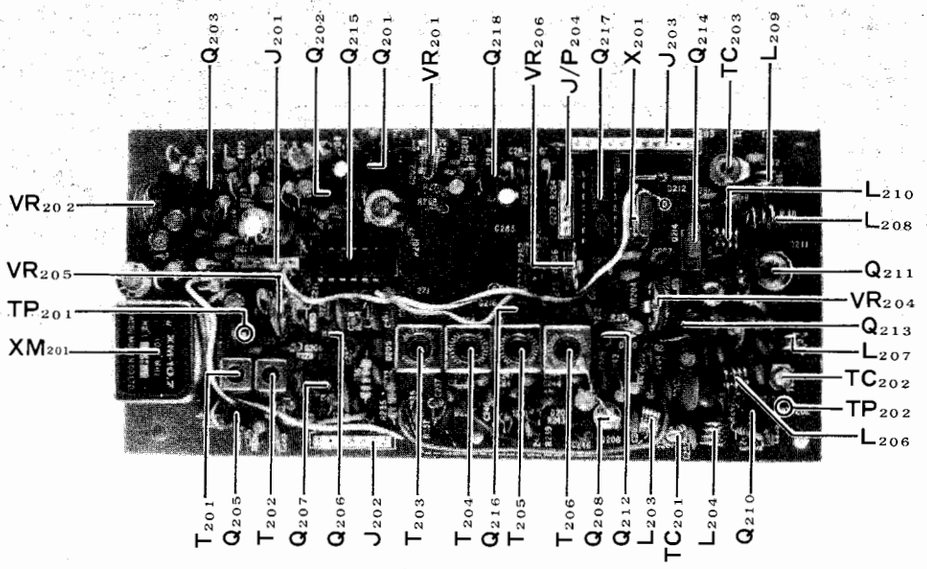
CPU-2500R transceivers bearing serial numbers 050001 and up used a modulator board different from that used in earlier production runs. The early models bear the nomenclature MOD Circuit (PB-1792, 1792A), while the new boards are called the TX Unit (PB-1792B, C . . .).

This change was not brought about because of any deficiency in the early circuitry. Rather, some new modular circuitry became available which reduced the parts required to do the same task. The consolidation was one factor which allowed Yaesu to avoid a price increase in this model.

The schematic diagrams for the circuits in question are shown below. There is no reason to retrofit early models with the new modulator board.

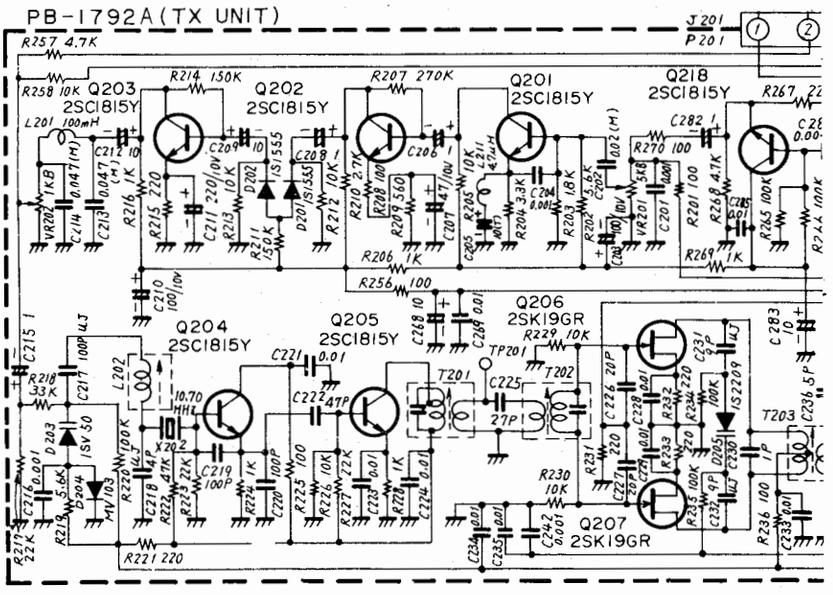


Early Model (Discrete FM Modulator)

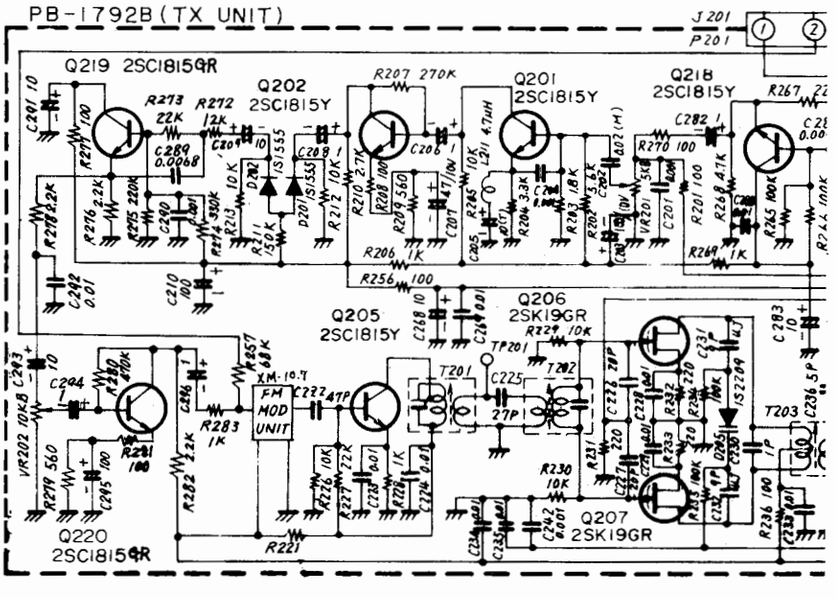


After Prod. 5 (FM Modulator Module)

Early Model (Discrete FM Modulator)



After Prod. 5 (FM Modulator Module)



INSTALLATION OF OPTIONAL TONE SQUELCH CIRCUIT

PARTS REQUIRED:

1. Tone Squelch Unit (PB-1555A) completed and tested ..... (1 pce)
2. RC Kit for Frequency Selection .... (1 set)

INSTALLATION:

(1) Remove screws on the side of the transceiver and lift up the top cover.

(2) Locate the space for PB-1555A and place it in such a way so that the pins on the receiver printed board come through the holes in the PB-1555A as illustrated in Fig. 4.

(3) Solder the pins on PB-1555A and the receiver printed board as illustrated in Fig. 4.

(4) Locate a jumper wire on the printed board as illustrated in Fig. 5. Cut this jumper wire.

ALIGNMENT:

The tone frequency should coincide with that of the transmitting station to open the squelch circuit. The frequency of the kit is set to 77 Hz at the factory and can be set anywhere between 70 Hz to 160 Hz by VR_{502}.

The tone frequency can be changed to 160 Hz through 250 Hz by selecting the components as illustrated in Table 1.

TONE FREQ	C516	R516	R513	R514	R524
70–160 Hz	0.15 μF	39 Kohm	15 Kohm	470 Kohm	15 Kohm
160–250 Hz	0.1 μF	33 Kohm	8.2 Kohm	270 Kohm	8.2 Kohm

Table 1

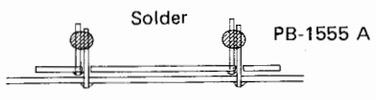
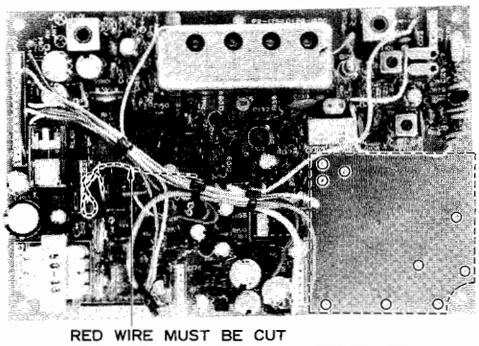
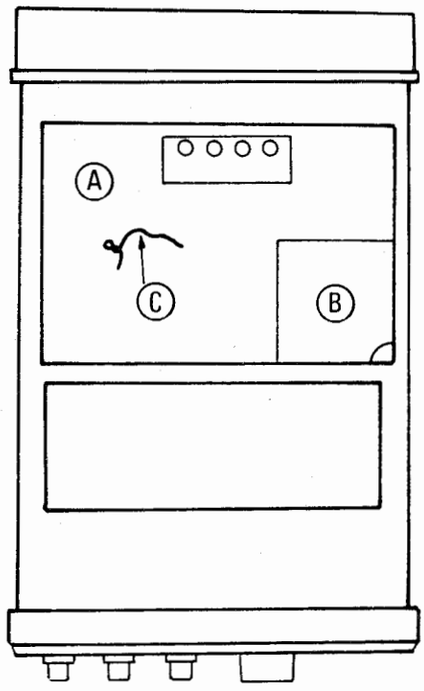


Figure 4





A RECEIVER BOARD
B TONE SQUELCH UNIT
C RED WIRE MUST BE CUT WHEN TONE SQUELCH UNIT IS INSTALLED.

Figure 5

FREQUENCY RANGE MODIFICATIONS

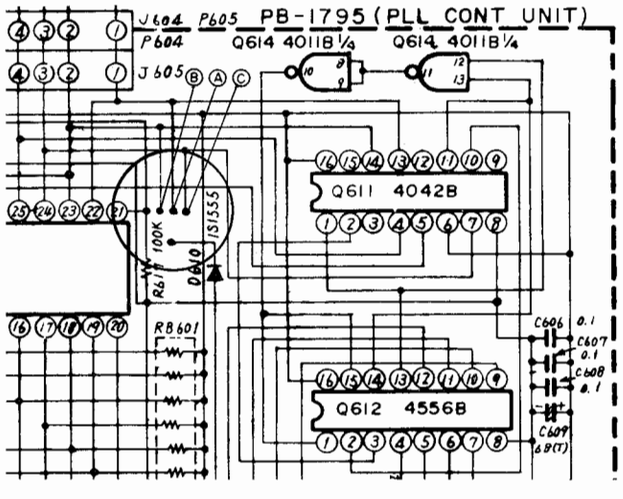
FREQUENCY RANGE MODIFICATION INFORMATION

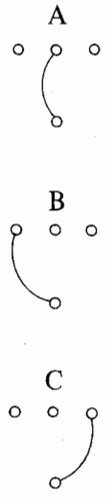
Several modifications are available for changing the frequency range and/or the preset frequency of the CPU-2500R.

Please refer to the chart, schematic, and board layouts provided in this section. In order to modify the frequency range, jumper wires must be installed or removed at points (A), (B), and (C) as shown, while diode D_{601} controls the preset frequency (145.000 MHz or 147.000 MHz).

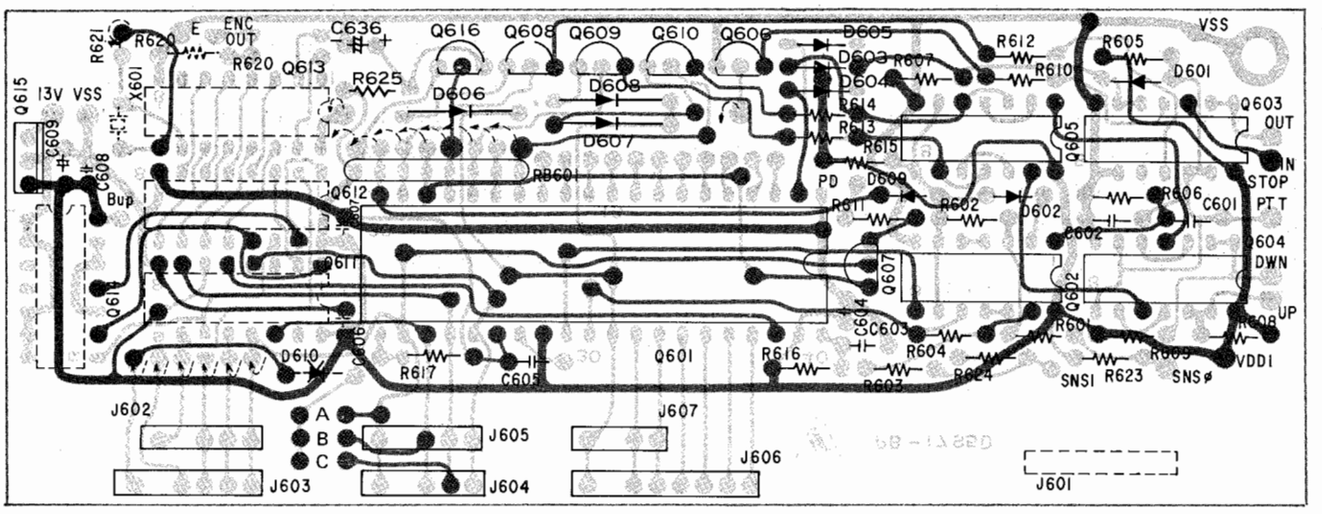
Please note that when a jumper is to be installed at point (A), this does not mean that the jumper is to be connected between point (A) and some other point (for example, (A) to (B), etc.). The correct jumpering technique is to install a wire between the two solder terminals which make up point (A), or the two that form (B), and so forth. If D_{601} is to be "open," simply remove the diode or lift one end of it from the board.

BAND	JUMPER	D610	RX FREQ.	TX FREQ.
144–146	A	○	144.00–145.99	144.01–145.99
144–148	OPEN	OPEN	144.00–147.99	144.01–147.99
144–148	B	○	144.00–147.99	144.01–145.99
144–149	C	○	144.00–148.99	144.01–145.99

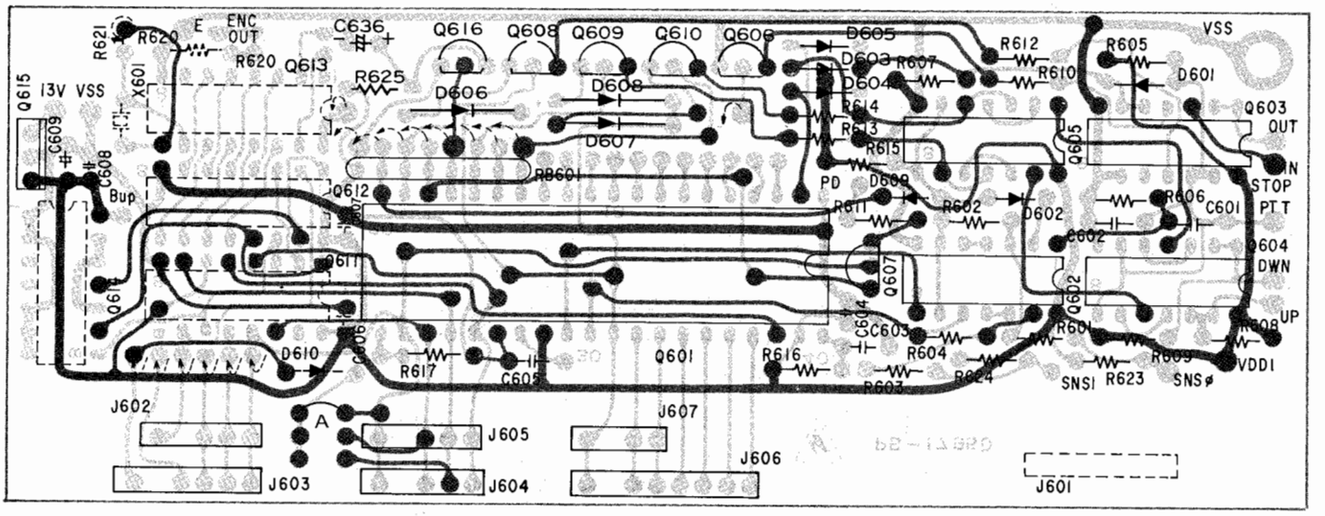




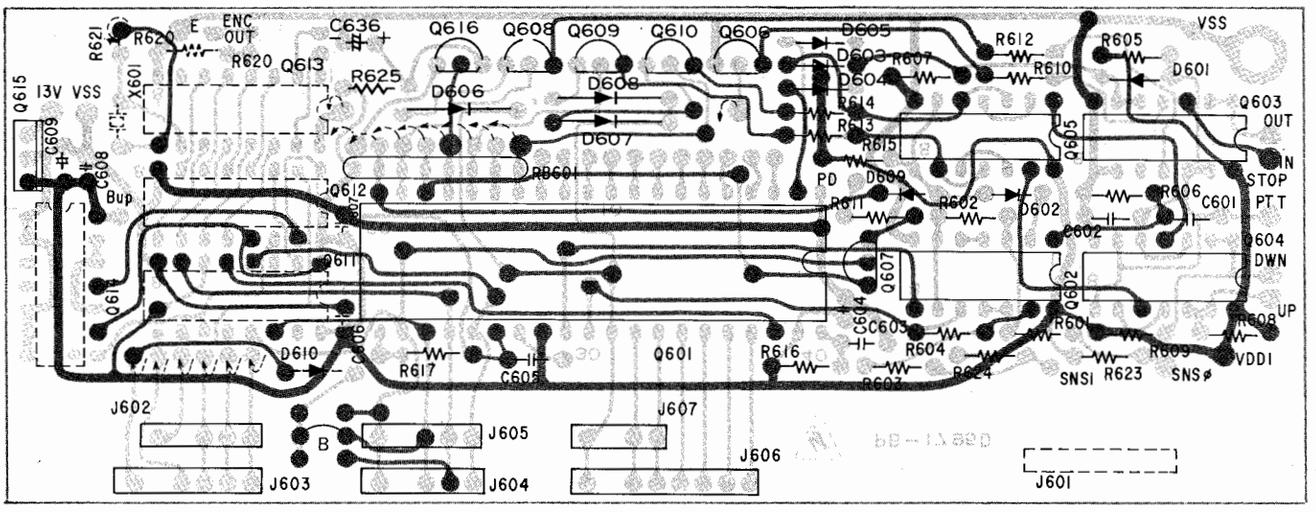
FREQUENCY RANGE RX 144.00–147.99 MHz, TX 144.01–147.99 MHz, PRESET 147 MHz



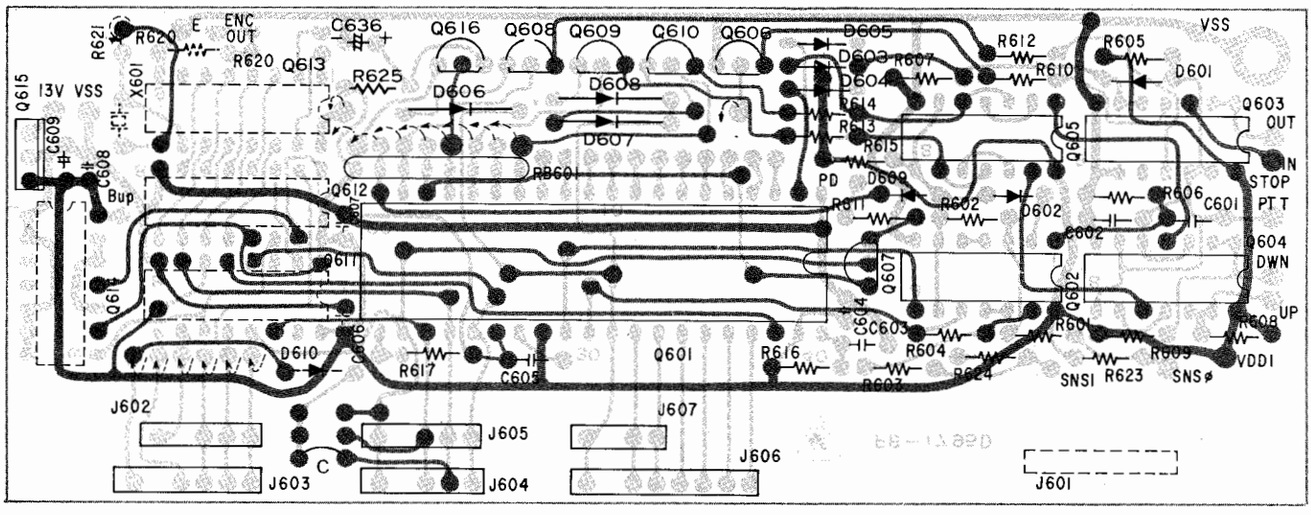
FREQUENCY RANGE RX 144.00–145.99 MHz, TX 144.01–145.99 MHz, PRESET 145 MHz



FREQUENCY RANGE RX 144.00–147.99 MHz, TX 144.01–145.99 MHz, PRESET 145 MHz

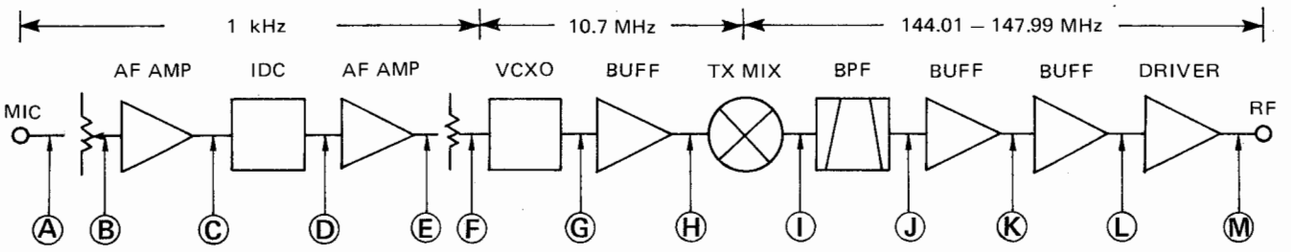


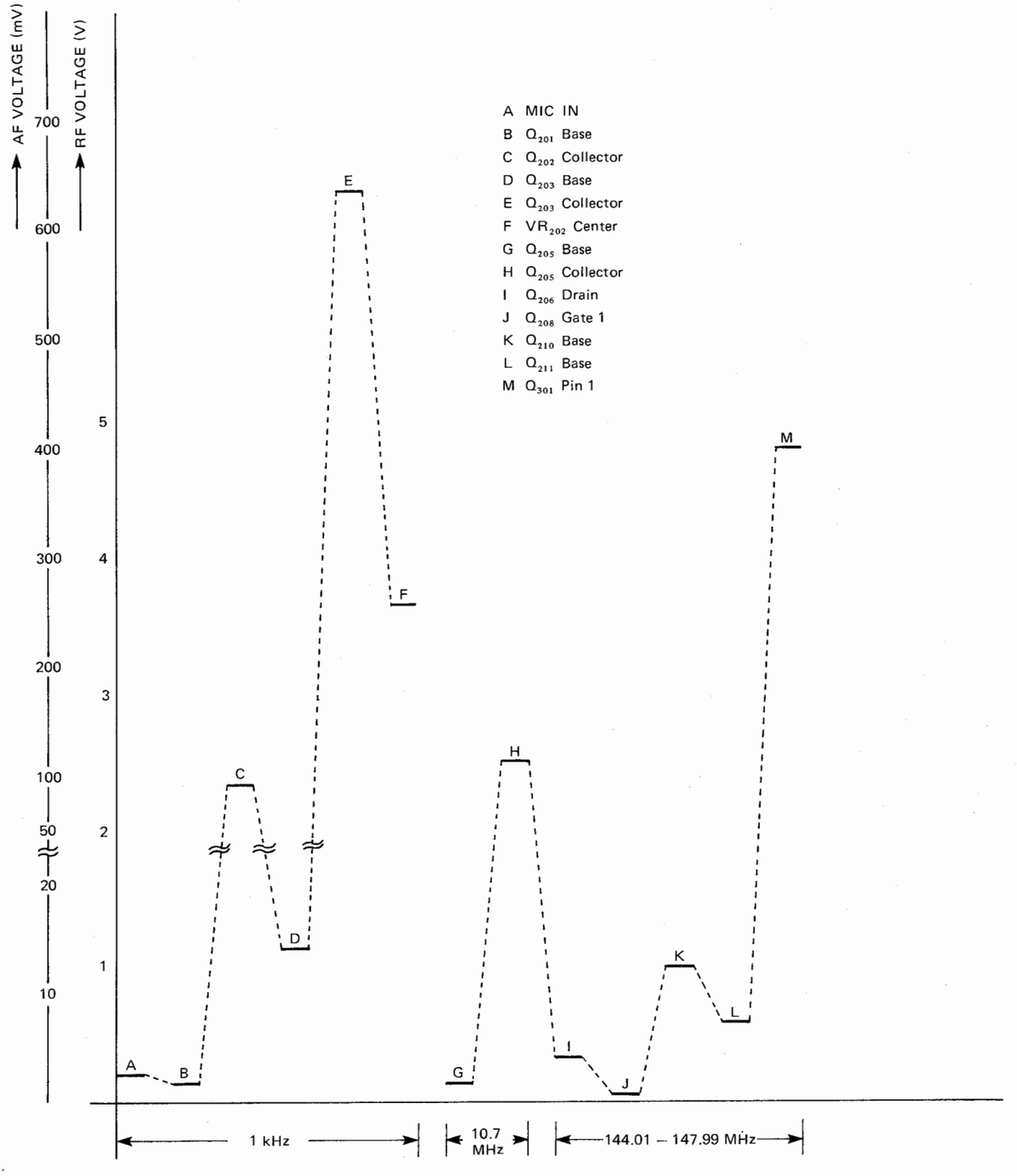
FREQUENCY RANGE RX 144.00–148.99 MHz, TX 144.01–145.99 MHz, PRESET 145 MHz



LEVEL DIAGRAM

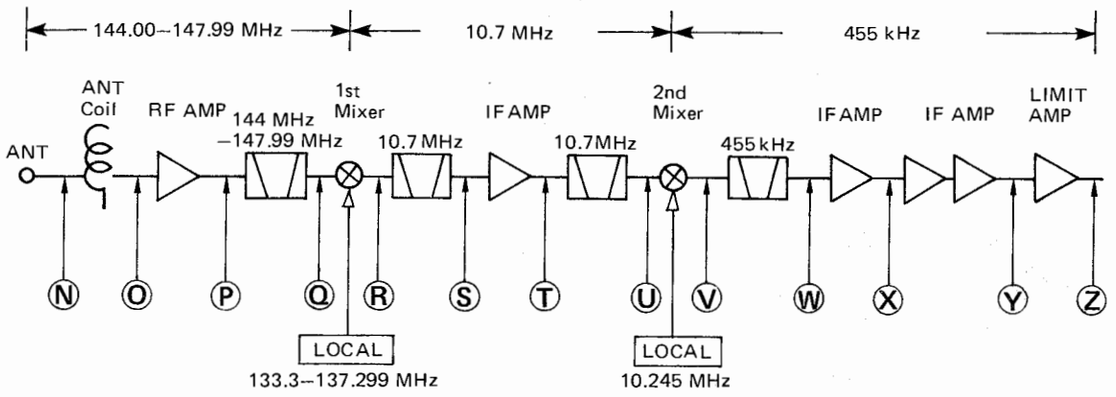
TRANSMITTER SECTION

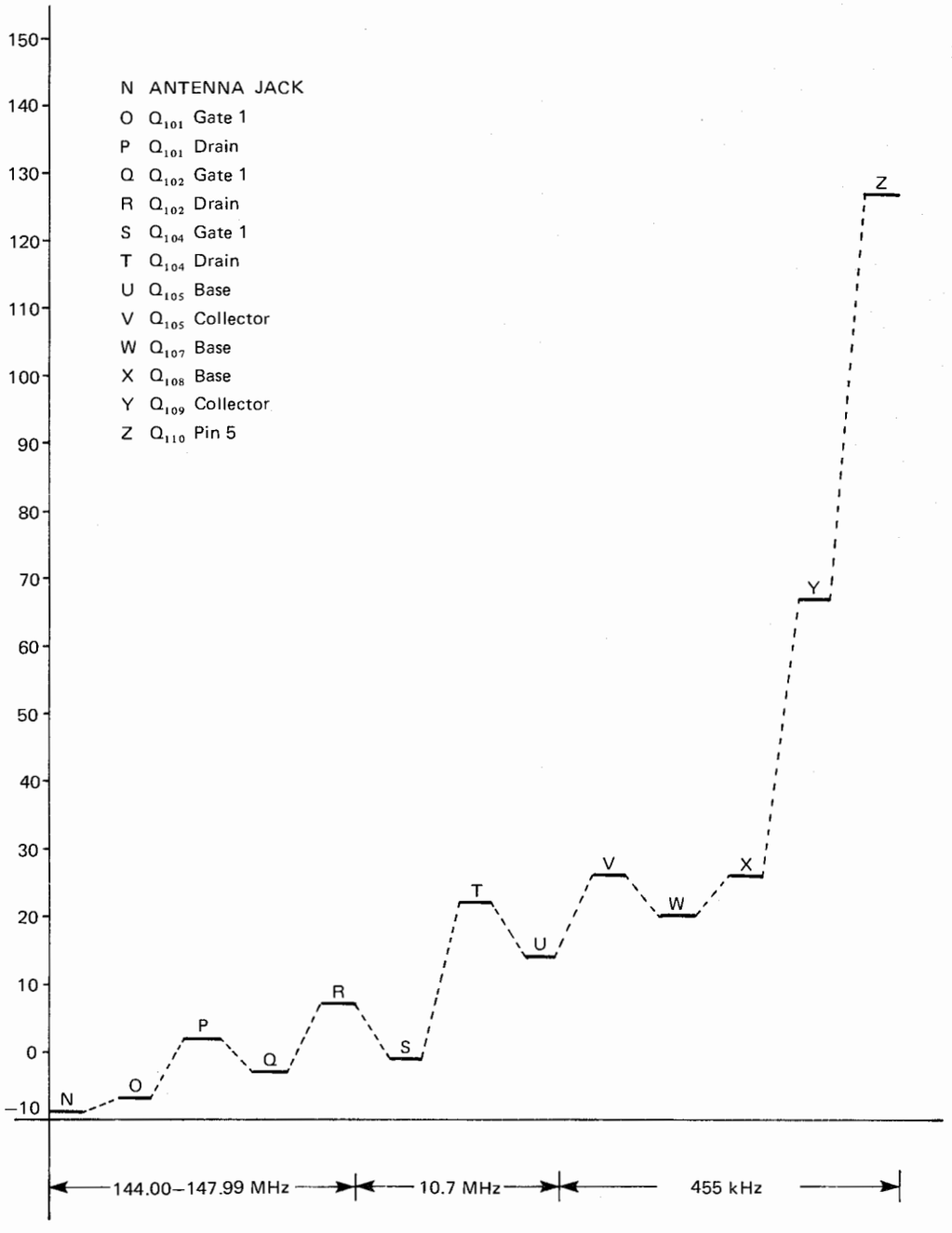




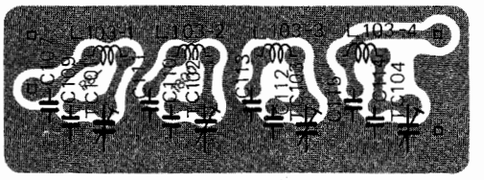
LEVEL DIAGRAM

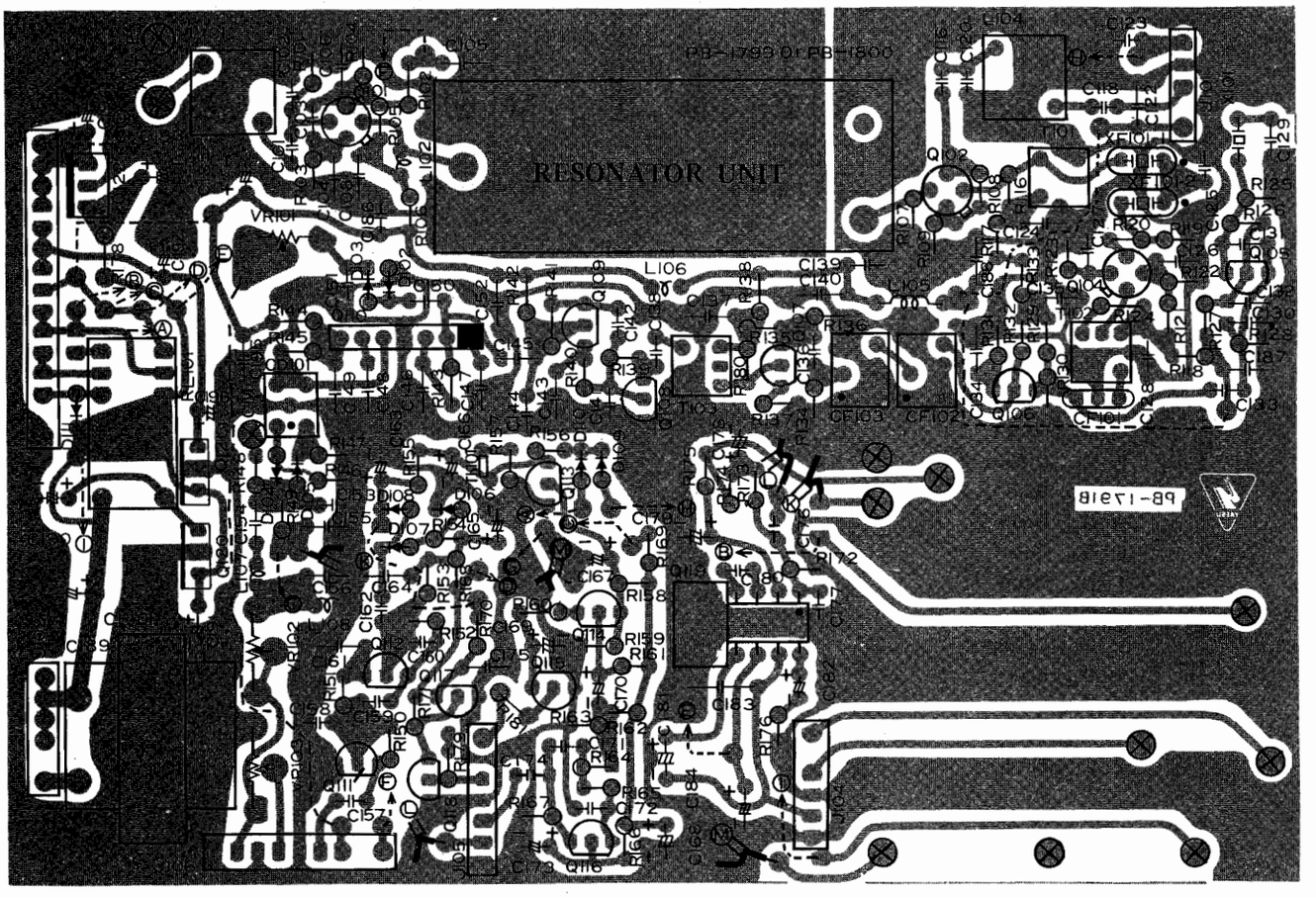
RECEIVER SECTION



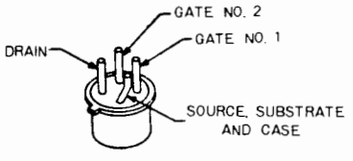


PARTS LAYOUT (RECEIVER/RESONATOR UNIT)

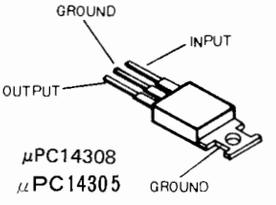




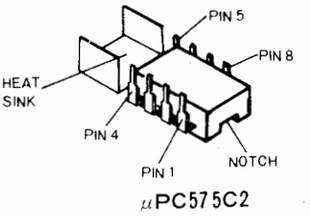
Viewed from component side



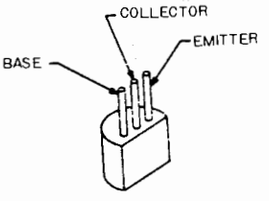
3SK40M
3SK51



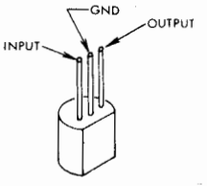
μPC14308
μPC14305



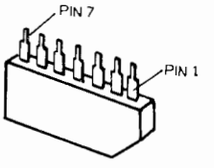
μPC575C2



2SA564A
2SC1383
2SC1815Y

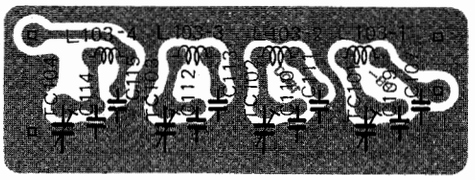


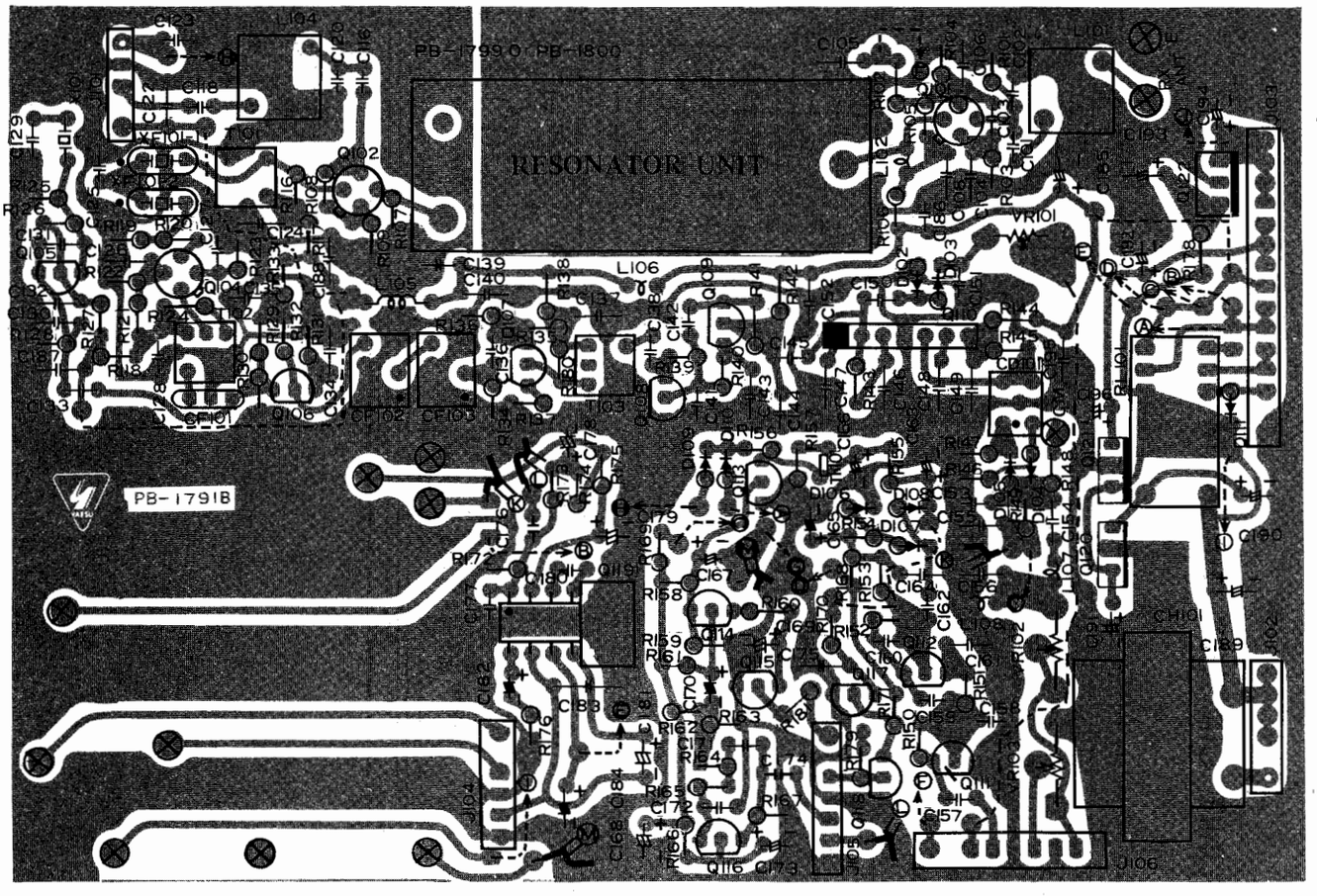
78L05/08



μPC577H

PARTS LAYOUT (RECEIVER/RESONATOR UNIT)





Viewed from solder side

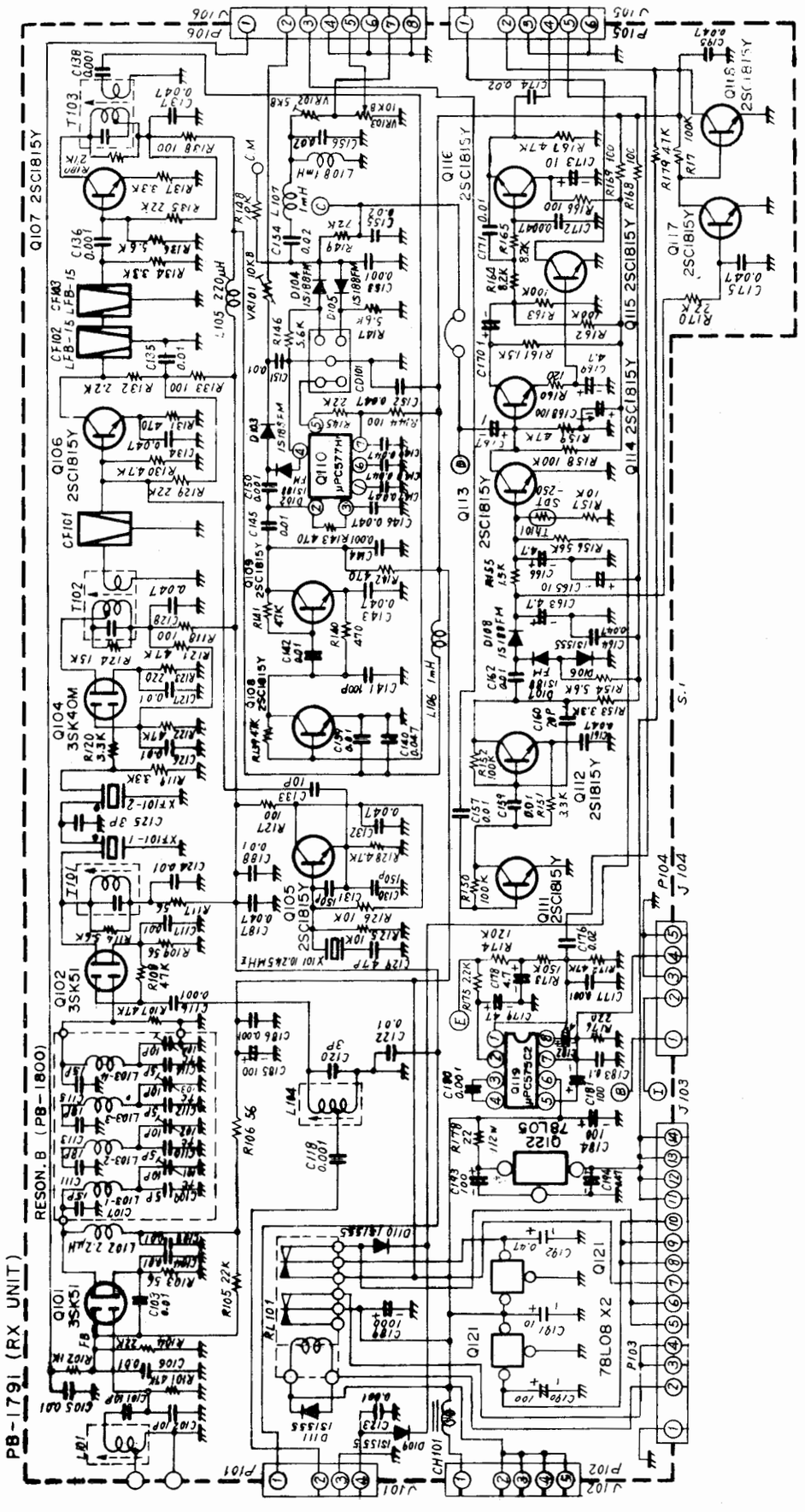
VOLTAGE CHART
(DC VOLTS)

	E(S)	C(D)	B(G_1)	G_2
Q_{101}	0.35	7.0	0	3.5
Q_{102}	0.15	7.0	0	0.15
Q_{104}	0.4	7.0	0	3.5
Q_{105}	3.4	7.0	3.5	—
Q_{106}	0.6	4.3	1.2	—
Q_{107}	0.8	7.2	1.5	—
Q_{108}	E	1.6	0.7	—
Q_{109}	3.5	5.5	4.2	—
Q_{111}	E	1.6	0.7	—

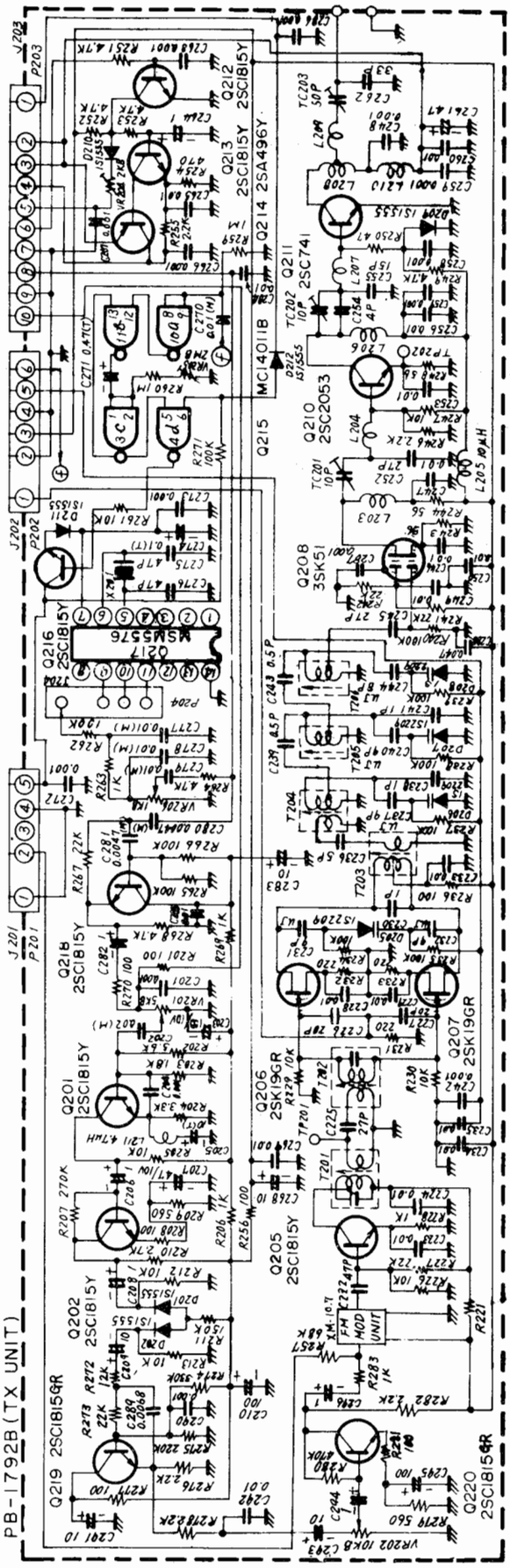
	E(S)	C(D)	B(G_1)	G_2	
Q_{112}	3.5	4.7	4.1	—	
Q_{113}	E	1.9/0	0.35/0.6	—	R/T (SQ ON/OFF)
Q_{114}	1.3	3.8	1.9	—	
Q_{115}	E	0.1/13.5	0.8/0	—	R/T (SQ ON/OFF)
Q_{116}	7	2.7	3.3	—	
Q_{117}	E	0.6/0	0.4/0.5	—	R/T (SQ ON/OFF)
Q_{118}	E	0.6/0	0/4.5	—	

	1	2	3	4	5	6	7	8
Q_{110}	5.0	5.0	3.5	E	2.5	2.0	6.0	–
Q_{119}	1.7	13.5	13.0	7.6	6.4	13.6	0.25	1.8
Q_{120}	13.6	0	8.0	–	–	–	–	–
Q_{121}	13.6	0	8.0	–	–	–	–	–
Q_{122}	12.4	0	5.0	–	–	–	–	–

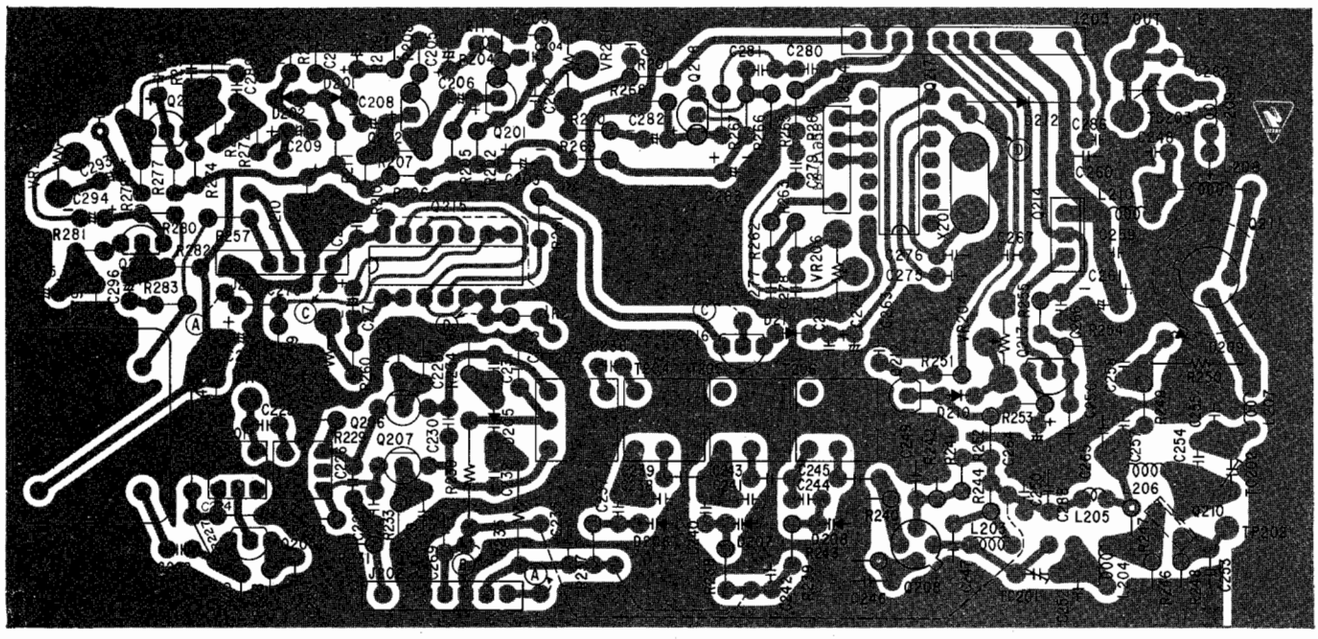
RX UNIT CIRCUIT DIAGRAM



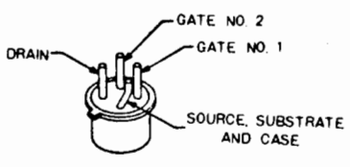
TX UNIT CIRCUIT DIAGRAM



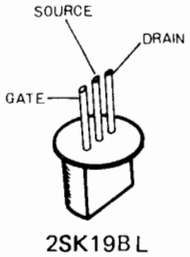
PARTS LAYOUT (TX UNIT)



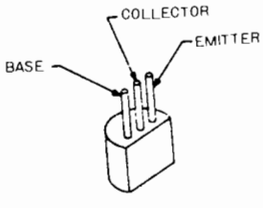
Viewed from component side



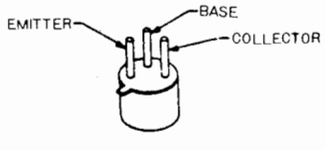
3SK40M
3SK51



2SK19BL
2SK19GR



2SA564A



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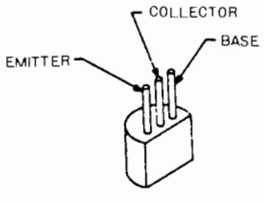
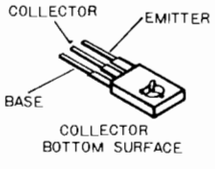
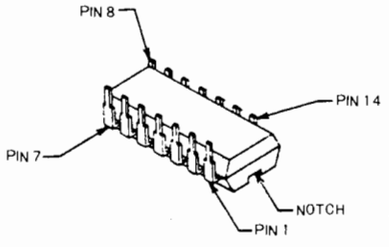
2SC741



2SC2053
2SC710D,

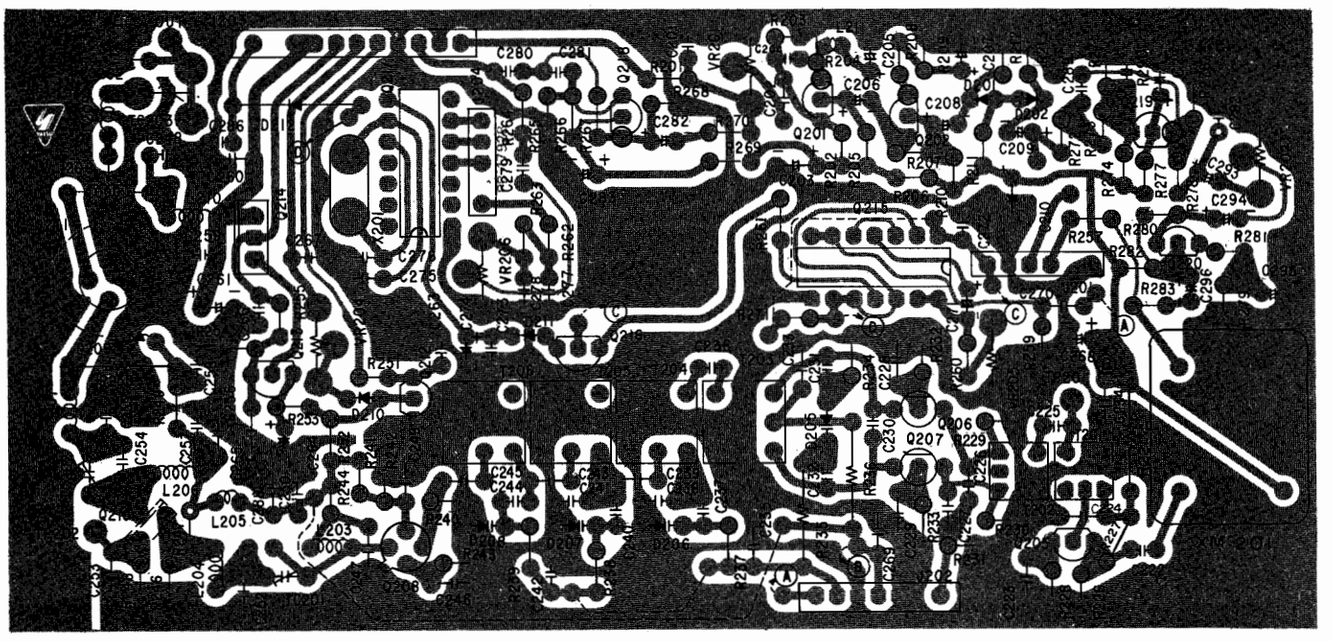


2SA496Y,O
2SC496Y,O



MC14011B
MC14081B
MSM5576

PARTS LAYOUT (TX UNIT)



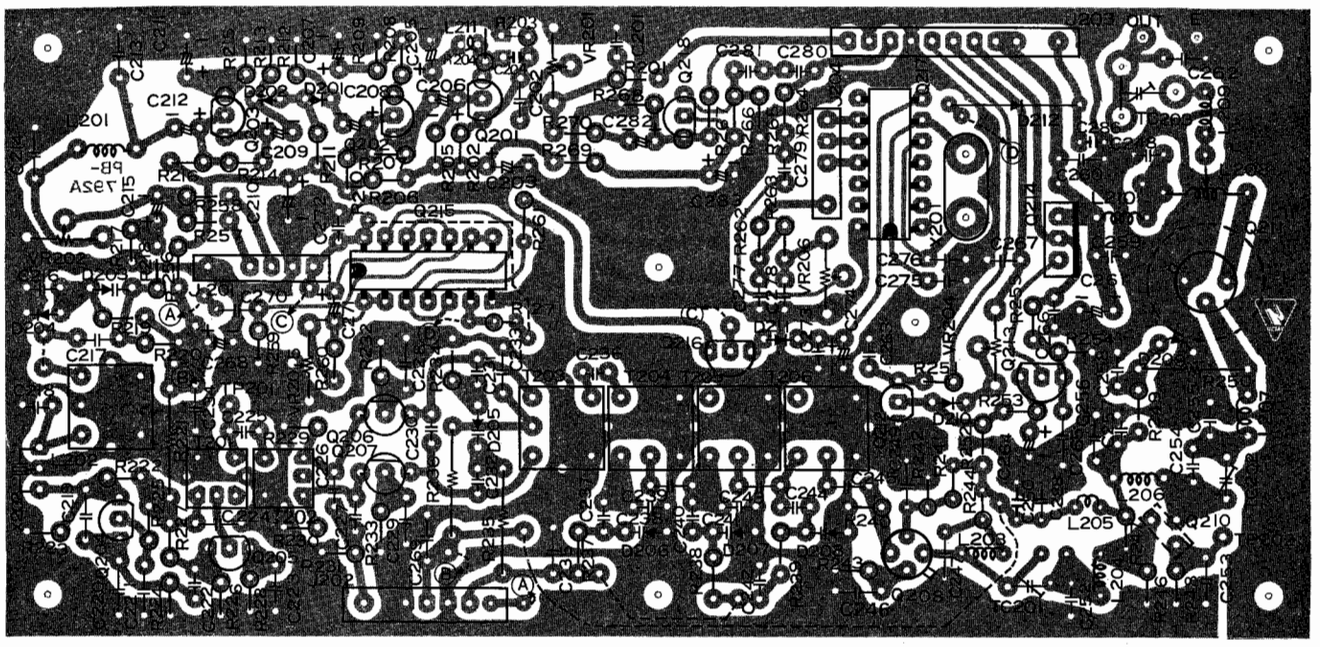
Viewed from solder side

VOLTAGE CHART
(DC VOLTS)

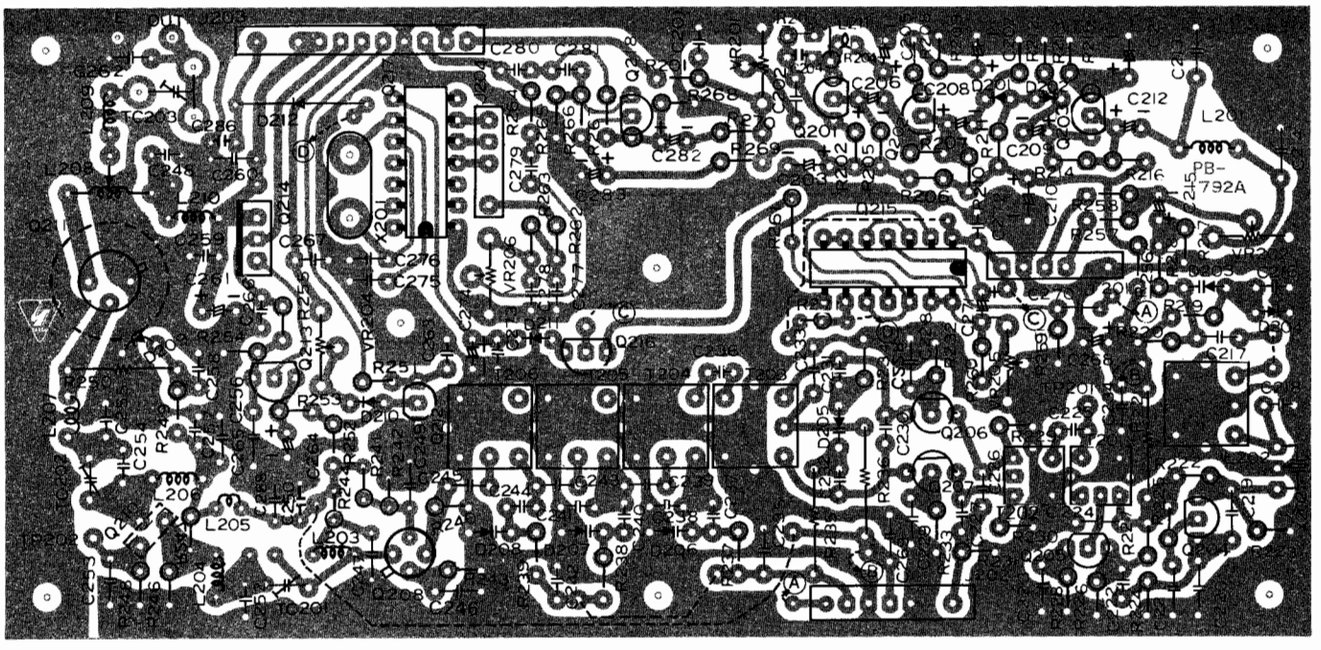
	E(S)	C(D)	B(G_1)	G_2	
Q_{201}	0.7	3.2	1.3	—	
Q_{202}	0.7	3.7	1.4	—	
Q_{203}	0.6	3.9	1.3	—	
Q_{204}	1.3	2.0	6.5	—	
Q_{205}	1.3	2.0	6.5	—	
Q_{206}	0.8	6.5	−0.15	—	
Q_{207}	0.8	6.5	−0.15		
Q_{208}	0.3	7	0	3.6	
Q_{210}	0.55	7.4	0.9	—	
Q_{211}	E	13.5	0.9	—	
Q_{212}	E	7.0/1.0	0.4/0.05	—	H/L
Q_{213}	6.5/0.65	12.5	7.0/1.0	—	H/L
Q_{214}	13.5	13.0/3.0	12.5	—	H/L
Q_{216}	6.5	7.3	7.3	—	BURST: ON
Q_{218}	1.7	5.0	2.4	—	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Q_{217}	0	0	0	0	2.6	2.5	6.0	0	3.0	3.0	3.0	3.0	3.0	0

PARTS LAYOUT (TX UNIT EARLY MODEL)

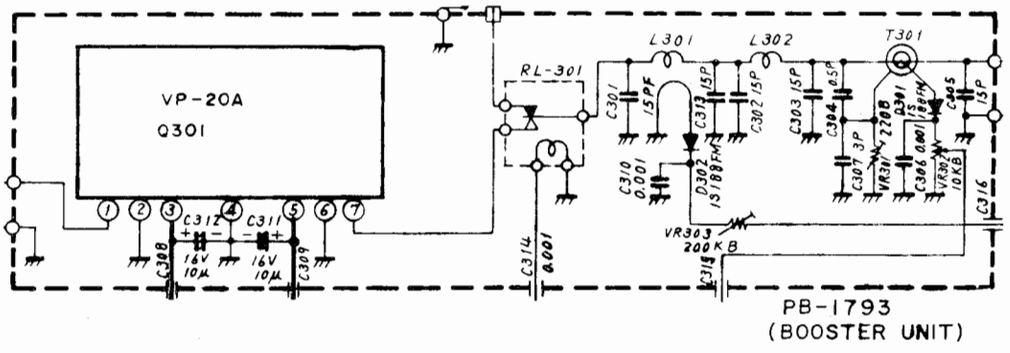


Viewed from component side

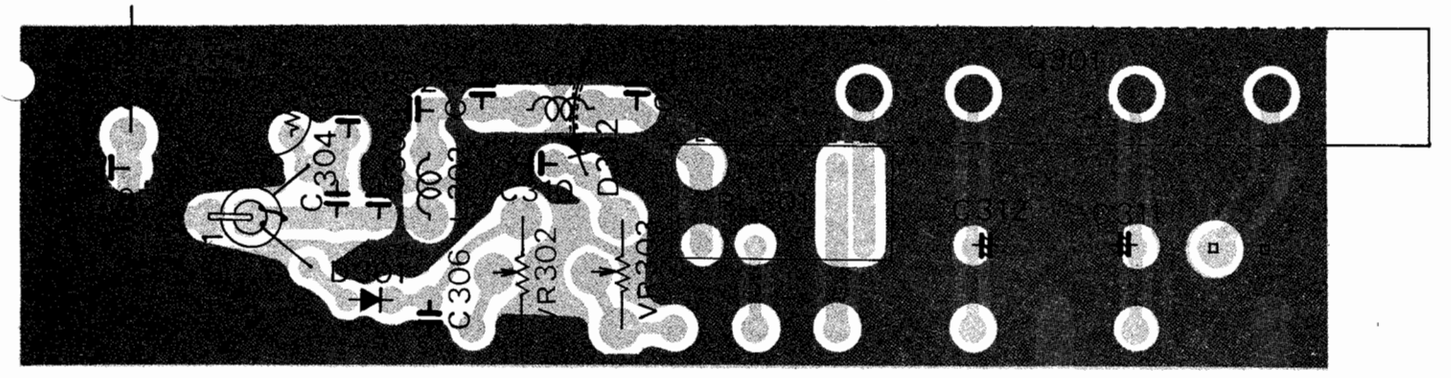


Viewed from solder side

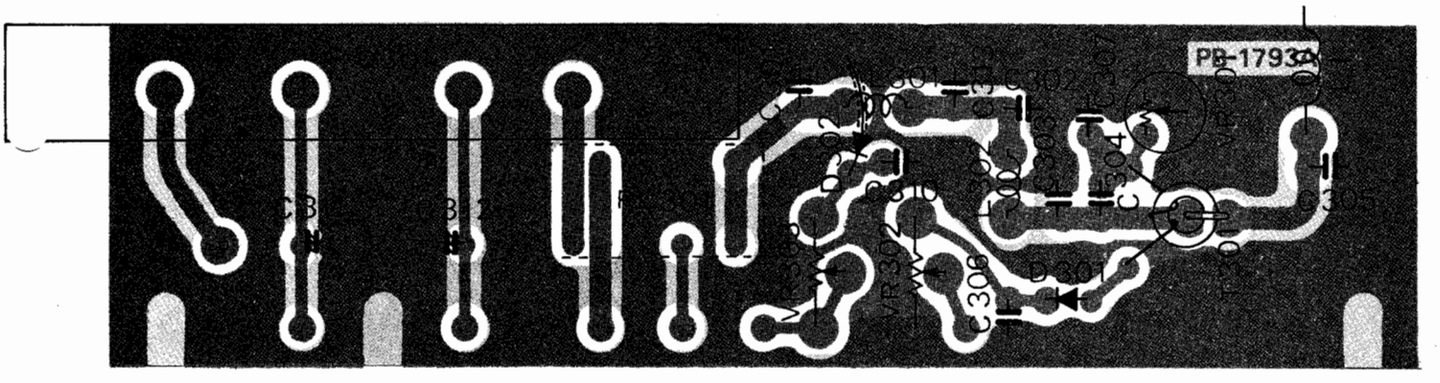
BOOSTER UNIT CIRCUIT DIAGRAM



PARTS LAYOUT (BOOSTER UNIT)

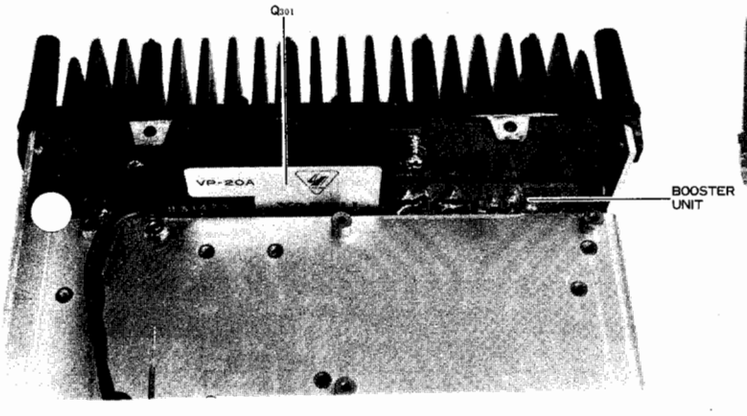


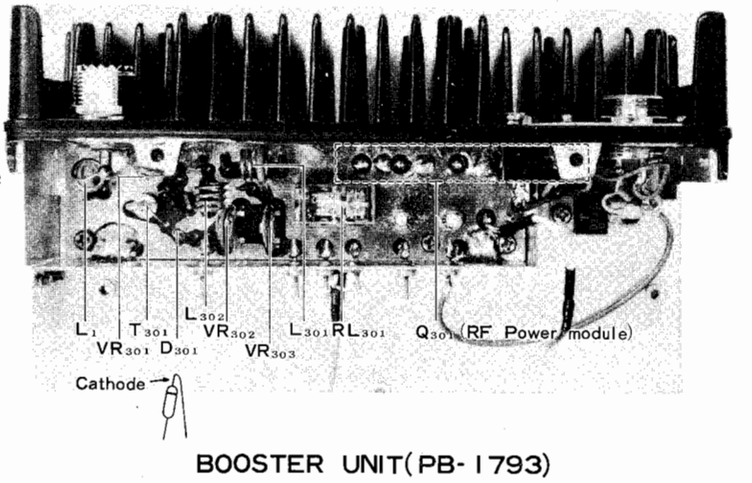
Viewed from component side



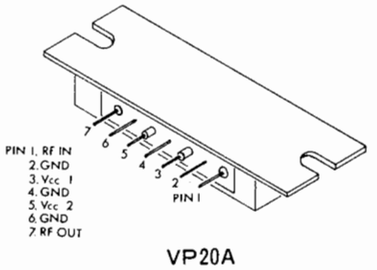
Viewed from power module side

MOUNTING DETAIL





BOOSTER UNIT(PB-1793)

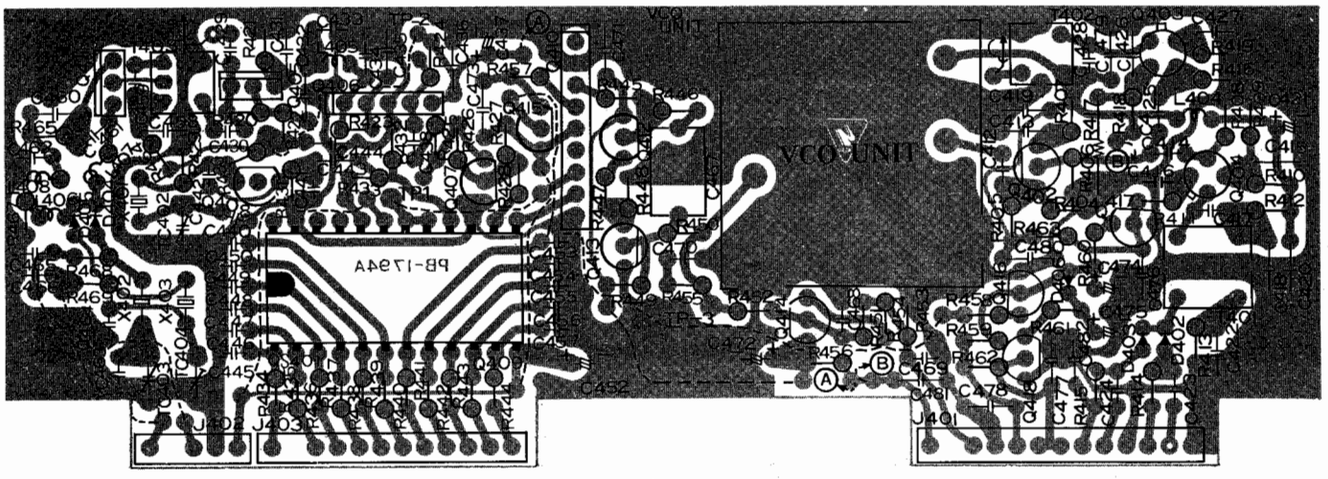


VP20A

VOLTAGE CHART
(DC VOLTS)

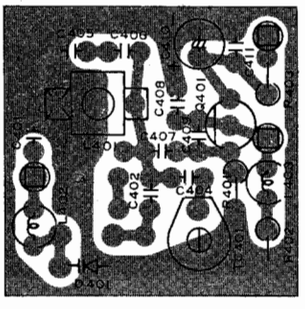
	1	2	3	4	5	6	7	
Q_{301}	0	0	12.5/2.5	0	13.6	0	0	H/L

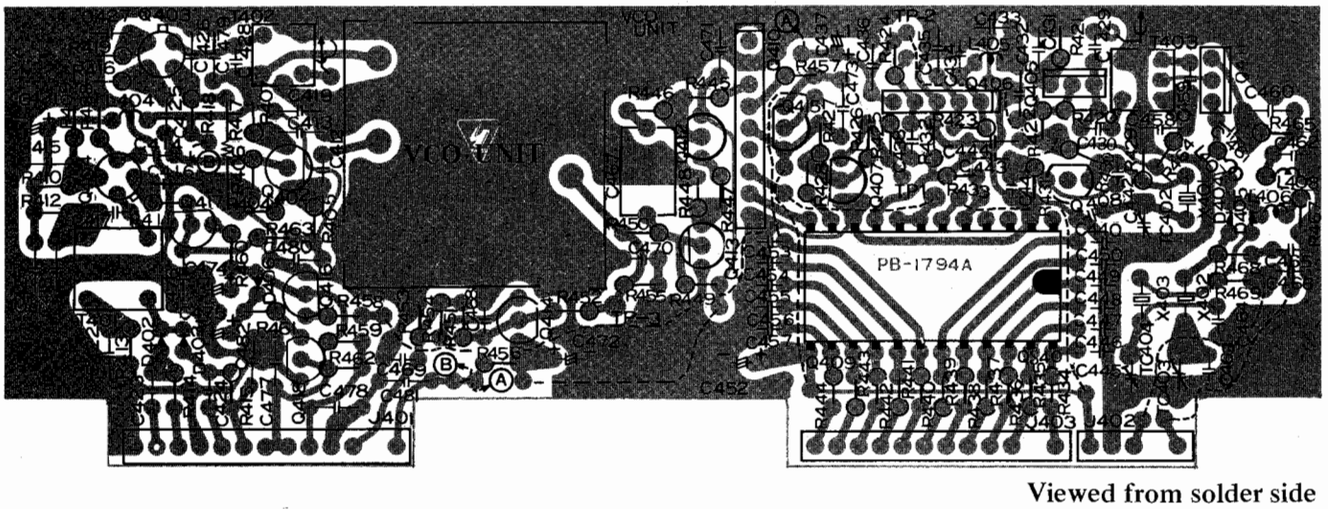
PARTS LAYOUT (PLL/VCO UNIT)



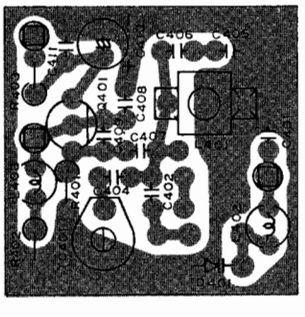
Viewed from component side

(VCO UNIT)

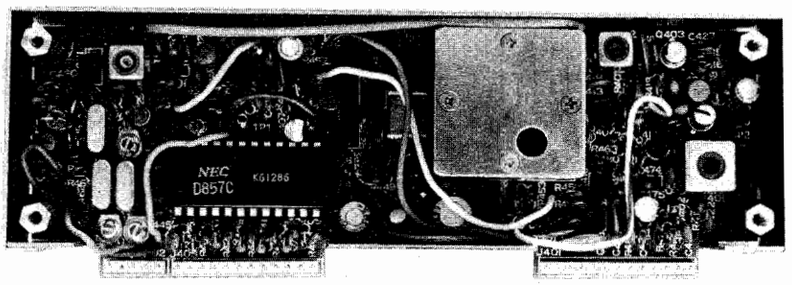




Viewed from solder side



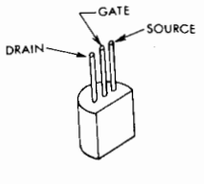
(VCO UNIT)



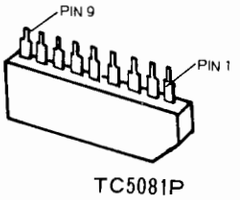
VOLTAGE CHART
(DC VOLTS)

	E(S)	C(D)	B(G)	G_2	
Q_{401}	0.8	7.0	–1.5	—	
Q_{402}	4.2	7.0	3.7	—	
Q_{403}	0.2	7.0	0	3.7	
Q_{404}	0.2	7.0	0	3.7	
Q_{405}	1.0	7.0	1.6	—	
Q_{407}	E	2.5	0.6	—	
Q_{408}	4.5	7.0	4.6	—	
Q_{411}	0.7	7.0	1.35	—	
Q_{412}	2.0	7.0	2.4	—	
Q_{413}	E	3.2	0.65	—	
Q_{414}	3.0	7.0	3.5	—	
Q_{415}	6.0	0	5.0	—	PLL: LOCK
Q_{416}	E	4.2	0	—	
Q_{417}	E	0.2	0.7	—	
Q_{418}	E	0	0.7	—	

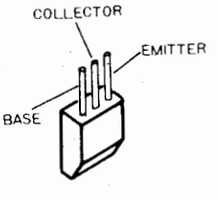
	1	2	3	4	5	6	7	8	9	
Q_{406}	1.5	1.5	0	6.5	7.5	—	—	—	—	
Q_{410}	5.0	0	2.0	5.0	5.0	0	2.5	0	0	PLL LOCK



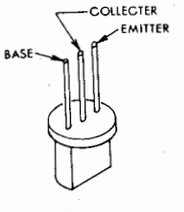
2SK30Y



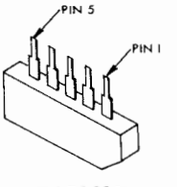
TC5081P



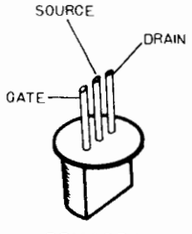
2SC535A



2SC373
2SC1000GR



TA7060P



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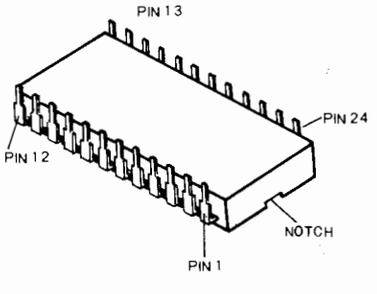
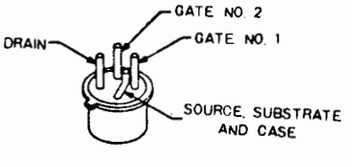
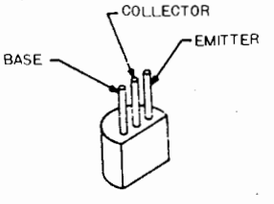
2SK19GR



μPD857C

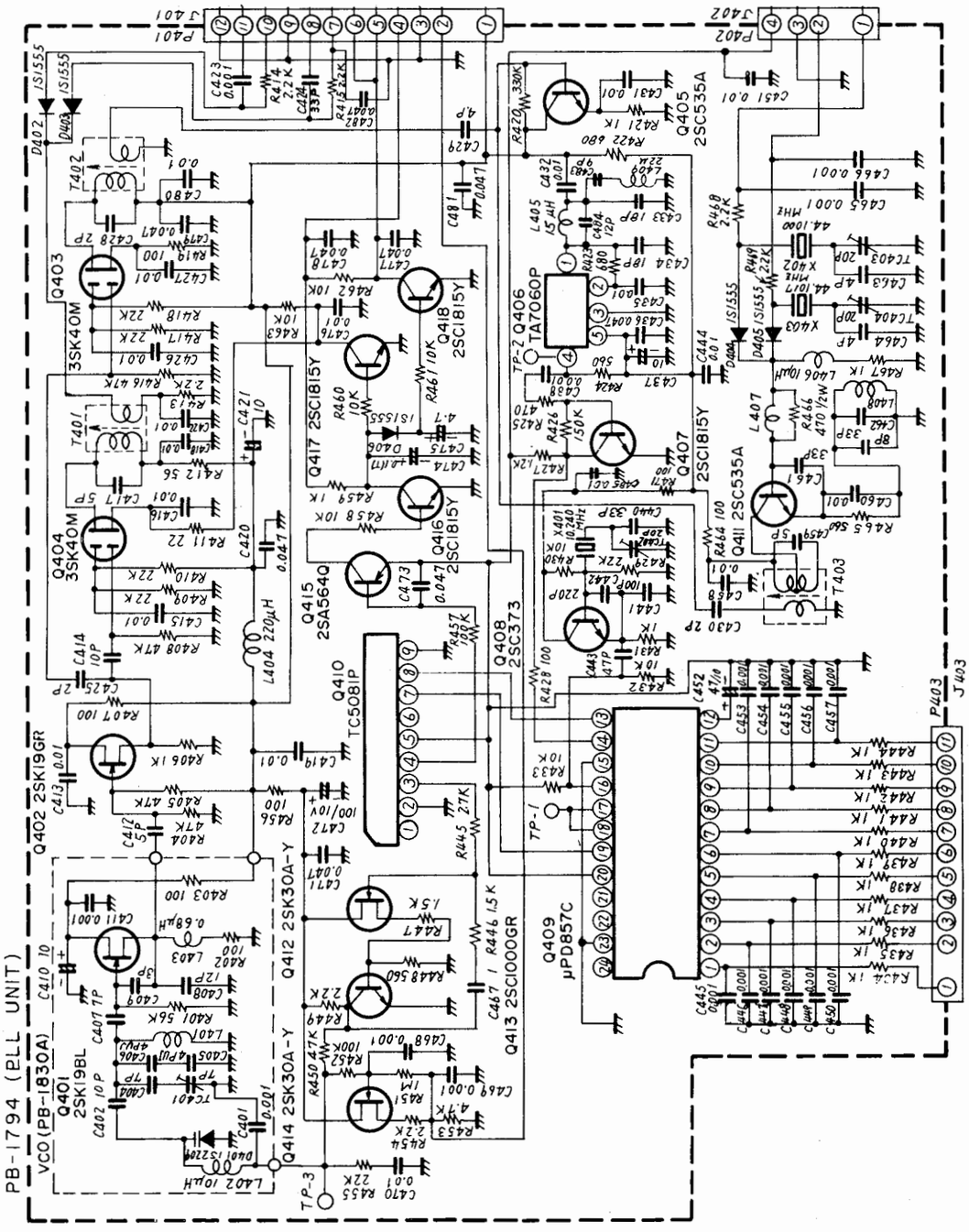


3SK40M
3SK51-03

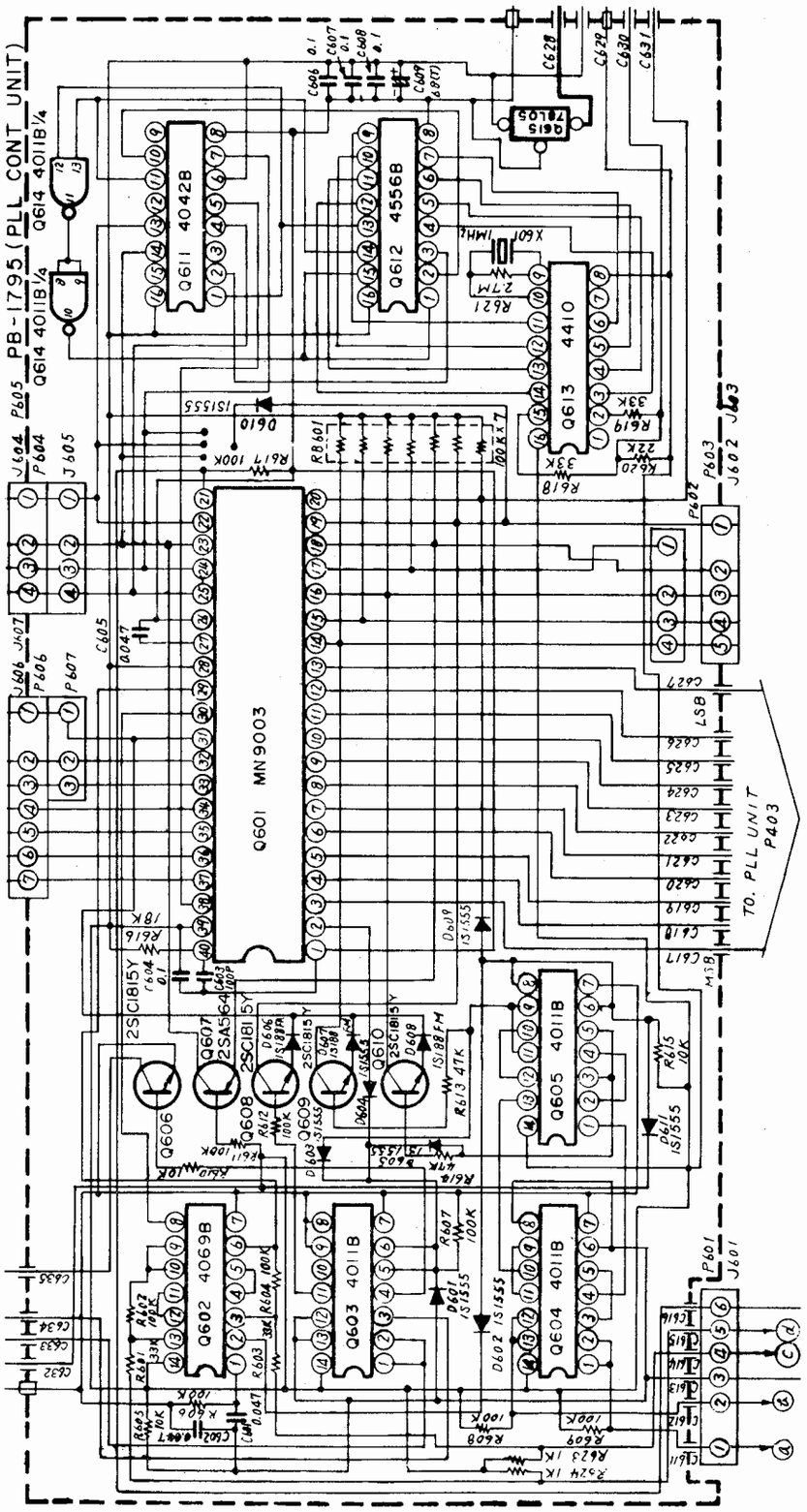


2SA564A
2SC1383
2SC1815Y

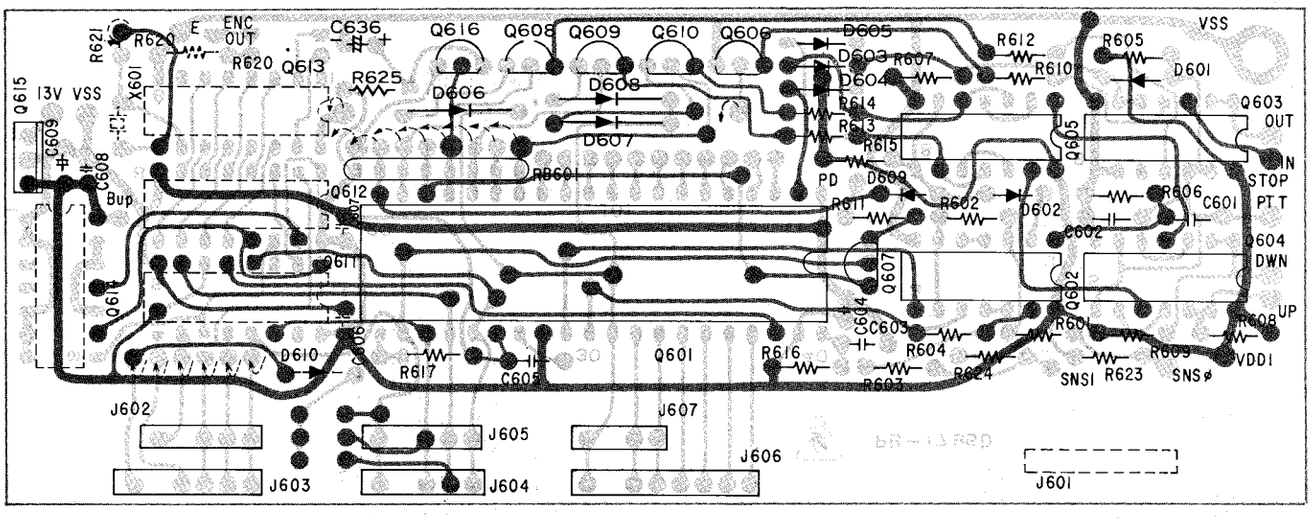
PLL/VCO UNIT DIAGRAM

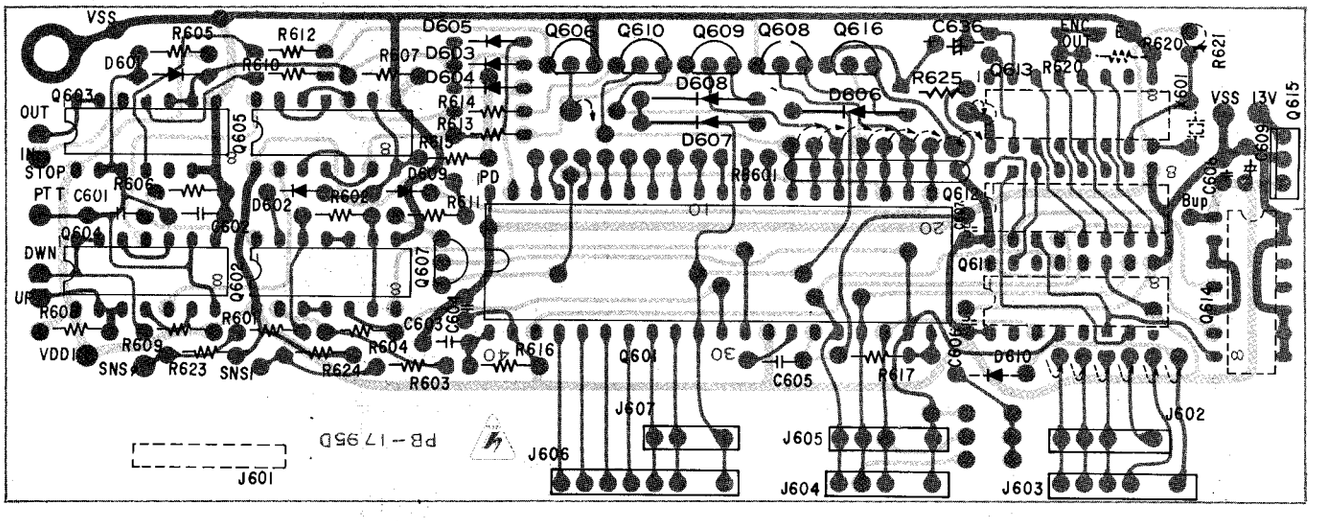


PLL CONTROL UNIT CIRCUIT DIAGRAM

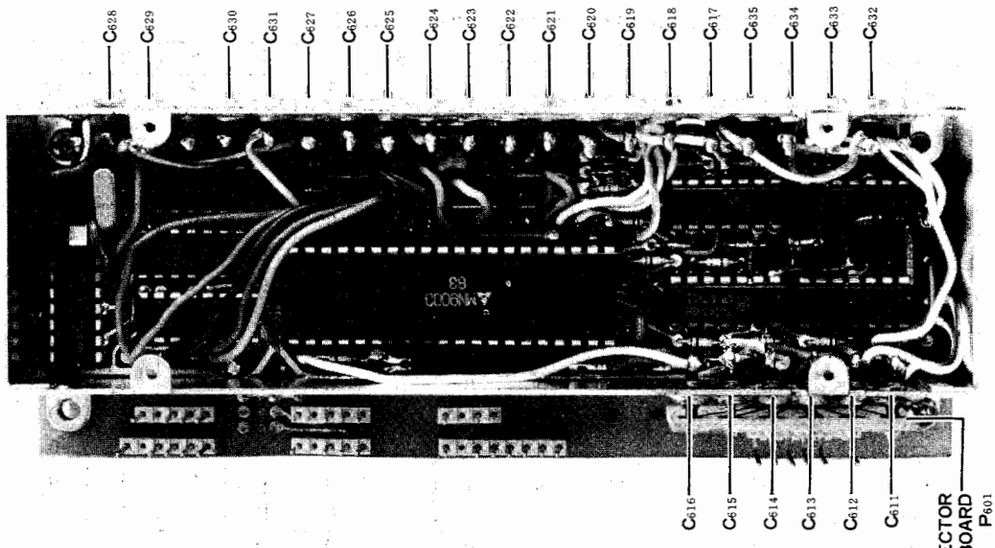


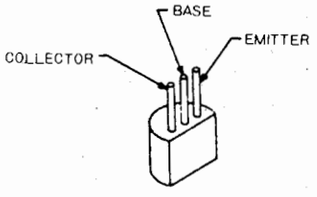
PARTS LAYOUT (PLL CONTROL UNIT)

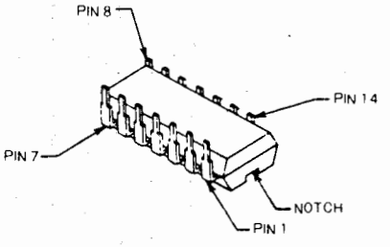


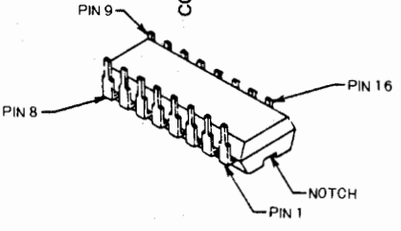


J601 CONNECTOR BOARD PARTS LAYOUT



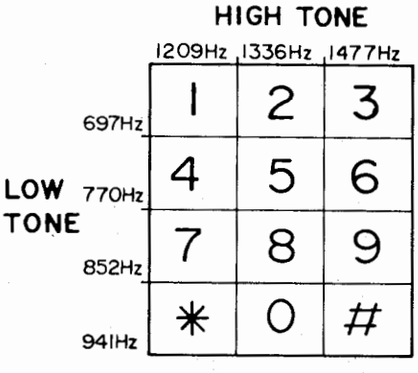






MSM561 MC14049B
MC14008B MC14510B
MC14028B MC14511B
MC14042B MC14519B

YM-2500	Q_{601} MN9003				Q_{613} MC14410							
KEY-BOARD	PIN 25	PIN 24	PIN 23	PIN 22	PIN 6	PIN 5	PIN 4	PIN 3	PIN 11	PIN 12	PIN 13	PIN 14
1	L	L	L	L	H	H	H	L	H	H	H	L
2	L	L	L	H	H	H	H	L	H	H	L	H
3	L	L	H	L	H	H	H	L	H	L	H	H
4	L	H	L	L	H	H	L	H	H	H	H	L
5	L	H	L	H	H	H	L	H	H	H	L	H
6	L	H	H	L	H	H	L	H	H	L	H	H
7	H	L	L	L	H	L	H	H	H	H	H	L
8	H	L	L	H	H	L	H	H	H	H	L	H
9	H	L	H	L	H	L	H	H	H	L	H	H
*	H	H	L	L	L	H	H	H	H	H	H	L
0	H	H	L	H	L	H	H	H	H	H	L	H
#	H	H	H	L	L	H	H	H	H	L	H	H



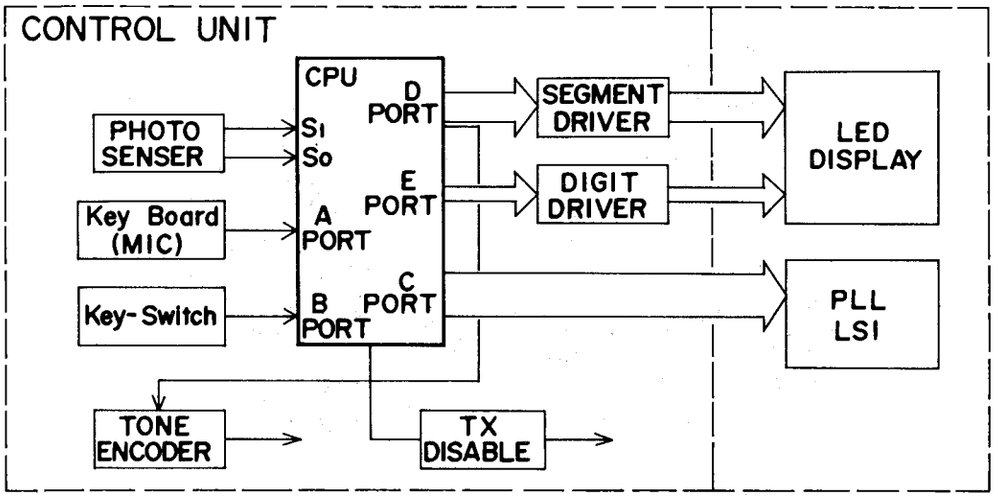
CPU MN9003 and TONE ENCODER MC14410 LOGIC CHART

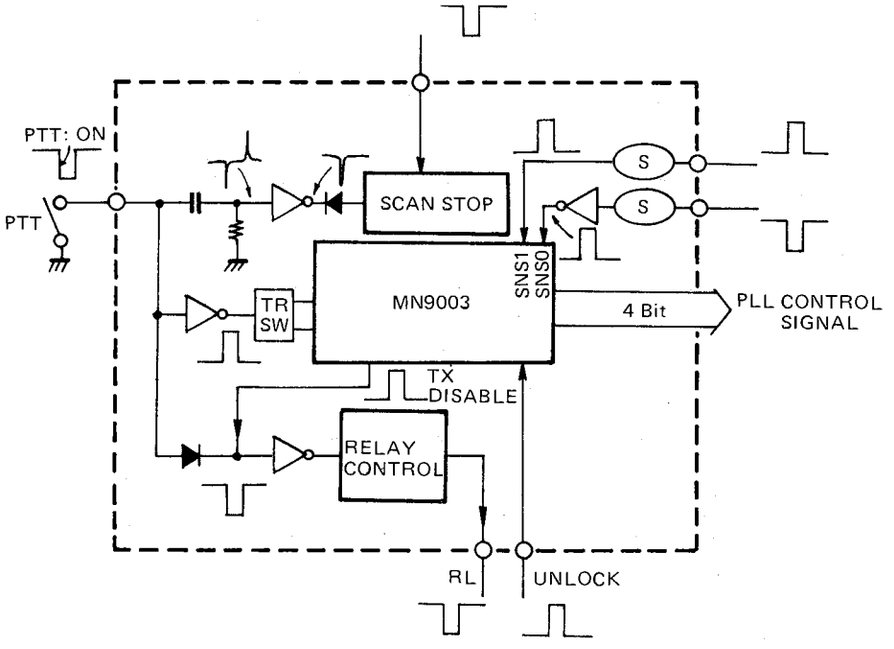
Q409 (μPD857C) PROGRAMMABLE DIVIDER CODE

Q409 PIN NUMBER →		1	2	3	4	5	6	7	8	9	10	11
P/J403 →		1	2	3	4	5	6	7	8	9	10	11
DIAL DISPLAY ↓	PROGRAMMABLE DIVIDER RATIO ↓	P_1	P_2	P_3	P_4	P_5	P_6	P_7	P_8	P_9	P_{10}	P_{11}
144.000	1/100	0	0	0	0	0	0	0	0	1	0	0
4.010	1/101	1	0	0	0	0	0	0	0	1	0	0
4.020	1/102	0	1	0	0	0	0	0	0	1	0	0
4.030	1/103	1	1	0	0	0	0	0	0	1	0	0
4.040	1/104	0	0	1	0	0	0	0	0	1	0	0
4.050	1/105	1	0	1	0	0	0	0	0	1	0	0
4.060	1/106	0	1	1	0	0	0	0	0	1	0	0
4.070	1/107	1	1	1	0	0	0	0	0	1	0	0
4.080	1/108	0	0	0	1	0	0	0	0	1	0	0
4.090	1/109	1	0	0	1	0	0	0	0	1	0	0
144.100	1/110	0	0	0	0	1	0	0	0	1	0	0
4.110	1/111	1	0	0	0	1	0	0	0	1	0	0
4.120	1/112	0	1	0	0	1	0	0	0	1	0	0
4.130	1/113	1	1	0	0	1	0	0	0	1	0	0
4.140	1/114	0	0	1	0	1	0	0	0	1	0	0
4.150	1/115	1	0	1	0	1	0	0	0	1	0	0
4.160	1/116	0	1	1	0	1	0	0	0	1	0	0
4.170	1/117	1	1	1	0	1	0	0	0	1	0	0
4.180	1/118	0	0	0	1	1	0	0	0	1	0	0
4.190	1/119	1	0	0	1	1	0	0	0	1	0	0
144.200	1/120	0	0	0	0	0	1	0	0	1	0	0
4.300	1/130	0	0	0	0	1	1	0	0	1	0	0
4.400	1/140	0	0	0	0	0	0	1	0	1	0	0
4.500	1/150	0	0	0	0	1	0	1	0	1	0	0
4.600	1/160	0	0	0	0	0	1	1	0	1	0	0
4.700	1/170	0	0	0	0	1	1	1	0	1	0	0
4.800	1/180	0	0	0	0	0	0	0	1	1	0	0
4.900	1/190	0	0	0	0	1	0	0	1	1	0	0
145.000	1/200	0	0	0	0	0	0	0	0	0	1	0
5.010	1/201	1	0	0	0	0	0	0	0	0	1	0
5.020	1/202	0	1	0	0	0	0	0	0	0	1	0
5.030	1/203	1	1	0	0	0	0	0	0	0	1	0
5.040	1/204	0	0	1	0	0	0	0	0	0	1	0
5.050	1/205	1	0	1	0	0	0	0	0	0	1	0
5.060	1/206	0	1	1	0	0	0	0	0	0	1	0
5.070	1/207	1	1	1	0	0	0	0	0	0	1	0
5.080	1/208	0	0	0	1	0	0	0	0	0	1	0
5.090	1/209	1	0	0	1	0	0	0	0	0	1	0
145.100	1/210	0	0	0	0	1	0	0	0	0	1	0
5.200	1/220	0	0	0	0	0	1	0	0	0	1	0
5.300	1/230	0	0	0	0	1	1	0	0	0	1	0
5.400	1/240	0	0	0	0	0	0	1	0	0	1	0
5.500	1/250	0	0	0	0	1	0	1	0	0	1	0
5.600	1/260	0	0	0	0	0	1	1	0	0	1	0
5.700	1/270	0	0	0	0	1	1	1	0	0	1	0
5.800	1/280	0	0	0	0	0	0	0	1	0	1	0
5.900	1/290	0	0	0	0	1	0	0	1	0	1	0
146.000	1/300	0	0	0	0	0	0	0	0	1	1	0
147.000	1/400	0	0	0	0	0	0	0	0	0	0	1
147.990	1/499	1	0	0	1	1	0	0	1	0	0	1

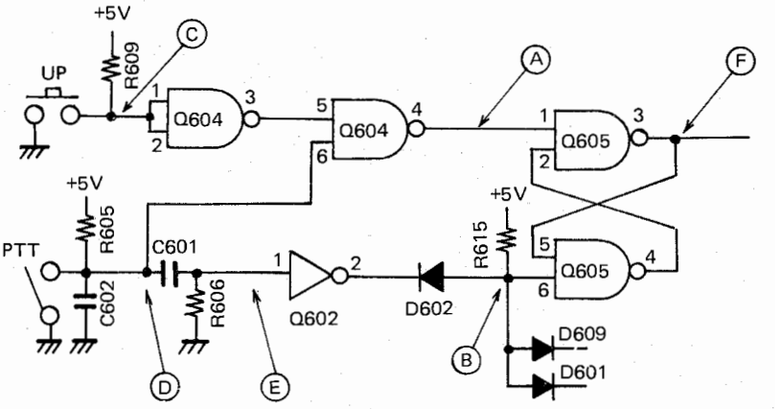
※1 HIGH LEVEL (5V)
※0 LOW LEVEL (0V)

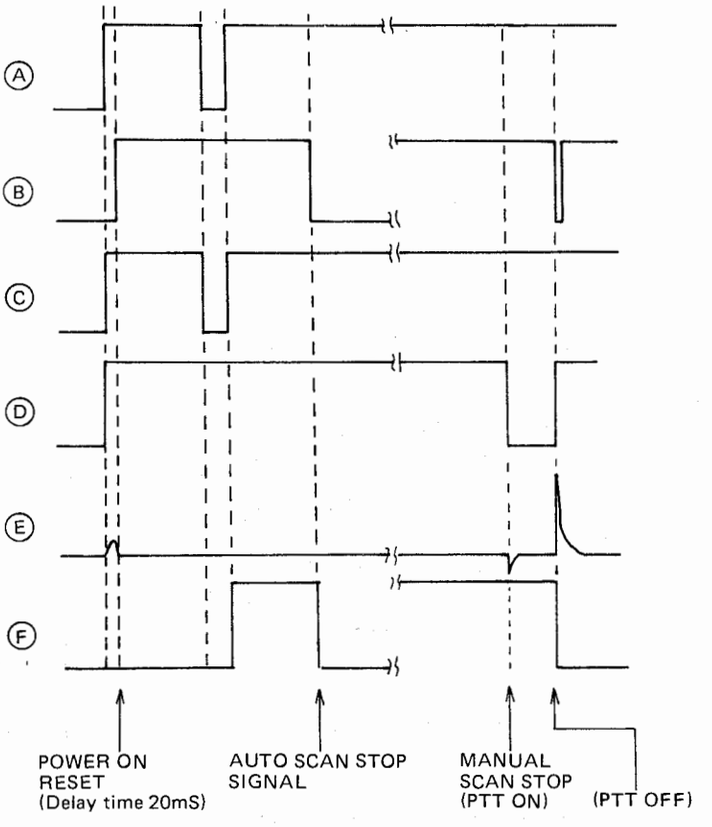
PLL CONTROL UNIT



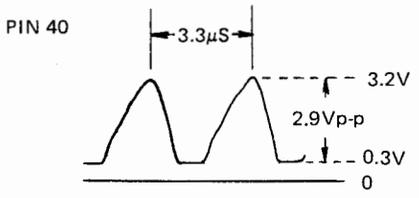


SCAN CONTROL CIRCUIT TIMING CHART (UP SCAN)

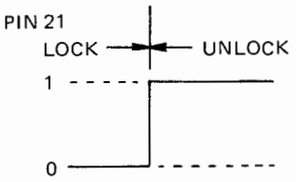




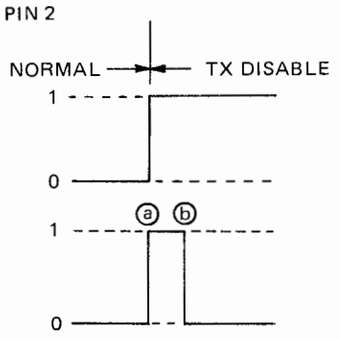
Q601 MN9003 I/O SIGNAL



CPU CLOCK OSCILLATOR



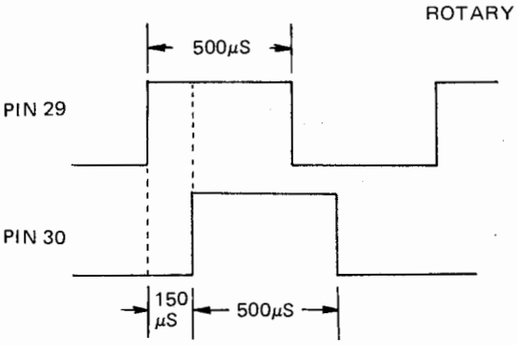
LOCK ..... LOW (TX, RX ENABLE)
UNLOCK..... HIGH (TX, RX DISABLE)



NORMAL ..... LOW (TX, RX ENABLE)
OFFBAND, UNLOCK ..... HIGH (TX, RX DISABLE)

PTT (MANUAL) SCAN STOP
ⓐ Press HIGH (SCAN STOP ONLY, NOT TRANSMIT)
ⓑ Release LOW (NORMAL)

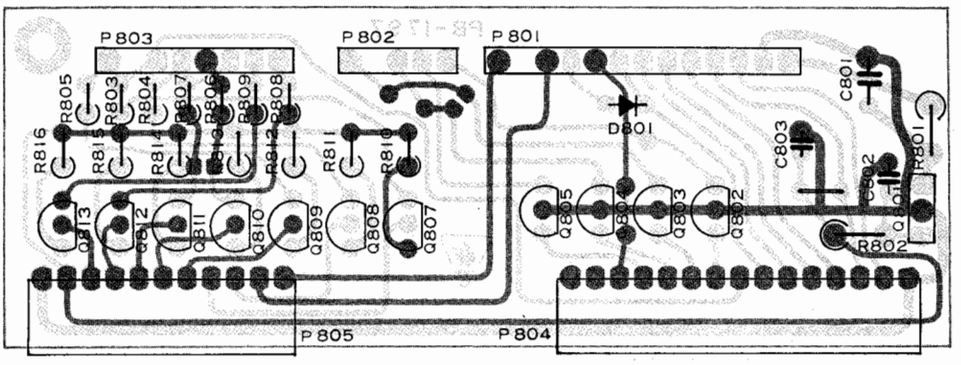
ROTARY ENCODER (PHOTO SENSOR) SIGNAL PHASE RELATIONS



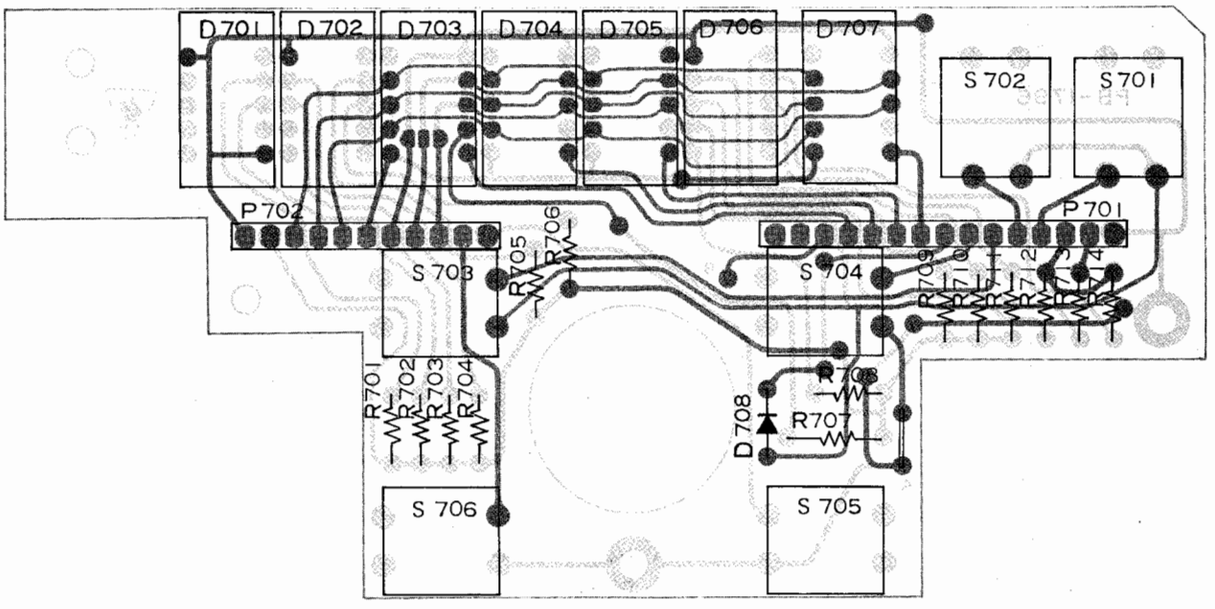
SNS0 (CLOCK)

SNS1 (UP/DOWN)

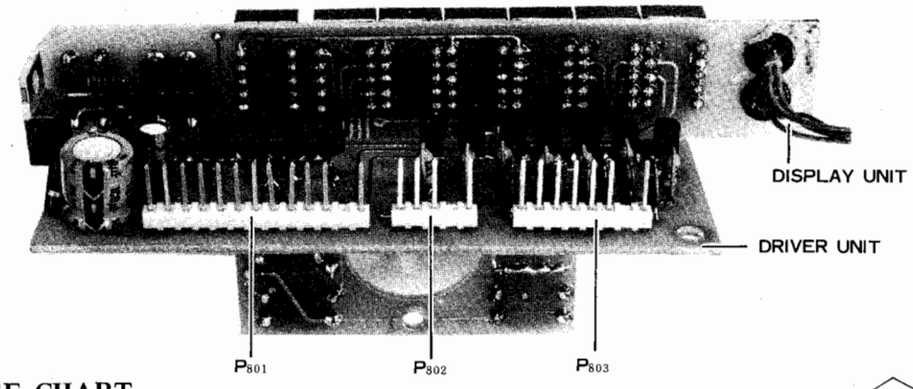
PARTS LAYOUT (DRIVER/DISPLAY UNIT)



Viewed from component side



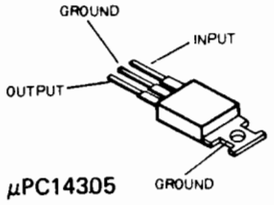
Viewed from component side



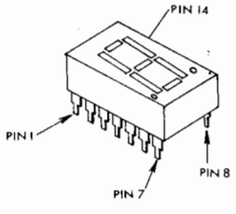
VOLTAGE CHART
(DC VOLTS)

	E	C	B
$Q_{802-805}$	2.4	0	4.2
$Q_{807-813}$	4.5	3.1	4.3

	IN	E	OUT
Q_{801}	10.5	0	5.0

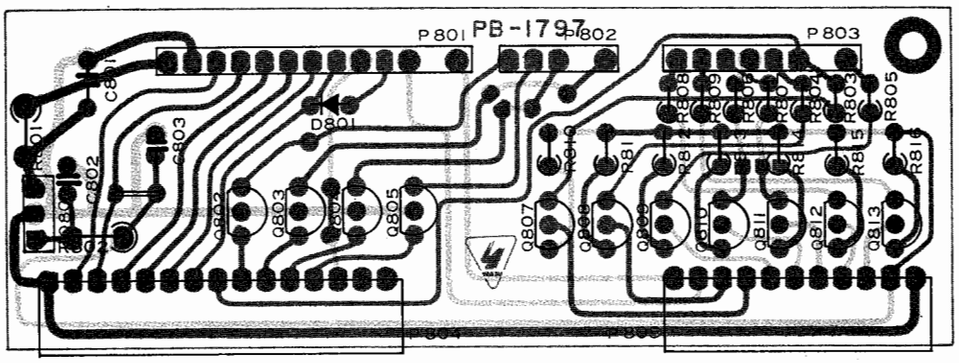


μPC14305

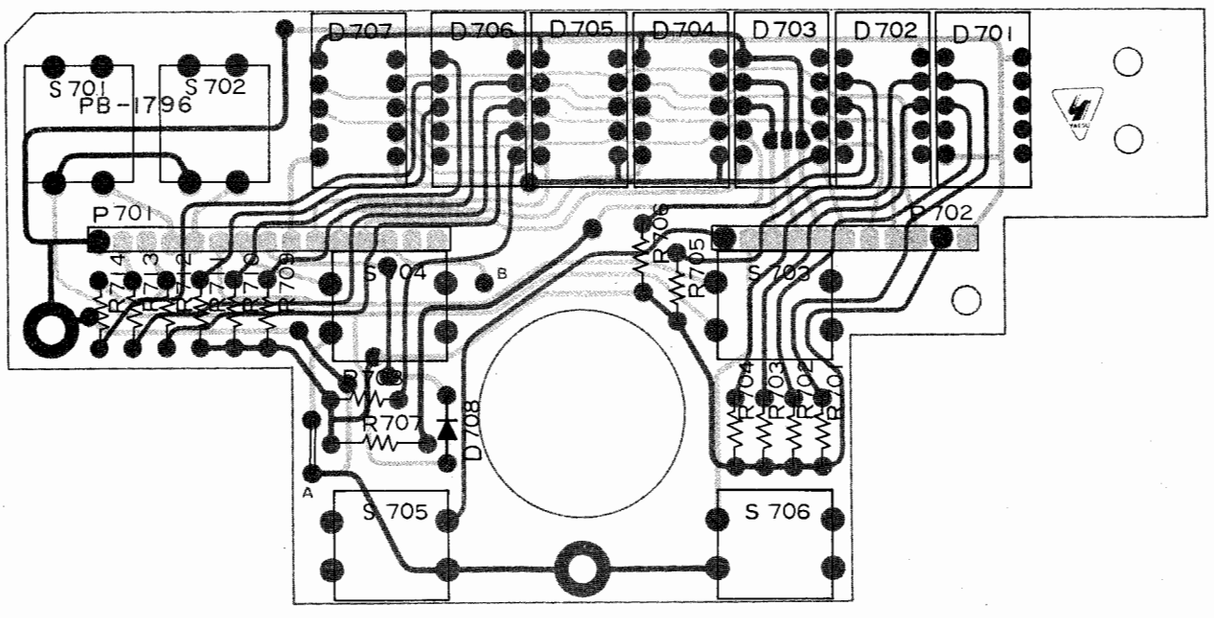


5082-7740

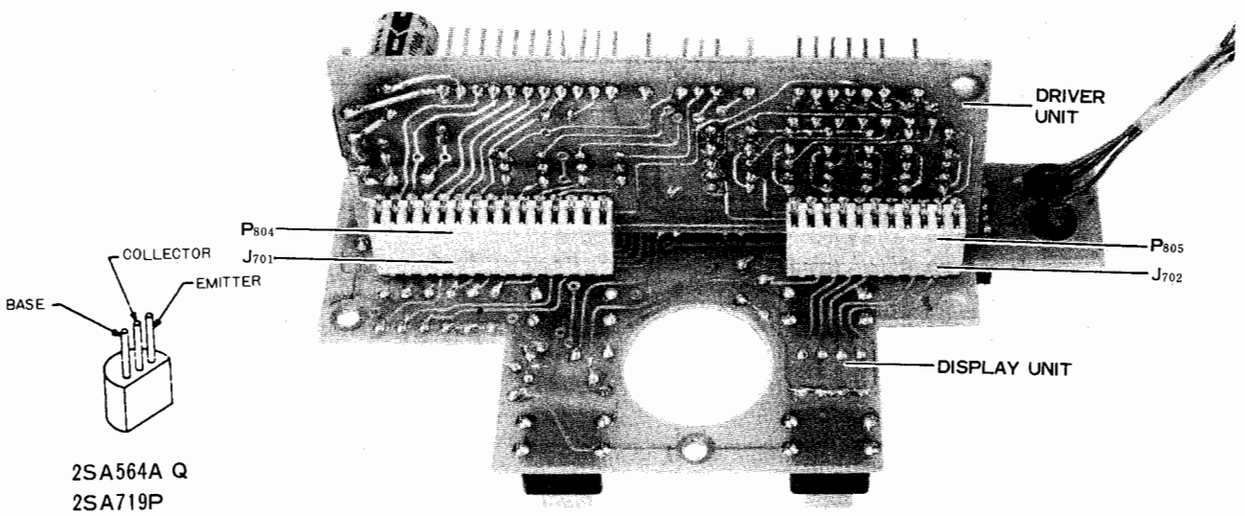
PARTS LAYOUT (DRIVER/DISPLAY UNIT)



Viewed from solder side

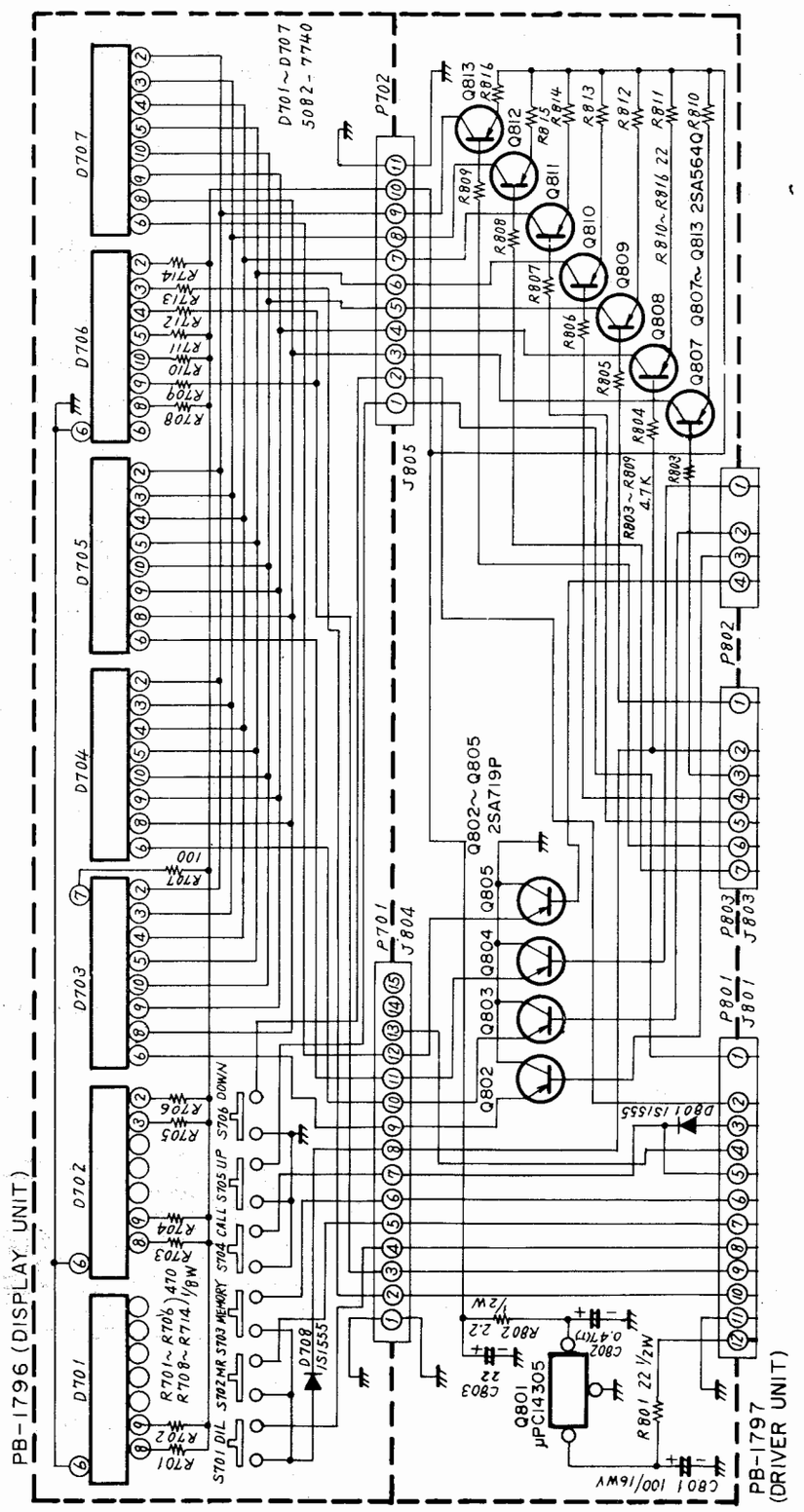


Viewed from solder side

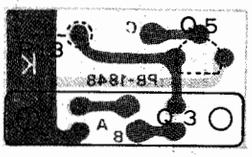


2SA564A Q
2SA719P

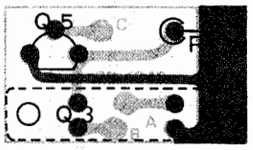
DRIVER/DISPLAY UNIT CIRCUIT DIAGRAM



PARTS LAYOUT (PHOTO UNIT)

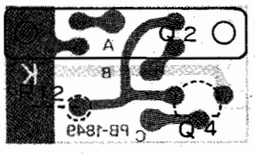


Viewed from component side

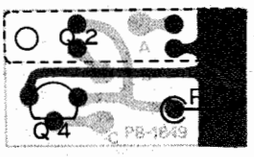


Viewed from solder side

PB-1848

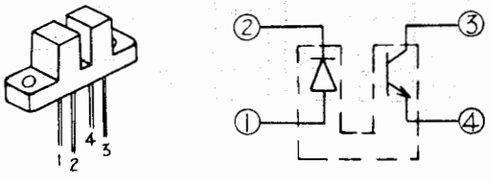


Viewed from component side

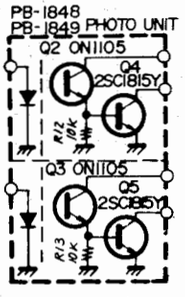


Viewed from solder side

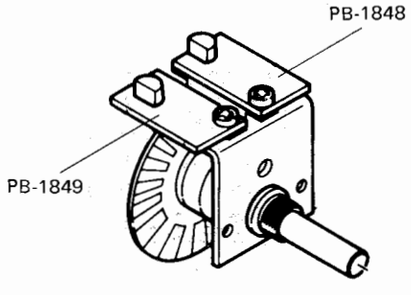
PB-1849

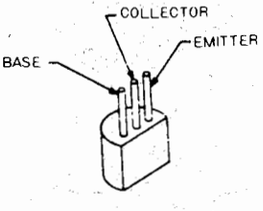


ON1105



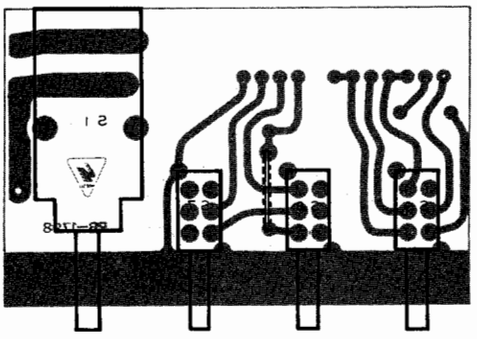
MOUNTING DETAILS



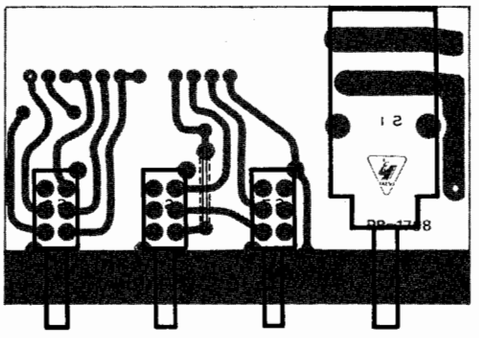


2SC1815Y

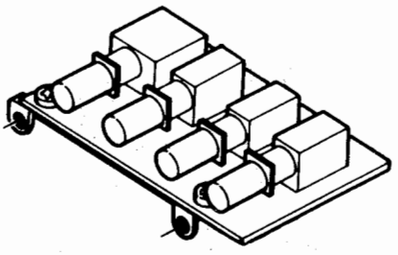
PARTS LAYOUT (SW UNIT)

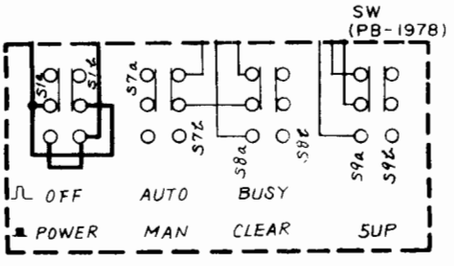


Viewed from component side

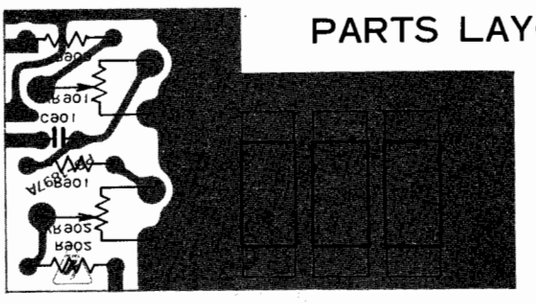


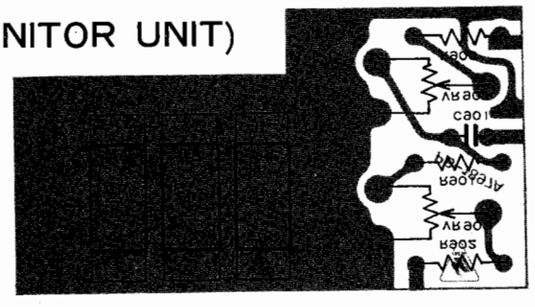
Viewed from solder side





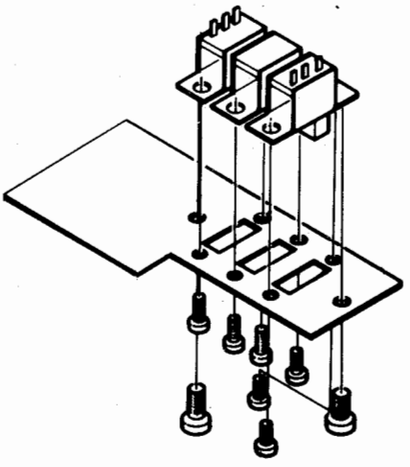
PARTS LAYOUT (MONITOR UNIT)

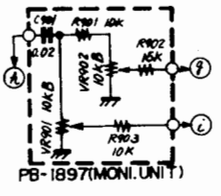




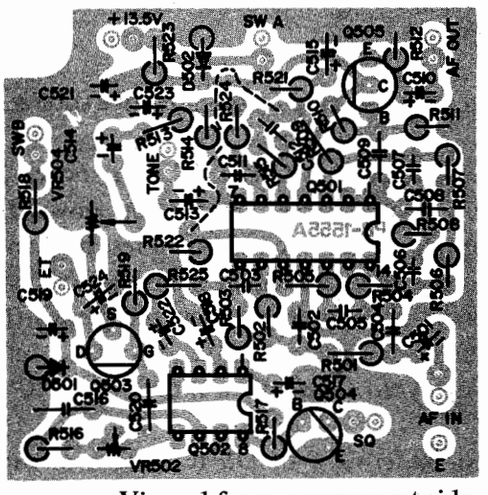
Viewed from component side

Viewed from solder side

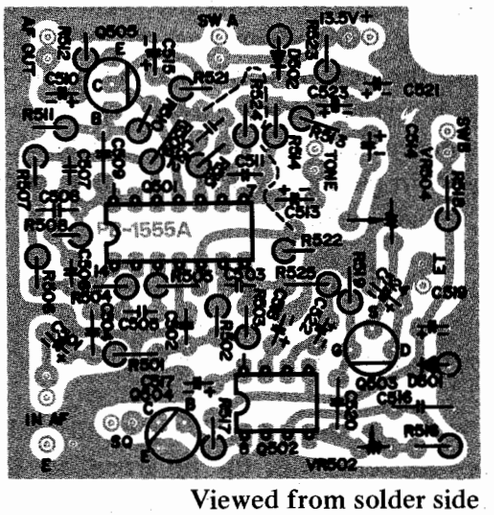




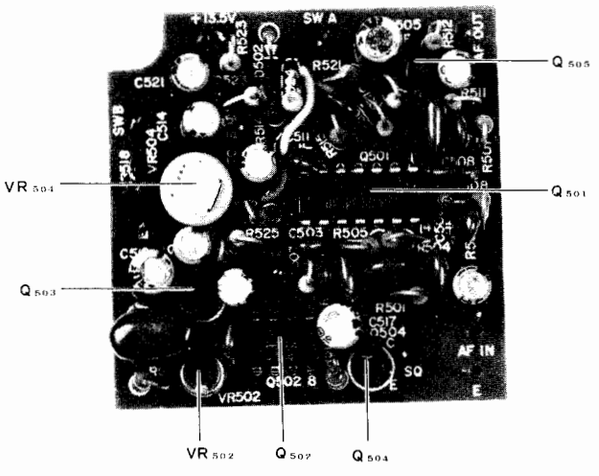
PARTS LAYOUT (TONE SQUELCH UNIT)



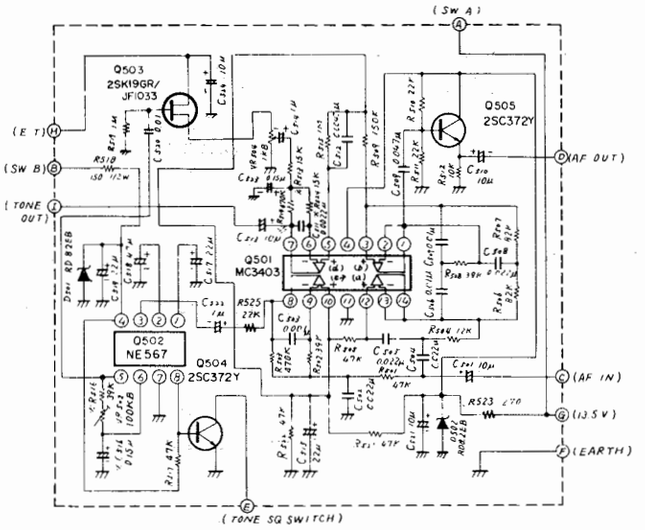
Viewed from component side



Viewed from solder side



	C516 ※	R516 ※	R513 ※	R514 ※	R524 ※
70Hz ~ 160Hz	0.15μF	39KΩ	15KΩ	470KΩ	15KΩ
160Hz ~ 250Hz	0.1μF	33KΩ	8.2KΩ	270KΩ	8.2KΩ



TONE SQUELCH (PB-1555A) OPTION

SOLDERING AND DESOLDERING TECHNIQUE ON PRINTED CIRCUIT BOARDS

The CPU-2500R 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.

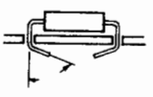
In storage, use only a non-inductive sponge.

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 !).

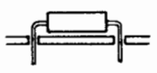
When soldering a CMOS IC onto a circuit board, use a low wattage iron, and be sure to ground the tip with a clip lead, if the tip is not grounded through a three-wire power cord.

INSERTION OF PARTS ON CIRCUIT BOARDS

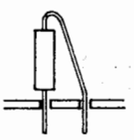
All of the below are acceptable ways of inserting components into circuit board mounting holes.



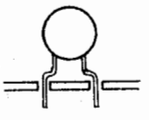
(a) Bend leads slightly



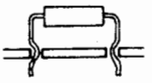
(b) Straight-in mounting



(c) Vertical mounting

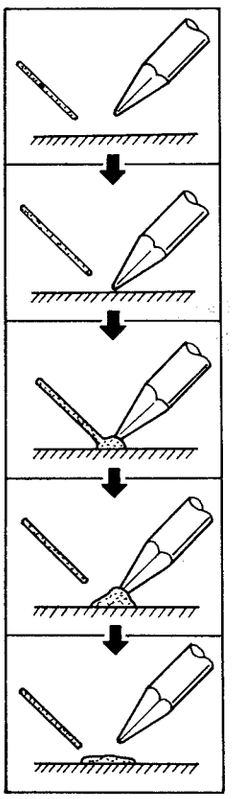


(d) Preformed disc ceramic capacitor



(e) Preformed resistor, diode, etc.

BASIC SOLDERING PRACTICE



(1) Prepare soldering iron and solder.

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

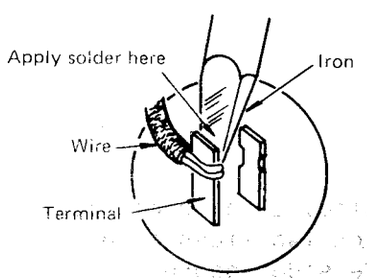
(3) Apply solder to heated surface.

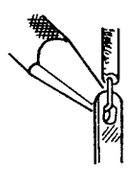
(4) When enough solder is applied, remove solder. Continue to apply heat until solder flows cleanly.

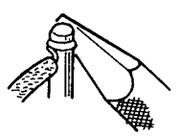
(5) Remove iron from work. Do not apply more heat than necessary for good solder flow.

Soldering to terminal posts:

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

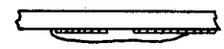




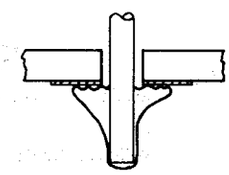


EXAMPLES OF POOR SOLDERING PRACTICE

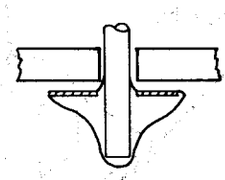
Solder bridge (caused by use of too much solder)



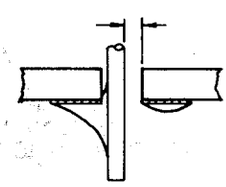
"Cold joint" (caused by insufficient heat to part of work, resulting in poor solder flow)



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

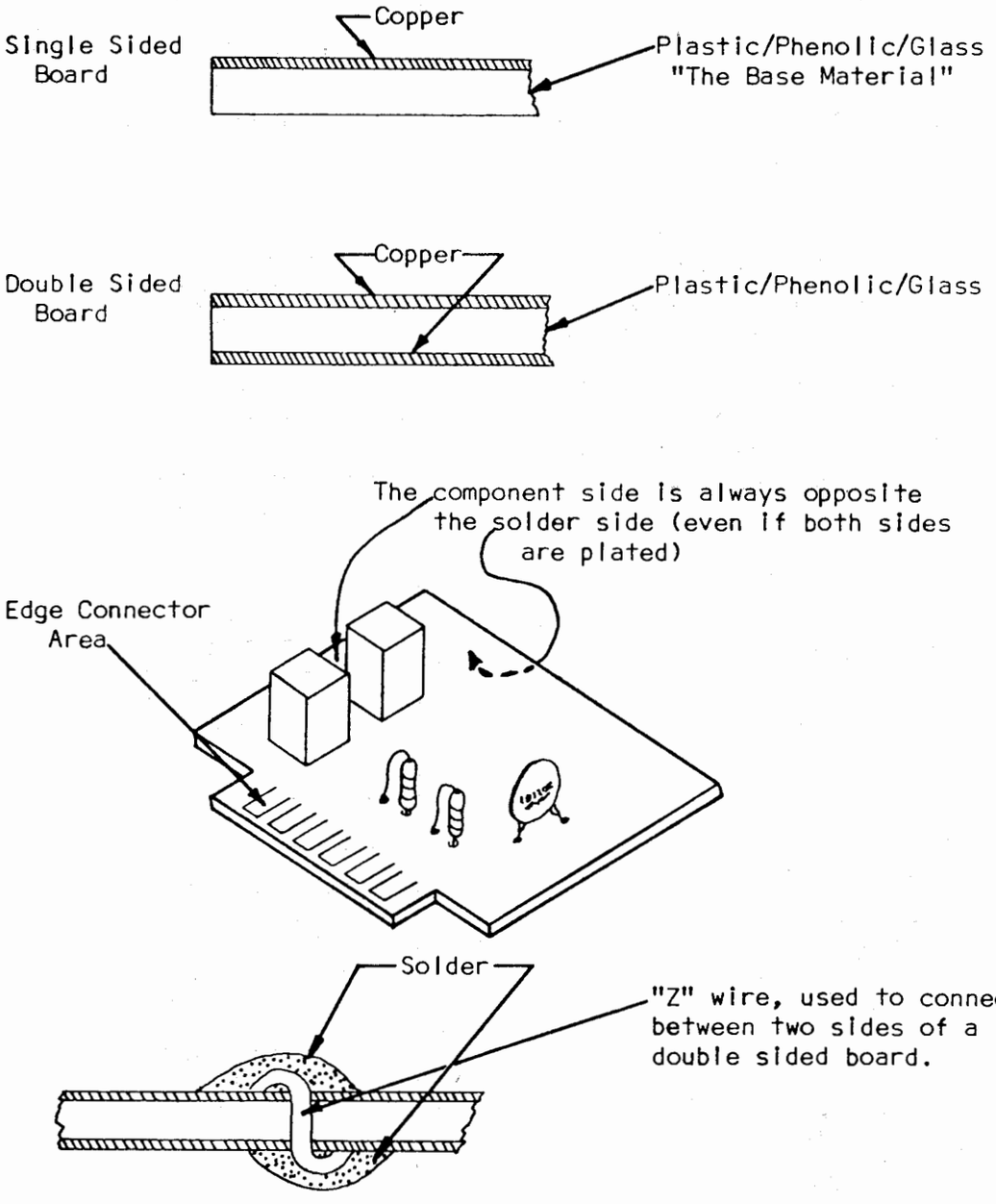


Unstable joint (caused by insufficient heat or solder)



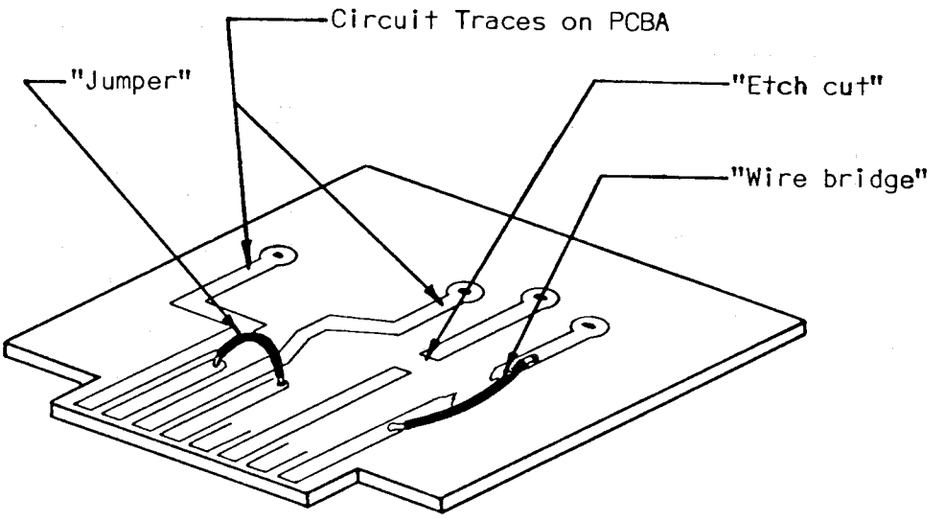
CIRCUIT TRACE REPAIR

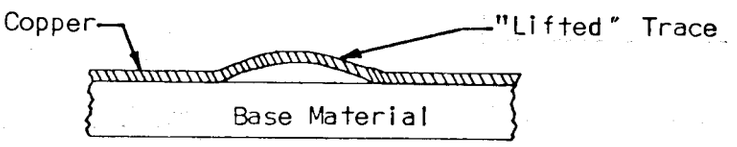
Most of the printed circuit boards used in the CPU-2500R are single sided boards. However, occasionally a double-sided board is used in situations where high shielding is required. A comparison of the two types is shown below.



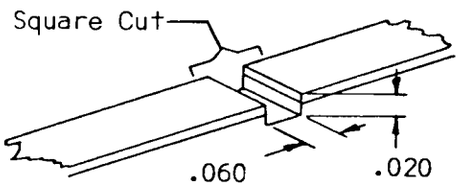
Sometimes, after the design and drafting of a board are completed, a board is produced with an error in it. Though non-technical managers sometimes suffer a stroke at hearing of this situation, it is not unheard of in engineering circles. Thus, should you encounter etch cuts and jumpers on a board, be 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.

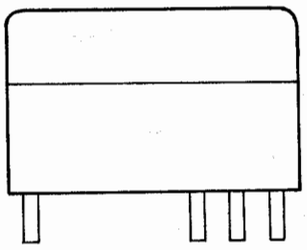


Coat Cut Area With Eastman 910

RELAY CONNECTION INFORMATION

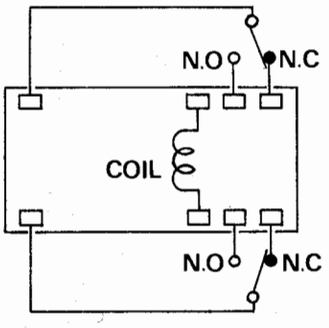
Should the need for replacement of relays become necessary, or if you are trying to verify proper relay operation, the diagrams below should help you.

RL-101



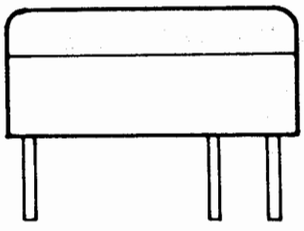
SIDE VIEW

AW6221-DC12V



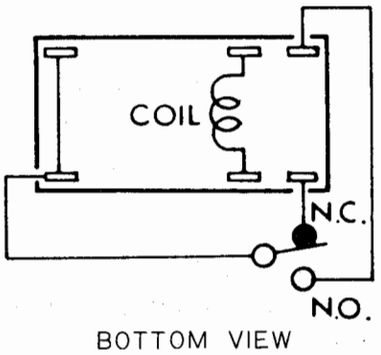
BOTTOM VIEW

RL-301



SIDE VIEW

FBR221D012



BOTTOM VIEW

MAINTENANCE & ALIGNMENT

GENERAL

The CPU-2500R has been carefully aligned and tested at the factory prior to shipment. The reliability of the solid-state devices used in the CPU-2500R should provide years of trouble-free service if the transceiver is not abused, and if normal, routine maintenance is carried out.

THE FOLLOWING PRECAUTIONS SHOULD BE OBSERVED IN ORDER TO PREVENT DAMAGE TO THE TRANSCEIVER:

(1) Do not exceed 15 volts DC at the power receptacle. When operating mobile, check the battery voltage under load (transmitter keyed) with the engine running fast enough that the ammeter shows a charge. As well, do not operate the CPU-2500R if the battery voltage is below 12 VDC.

(2) Avoid prolonged exposure to direct sunshine, and do not expose the transceiver directly to water.

ROUTINE MAINTENANCE

Routine maintenance should be limited to keeping the transceiver clean, and making periodic checks of the transmitter power output and the receiver sensitivity.

Cleaning:

When the transceiver has been used in a dusty or sandy area, the interior may require periodic cleaning. A vacuum cleaner may be used for loose dirt, while caked or otherwise accumulated dirt may be removed with a soft brush. Check the interior to make sure that it is completely dry before replacing the case and operating the transceiver. The exterior may be wiped with a damp cloth as often as needed.

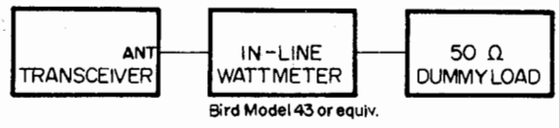
PERFORMANCE CHECKS

Make all performance checks at 13.6 VDC under load.

Check the transmitter output as follows:

(a) Connect a suitable dummy load/RF wattmeter to the ANT receptacle.

(b) Set the channel selector to any channel and key the transmitter. Observe the RF power output, which should be approximately 25 watts (HIGH). The S-meter should indicate between 6 and 8 on the relative output scale at full power.



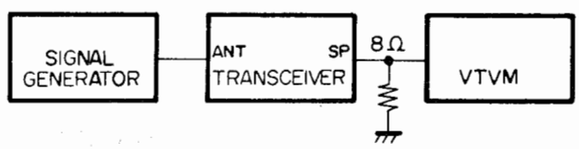
PO Test Setup

Check the receiver sensitivity as follows:

(a) Connect an AC voltmeter to the SP receptacle, and set the SQUELCH control fully counterclockwise.

(b) Connect the RF output of a precision VHF signal generator to the ANT receptacle. Note the VTVM reading with no signal generator input. Adjust the VOLUME control and the VTVM range, as required, to obtain approximately a full scale reading on the VTVM. Do NOT change the VOLUME control setting after this adjustment is made.

(c) Set the signal generator to the receiving frequency of the transceiver, and adjust the output amplitude of the signal generator until the VTVM reads 20 dB decrease (1/10 voltage) of the reading in step (b). The signal generator output voltage at this point is the 20 dB quieting sensitivity, and the level should be approximately 0.3 μV.



RX Sensitivity Test Setup

If the above performance checks indicate the need for realignment, it is recommended that the unit be returned to your dealer for servicing. The sophisticated CPU and control circuitry, in particular, are so critical that they should not be touched by other than an experienced technician. Attempts to realign the transceiver tuned circuits without the proper test equipment may result in degraded transceiver performance.

ALIGNMENT

SOME OF THE FOLLOWING ALIGNMENT PROCEDURES REQUIRE SPECIALIZED TEST EQUIPMENT AND TECHNIQUES, AND SHOULD ONLY BE PERFORMED BY AN EXPERIENCED TECHNICIAN.

RECEIVER

(1) RF Amplifier

a) Connect a calibrated VHF signal generator to the antenna receptacle, and set the channel selector to 147.000 MHz.

b) Tune the signal generator to the receive frequency, and peak L_{101}, L_{104}, TC_{101} –TC_{104}, T_{101}, and T_{102} for a maximum S-meter reading.

(2) First IF Amplifier

a) Connect a sweep generator to the second gate of Q_{102}. Connect an oscilloscope through a detector to the drain of Q_{103}.

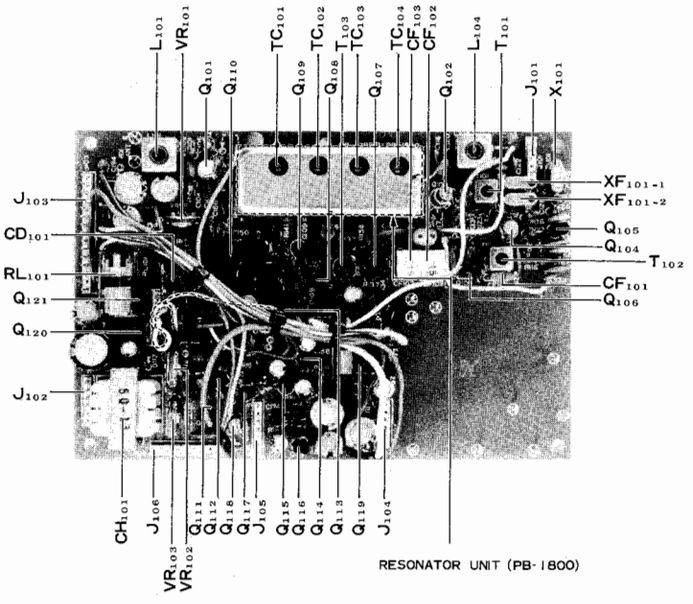
b) Set the frequency of the sweep generator to 10.7 MHz, and apply output from the generator. Adjust T_{101} until the scope pattern illustrated in Figure 6 is obtained.

c) Disconnect the sweep generator and scope. Measure the RF injection voltage to the second gate of Q_{105}. A nominal value is 1 volt RMS.

(3) S-Meter Sensitivity

a) Apply the output from the signal generator to the antenna receptacle. Peak T_{103} for a maximum S-meter reading on the generator signal.

b) Set the output level of the signal generator to 20 dB, and adjust VR_{101} for a full-scale deflection of the S-meter.



RECEIVER UNIT (PB-1791)

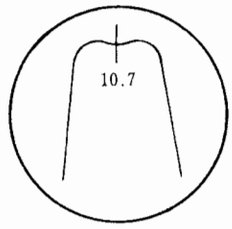


Fig. 6

(4) Noise Squelch Threshold

a) Apply a 0 dB signal from the signal generator at 147.000 MHz.

b) Set the front panel SQL switch to the fully clockwise position. Adjust VR_{102} until the squelch just opens. Do not advance VR_{102} past the threshold point.

c) Place the TONE SQ switch in the ON position. Set the signal generator output to −10 dB.

d) Adjust VR_{103} until the squelch threshold is found. Do not vary VR_{103} away from the threshold point.

e) Turn off the signal generator.

f) Rotate the front panel SQL control until the squelch threshold is found. Back off on the SQL control very slightly so that the receiver is just muted. Now apply output from the signal generator. A signal of approximately −12 dB should be required to trip the squelch.

TRANSMITTER ALIGNMENT (Align at 146.000 MHz)

Note: When making the automatic final protection (AFP) circuit adjustment, be certain to follow the instructions regarding connection of the dummy load explicitly. If no load is connected when the AFP is out of alignment, the final transistor may be damaged.

(1) 10.7 MHz TX Alignment

a) Connect the RF probe of a VTVM to TP_{201}.

b) Adjust T_{201} for a maximum indication on the VTVM. A nominal value is 550 mV RMS.

c) Connect a frequency counter to TP_{201}, and adjust L_{202} for a reading of 10.700 MHz ± 100 Hz on the counter.

(2) Mixer/Interstage Alignment

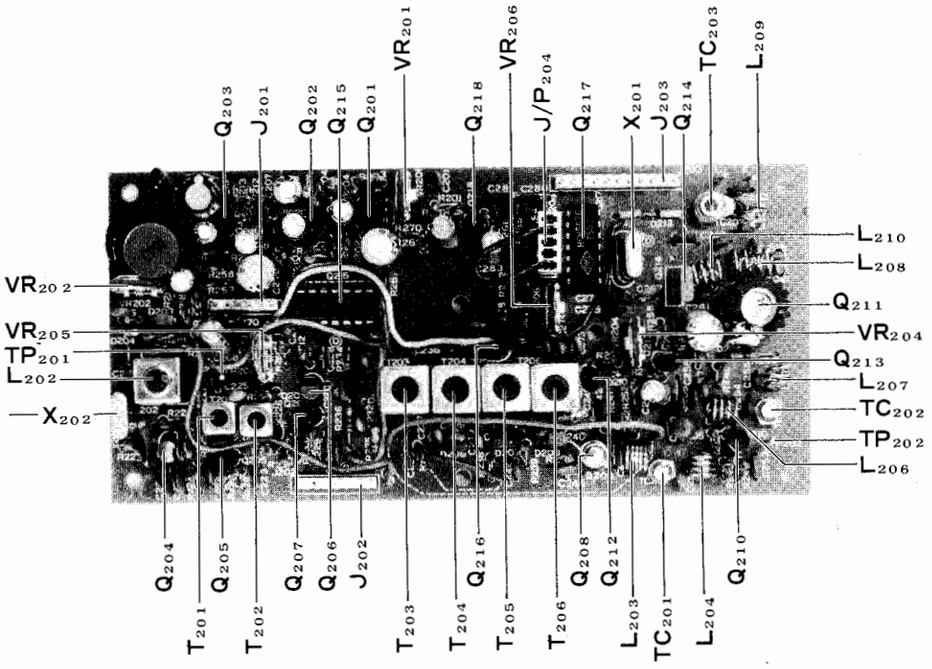
a) Connect a dummy load/wattmeter to the antenna jack.

b) Connect the RF probe of a VTVM to gate 1 of Q_{208}.

c) Close the microphone PTT switch, and adjust T_{201}–T_{206} for a maximum VTVM indication. A nominal reading is 100 mV RMS.

d) Connect a DC voltmeter to TP_{202}, and adjust T_{201}–T_{206} and TC_{201} for a maximum reading on the DC voltmeter.

e) Remove the DC voltmeter, and adjust T_{201}–T_{206} and TC_{201}–TC_{203} for maximum power output as indicated on the wattmeter.



TRANSMITTER UNIT (PB-1792)

(3) Modulator Alignment

a) Set up the test equipment as specified in Figure 7.

b) As shown in Figure 8, set VR_{201} and VR_{202} to the center of their ranges. Apply a signal of 1 kHz at 25 mV from an audio oscillator connected to the microphone jack.

c) Short the PTT connection at pin 4 of the mic jack to ground. Adjust VR_{202} for an indication of ± 4.5 kHz on the deviation meter.

d) Set the audio generator for an output of 2.5 mV. Adjust VR_{201} for a deviation of ± 3.5 kHz as indicated on the deviation meter.

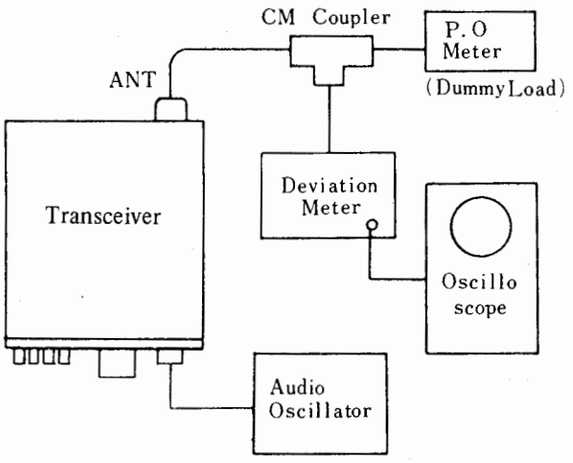


Fig. 7

(4) Tone Burst

a) Push the front panel CALL switch.

b) Connect an oscilloscope to the center pin of VR_{202}, and confirm that oscillation of the circuit is taking place.

c) Connect a frequency counter to the center pin of VR_{206}, and confirm that the burst signal is of the proper frequency (1800 Hz for the USA model, etc.). Release the CALL switch.

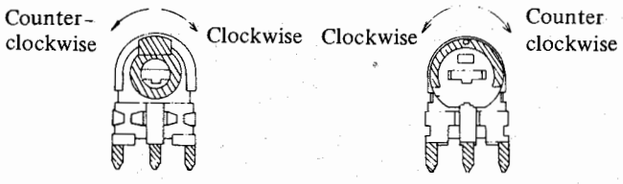
d) Return to step a) of section 3, "Modulator Alignment". Adjust VR_{206} while pressing the CALL switch to establish that the FM deviation is ± 3.5 kHz with application of the burst signal. Release the CALL button after this alignment.

e) While listening on a monitor receiver, place the BURST/CALL switch in the BURST position, and close the microphone PTT switch. Confirm that the burst signal is of the desired duration (factory set at 0.5 second). VR_{205} provides adjustment of the burst length.

(5) AFP Circuit, PO Meter, and Local Output

a) Connect a dummy load/wattmeter to the antenna receptacle.

b) Connect a DC voltmeter (+) lead to the cathode of D_{301}, and the (–) lead to ground. Adjust VR_{301} for minimum cathode voltage.



Front View Rear View

Fig. 8

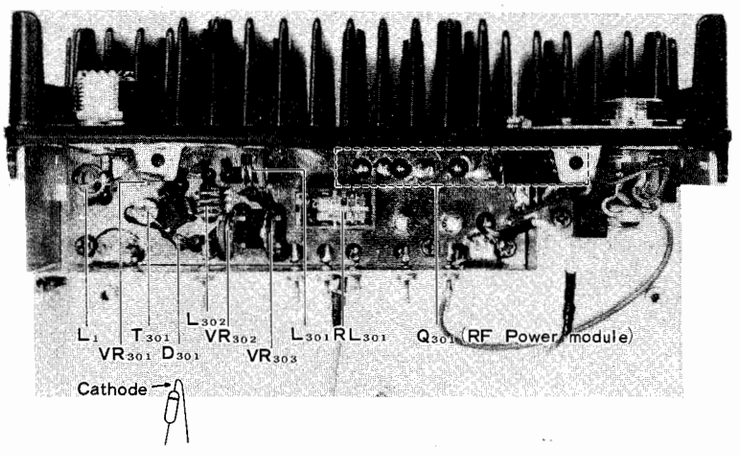
c) Remove the dummy load/wattmeter from the antenna receptacle.

d) Connect a DC ammeter with a 10 ampere full scale capability to the (+) lead of the power cord.

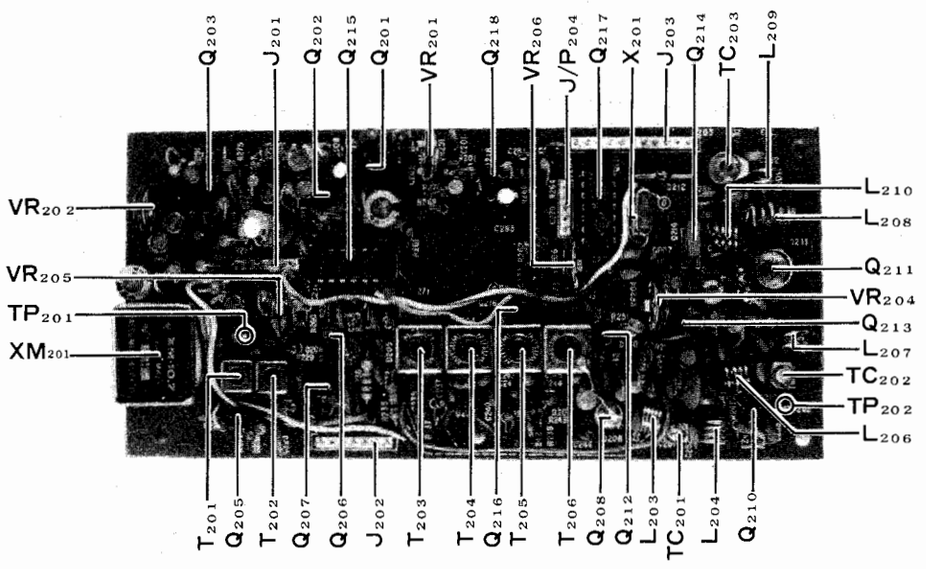
e) While transmitting, adjust VR_{302} for a reading of 2 amps on the DC ammeter.

f) Reconnect the dummy load/wattmeter to the antenna receptacle. Adjust VR_{303} for a reading of 8 on the front panel meter. This calibrates the relative output meter.

g) To set the low power mode output power, set the power switch to the LOW position. Adjust VR_{204} while transmitting for a reading of 3 watts output on the wattmeter.



BOOSTER UNIT (PB-1793)



TX UNIT (PB-1792B)

PLL ALIGNMENT

(1) 10.240 MHz Oscillator Alignment

a) Connect the RF probe of a VTVM to the emitter of Q_{408}. Confirm that oscillation is taking place at a level of approximately 1.1 V RMS.

b) Connect a frequency counter to TP_1, located on the PLL Unit. Adjust TC_{402} for a reading of exactly 5.1200 MHz.

(2) PLL Local, Multiplier Stages

a) In the receive mode, connect the RF probe of a VTVM to the emitter of Q_{111}. Confirm that the stage is oscillating at a level of approximately 180 mV RMS.

b) Connect a DC voltmeter using a 10 volt scale to TP3. Adjust TC_{401} to secure a voltage of 3.3 volts.

c) Connect an oscilloscope to TP_2, and adjust T_{402} and T_{403} for a maximum deflection on the scope.

d) Connect the RF probe of a VTVM to the cathodes of D_{402}/D_{403}. Adjust T_{401} for a maximum reading on the VTVM. A nominal reading is 540 mV RMS.

(3) PLL Local Frequency

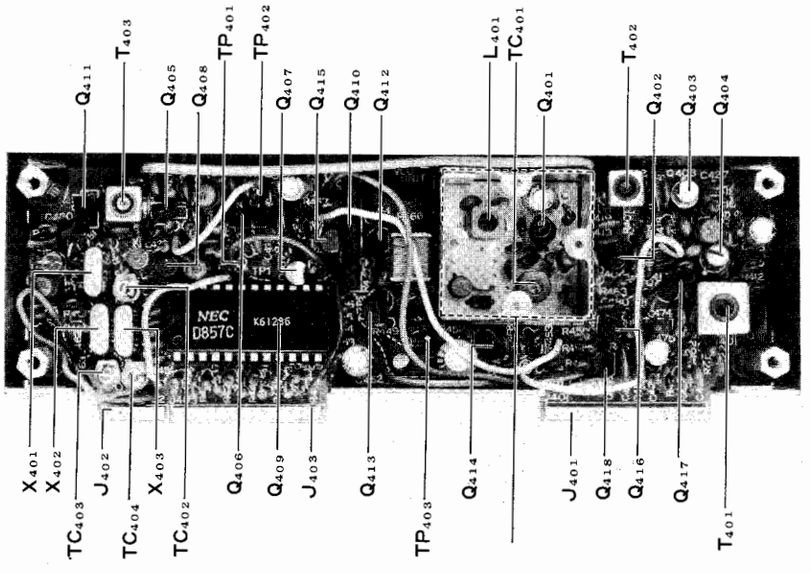
a) Connect a frequency counter to the cathodes of D_{402}/D_{403}.

b) Adjust TC_{403} for a reading of 135.300 MHz ± 100 Hz on the counter.

c) Press the front panel 5 UP button, and adjust TC_{404} for a reading of 135.305 MHz ± 100 Hz on the counter.

(4) UNLOCK Circuit

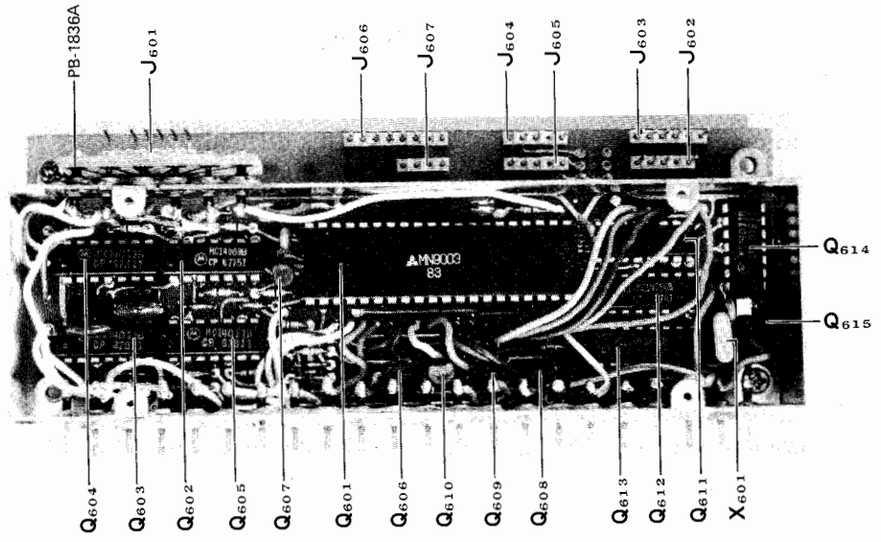
a) Short TP2 to ground. Digits 3, 4, and 5 of the display should be blanked to indicate PLL unlock.



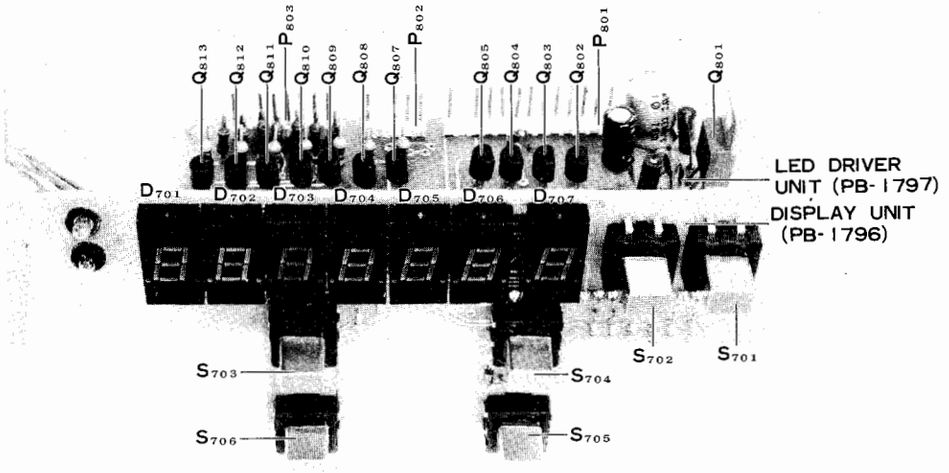
PLL UNIT (PB-1794) VCO UNIT (PB-1830A)

PLL CONTROL, DISPLAY UNITS

The CMOS circuitry used in these units is extremely critical in its adjustment. Under no circumstances should this circuitry be touched for alignment purposes.



PLL CONTROL UNIT (PB-1795)



TROUBLESHOOTING

A FUNDAMENTAL ANALYSIS OF THE TROUBLE

The failure may be caused by one of the following:

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

1. MECHANICAL DEFECTS

Typical mechanical defects encountered by the technician are:

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

2. ELECTRICAL DEFECTS

Typical electrical defects encountered are:

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

3. OTHERS

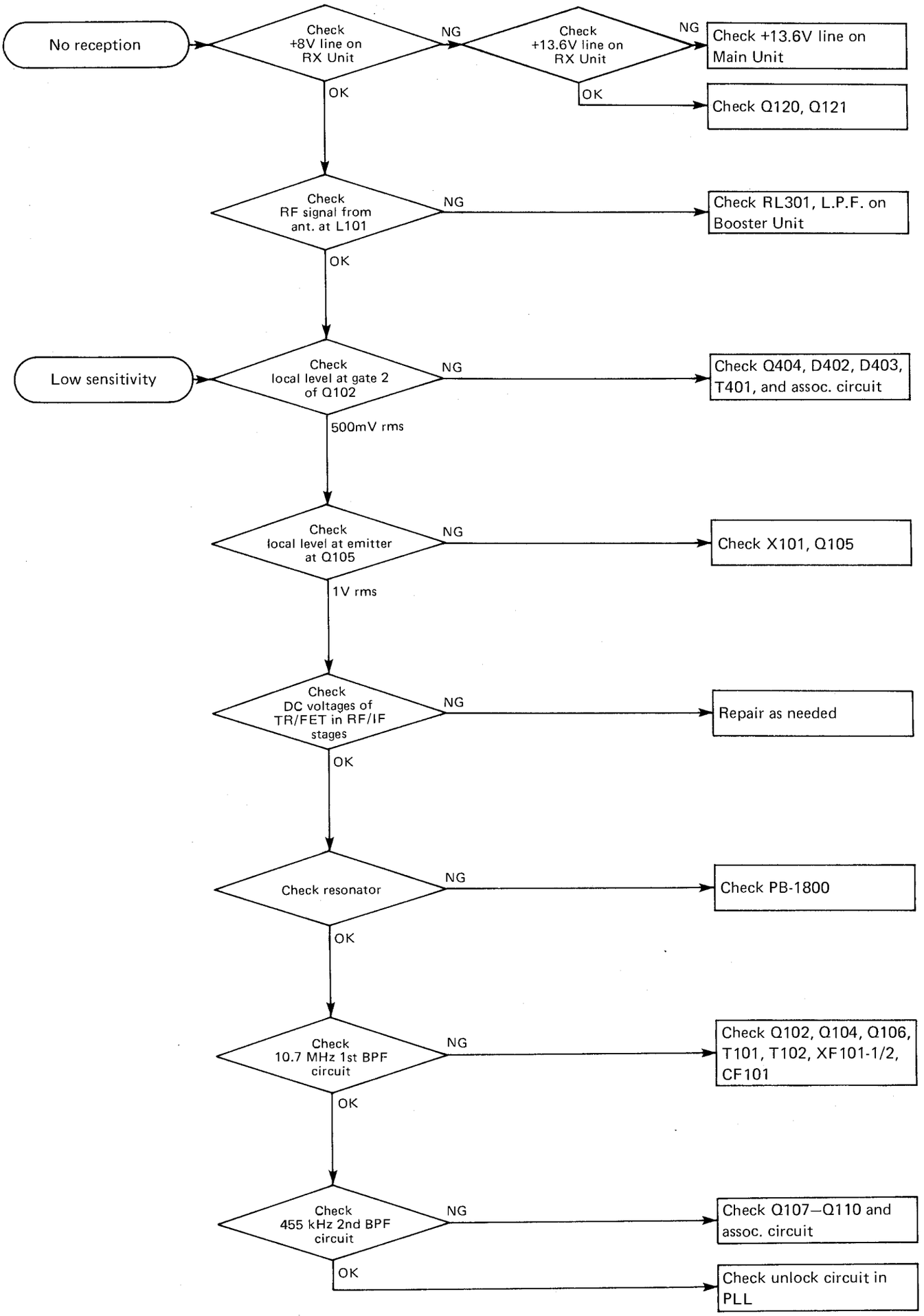
Among the miscellaneous types of failures or difficulties encountered are:

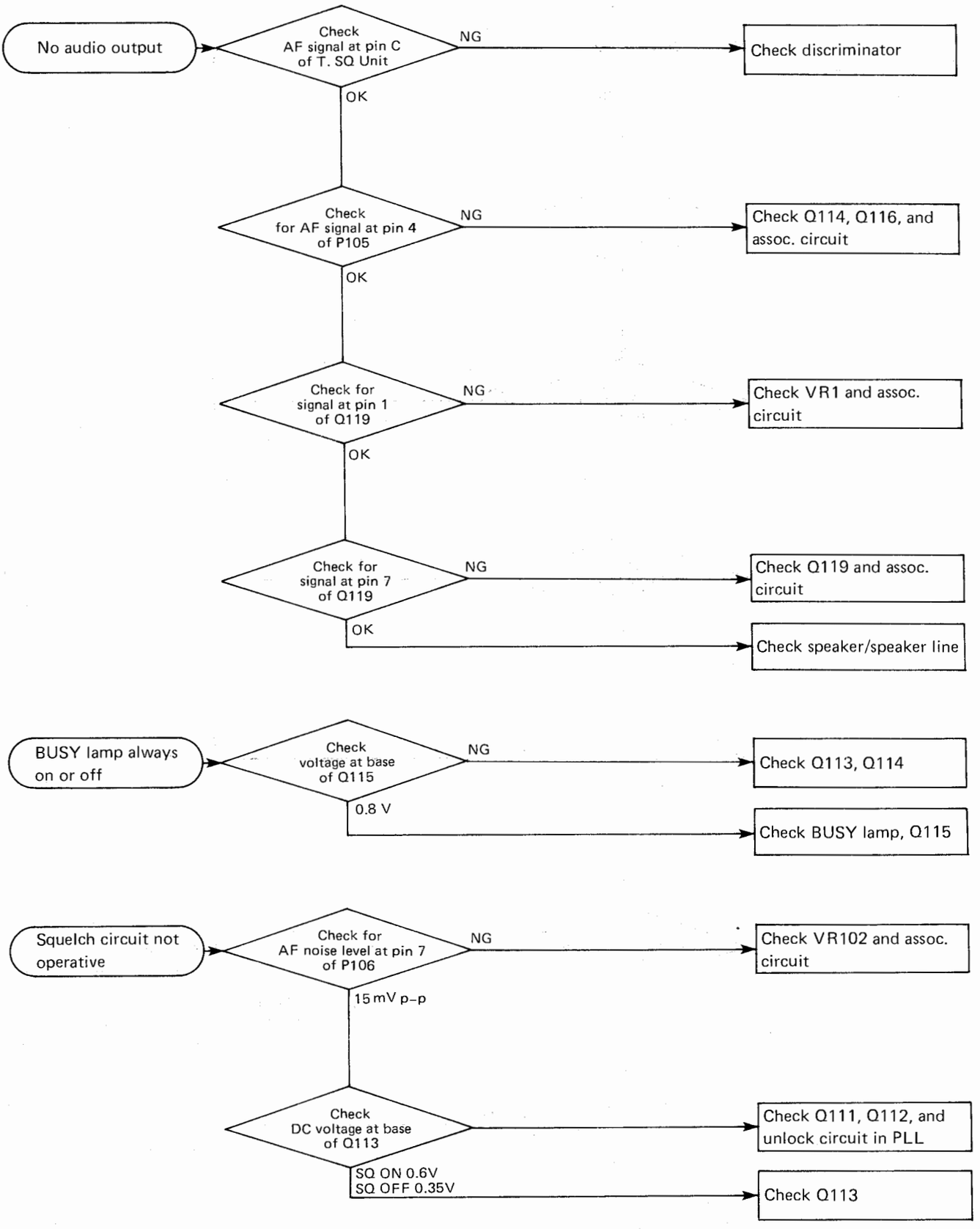
a) Antenna troubles – poor connectors, use of cheap coax not made to withstand weather, and sabotage by neighbors (nail driven through coax, etc.).
b) "Cockpit error:" including mislabeled coax lines to coax switch, or attempt to use transceiver on frequencies other than those it was designed for.
c) Murphy's Law: use of a non-Yaesu microphone with different connections, for example (See page1-10)

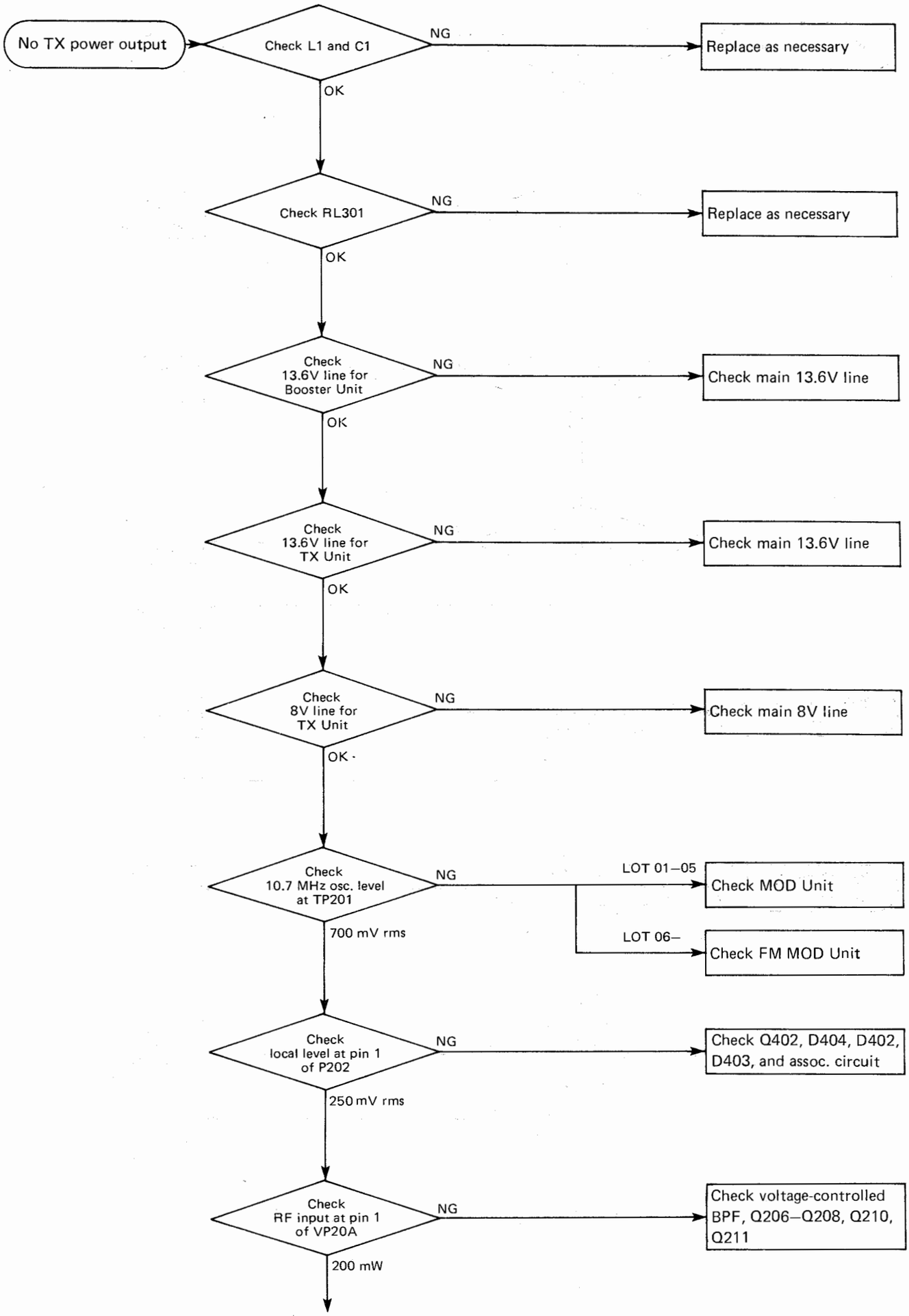
TYPICAL PART FAILURES, CAUSES, AND SYMPTOMS

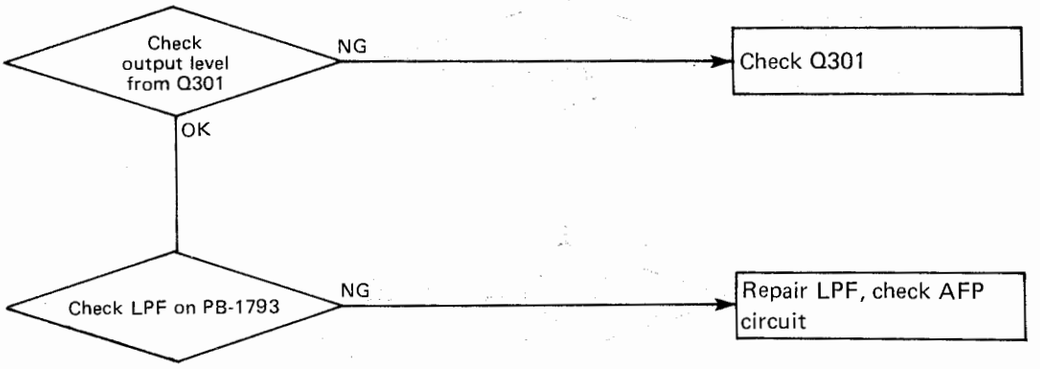
PARTS	CAUSE OF TROUBLE	SYMPTOMS
Semiconductors (IC, FET, TR)	High supply voltage Open circuit Excessive drive High temperature	Short or open circuit Output decreases to 1/2 at 80°C Internal noise Instability
MOS FET MOS IC	Static electricity	Total failure
Crystal Crystal filter	Shock High temperature	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

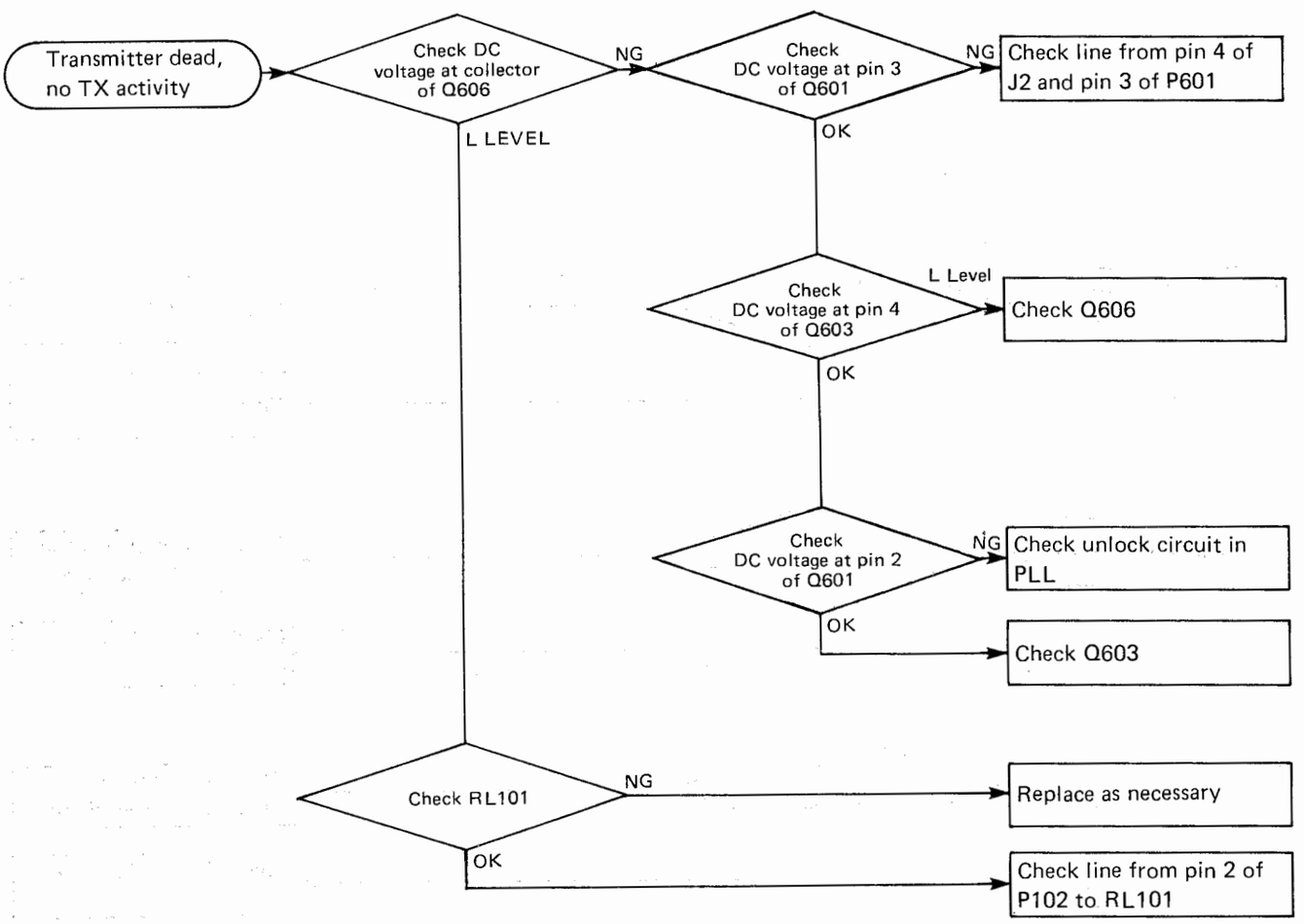
FAULT TREE

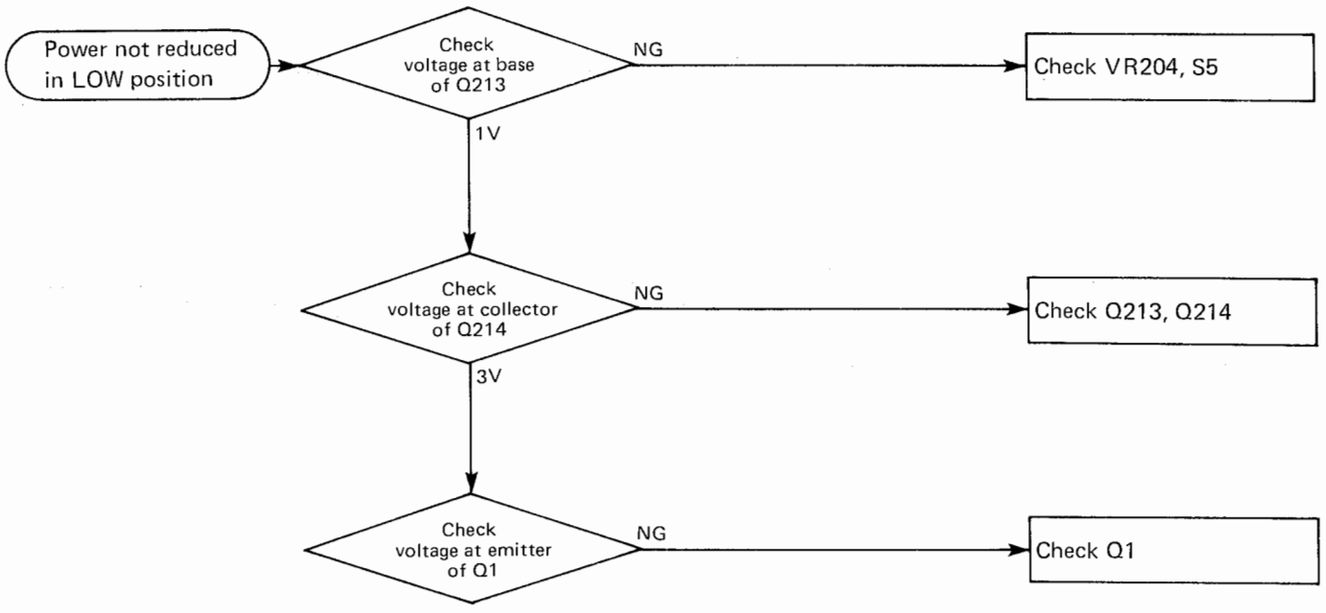


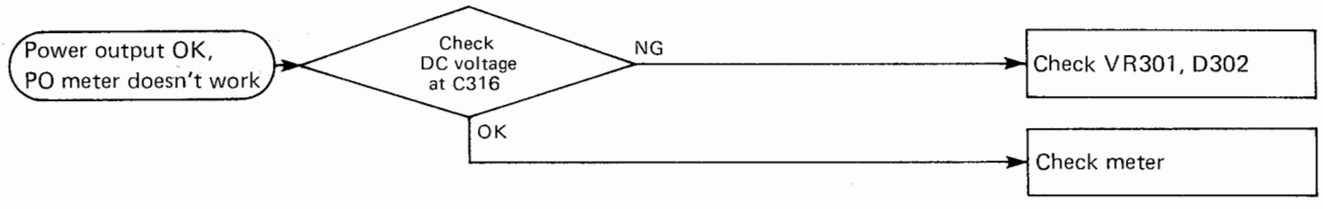


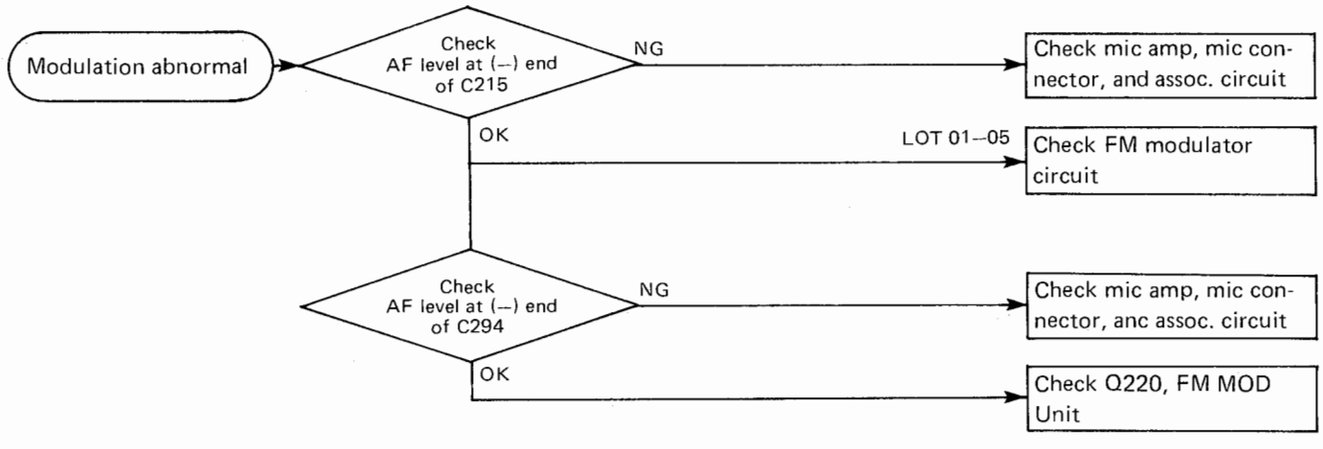


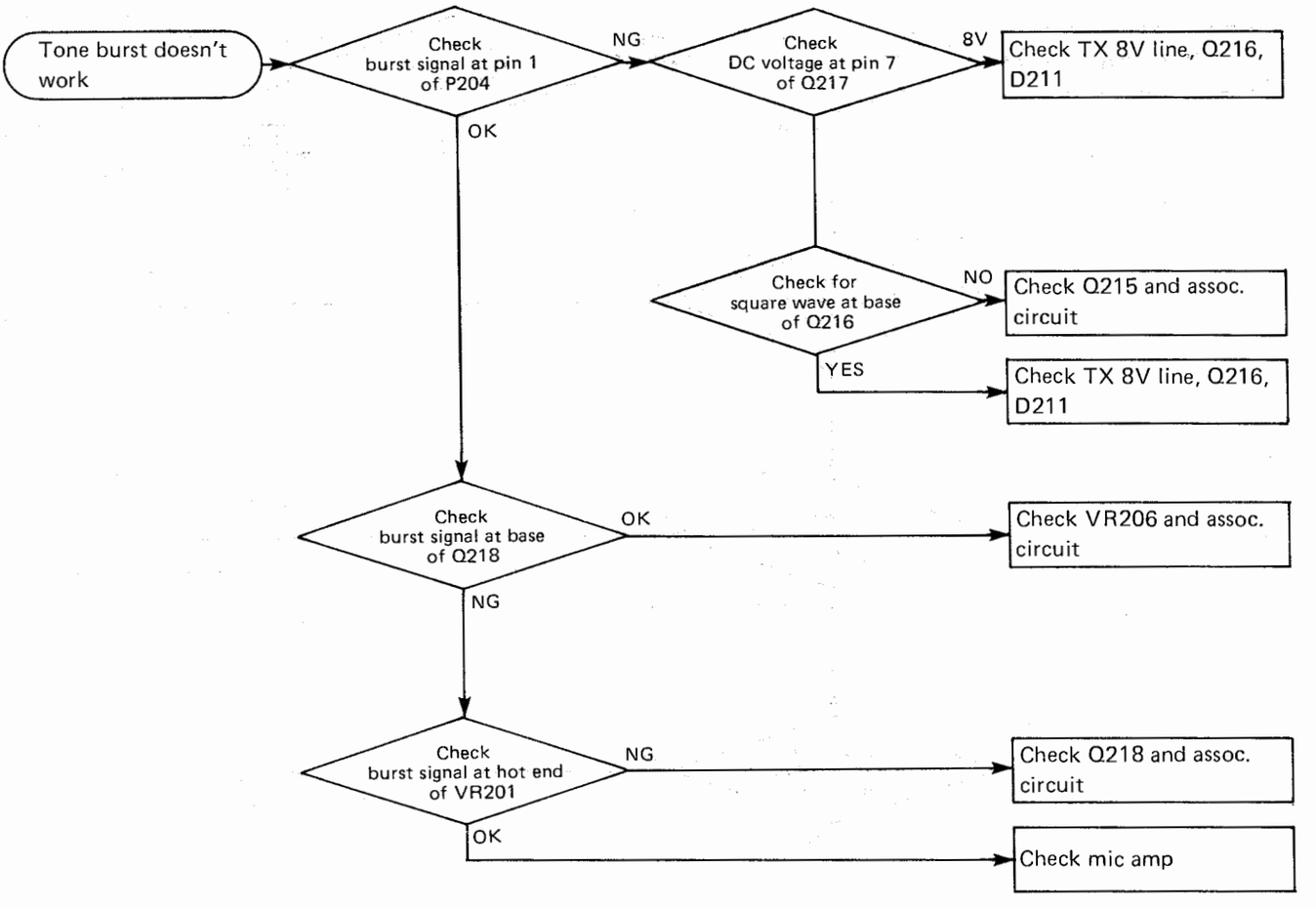


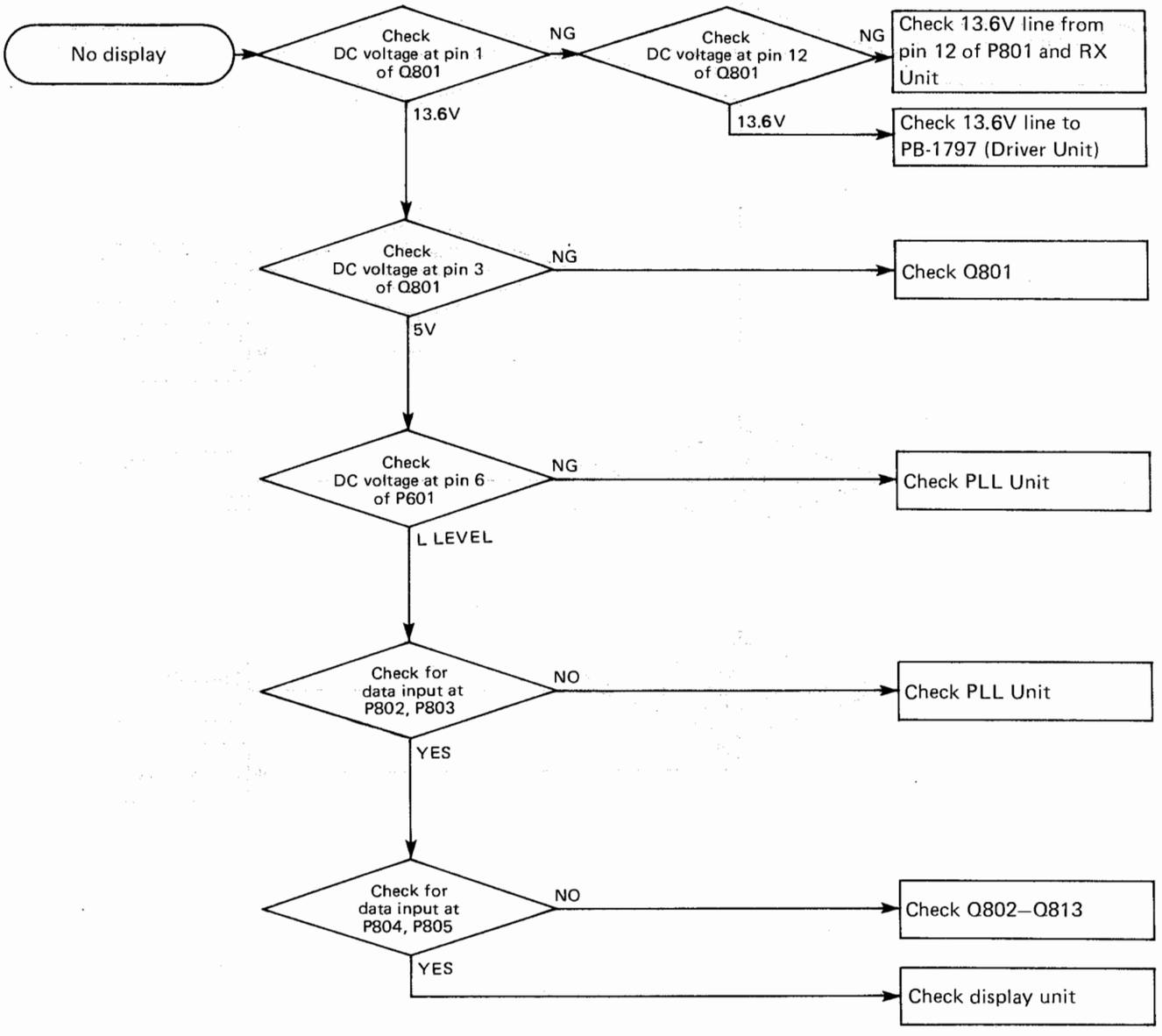












SECTION4-REPAIR PARTS

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	CPU-2500R	PB-1791	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 CPU-2500R transceivers have a part number for each component.

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YAESU MUSEN COMPANY, LTD. – C.P.O. BOX 1500, TOKYO, JAPAN
YAESU ELECTRONICS CORPORATION – 6851 Walthall Way, 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 – 6851 Walthall Way, Paramount, CA 90723
YAESU ELECTRONICS CORPORATION – 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

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

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

PARTS LIST

MAIN CHASSIS

Symbol No.	Parts No.	Description
		TRANSISTOR
Q1	G3402350O	Silicon Transistor 2SD235(O)
		DIODE
D1	G2090034	Silicon Diode U05B
D2,3,4	G2015550	" " 1S1555
		RESISTOR
R6	J10276100	Carbon Composition 1/2W GK 10Ω
R7	J10276101	" " " " 100Ω
R2,3	J10276181	" " " " 180Ω
R4,5	J01245221	Carbon Film 1/4W TJ 220Ω
		POTENTIOMETER
VR1	J62800030	DM10A637A 10kΩB/10kΩA
		CAPACITOR
C2	K00175150	Ceramic disc 50WV SL 15pF
C4,5	K12171102	" " " 0.001μF
C1	K40120226	Electrolytic 16WV R 22μF
C3	K40120476	" " R 47μF
		INDUCTOR
L1	L0020132	Lowpass Coil
		METER
M1(with PL3)	M0290012	AP-120 200μA
		SPEAKER
SP1	M4090032	SM-77K-Y 8Ω 1W
		SWITCH
S2,5,6,10	N6090004	SSF-22-08B
S3	N0050023	SRN1026N
S4	N0190004	SRN1025N
		CONNECTOR
J1	P0090010	FM-142S
J2	P0090012	FM-146S
J3	P1090005	SG-8050
J4	P1090028	M-BR-06D
J5	P1090048	S-1620A-ST
J101, J103, J202, J401	T9201050B	5047-04, 5047-14, 5047-06, 5047-12 with wire
J102	T9201010B	5047-05 "
J104, J201	T9201040B	5047-05, 5047-05 "
J105	T9201000A	5047-06 "
J106	T9200990A	5047-08 "
J203	T9200980B	5047-10 "
J402	T9200970A	5047-04 "
J403	T9200960A	5047-11 with wire
J601	T9200950A	5047-06 "
J602	T9200940A	5047-04 "
J603, J801	T9200920A	5047-05, 5047-12 "
J604, J802	T9201030A	5047-04, 5047-04 "
J605	T9200930A	5047-04 "
J606	T9200900A	5047-07 "
J607	T9200910B	5047-03 "
J803	T9200890A	5047-07 "
		PILOT LAMP
PL1,2	Q1000024	BQ034-22528A
		TERMINAL BOARD
TB1	Q6000011	1L4PS2-0-2
TB2	Q6000014	1L5PS3-0-2
TB3	Q6000007	1L3PS2-0-1

RX UNIT

Symbol No.	Parts No.	Description
	C0017910	RX UNIT and RESONATOR UNIT with components
PB-1791B	F0001791B	Printed Circuit Board
		IC, FET & TRANSISTOR
Q122	G1090084	IC μPC78L05A
Q120 ,121	G1090080	" μPC78L08
Q119	G1090073	" μPC575C2
Q110	G1090072	" μPC577H
Q104	G4800400M	FET 3SK40M
Q101,102	G4800510C	" 3SK51-03
Q105–109, 111–118	G3318150Y	Transistor 2SC1815Y
		DIODE
D102–105, 107,108	G2001880F	Germanium Diode 1S188FM
D106,109–111	G2015550	Silicon Diode 1S1555
		CRYSTAL
X101	H0100720A	HC-18/U, 10.245MHz
		MONOLITHIC FILTER
XF101	H1101960	10M2B2
		CERAMIC FILTER
CF101	H3900130	RVF10.7MF-BR
CF102,103	H3900030	LFB-15
		CERAMIC DISCRIMINATOR
CD101	H7900060	SFD455S4

		RESISTOR	
R178	J10276220	Carbon Composition	1/2W GK 22Ω
R181	J10276181	" " " "	180Ω
R103,106,109, 117	J00245560	Carbon Film	1/4W VJ 56Ω
R118,127,133, 138,144,166, 168,169	J00245101	" " " "	100Ω
R160	J00245121	" " " "	120Ω
R123,176	J00245221	" " " "	220Ω
R131,140,142, 143	J00245471	" " " "	470Ω
R102	J00245102	" " " "	1kΩ
R155,161	J00245152	" " " "	1.5kΩ
R132,145,175	J00245222	" " " "	2.2kΩ
R119,120,134, 137,151,153	J00245332	" " " "	3.3kΩ
R128,130,167	J00245472	" " " "	4.7kΩ
R116,136,146, 147,154	J00245562	" " " "	5.6kΩ
R164,165,180	J00245822	" " " "	8.2kΩ
R125,126,148, 157	J00245103	" " " "	10kΩ
R124	J00245153	" " " "	15kΩ
R104,105,129, 135,149,170	J00245223	" " " "	22kΩ
R180	J00245273	" " " "	27kΩ
R101,107,108, 121,122,139, 141,159,172, 179	J00245473	" " " "	47kΩ
R156	J00245563	" " " "	56kΩ
R150,152,158, 162,163,171	J00245104	" " " "	100kΩ
R174	J00245124	" " " "	120kΩ
R173	J00245154	" " " "	150kΩ
		THERMISTOR	
TH101	G9090001	SDT-250	
		POTENTIOMETER	
VR102	J50701502	TR-11R300	5kΩB
VR101,103	J50701103	"	10kΩB
		CAPACITOR	
C120,125	K02172030	Ceramic disc	50WV CH 3pF
C101,102	K02173100	" " "	CH 10pF
C133	K00173100	" " "	SL 10pF
C160	K00179005	" " "	SL 20pF
C129	K02175470	" " "	CH 47pF
C141,196,197	K00175101	" " "	SL 100pF
C130,131	K00175151	" " "	SL 150pF
C116,118,123, 144,177,180, 186	K12171102	" " "	0.001μF
C103–106,108, 117,122,124, 126,127,135, 139,188	K14170103	" " "	0.01μF
C128,132,134, 140,187	K14170473	" " "	0.047μF

C136,138,150, 153,158	K50177102	Mylar Film	50WV 0.001μF
C172	K50177472	" " "	0.0047μF
C142,145,151, 157,159,162, 171	K50177103	" " "	0.01μF
C154–156,174, 176	K50177223	" " "	0.022μF
C137,143, 146–149,152, 161,164,175, 195	K50177473	" " "	0.047μF
C183	K50177104	" " "	0.1μF
C194	K70167474	Tantalum	35WV 0.47μF
C167,170	K40170105	Electrolytic	50WV R 1μF
C163,166,169, 178	K40140475	"	25WV R 4.7μF
C165,173,191, 192	K40120106	"	16WV R 10μF
C179,182	K40100476	"	10WV R 47μF
C168,185,190	K40100107	"	" 100μF
C181,184,193	K40120107	"	16WV R 100μF
C189	K40129003	"	" R 1000μF
		INDUCTOR	
L101,104	L0020105	R12-4091	
L102	L1190008	FL-4H2R2M	2.2μH
L105	L1190068	EL0710 221K	220μH
L106–108	L1190017	FL-5H 102K	1mH
		AF CHOKE	
CH101	L2030022		
		TRANSFORMER	
T101,102	L0020187	3005	
T103	L0190002	7MC-312162NO	
		RELAY	
RL101	M1190007	HB2-DC12V	
		MINI CONNECTOR	
P101	P0090059	5048-04A	
P102,104	P0090042	5048-05A	
P105	P0090051	5048-06A	
P106	P0090037	5048-08A	
P103	P0090036	5048-14A	
	L9190001	Ferrite Beads 4A-RI 3x3-1	
	Q5000011	Wrapping Terminal C	

TX UNIT

Symbol	Parts No.	Description
	C0017920	TX UNIT with components
PB-1792C	F0001792C	Printed Circuit Board
		IC, FET & TRANSISTOR
Q215	G1090068	IC MC14011B

Q217	G1090103	IC	MSM5576
Q206,207	G3800190G	FET	2SK19GR
Q208	G4800510C	"	3SK51-3
Q214	G3104960Y	Transistor	2SA496Y
Q210	G3320530	"	2SC2053
Q211	G3307410	"	2SC741
Q201–205,212, 213,216,218	G3318150Y	"	2SC1815Y
Q210*	G3305350A	"	2SC535A
Q219,220	G3318150G	"	2SC1815GR
		DIODE	
D201,202, 209–212	G2015550	Silicon Diode	1S1555
D204	G2090041	Varistor "	MV-103
D203	G2090023	Varactor "	1SV50
D205–208	G2022090	" "	1S2209
		CRYSTAL	
X201	H0100601	HC-25/U	(1800Hz Tone) 3.6864MHz
X201	H0100602	"	(1750Hz Tone) 3.584MHz
X202	H0100490	HC-18/U	10.74MHz
		MODULATOR MODULE	
XM201	H9500320	XM-10.7	
		RESISTOR	
R250	J01245470	Carbon Film	1/4W TJ 47Ω
R243,244,248	J00245560	" "	" VJ 56Ω
R236	J01245101	" "	" TJ 100Ω
R201,208,225, 256,270,277, 281	J00245101	" "	" VJ 100Ω
R221	J01245221	" "	" TJ 220Ω
R215,231–233	J00245221	" "	" VJ 220Ω
R254	J00245471	" "	" " 470Ω
R209,279	J00245561	" "	" " 560Ω
R206,216,224, 228,263,269, 283	J00245102	" "	" " 1kΩ
R203	J00245182	" "	" " 1.8kΩ
R246,255,276, 282	J00245222	" "	" " 2.2kΩ
R210,278	J00245272	" "	" " 2.7kΩ
R204	J00245332	" "	" " 3.3kΩ
R249,251,253, 257,264,268	J00245472	" "	" " 4.7kΩ
R202,219	J00245562	" "	" " 5.6kΩ
R205,212,213, 226,229,230, 247,258,261	J00245103	" "	" " 10kΩ
R272	J00245123	" "	" " 12kΩ
R252	J00245153	" "	" " 15kΩ
R217,223,227, 241,242,267, 273	J00245223	" "	" " 22kΩ
R218	J00245333	" "	" " 33kΩ
R222	J00245473	" "	" " 47kΩ
R235	J01245104	Carbon Film	1/4W TJ 100kΩ
R220,234, 237–240,262, 265,266,271	J00245104	" "	" " 100kΩ
R211,214	J00245154	" "	" VJ 150kΩ
R275	J00245224	" "	" " 220kΩ
R207	J00245274	" "	" " 270kΩ
R274	J00245334	" "	" " 330kΩ
R280	J00245474	" "	" " 470kΩ
R259,260	J00245105	" "	" " 1MΩ
		POTENTIOMETER	
VR202,206	J50701102	TR-11R300	1kΩB
VR204	J50701202	"	2kΩB
VR201	J50701502	"	5kΩB
VR205	J50701205	"	2MΩB
		CAPACITOR	
C239,243	K00179001	Ceramic disc 50WV	0.5pF
C238,241	K02179001	" " " CH	1pF
C230	K02172020	" " " "	2pF
C218	K06172040	" " " UJ	4pF
C254	K00172040	" " " SL	4pF
C236	K00172050	" " " CH	5pF
C244	K06173080	" " " UJ	8pF
C231,232,237, 240	K06173090	" " " "	9pF
C255	K00175150	" " " SL	15pF
C226,227	K02179008	" " " CH	20pF
C225,245,252	K00175270	" " " SL	27pF
C262	K00175330	" " " "	33pF
C275,276	K02175470	" " " CH	47pF
C222	K00175470	" " " SL	47pF
C219,220	K02175101	" " " CH	100pF
C217	K06175101	" " " UJ	100pF
C201,204,216, 242,248, 257–259,263, 266,267,272, 273,286,287, 290	K12171102	" " "	0.001μF
C221,223,224, 228,229, 233–235,246, 247,249,250, 253,256,260, 265,269	K14170103	" " "	0.01μF
C288	K14170473	" " "	0.047μF
C284,285	K23140001	Ceramic Chip 25WV	0.01μF
C280,281	K50177472	Mylar Film 50WV	0.0047μF
C289	K50177682	Mylar 50WV	0.0068μF
C270,277–279, 292	K50177103	" " "	0.01μF
C202	K50177223	" " "	0.022μF
C213,214	K50177473	" " "	0.047μF
C274	K70127104	Tantalum 35WV	0.1μF
C271	K70127474	" "	0.47μF
C205	K70127106	" 16WV	10μF
C206,208,215, 264,282,294, 296	K40170105	Electrolytic 50WV R	1μF
C209,212,268, 283,291,293	K40120106	" 16WV R	10μF
C207	K40100476	" 10WV R	47μF
C261	K40120476	" 16WV R	47μF

C203,210,295	K40100107	Electrolytic 10WV R 100μF
C211	K40100227	" 10WV R 220μF
		TRIMMER CAPACITOR
TC201,202	K91000028	ECV-1ZW 10x53 10pF
TC203	K91000016	ECV-1ZW 50x32 50pF
		INDUCTOR
L207,209	L0020193	
L203	L0020195	
L204,206,210	L0020196	
L202	L0020319	
L208	L0020380	
L201	L1190075	L10-104J 100mH
L205	L1190014	FL-4H 100M 10μH
L211	L1190011	FL-4H 4R7M 4.7μH
		TRANSFORMER
T201,202	L0020187	3005
T203–206	L0020111	R12-4102
		CRYSTAL SOCKET
XS201	P3090002	S2-101P-00
		MINI CONNECTOR
P204	P0090050	5048-04A
P201	P0090042	5048-05A
P202	P0090051	5048-06A
P203	P0090052	5048-10A
J204	T9201020A	5047-04 with Jumper wire
	Q5000011	Wrapping Terminal C
	R5047912B	Heat Sink TO-5
	L9190001	Ferrite Beads 4A-RI 3x3-1

BOOSTER UNIT

Symbol No.	Parts No.	Description
	C0017930	BOOSTER UNIT with components
PB-1793	F1001793A	Printed Circuit Board
		RF POWER MODULE
Q301	G1090245	VP-20A-1
		DIODE
D301,302	G2001880F	Germanium Diode 1S188FM
	G2090001	Silicon 10D1
		POTENTIOMETER
VR301	J51723221	SR19R 220ΩB
VR302	J50701103	TR-11R300 10kΩB
VR303	J50701204	TR-11R300 200kΩB
		CAPACITOR
C304	K00179001	Ceramic disc 50WV 0.5pF
C307	K00172030	" " " SL 3pF
C301–303,305, 313	K00175150	" " " SL 15pF
C306,310	K12171102	" " " 0.001μF
C308,309, 314–316	K20170102	Feed Thru " 0.001μF
C311,312	K40120106	Electrolytic 16WV R 10μF
		RELAY
RL301	M1190006	FBR221D012 DC 12V
		INDUCTOR
L301,302	L0020430	LPF Coil
		TRANSFORMER
T301	L0020335	CM Coupler
	Q5000011	Wrapping Terminal C
	Q4000001	Seal Terminal A102

PLL UNIT

Symbol No.	Parts No.	Description
	C0017940	PLL UNIT and VCO BOARD with components
PB-1794A	F0001794A	Printed Circuit Board
		IC, FET & TRANSISTOR
Q409	G1090047	IC μPD857C
Q410	G1090048	" TC-5081P
Q406	G1090063	" TA-7060P
Q402	G3800190G	FET 2SK19GR
Q412,414	G3800301Y	" 2SK30A-Y
Q403,404	G4800400M	" 3SK40M
Q415	G3105640Q	Transistor 2SA564Q
Q408	G3303730	" 2SC373
Q405,411	G3305350A	" 2SC535A
Q413	G3310000G	" 2SC1000GR
Q407,416–418	G3318150Y	" 2SC1815Y
		DIODE
D402–406	G2015550	Silicon Diode 1S1555
		CRYSTAL
X401	H0100350	HC-18/U 10.240MHz
X402	H0100841	" 44.100MHz
X403	H0100844	" 44.10166MHz
		RESISTOR
R411	J00245220	Carbon Film 1/4W VJ 22Ω
R412	J00245560	" " " " 56Ω

R407,419,428, 456,464,471	J00245101	Carbon Film 1/4W VJ 100Ω	C472	K40100107	Electrolytic 10WV R 100μF
			C474	K70167104	Tantalum 35WV 0.1μF
R425	J00245471	" " " " 470Ω	C441	K51176101	Styrol 50WV 100pF
R466	J10276471	Carbon Composition	C442	K51176221	" " 220pF
		" " 1/2W GK 470Ω	C467	K54200001	Polyester Film 100WV 1μF
R424,448,465	J00245561	Carbon Film 1/4W VJ 560Ω			
R422,423	J00245681	" " " " 680Ω			
R406,421,431, 434,435, 436–444,459, 467	J00245102	" " " " 1kΩ			**TRIMMER CAPACITOR**
			TC402–404	K91000029	ECV-1ZW 20x53 20pF
R427	J00245122	" " " " 1.2kΩ			**INDUCTOR**
R446,447	J00245152	" " " " 1.5kΩ	L408	L0020205	OSC COIL
R413–415,449, 454,468,469	J00245222	" " " " 2.2kΩ	L407	L0020206	RFC
			L406	L1190014	FL4H 100K 10μH
R445	J00245272	" " " " 2.7kΩ	L405	L1190019	FL5H 150K 15μH
R453	J00245472	" " " " 4.7kΩ	L409	L1190023	FL5H 220K 22μH
R430,432,433, 458,460, 461–463	J00245103	" " " " 10kΩ	L404	L1190024	FL5H 221K 220μH
R418	J01245223	" " " TJ 22kΩ			**TRANSFORMER**
R409,410,417, 429,455	J00245223	" " " VJ 22kΩ	T401	L0020111	R12-4102
			T402,403	L0020312	
R404,405,408, 416,450	J00245473	" " " " 47kΩ			
R452,457	J00245104	" " " " 100kΩ			**MINI CONNECTOR**
R426	J00245154	" " " " 150kΩ	P402	P0090050	5048-04A
R420	J00245334	" " " " 330kΩ	P403	P0090053	5048-11A
R451	J00245105	" " " " 1MΩ	P401	P0090038	5048-12A
		CAPACITOR			**IC SOCKET**
C428,430	K02172020	Ceramic disc 50WV CH 2pF	QS401	P3090034	116-24-30-114
C425	K00172020	" " " SL 2pF			
C463,464	K02172040	" " " CH 4pF			
C429	K00172040	" " " SL 4pF		R0044710	PLL Case
	K02179015	" " " CH 43pF		R0044720	" Cover A
	K00175330	" " " SL 33pF		R0044730	" Cover B
C417,459	K02172050	" " " CH 5pF		R6044740	Hex Spacer
C412	K00172050	" " " SL 5pF		Q5000011	Wrapping Terminal C
C483	K02173090	" " " CH 9pF			
C414	K00173100	" " " SL 10pF			
C484	K00175120	" " " SL 12pF	**VCO BOARD (P/O PLL UNIT) 3390**		
C433,434	K00175180	" " " SL 18pF	Symbol No.	Parts No.	Description
C424,440,461, 462	K02179013	" " " CH 33pF		C0018302	VCO Board with components
			PB-1830A	F0001830A	Printed Circuit Board
C443	K00175470	" " " SL 47pF			
C423,438,445, 446–450, 453–457,465, 466,468,469	K12171102	" " " 0.001μF			
					FET
			Q401	G3800190B	2SK19BL
C413,415,416, 418,419,422, 426,427,431, 432,435,444, 451,458,460, 476,480,485	K14170103	" " " 0.01μF			
					DIODE
			D401	G2022090	Varactor Diode 1S2209
					RESISTOR
C420,436, 477–479,481, 482	K14170473	" " " 0.047μF	R402,403	J00245101	Carbon Film 1/4W VJ 100Ω
			R401	J00245563	" " " " 56kΩ
C470	K50177103	Mylar Film 50WV 0.01μF			
C471,473	K50177473	" " " 0.047μF			**CAPACITOR**
C475	K40140475	Electrolytic 25WV R 4.7μF	C409	K02172030	Ceramic disc 50WV CH 3pF
C421,437	K40120106	" 16WV R 10μF	C405,406	K06172040	" " " UJ 4pF
C452	K40100476	" 10WV R 47μF	C404,407	K02173070	" " " CH 7pF

C402	K02173100	Ceramic disc 50WV CH 10pF
C408	K02175120	" " " CH 12pF
C401,411	K12171102	" " " 0.001μF
C410	K40120106	Electrolytic 16WV R 10μF
		TRIMMER CAPACITOR
TC401	K91000056	TZ03Z070A 7pF
		INDUCTOR
L401	L0020359A	S6-B
L403	L1190004	Micro Inductor 0.68μH
L402	L1190014	" " 10μH
	R0041040B	VCO Case
	R0041050B	VCO Cover
	Q5000011	Wrapping Terminal C

PLL CONT UNIT

Symbol No.	Parts No.	Description
PB-1795D	F0001795D	Printed Circuit Board
	C0017950	P.C.B with components
PB-1836	F1001836	Connector Board
		IC, FET & TRANSISTOR
Q601	G1090142	CPU MN-9003
Q603–605,614	G1090068	IC MC-14011B
Q611	G1090051	" MC-14042B
Q602	G1090126	" MC-14069B
Q613	G1090127	" MC-14410
Q612	G1090128	" MC-14556B
Q615	G1090084	" μPC78L05A
Q607,616	G3105640Q	Transistor 2SA564Q
Q606,608–610	G3318150Y	" 2SC1815Y
		DIODE
D601–604,609, 610–612	G2015550	Silicon Diode 1S1555
D606–608	G2001880F	Germanium Diode 1S188FM
		CRYSTAL
X601	H0100710	HC-43/U 1MHz
		RESISTOR
R623,624	J01215102	Carbon Film 1/8W TJ 1kΩ
R605,610	J01215103	" " " " 10kΩ
R616	J01215183	" " " " 18kΩ
R620	J01215223	" " " " 22kΩ
R601,603,618, 619	J01215333	" " " " 33kΩ
R613,614	J01215473	" " " " 47kΩ
R602,604,606, 607–609,611, 612,615,617	J01215104	" " " " 100kΩ
R606,625	J01215224	" " " " 220kΩ

R621	J10246275	Carbon Composition 1/4W GK 2.7MΩ
		BLOCK RESISTOR
RB601	J40900003	7x100kΩ RA-7R
		CAPACITOR
C603	K02175101	Ceramic 50WV CH 100pF
C604,606–608	K23170003	Ceramic RPE112F104Z50V 0.1μF
C601,602,605	K50177473	Mylar Film 50WV 0.047μF
C609	K71137685	Tantalum 20WV 6.8μF
C611–635	K21170002	Feedthru 50WV 1000pF
C636	K70127106	" 10WV 10μF
		MINI CONNECTOR
P607	P0090048	5048-03A
P602,604,605	P0090050	5048-04A
P603	P0090042	5048-05A
P601	P0090095	5049-06A
P606	P0090054	5048-07A
		IC SOCKET
QS601	P3090040	SE-OC8340-02 (116-40-40-114)
	Q4000001	Seal Terminal A102

DISPLAY UNIT

Symbol No.	Parts No.	Description
PB-1796	F0001796	Printed Circuit Board
	C0017960	P.C.B with components
		DIODE
D701–707	G2090059	LED 5082-7740
D708	G2015550	Silicon Diode 1S1555
		RESISTOR
R707	J10246101	Carbon Composition 1/4W GK 100Ω
R701–706, 708–714	J01215471	Carbon Film 1/8W TJ 470Ω
		PUSH SWITCH
S701–706	N7090001	AKC-8N
		MINI CONNECTOR
P702	P0090059	3022-11A
P701	P0090058	3022-15A

DRIVER UNIT

Symbol No.	Parts No.	Description
PB-1797	F0001797	Printed Circuit Board
	C0017970	P.C.B with components

		IC & TRANSISTOR	
Q801	G1090065	IC	μPC14305
Q807–813	G3105640Q	Transistor	2SA564Q
Q802–805	G3107190P	"	2SA719-P
		DIODE	
D801	G2015550		1S1555
		RESISTOR	
R802	J10276229	Carbon Composition	1/2W GK 2.2Ω
R801	J10276220	" " " "	22Ω
R810–816	J00245100	Carbon Film	1/4W VJ 10Ω
R803–809	J00245472	" " " "	4.7kΩ
		CAPACITOR	
C802	K70167474	Tantalum	35WV 0.47μF
C803	K40120226	Electrolytic	16WV R 22μF
C801	K40120107	" "	100μF
		MINI CONNECTOR	
P802	P0090050	5048-04A	
P803	P0090054	5048-07A	
P801	P0090038	5048-12A	
J805	P1090047	3024-11A	
J804	P1090046	3024-15A	

SW UNIT

Symbol No.	Parts No.	Description
PB-1798	F0001798	Printed Circuit Board
	C0017980	P.C.B with components
		PUSH SWITCH
S1	N4090003	MP0001AA2060
S7,8,9	N4090012	SPJ2-22-A01

PHOTO A BOARD

Symbol No.	Parts No.	Description
PB-1848	F0001848	Printed Circuit Board
	C0018480	PCB with components
		PHOTO INTERRUPTER
Q3	G0090001	ON-1105
		TRANSISTOR
Q5	G3318150Y	2SC1815Y
		RESISTOR
R13	J00245103	Carbon Film 1/4W VJ 10kΩ

PHOTO B BOARD

Symbol No.	Parts No.	Description
PB-1849	F0001849	Printed Circuit Board
	C0018490	PCB with components
		PHOTO INTERRUPTER
Q2	G0090001	ON-1105
		TRANSISTOR
Q4	G3318150Y	2SC1815Y
		RESISTOR
R12	J00245103	Carbon Film 1/4W VJ 10kΩ

RESONATOR BOARD (P/O RX UNIT)

Symbol No.	Parts No.	Description
PB-1800	F0001800	Printed Circuit Board
	C0018000	RESONATOR BOARD with components
		CAPACITOR
C109,110,112, 114	K02172050	Ceramic 50WV CH5pF
C107,115	K02175150	" " " 15pF
C111,113	K02175180	" " " 18pF
		CERAMIC TRIMMER
TC101–104	K91000028	ECV-1ZW 10x53 10pF
		INDUCTOR
L103	L0020409	
	R5044940A	Resonator Case
	Q5000011	Wrapping Terminal C

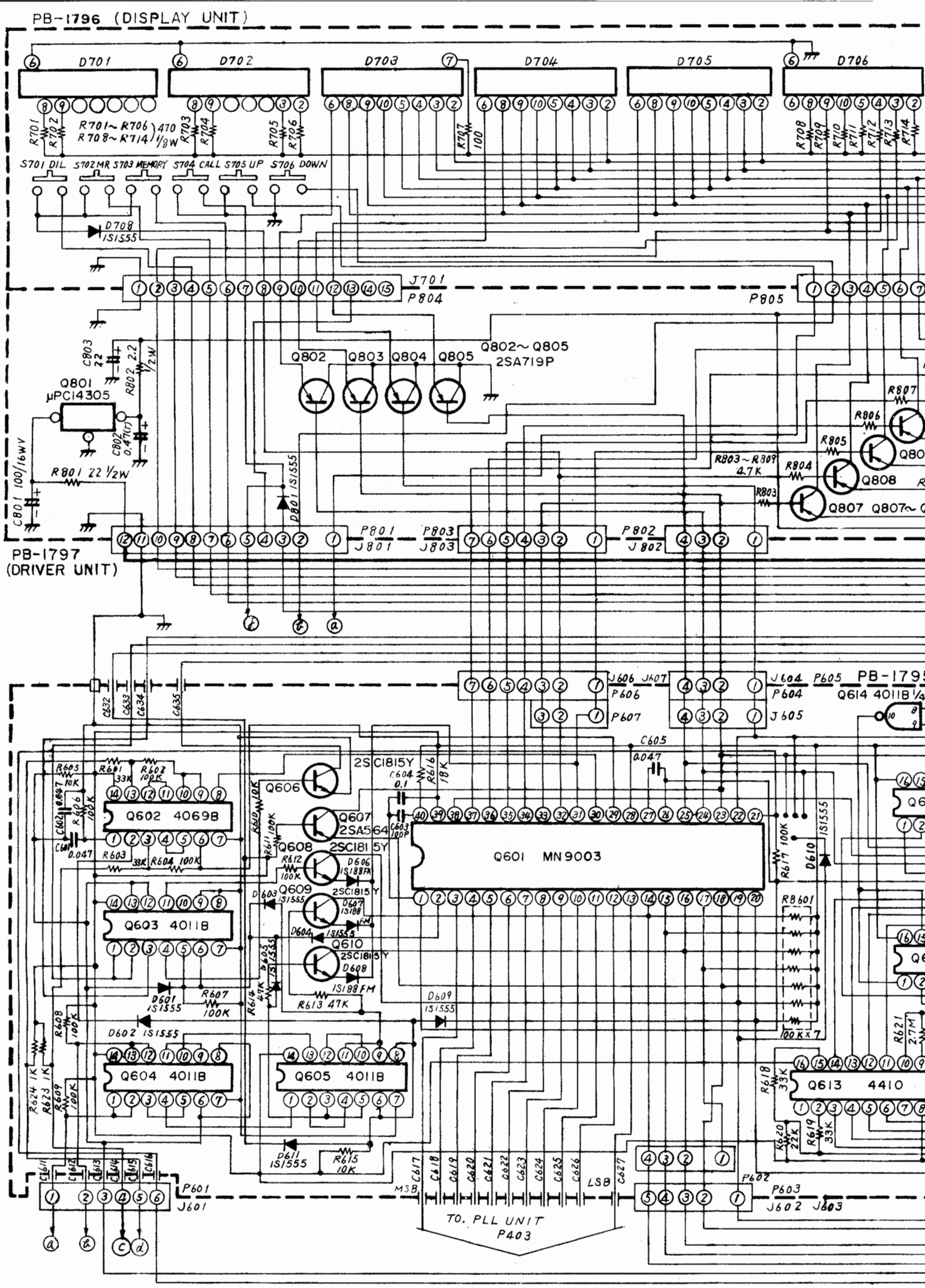
MONITOR UNIT

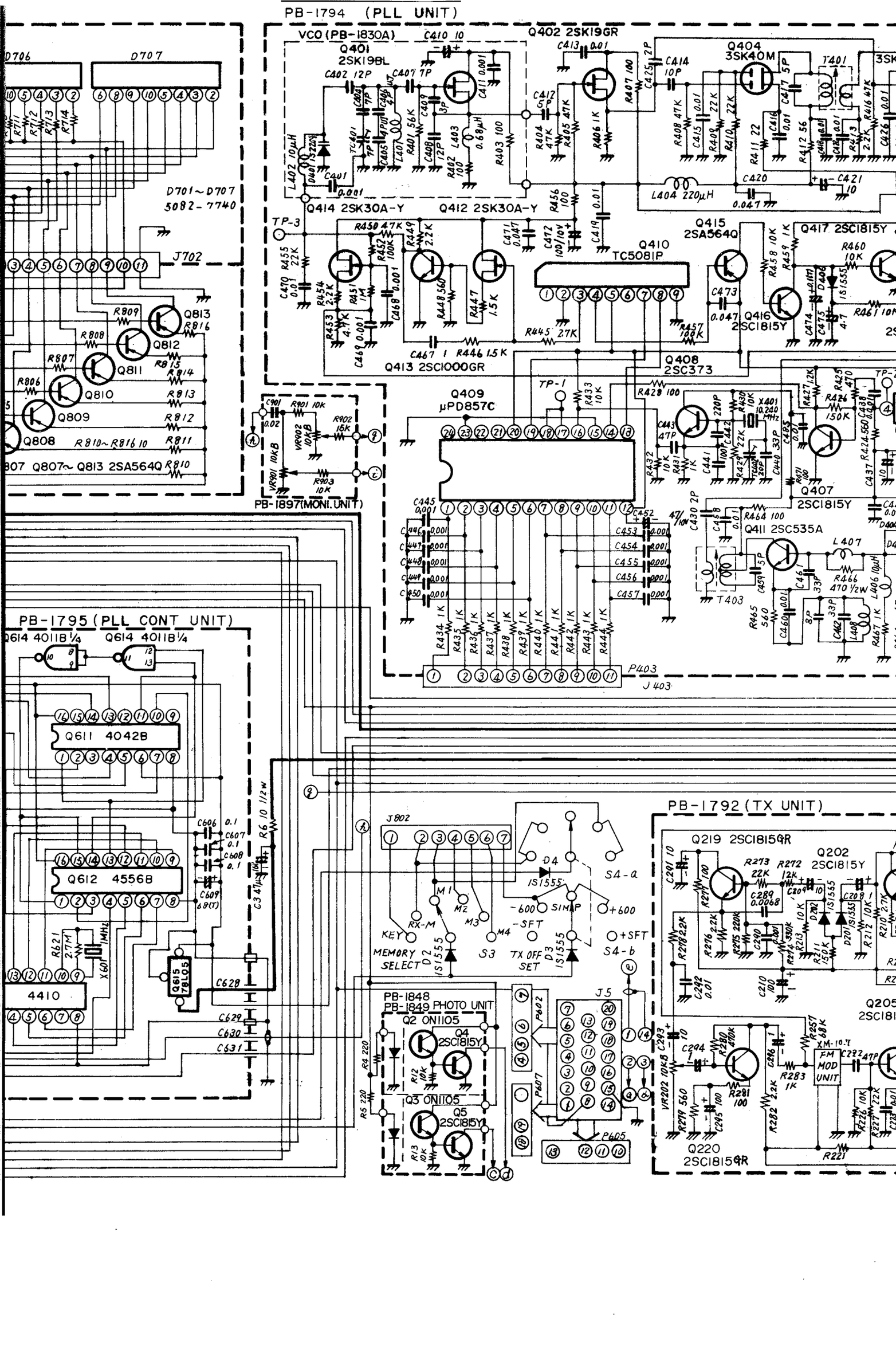
Symbol No.	Parts No.	Description
PB-1897A	F0001897A	Printed Circuit Board
	C0018970	P.C.B with components
		RESISTOR
R901,903	J10246103	Carbon Composition 1/4W GK 10kΩ
R902	J10246153	" " " " 15kΩ
		POTENTIOMETER
VR901,902	J51721203	EVL-S3AA 00B24 20kΩB
		CAPACITOR
C901	K50177223	Mylar Film 50WV 0.022μF

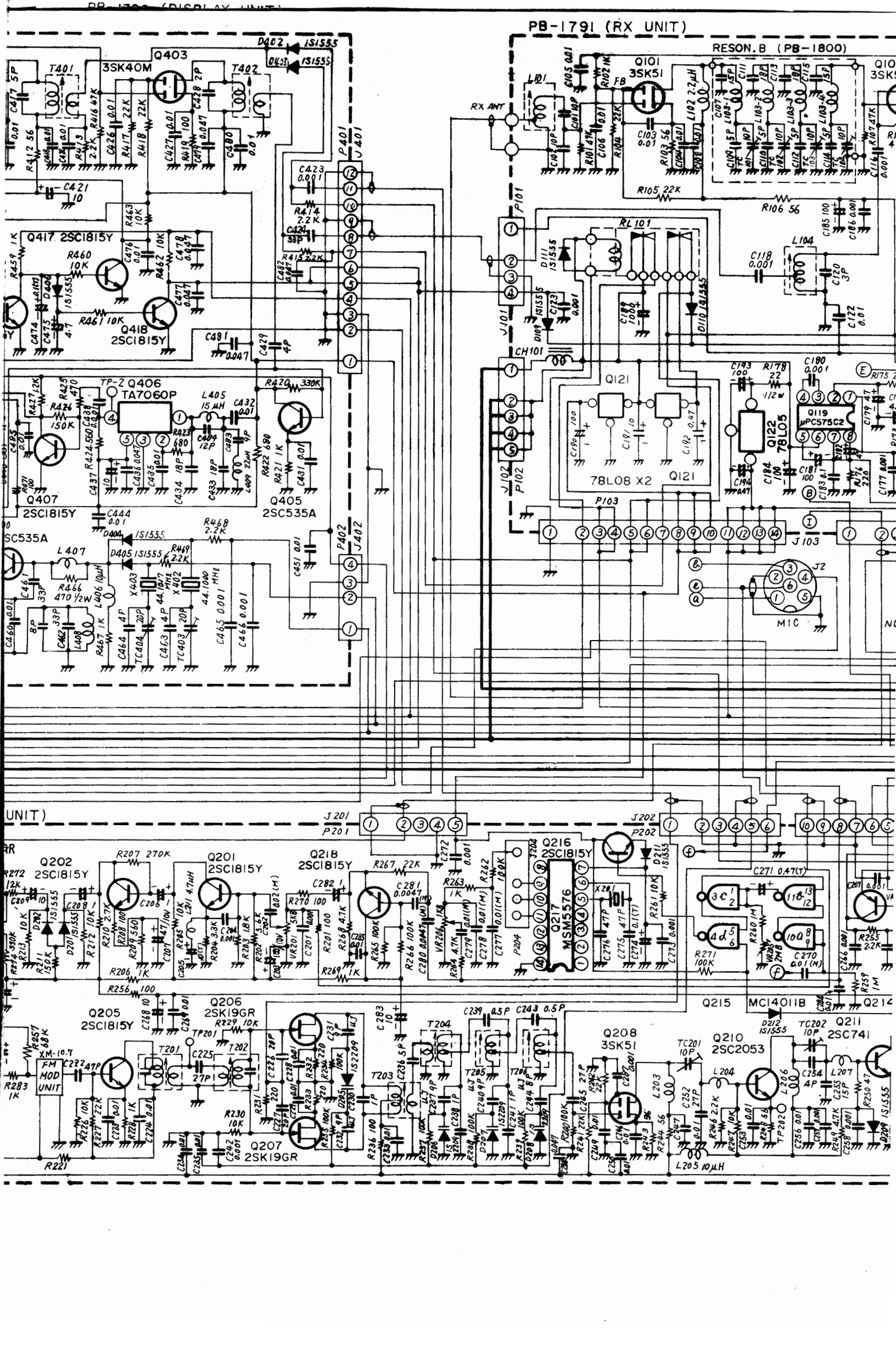
ACCESSORIES		
Symbol No.	Parts No.	Description
	M3090008	**Microphone Assembly YE-17** with Microphone Hanger, screws
	P1090021	Microphone Plug FM-146P
		Power Cord Assembly
	P1090019	Power Plug FM-142P
	G20000001	Fuse Holder SN-1101
	Q0000007	Fuse 10A
	Q0000007	**Fuse** 10A
	P0090034	**External Speaker Plug P-2240 (C-107)**
	R0038630	**Stand**
	D6000003	**Mobile Bracket Assembly** with Set Screws

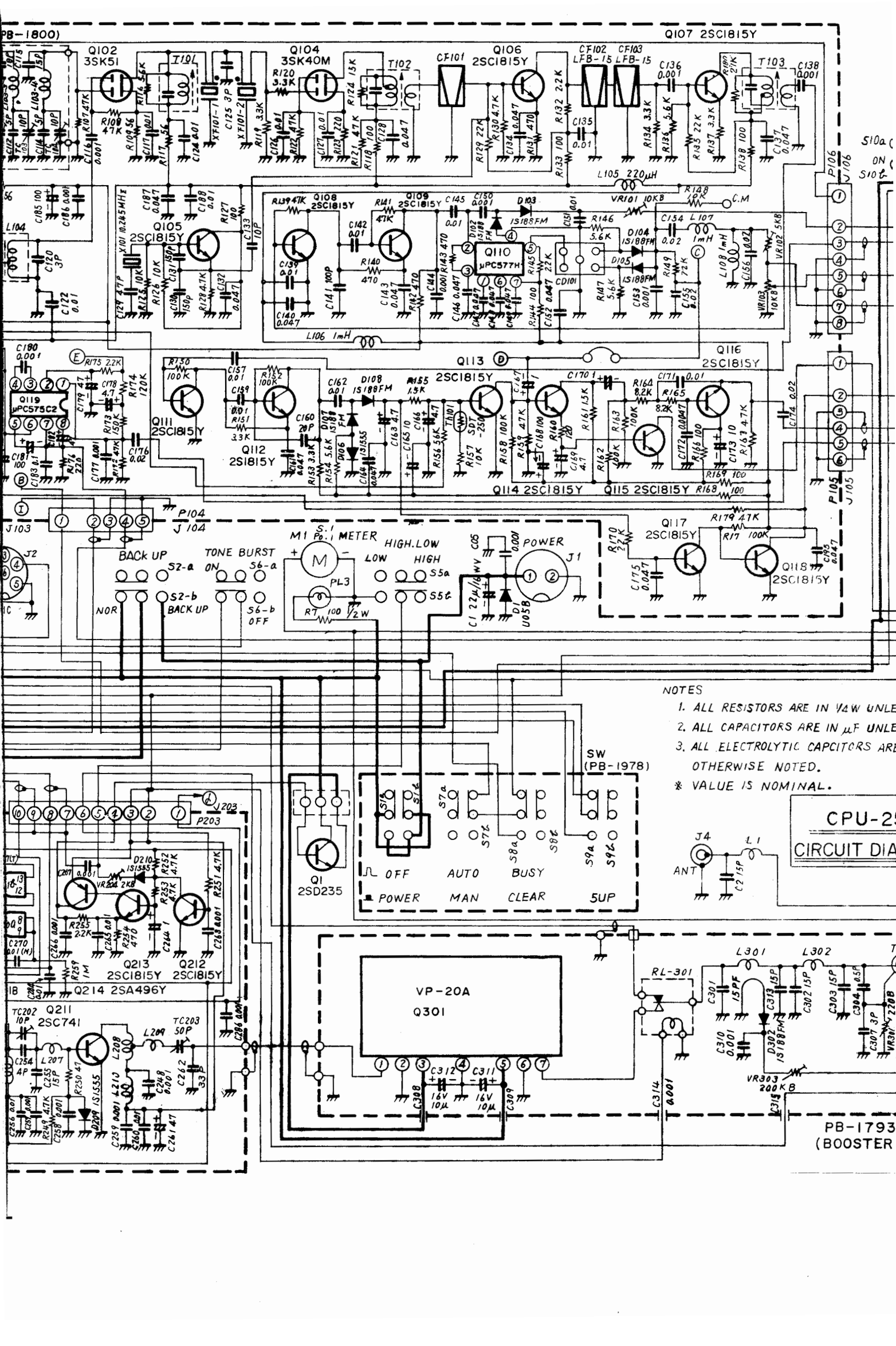
OPTIONAL KEYBOARD MICROPHONE		
Symbol No.	Parts No.	Description
	M3090016	**Microphone Assembly** CPU-2500L with Microphone Hanger, Screws
	P1020149	Microphone Plug P-1620A

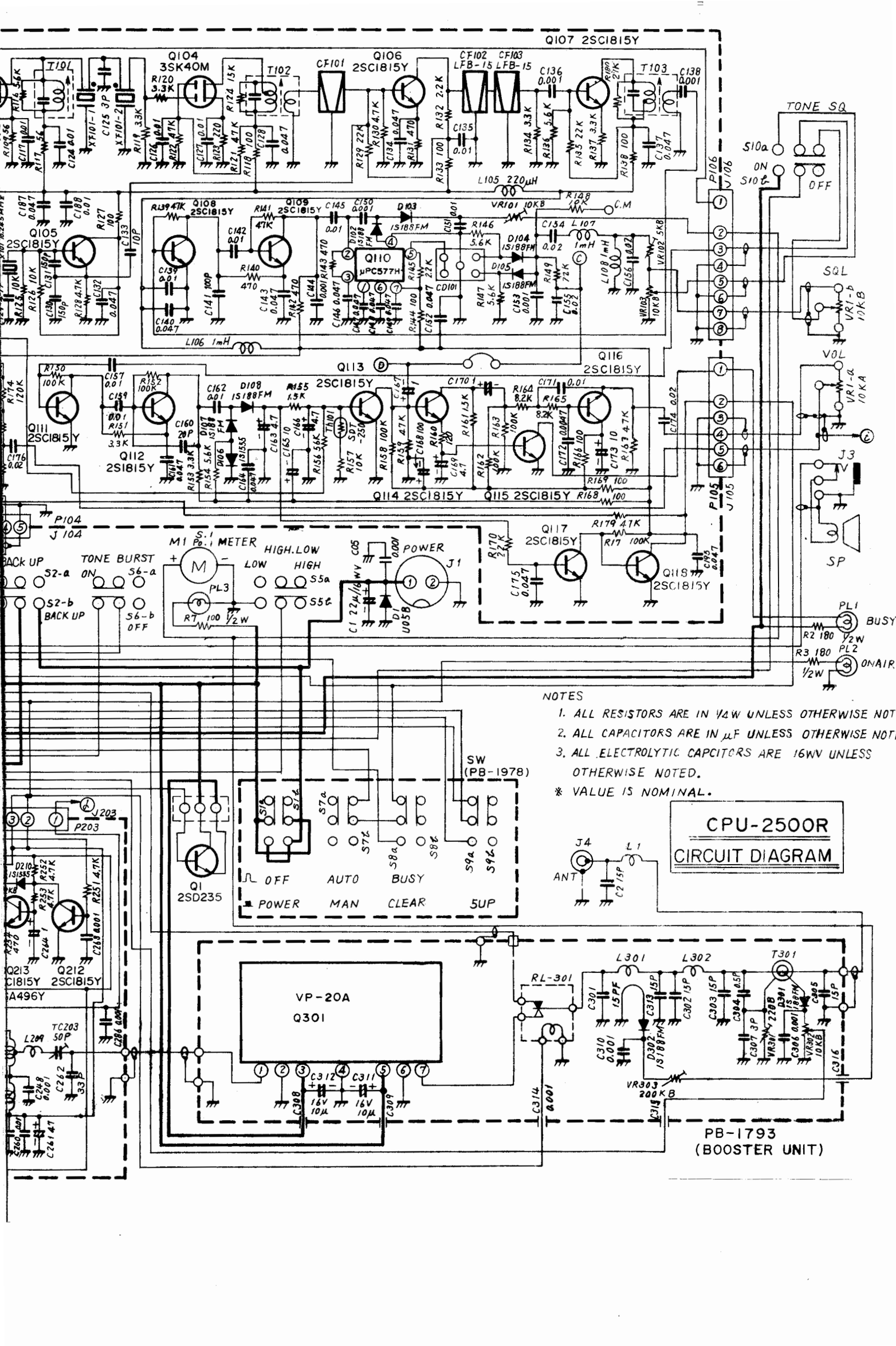
TONE SQUELCH UNIT		
Symbol No.	Parts No.	Description
PB-1555A	F0001555A	Printed Circuit Board
	C0015550	PCB with components
		IC, FET & TRANSISTOR
Q502	G1090154	IC NE567V
Q501	G1090077	" MC3403
Q503	G3800190G	FET 2SK19GR
Q504,505	G3303720Y	Silicon Transistor 2SC372Y
		DIODE
D501,502	G2090042	Zener Diode RD8.2EB
		RESISTOR
R518	J10276151	Carbon Composition 1/2W GK 150Ω
R523	J00245271	Carbon Film 1/4W VJ 270Ω
R517	J00245472	" " " " 4.7kΩ
R513*,524*	J00245822	" " " " 8.2kΩ
R512	J00245103	" " " " 10kΩ
R504	J00245123	" " " " 12kΩ
R510,511,525	J00245223	" " " " 22kΩ
R516*	J00245333	" " " " 33kΩ
R502,508	J00245393	" " " " 39kΩ
R501,505,521, 522	J00245473	" " " " 47kΩ
R506,507	J00245823	" " " " 82kΩ
R509	J00245154	" " " " 150kΩ
R514	J00245274	Carbon Film 1/4W VJ 270kΩ
R503	J00245474	" " " " 470kΩ
R515,519	J00245105	" " " " 1MΩ
		POTENTIOMETER
VR502		TM062P 100kΩ(B)
VR504	J51723102	SR-19R 1kΩ (B)
		CAPACITOR
C503	K50177102	Mylar Film 50WV 0.001μF
C511	K50177222	" " " 0.0022μF
C512	K50177472	" " " 0.0047μF
C506,507,520	K50177103	" " " 0.01μF
C502,504,505, 508	K50177223	" " " 0.022μF
C509	K50177473	" " " 0.047μF
C516*	K50177104	" " " 0.1μF
C523	K70167154	Tantalum 35WV 0.15μF
C518	K70167475	" " 4.7μF
C514,522	K40170105	Electrolytic 50WV 1μF
C501,510,513, 521,524	K40120106	" 16WV 10μF
C515,517,519	K40120226	" " 22μF
	Q50000011	Wrapping Terminal C




PB-1794 (PLL UNIT)
VCO (PB-1830A)
Q401 2SK198L
Q402 2SK19GR
Q404 3SK40M
Q414 2SK30A-Y
Q412 2SK30A-Y
Q410 TC5081P
Q415 2SA564Q
Q416 2SC1815Y
Q417 2SC1815Y
Q413 2SC1000GR
Q408 2SC373
Q409 μPD857C
Q407 2SC1815Y
Q411 2SC535A
D701~D707 5082-7740
J702
PB-1897(MONI.UNIT)
PB-1795 (PLL CONT UNIT)
Q611 4042B
Q612 4556B
Q615 78L05
4410
PB-1792 (TX UNIT)
Q219 2SC1815GR
Q202 2SC1815Y
Q220 2SC1815GR
PB-1848
PB-1849 PHOTO UNIT
Q2 ON1105
Q3 ON1105
Q4 2SC1815Y
Q5 2SC1815Y
FM MOD UNIT
J802
P403
J403
P602
P607
P605
J5
MEMORY SELECT
KEY
RX-M
M1
M2
M3
M4
-600
SIMP
+600
-SFT
+SFT
TX OFF SET
S4-a
S4-b
S3
D2
D3
D4
TP-1
TP-3
X401 10.240 MHz
X601 1MHz


PB-1791 (RX UNIT)
RESON. B (PB-1800)
Q101 3SK51
Q403 3SK40M
Q417 2SC1815Y
Q418 2SC1815Y
Q406 TA7060P
Q407 2SC1815Y
Q405 2SC535A
Q121 78L08 X2
Q122 78L05
Q119 μPC575C2
RL101
CH101
J101 P101
J102 P102
J103 P103
J401 P401
J402 P402
J201 P201
J202 P202
J2
MIC
Q202 2SC1815Y
Q201 2SC1815Y
Q218 2SC1815Y
Q216 2SC1815Y
Q217 MSM5576
Q205 2SC1815Y
Q206 2SK19GR
Q207 2SK19GR
Q208 3SK51
Q210 2SC2053
Q211 2SC741
Q215 MC14011B
FM MOD UNIT
RX ANT
TP-2
TP201
TP202


PB-1800)
Q107 2SC1815Y
Q102 3SK51
Q104 3SK40M
Q106 2SC1815Y
CF101
CF102 LFB-15
CF103 LFB-15
T101
T102
T103
L105 220μH
Q108 2SC1815Y
Q109 2SC1815Y
Q110 μPC577H
Q105 2SC1815Y
L104
L106 1mH
VR101 10KB
C.M
Q113
Q116 2SC1815Y
Q119 μPC575C2
Q111 2SC1815Y
Q112 2SC1815Y
Q114 2SC1815Y
Q115 2SC1815Y
Q117 2SC1815Y
Q118 2SC1815Y
P104 J104
J103
P106 J106
P105 J105
J2
J1
J4
ANT
L1
BACk UP
TONE BURST
ON
S2-a
S2-b
BACK UP
NOR
S6-a
S6-b
OFF
M1 S.I Po.I METER
PL3
HIGH.LOW
LOW
HIGH
S5a
S5b
POWER
D1 U05B
SW (PB-1978)
OFF
AUTO
BUSY
POWER
MAN
CLEAR
5UP
Q1 2SD235
P203 J203
Q213 2SC1815Y
Q212 2SC1815Y
Q214 2SA496Y
Q211 2SC741
VP-20A
Q301
RL-301
L301
L302
L207
L208
L209
L210
PB-1793
(BOOSTER
CPU-2
CIRCUIT DIA
NOTES
1. ALL RESISTORS ARE IN 1/4W UNLE
2. ALL CAPACITORS ARE IN μF UNLE
3. ALL ELECTROLYTIC CAPCITORS ARE
OTHERWISE NOTED.
* VALUE IS NOMINAL.


Q107 2SC1815Y
Q104 3SK40M
Q106 2SC1815Y
CF101
CF102 LFB-15
CF103 LFB-15
T101
T102
T103
L105 220μH
TONE SQ
S10a
S10b
ON
OFF
P106 J106
Q105 2SC1815Y
Q108 2SC1815Y
Q109 2SC1815Y
Q110 μPC577H
D103 1S188FM
D104 1S188FM
D105 1S188FM
VR101 10KB
C.M
L106 1mH
L107 1mH
L108 1mH
SQL
VR1-b 10KB
VOL
VR1-a 10KA
Q113
Q116 2SC1815Y
Q111 2SC1815Y
Q112 2SC1815Y
Q114 2SC1815Y
Q115 2SC1815Y
Q117 2SC1815Y
Q118 2SC1815Y
P105 J105
J3
SP
P104 J104
BACK UP
TONE BURST
S2-a
S2-b
S6-a
S6-b
ON
OFF
M1 METER
S1 Po.1
HIGH.LOW
LOW
HIGH
S5a
S5b
PL3
RT 100 1/2W
POWER
J1
D1 U05B
PL1
BUSY
R2 180 1/2W
PL2
ONAIR
R3 180 1/2W
NOTES
1. ALL RESISTORS ARE IN 1/4W UNLESS OTHERWISE NOT
2. ALL CAPACITORS ARE IN μF UNLESS OTHERWISE NOT
3. ALL ELECTROLYTIC CAPCITORS ARE 16WV UNLESS OTHERWISE NOTED.
* VALUE IS NOMINAL.
CPU-2500R
CIRCUIT DIAGRAM
SW (PB-1978)
OFF
AUTO
BUSY
POWER
MAN
CLEAR
5UP
Q1 2SD235
J4
ANT
L1
C2 15P
P203
J203
Q213 2SC1815Y
Q212 2SC1815Y
2SA496Y
VP-20A
Q301
RL-301
L301
L302
T301
L209
TC203 50P
C262 33P
C314 0.001
C315
VR303 200KB
PB-1793
(BOOSTER UNIT)