50MHz ALL MODE TRANSCEIVER

IC-551

IC-551D

MAINTENANCE MANUAL

ICOM INCORPORATED

TABLE OF CONTENTS

SECTION 1 SPECIFICATIONS

GENERAL

Number of Semi-Conductors	:	Transistors	56 [74]
		FET	13 [17]
		IC (includes CPU)	30 [44]
		Diodes	114 [162]
Frequency Coverage	:	50 ~ 54MHz	
Operationable Temperature	:	−10°C ~ +60°C (14°F ~ 140°F)	
Frequency Stability	:	Less than ±500Hz after switch on 1 min to 60 min, less than 100Hz per 1 hou r after 60 min, and less than ±1KHz in the range of −10°C to +60°C	
Antenna Impedance	:	50 ohms unbalanced	
Power Supply Requirements	:	13.8V DC ±15%, negative ground, or 117V/240V AC ±10%	
		Current drain 18A max. (at 200W input)	
		AC power supply speaker console is available for AC operation.	
Power Consumption (at 13.8V DC)	:	Receive at min. audio level	0.5A
		at max. audio level	0.7A
		Transmit in SSB/CW modes	3.3A [15A]
		in AM mode	3.0A [8A]
		in FM mode*	3.3A [15A]
Dimensions	:	111mm(H) x 241mm(W) x 311mm(D)	
Weight	:	6.1kg [6.6kg]	

TRANSMITTER

Emission Modes	:	A3J	SSB (USB/LSB)		
		A1	CW		
		A3H	AM		
		F3*	FM		
RF Output Power	:	SSB	10W PEP	(1 ~ 10W adjustable)	[80W PEP (1 ~ 80W adjustable)]
		CW	10W	(1 ~ 10W adjustable)	[80W (1 ~ 80W adjustable)]
		AM	4W	(0 ~ 4W adjustable)	[40W (0 ~ 40W adjustable)]
		FM*	10W	(1 ~ 10W adjustable)	[80W (1 ~ 80W adjustable)]
Modulation System	:	SSB/AM	Balanced modulation		
		FM*	Variable reactance frequency modulation		
Max. Frequency Deviation*	:	±5KHz			
Spurious Emission	:	More than 60dB below peak power output			
SSB Carrier Suppression	:	More than 40dB below peak power output			
SSB/AM Unwanted Sideband	:	More than 40dB down at 1000Hz AF input			
Microphone	:	600 ohm dynamic or electret condenser microphone			

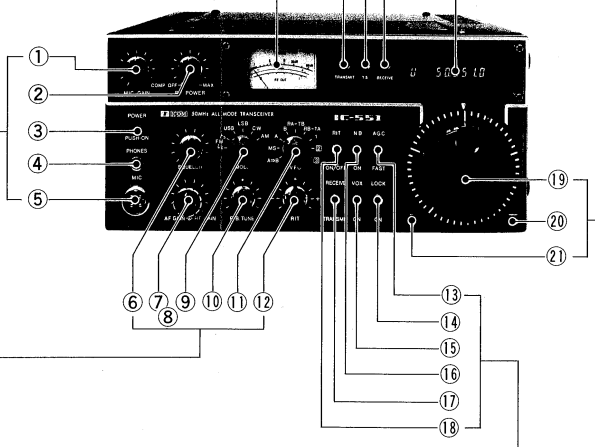
RECEIVER

Receiving Mode	:	A1 (CW), A3J (USB, LSB), A3H (AM), F3 (FM)*	
Receiving System	:	SSB/CW/AM	Single Superheterodyne (Triple Superheterodyne when Pass Band Tuning unit is installed or IC-551D)
		FM*	Double Superheterodyne
Intermediate Frequency	:	SSB/CW/AM	9.0115MHz (When Pass Band Tuning Unit is installed, or IC-551D: 2nd IF: 10.75MHz, 3rd IF: 9.0115MHz)
		FM*	1st IF: 9.0115MHz, 2nd IF: 455KHz
Sensitivity	:	SSB/CW/AM	Less than 0.5μV for 10dB S+N/N
		FM*	More than 30dB S+N+D/N+D at 1μV
Spurious Response Rejection Ratio	:	More than 60dB	
Selectivity	:	SSB/CW/AM	More than ±1.1KHz at −6dB Less than ±2.2KHz at −60dB (When Pass Band Tuning Unit is installed, or IC-551D: less than 1KHz at −6dB)
		FM*	More than ±7.5KHz at −6dB Less than ±15KHz at −60dB
Squelch Sensitivity	:	SSB/CW/AM	1μV
		FM*	0.4μV
Audio Output Power	:	More than 2 watts	
Audio Output Impedance	:	8 ohms	

*Only when FM Unit is installed.

[ ]: Value for IC-551D

2-1 FRONT PANEL



①MIC GAIN CONTROL
Adjusts the level of modulation according to the input of the microphone. Clockwise rotation increases microphone gain.

②RF POWER CONTROL
Adjusts the RF output power to between 1 and 10 [80] watts in FM, SSB and CW, and between 0 and 4 [40] watts in AM.
In the COMP OFF, the RF output power is the maximum for each mode.

③POWER SWITCH

④PHONES JACK
Accepts a standard 1/4-inch headphone plug for a 4 ~ 16 ohm headphone set.

⑤MIC CONNECTOR
Connect the supplied microphone or optional microphone to this jack. The IC-SM2 stand-type Electret microphone or the IC-HM5 noise cancelling microphone can also be used.

⑥SQUELCH CONTROL
Sets the squelch threshold level.

⑦AF GAIN CONTROL
Controls the audio output level in the receive mode.

⑧RF GAIN CONTROL
Controls the gain of the RF section in the receive mode.

⑨MODE SELECT SWITCH
Selects the mode of operation for both transmit and receive. The initial letter of each mode is displayed on the frequency display.

⑩PASS BAND TUNING CONTROL
This control allows continuous setting of the pass band selectivity, moving the edge of the filter up to approximately 1KHz/—6dB from either the upper or lower side in all modes except the FM mode. (This function is available only when the optional Pass Band Tuning unit is installed in the IC-551.)

⑪VFO SWITCH
Selects an operating VFO from "A" VFO and "B" VFO, and selects the other various operations.

⑫RIT CONTROL
Shifts the receiver frequency ±800Hz either side of the transmit frequency.

⑬AGC SWITCH
Selects the time constant of the AGC circuit.

⑭DIAL LOCK SWITCH
Inactivates the operation of the Tuning Knob. The VFO is electronically locked at the displayed frequency.

⑮VOX SWITCH
Switches the VOX circuit ON and OFF. In SSB, T/R switching is accomplished by means of a voice signal. In CW operation, semi-break-in switching by means of keying is possible. (This function is available only when the optional VOX unit is installed in the IC-551.)

⑯NOISE BLANKER SWITCH
When noise is present, set this switch to the ON position

⑰TRANSMIT/RECEIVE (T/R) SWITCH
This switch is for manually switching from transmit to receive and vice versa. When switching with the PTT switch on the microphone or with the VOX switch set to ON, the T/R switch must be in the RECEIVE position.

⑱RIT SWITCH
This is a spring-loaded switch for the RIT Control. To turn ON the RIT, push down once. To turn OFF, push down again.

⑲TUNING CONTROL KNOB
The frequency is changed in 100Hz steps (all modes except FM) and 10KHz steps (FM mode) When the TUNING SPEED Button is pushed, the frequency is changed in 1KHz steps, in all modes including FM.

⑳MS/MW BUTTON
Three functions are provided by pushing the MS/MW Button. Writing a frequency into Memory Channel 1, [2], or [3]. Starting the "A" and "B" scans and Memory Scan. Stopping any of the scan functions.

㉑TUNING SPEED (TS) BUTTON
Pushing the TUNING SPEED Button, the operating frequency is changed 1KHz steps in any mode. At the same time, the 100Hz digit is cleared on the display to show "0" in the last digit.

㉒MULTI-FUNCTION METER
This meter functions as a relative RF output meter in transmit mode, and as an S-meter in receive mode, at the FM-c, the meter functions as a discriminator meter.

㉓TRANSMIT INDICATOR LED
When your set is in the transmit mode, this LED is lit.

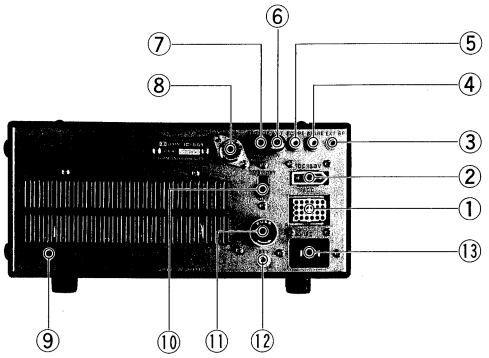
㉔TUNING SPEED (TS) INDICATOR LED
Illuminates when the TUNING SPEED Button is pressed to set the dial to 1KHz-step tuning.

㉕RECEIVE INDICATOR LED
Illuminates when the squelch is opened in the receive mode.

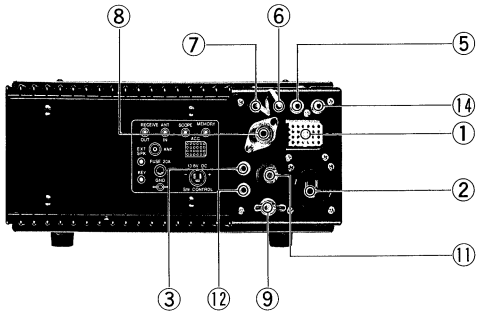
㉖FREQUENCY DISPLAY
The operating frequency and the initial letter of the operating mode are displayed on a luminescent display tube.

2 - 2 REAR PANEL

IC-551

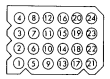


IC-551D



① **ACCESSORY (ACC) SOCKET**
Various functions are available through the accessory socket. The table below shows those terminals.

ACC SOCKET CONNECTIONS



PIN No.	FUNCTION
1.	Output from squelch control stage. (+7V when squelch is ON)
2.	13.8 Volts DC in conjunction with the power switch operation.
3.	Connected to Push-to-talk, T/R change-over switch. When grounded, the set operates in the transmit mode.
4.	Output from the receive detector stage. Fixed output regardless of AF output or AF gain.
5.	Output from Transmitter MIC amplifier stage.
6.	8 Volts DC available when transmitting. (relay can not be directly actuated. Max. 5mA.)
7.	Input for external ALC voltage.
8.	Ground
9.~24.	NC (no connection).

② **DC POWER SOCKET**
Connect the included DC power cable when DC operation. (IC-551D: Connect the DC power cord or cable from the IC-PS20.)

③ **EXTERNAL SPEAKER JACK**
When an external speaker is used, connect it to this jack. Use a speaker with an impedance of 8 ohms.

④ **SPARE TERMINAL (IC-551 only)**
This terminal is available for your personal use.

⑤ **SCOPE TERMINAL**
This terminal brings out the 9.0115MHz IF signal from the mixer in the receiver.

⑥ **RECEIVER INPUT TERMINAL**
This is an input terminal which is connected directly to the receiver.

⑦ **RECEIVER ANTENNA OUTPUT TERMINAL**
This is a terminal to which received signals from the antenna connector are conducted after the signal passes through the transmit/receive antenna switching circuit. Usually the receiver IN and OUT terminals are connected with a jumper cable.

⑧ **ANTENNA (ANT) CONNECTOR**
This is used to connect the antenna to the set. Its impedance is 50 ohms and connects with a PL-259 connector.

⑨ **GROUND TERMINAL**
To prevent electrical shock, TVI, BCI and other problems, be sure to ground the equipment through the GROUND TERMINAL.

⑩ **MEMORY SWITCH (IC-551 only)**
When this switch is in the ON (up) position, the power to the CPU is supplied, even when the POWER Switch is turned OFF, to retain all the programmed frequencies.

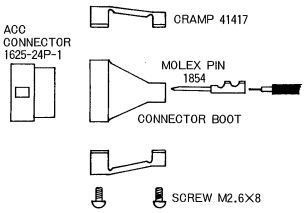
⑪ **FUSE HOLDER**
This holds the fuse for the AC power circuit, (2 Amp for 117V/1 Amp for 240V).
(IC-551D: This holds the fuse for the DC power circuit (20 Amp).)
Open the fuse holder with a Phillips screwdriver.

⑫ **KEY JACK**
For CW operation, connect the key here.

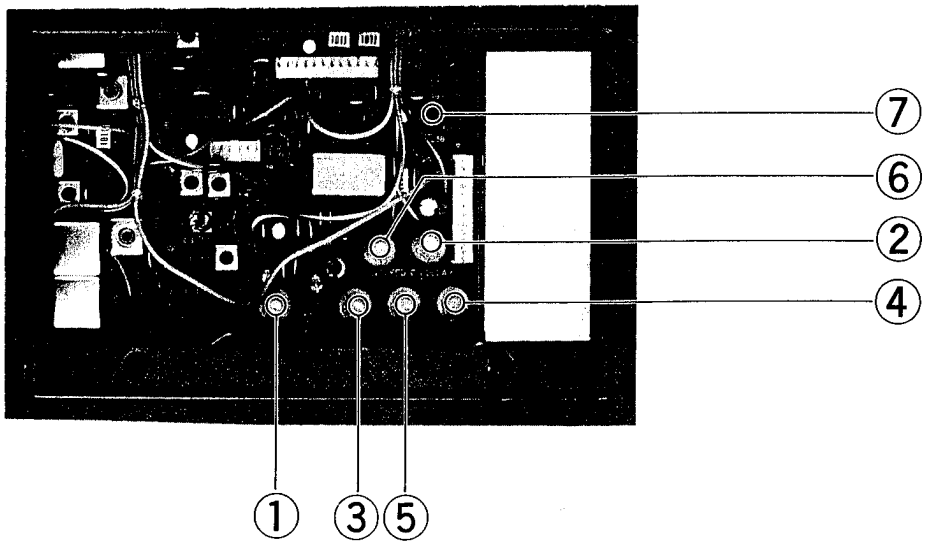
⑬ **AC POWER SOCKET (IC-551 only)**
Connect the included AC power cable to this connector and the included jumper plug to the DC power connector for AC operation.

⑭ **MEMORY POWER TERMINAL (IC-551D only)**
When a memory power source is connected to this terminal, the power to the CPU is supplied, even when the POWER Switch is turned OFF, to retain all the programmed frequencies.

Plug parts for the Accessory Socket



2-3 CONTROLS UNDER THE ACCESS COVER



① **CW MONI (MONITOR) CONTROL (R172)**
This control adjusts the audio volume of the side tone (monitor) audio during CW transmit operation. Adjust it to your desired level for easy listening.

② **CW DELAY (CW TIME DELAY CONSTANT) CONTROL (R137)**
In semi-break-in CW operation, this controls the transmit/receive switch-over time delay. Adjust it to suit your keying speed.

③ **ANTI-VOX CONTROL (R138)**
In VOX operation, the VOX circuit may be operated by sound from the speaker, causing a switch to the transmit mode. This can be prevented by adjusting the input level of the ANTI-VOX circuit with this control along with the VOX gain control so that the VOX circuit operates only from the operator's voice, not by sound from the speaker.

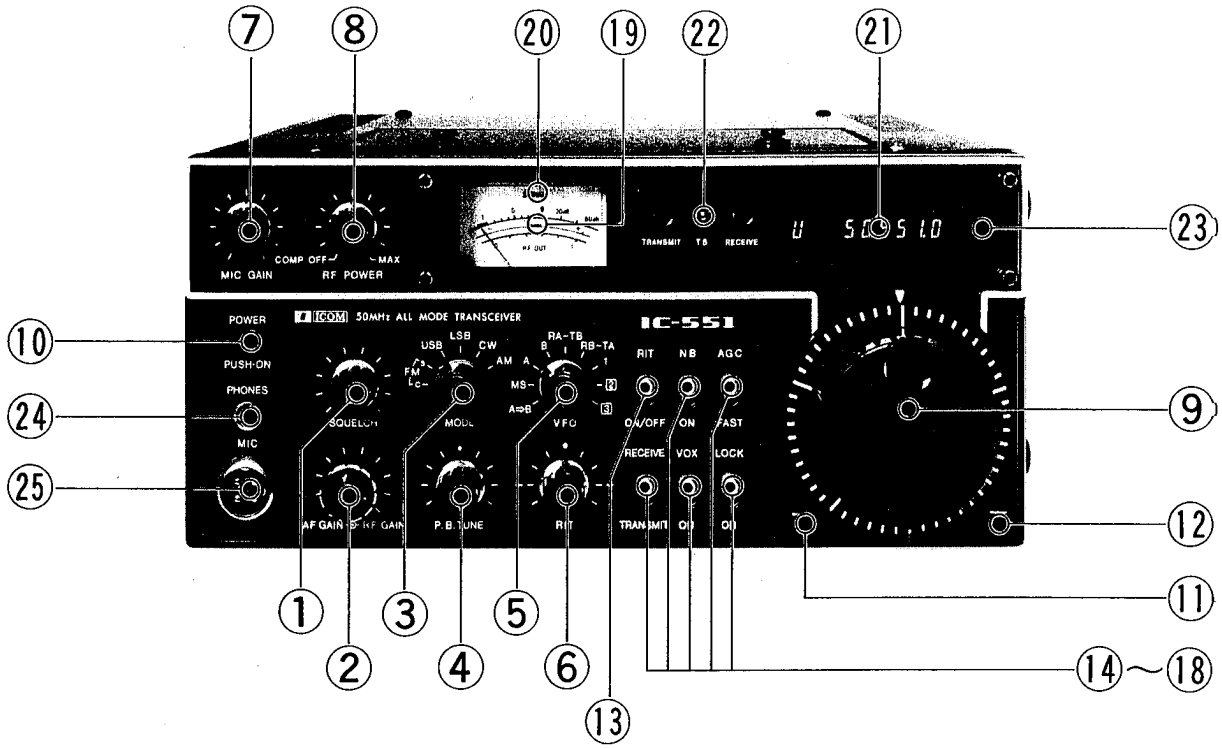
④ **VOX DELAY (VOX TIME CONSTANT) CONTROL (R140)**
This controls the transmit-to-receive switching time. Adjust it so switching will not occur during short pauses in normal speech.

⑤ **VOX GAIN CONTROL (R152)**
This control adjusts the input signal level via the microphone to the VOX circuit. For VOX operation, adjust the control so that the VOX circuit will operate with normal speech.

⑥ **SCAN SPEED CONTROL (R203)**
This controls the scanning speed in Programmed Scan "A" and "B". Adjust the control to desired scanning speed.

⑦ **FAN SWITCH (IC-551D only)**
This switches the function of cooling fan in the PA unit. In the "FAN" position, the fan turns in the transmit mode only. In the "R-ON" position, the fan turns in either the transmit mode or the receive mode.

2-4 FRONT PANEL PARTS LIST

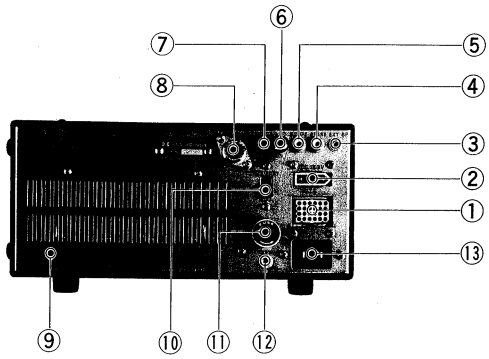


No	NAME	DESCRIPTION	PARTS No.
①	SQUELCH	KNOB N-22	41012
		VOLUME GM10A 10KB 500B	
②	AF·RF·GAIN	KNOB AF N-28 RF N-29	41190 41191
		VOLUME DM10A 10KA 10KB	
③	MODE SW.	KNOB N-24	41077
		ROTARY SW. SRN 3066N	
④	P·B·TUNE	KNOB N-22	41012
		VOLUME VM10A 10KB	
⑤	VFO SW	KNOB N-24	41077
		ROTARY SW. SRN 2029N	
⑥	RIT VOL.	KNOB N-22	41012
		VOLUME VM10A 10KB	
⑦	MIC. GAIN	KNOB N-25	41081
		VOLUME VM10A 10KB	
⑧	RF POW.	KNOB N-25	41081
		VOLUME VM11A5M1222 10KB	
⑨	TUNING	KNOB N-23	41076
⑩	POWER SW.	PUSH BUTTON	41013
		PUSH SWITCH Y1-5974	

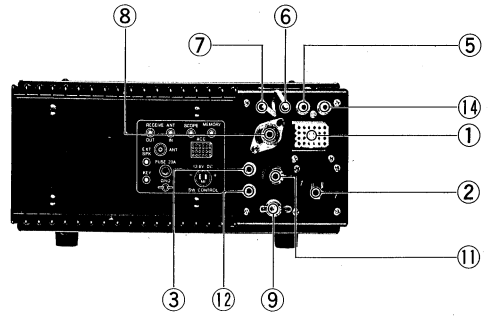
No	NAME	DESCRIPTION	PARTS No.
⑪	TUNING SPEED	PUSH BUTTON	41013
		PUSH BUTTON SPRING	40998
		PUSH BUTTON SHAFT	41073
⑫	MS/MW BUTTON	SW. PLATE	41071
		SW. CONTACT	41072
		PC BOARD B-202A	
⑬	RIT SW.	SNAP SW. SLC-22C	
		SPRING	41110
⑭ ∫ ⑱	NB, AGC, T/R, VOX, LOCK	SNAP SW SLC-22C	
⑲	MULTI-METER	METER YN-45-1	
⑳	PILOT LAMP	LAMP BQ044-32582A	
㉑	DISPLAY	FIP LD8231	
㉒	INDICATOR	LED SLP-119B	
㉓	WINDOW GLASS		41059
㉔	PHONES JACK	PHONEJK LJ-635-1-2	
㉕	MIC. CONNECTOR	CONNECTOR 4P BASE	

2-5 REAR PANEL PARTS LIST

IC-551



IC-551D



REAR PANEL PARTS LIST

No	NAME	DESCRIPTION	REMARKS
①	ACC SOCKET	CONNECTOR 1625-24R	
②	DC POWER	DC JACK 1490-4P	551
	SOCKET	CONNECTOR 206036-2	551D
③	EXT SP	SP JACK SJ-296	
④	SPARE	PIN JACK CN-3561S	
⑤	SCOPE	PIN JACK CN-3561S	
⑥	RX ANT. IN	PIN JACK CN-3561S	
⑦	RX ANT. OUT	PIN JACK CN-3561S	
⑧	ANT. CONNECTOR	FM-MDRmi	
⑨	GROUND TERMINAL	SCREW M5×16	
		WING NUT M5	
		LOCK NUT M3	
		WASHER M5×2	
		S WASHER M5	
		VIBRATION WASHER M5	
⑩	MEMORY SW	SLIDE SW. S-1	551
⑪	FUSE HOLDER	FH-032	551
		S-N-2054	551D
⑫	KEY JACK	KEY JACK SJ-296	
⑬	AC POWER SOCKET	AC JACK CM3	551
⑭	MEMORY TERMINAL	CONNECTOR CN-3561S	551D

2-6 ACCESSORIES

IC-551

NAME	DESCRIPTION	QTY
MICROPHONE	IC-HM 3	1
PLUG	SP. PLUG, KEY PLUG	2
PIN PLUG	CN3561P	4
FUSE	5A(DC)	2
	2A(AC)	2
DC POWER CABLE KIT	CONNECTOR 1490-4R	1
	COVER SB-0315R	1
	FUSE HOLDER SL-9011	2
	FUSE 5A	2
	WIRE(1) (2)	1
AC POWER CORD	2P SOCKET PLUG	1
JUMPER PLUG	CONNECTOR 1490-4R	1
	WIRE(3)	1

IC-551D

NAME	DESCRIPTION	QTY
MICROPHONE	IC-HM 3	1
PLUG	SP. PLUG, KEY PLUG	2
PIN PLUG	CN 3561P	2
FUSE	20A	2
DC POWER CABLE KIT	WIRE RED / WIRE BLACK 3m	1
	CONNECTOR 206037-2	1
	PIN 66258-1	2
	COVER 41296	1

SECTION 3 CIRCUIT DESCRIPTION

3-1 OUTLINE

The IC-551D employs a digital phase locked loop (PLL) circuit as the local oscillator for both transmit and receive. The output of the PLL circuit is approximately 9MHz below the receive frequency, thereby spurious is kept to a minimum.

The operating frequency is controlled by pulse signals, generated by the optical chopper circuit located at the tuning knob, being added to or subtracted from the preset frequencies in the microcomputer.

The microcomputer controls the PLL circuit which determines the output frequency of the VCO (Voltage Controlled Oscillator).

In the receiver section, signals from the antenna are mixed with the local oscillator output from the PLL circuit. The circuits function as a triple-conversion type with a 9MHz IF in the SSB, CW, and AM modes with the Pass Band Tuning unit, and as a dual-conversion type with an additional 455KHz IF in the FM mode.

The IF signals are amplified, then detected to become audio signals, amplified again and sent to the speaker.

In the USB and LSB modes, the transmitter uses a carrier of 9.010MHz for USB and 9.013MHz for LSB. The carrier and the voice signal are sent to a balanced modulator where the DSB suppressed carrier signal is generated. The unwanted sideband is removed by a crystal filter, and an SSB signal of 9.0115MHz is obtained.

The Pass Band Tuning unit acts as a low distortion RF speech processor. This enables greater talk power and better results in DX operation.

In the CW mode, the set uses the carrier for USB which is shifted about +500Hz. This carrier is fed to the transmit mixer directly.

In the AM mode, the set uses the carrier for USB. The same 9.0115MHz SSB signal as for USB and a part of the carrier signal is fed to the transmit mixer, and an AM (A3H, single side band with full carrier) signal is obtained.

In the FM mode, the set uses another crystal oscillator to produce the 9.0115MHz signals which are direct-frequency modulated. (Only when the optional FM unit is installed.)

The SSB, CW, AM or FM signal is mixed with the local oscillator output from the PLL circuit, which is the same as that of the receiver section, and then amplified, filtered, and sent to the antenna.

3-2 RECEIVER CIRCUITS

ANTENNA SWITCHING CIRCUIT

Signals from the antenna connector are fed to the two-stage helical cavity filter L29 and L30, through T/R relay RL1 which are turned ON in the transmit mode, and through J3 the receiver antenna output terminal and J4 the receiver input terminal.

RF CIRCUIT

Filtered signals from the double-helical cavity filter, which reduces interference and intermodulation from other radio signals or nearby signals, are fed to the bridge attenuator consisting of L28, D23, C95 and C96. RF gain control and AGC voltage are added to diode D23, which changes the balance of the bridge to control the input signal level. Signals then are amplified by the low-noise, wide dynamic range FET Q19 and then sent to the gate of the first mixer Q18 through the two- stage band-pass filter L26 and L27. To the source of the high quality FET mixer Q18, a 40MHz signal is supplied from the PLL unit through D22. The 9.0115MHz signals are taken from Q18 and tuned by L25 and C89.

IF CIRCUIT

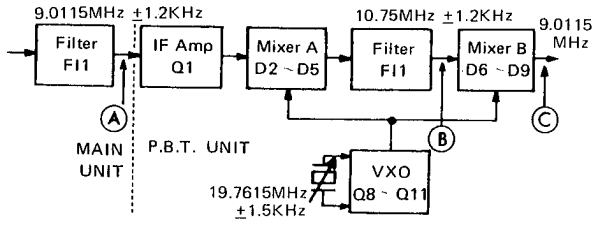
9.0115MHz 1st IF signals from the drain of Q18 are fed to the 1st gate of the dual gate MOS FET Q16, through monolithic crystal filter FI2 and the impedance-matching coil L22. AGC voltage is supplied to the 2nd gate of Q16 to improve the receiving characteristics.

The output signals from Q18 are also fed to the external scope terminal through the source follower Q17. Signals amplified by Q16 are fed through L21, L20 and D21 to the FM Unit through D14 in the FM mode, and to the high-selectivity 4-stage monolithic crystal filter FI1 through D13 in the SSB, CW and AM modes. In the SSB, CW and AM modes, D10 and D11 are turned ON and the signals are fed to the source follower Q11. These output signals are fed to the Pass Band Tuning circuit through J3 and P1 of the unit.

PASS BAND TUNING CIRCUIT

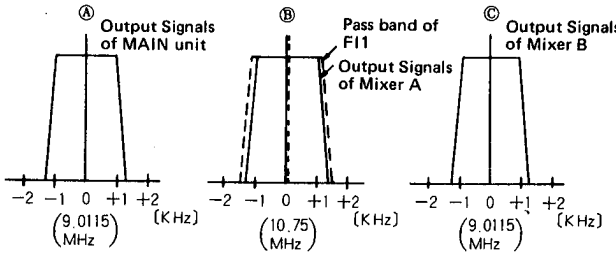
A VXO circuit composed of Q8 ~ Q11, X1 and D16 in the P.B.T. unit. The bias voltage of D16 is changed by turning the Pass Band Tuning control, located on the front panel, which varies the VXO frequency (19.7615MHz) by ±1.5 KHz. The signals from P1 are fed to Q1 through D18, D1 and L1. The amplified signals are fed to the balanced mixer, D2 ~ D5, where the 9.0115MHz signal is mixed with the 19.7615MHz VXO signal. From the balanced mixer, the resultant 10.750MHz signal is fed through FI1, a high-selectivity 4-stage monolithic crystal filter having a center frequency of 10.750MHz and a band width of ±1.2KHz. This 10.750MHz signal is then again mixed with the VXO frequency, to result in the original 9.0115MHz signal to be fed to the IF amplifier circuit.

These diagrams will explain the operation of the Pass Band Tuning in more detail.



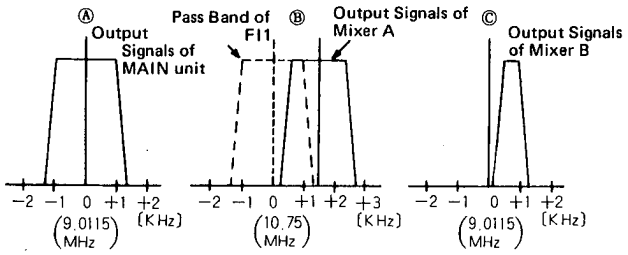
In the diagrams, "A" represents the 10.750MHz signals that are result of mixing of the 9.0115MHz input signals with the 19.7615MHz VXO signal in the Mixer A. These 10.750 MHz signals are represented by the solid line. The dotted line represents the pass band of the crystal filter, FI1 in the P.B.T. unit. With the Pass Band Tuning control in the center position, signals between 9.0127MHz and 9.0103 MHz (9.0115 ± 1.2KHz), when mixed with the VXO center frequency (19.7615MHz) result in signals of 10.7512MHz to 10.7488MHz (10.750MHz± 1.2KHz), all signals will pass through the filter.

A : P.B. TUNE centered



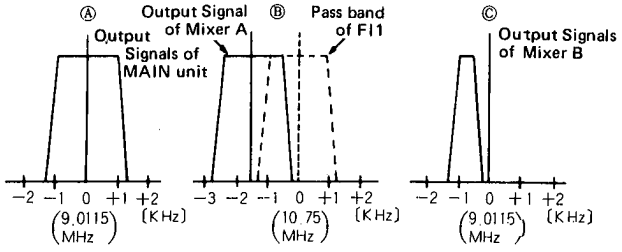
Turning the Pass Band Tuning control fully clockwise, the VXO frequency will become 19.7630MHz (19.7615+1.5 KHz). When mixed with the incoming 9.0115MHz signals, the resultant frequencies become 10.7503MHz to 10.7525MHz. Since the upper frequency pass band limit of the filter is 10.7512MHz, not all the signals will be passed by the filter. Only the signals between 10.7503MHz and 10.7512MHz, the upper limit, will be passed. As you can see, the pass band has been narrowed to 900Hz to one side of the center frequency of the filter. Therefore, all signals outside the 10.7503MHz to 10.7512MHz range will not pass through the filter.

B : P.B. TUNE fully clockwise



By turning the Pass Band Tuning control in the fully counterclockwise position, the VXO frequency becomes 19.760MHz. The 10.750MHz signals from the mixer A will be from 10.7497MHz to 10.7473MHz. Again with the 10.7512MHz to 10.7448MHz pass band width of the filter, not all signals will be passed. Only those between 10.749 MHz to 10.7488MHz will be passed. Again, the pass band has been narrowed to 900Hz and offset to the opposite side of the center frequency of the crystal filter.

C . P.B. TUNE fully counterclockwise



The signal which has passed through the pass band tuning circuits is amplified by a three-stage amplifier consisting of dual-gate MOS FET's Q2, Q3 and Q4. These amplifiers provide high gain and high stability, and the IF coils L9, L10 and L11 reject interference from outside the IF pass band and other wide-range noise. AGC voltage is supplied to the 2nd gate of the amplifiers for a wide AGC range.

IF signals amplified by Q2, Q3 and Q4 are rectified by the double voltage rectifier D10 and D11 and filtered by C18. This DC voltage is fed to the differential amplifier Q5 and then amplified by Q6 before being supplied as the AGC voltage. This AGC voltage is also fed to Q16 and the attenuator D23 on the main unit.

The amplified IF signal is then sent to the detector circuit.

SSB, CW, AM DETECTOR CIRCUIT

Signal from the IF amplifiers is fed to Pin 5 of the balanced modulator, IC3, through P1 of P.B.T. unit, J3 and C185. BFO signal is supplied to Pin 7 and the audio output signal appears at Pin 3.

BFO CIRCUIT

The BFO circuit consists of an oscillator Q20, a buffer Q21 and crystal X1. To shift the oscillating frequency according to the operating mode, the total inductance of L31, L32 and L33 is changed by supplying a voltage to an anode of the switching diodes D24, D25 and D26, depending on the operating mode.

AF CIRCUIT

Demodulated signals from IC3 are fed from Pin 3 of IC3 to Pin 2 of the AF amplifier IC1 through C152, R164 and R115. The level of the output signals from IC1 is controlled by the AF GAIN control variable resistor on the front panel and then fed to Pin 1 of the AF amplifier IC4 to obtain enough power to drive the speaker.

In the transmit mode, Pin 1 of IC4 is shunted through R156 by turning ON Q33. In the SSB and AM modes, while transmitting, +9V is supplied to Pin 2 of IC4 to

control the amplification by changing the bias voltage.

NOISE BLANKER CIRCUIT

Signals amplified by the IF amplifier Q16 are coupled by C92. Noise signals are amplified by IC2 and rectified by D19. A part of the rectified signals is integrated by C67 and R63, then amplified by Q14 and Q15, and supplied to IC2 as its AGC voltage. The other part of the rectified signals is fed to Q13, which is a Darlington transistor with a large DC gain. The emitter of Q13 is at the ground level when the noise blanker is turned ON.

When a pulse noise is received the positive part of the pulse turns ON Q13 and Pin 1 of IC8 is grounded through Q13. This acts as a trigger for the monostable multivibrator, IC8. IC8 generates a negative pulse which depends on the time constant of C63 and R71. D20 and D21 are biased by the negative pulse so that the pulse signal (noise) cannot go through L20. C78 and the capacitance caused by turning OFF D21 functions as an attenuator to improve the isolation when noise is received.

3-3 TRANSMITTER CIRCUITS

MICROPHONE AMPLIFIER AND LIMITER CIRCUIT

Audio signals from the microphone are fed to Pin 6 of the audio amplifier IC5/2. Amplified signals appear at Pin 7 and are sent through C172 and J4 to the MIC GAIN control variable resistor on the front panel. Adjusted signals are fed to Pin 2 of IC5/1 through C171, D45 and C170 in the FM mode, as D45 is turned ON by the voltage supplied through R188, and through C171, D44, C169 and R184 in the SSB and AM modes, as D44 is turned ON by the voltage supplied through R187. IC5/1 functions as a limiter amplifier in the FM mode. In the SSB and AM modes, since the input level is approximately 10dB lower than in the FM mode, because of R184, IC5/1 functions as a normal amplifier.

BALANCED MODULATOR CIRCUIT

In the SSB and AM modes, the amplified audio signals from Pin 1 of the audio amplifier IC5/1 are fed to Pin 5 of the balanced modulator IC3 (same as the receiver detector), through C164 and R182 level adjust trimmer. The BFO signal is fed to Pin 7, resulting in a 9.0115MHz suppressed carrier double side band signal brought out from Pin 3.

In the CW mode, a voltage is applied to D17 and D16 through D51, then D17 and D16 are turned ON, therefore the BFO signal from Pin 7 of the IC3 is fed to the transmit mixer circuit.

The keying control is done by stopping the oscillation of the BFO. During key up, a voltage is applied to the source of Q20, BFO oscillator, through R128, R127 and D30. Thus the BFO oscillation is stopped, and therefore no RF output. During key down, the applied voltage is shunted to ground through D29, thus the source voltage of Q20 becomes normal and the BFO starts oscillating.

TRANSMIT IF AMPLIFIER CIRCUIT

When the RF POWER CONTROL is in COMP OFF position, DSB signals which appear at Pin 3 of IC3, are fed to the gate of Q12 through D17, D27, D19 and D20 on the Pass Band Tuning unit. The DSB signals are amplified by Q12, and then fed to FI1 through the switching diodes D9 and D11. DSB signals are converted to SSB signals by the filter and sent to the transmit mixer circuit through D13, R61 and D8. In the AM mode, BFO signals from Pin 7 of the balanced modulator IC3 are fed through C69, R66, D16, D17 and D8 to the output of FI1 and mixed with SSB signals to generate AM (A3H) signals.

When the RF POWER CONTROL is turned clockwise to turn ON the speech processor circuit, the DSB signals are fed to the 1st gate of Q1 on the Pass Band Tuning unit through D17, D27 and D1. This DSB signals are amplified by Q1 and fed to the balanced mixer consisting of D2 ~ D5, where it is mixed with the VXO output frequency of 19.7615MHz. It passes through the crystal filter FI1 and becomes an SSB signal of 10.750MHz. This signal is mixed with the VXO output at another mixer consisting of D6 ~ D9 again to become an SSB signal of 9.0115MHz, amplified by Q2, Q3 and Q15, and passed to D25 and D26. D25 and D26 are the limiting circuit, and it clips signals above a fixed level.

Q14 is the clip level control circuit. The clipping current of D25 is applied to Q14's base, and amplified the voltage of Q2's 2nd gate is controlled by Q14's output, and controls Q2's gain and fixes the clip level. The clip level is adjustable with R63 and the output level is adjustable with R65. Some splatter is included in the output signal which has passed through the limiter circuit, but this is completely removed by the crystal filter FI1 on the MAIN unit, and the final signal is a clean and powerful SSB signal.

TRANSMIT MIXER CIRCUIT

High quality FET's Q6 and Q7, and coils L17 and L18 work as a double-balanced mixer to provide low spurious generation and excellent mixer characteristics. The local oscillator signals are supplied to L18 through D7 from the PLL circuit and mixed with the AM, SSB or CW signals fed through D8 from FI1. Both added and subtracted frequencies are generated by this mixer, but only the signals of the added frequency are filtered through the transmit band-pass filter L15 and L16.

BUFFER AMPLIFIER CIRCUIT

The filtered 50MHz signals, supplied to the first gate of the dual-gate FET Q5, are amplified to approximately 10mW PEP. The second gate is controlled by the ALC in the SSB mode and by the APC in the FM mode. The output of this buffer amplifier is sent through the transmit band-pass filter L13 and L14 to the other buffer amplifier Q4, whose output level is approximately 200mW PEP. L11 and C35 work as a trap for the local oscillator signals.

DRIVER CIRCUIT

The output signals of Q4 are amplified by Q3 up to approxi-

mately 1.5W PEP. D5, which is connected to the base circuit of Q3, is for temperature compensation to stabilize the bias voltage. The idling current is controlled by R15 to eliminate cross-over distortion.

The signals from Q3 are amplified by Q2 to obtain 10W PEP. The heat from Q2 is transmitted to the diecast chassis which radiates the heat very efficiently. D4 is for the bias voltage stabilization, and the idling current is controlled by R9. The output signals of Q2 are tuned by C10 and fed to the PA unit through J9 and P1 of the PA unit.

POWER AMPLIFIER CIRCUIT

The 10 Watt signal from the exciter stage is amplified class B push-pull in the final amplifier stage transistors, Q1 and Q2 of the PA unit to a level of about 80 Watts. Bias voltage is treated by D1, D2 and Q3. The junction voltage of D1 and D2 is amplified by Q3 and applied to the bases of Q1 and Q2, from the emitter of Q3, for the bias voltage.

The thermo-switch is set at near the PA transistors, and the thermo-switch is turned ON when the temperature of the PA transistors is over 80°C and the buzzer beeps for warning to stop transmitting.

The PA unit has the cooling fan to increase the efficiency of the heatsink. The cooling fan is selectable to turn in the transmit mode only or to turn in either the transmit mode or the receive mode.

The 80 Watt signal is fed to the filter circuit.

LOW-PASS FILTER CIRCUIT

The PA output is fed to two section low-pass filters which serve to attenuate harmonics by more than 60dB in order to get a pure transmit output. This signal is fed to the ANTENNA connector through contacts of the T/R relay which is made in the transmit mode and SWR pick up coil L3, J3 and P6.

APC/ALC CIRCUIT

This circuit stabilizes the output power, even when the power voltage or the antenna load is fluctuating, and sets the output power between 1 and 80 watts. The variation in the collector current of Q2 is detected at R6 and amplified by differential amplifier IC1/1. The output voltage from Pin 7 of IC1/1 is fed to the second gate of Q5 to stabilize the RF output power. In the SSB mode, when output signals are higher than the saturation level, Q8 and Q9 are turned ON, C54 is charged up, and R33 and R36 are set in parallel to control the ALC voltage level. In the AM mode, Q10 is turned ON and the RF output is set at 40 watts, by R43. The ALC time constant is set by C41 and R22, and D6 shortens the attack time. The APC/ALC signals are applied to the accessory socket on the rear panel through D46, D48 and C17.

L3 of the Low-Pass Filter circuit is an SWR pick up coil, and D1 and D2 are the detection diodes. The voltage of a traveling wave is detected by D1 as a positive DC voltage, and a reflected wave is detected as a positive DC voltage by D2. They are fed to IC2 and compared their voltage ratio. When VSWR is over 3:1, the ALC voltage is put out at Pin 1 of IC2. The ALC voltage is fed to the 2nd gate of Q5 through D46 and D48, and the driving power to the final PA stage becomes low and protects the PA transistors.

VOX CIRCUIT

A new time delay device is used in the VOX circuit. It is a low-noise, no-loss BBD (Bucket Brigade Device) and its maximum time delay is about 50 milliseconds.

The BBD has 1024 stages and each stage, consisting of a MOS FET and a capacitor, transfers electric charges corresponding to the input level from one stage to the next by the clock pulse. This delayed audio signal is fed to the transmitter and the direct signal from the microphone amplifier is fed to VOX circuit.

Thus receive to transmit change over time is negligible and it provides smooth VOX operation. In the SSB, AM and FM modes, the audio signal from the microphone amplifier through J4 of the main unit and P1, is fed to the input terminal Pin 3 of IC4 and time-delayed during the time which the signal is transfered between 1024 bucket stages. IC5 is the clock pulse generator for the BBD and oscillates about 10KHz. The output signal is fed to the low-pass filter to remove the clock pulse signals and amplified by 1/2 IC3. The amplified signal is fed to the MIC GAIN control through P1 and J4, and applied to the transmitter section. A part of the output signals of the microphone amplifier is fed to the amplifier IC1 through R152 VOX GAIN control and J4 in the main unit and P1.

The amplified signal is fed to the base of VOX detector transistor Q1. The output of the emitter is supplied through R15 to one of the bases of a dual transistor Q3, the collector of which is connected to the DC switching circuit Q4 and Q5.

When you speak into the microphone, Q5 turns ON and the set is turned in the transmit mode. C6 and R12, and R140 VOX DELAY control on the MAIN unit compose a circuit to determine the time constant to the VOX circuit.

The VOX circuit provides the ANTI-VOX circuit to prevent the set turns in the transmit mode with sounds from the speaker.

A part of the output signals of the AF power amplifier is fed to the amplifier 1/2 IC3 through R138 ANTI-VOX GAIN control and J4 in the main unit and P1. The amplified signal is fed to the base of ANTI-VOX detector Q2 and its output of the emitter is supplied to the other base of Q3. The emitter voltage of Q3 is changed to ground level by turning ON Q3 to cancel the VOX signals.

In the CW mode, the keying signal is fed to the base of Q10 through R33 and keys the input terminal of the BBD, IC4.

The time-delayed keying signal, the output signal of IC4 is

fed to the base of Q7 and switches Q6 corresponding to keying. The collector of Q6 is connected to the transmitter's keying circuit through P1 and J4 in the MAIN unit. A part of the keying signals is fed to the base of Q9.

When key down, Q9 is turned ON and charges up C13 rapidly and also Q8 is turned ON. The collector of Q8 is connected to the base of Q4 and Q5 is turned ON the same as SSB VOX operation. Thus the set is turned in the transmit mode with the keying, C13 and R30, and R137 CW DELAY control in the MAIN unit compose a circuit to determine the time constant to the CW break-in circuit.

In the CW mode, +9V is applied to the base of Q11 and Q11 is turned ON and shunts the voice signals fed to the input terminal of the BBD, IC4.

CW MONITOR CIRCUIT

Phase oscillator Q34 oscillates at approximately 800Hz. The positive line of the key jack is connected to the base of Q35 through R178. When the key is up, Q35 is ON and Q34 is OFF, when the positive line is grounded by keying, the base of Q35 is grounded and turned OFF, and Q34 is turned ON to oscillate. The oscillator signals are fed to Pin 1 of AF amplifier IC4 through the level adjust resistor R172, C157 and R163.

METERING CIRCUIT

In the receive mode, the meter functions as an S-meter. The source voltage of Q24 drops according to the AGC voltage applied to the second gate of each IF amplifier. The voltage drop controls the base of Q27 for S-meter operation.

In the transmit mode, the meter functions as a relative RF power meter. The detected traveling wave voltage of D1 in the low-pass filter unit is fed to the meter through R19 and R20. R19 is the meter sensitivity adjust trimmer.

SQUELCH STOP CIRCUIT

This circuit provides signals to stop the scan operation by use of the squelch signal in the FM mode and the S-meter signals in the SSB, AM or CW mode. In the SSB, AM or CW mode, the S-meter signals are fed from the collector of Q27 through R198 to Pin 2 of IC6/2. The voltage set by SQL control R7-2 on the front panel is applied to Pin 3. IC6/2 functions as a comparator. When the voltage at Pin 2 becomes higher than the voltage set at Pin 3 the level at Pin 1 is changed to ground level (L-level), and that of Pin 7 of IC6/2 is switched to the H-level, which is sent to the Driver Unit as the stop signal. During the scan operation, the voltage at Pin 3 stays below the set voltage so that Pin 1 is at the H-level, which turns ON Q33 through D43. Q33 grounds the center tap of AF control resistor R1-1 on the front panel so that IC4 is cut off to quiet the audio signals. When the unit is set in the transmit mode during the scan operation, the voltage from the RF-level detector is supplied to Pin 2 of IC6/2 through R198, Pin 1 is switched to the ground level, and Pin 7 of IC6/2 puts out the H-level to the Driver Unit to stop the scan operation.

POWER SUPPLY CIRCUIT

Regardless of whether the transceiver is switched to the receive mode or not, power is always supplied from a constantly activated source to the receiver AF amplifier, the transmitter microphone amplifier circuits and VOX circuit BFO and CW monitor circuits are supplied through the mode switch. This power source supplied current through R143 and zener diode D38, produces a regulated voltage of about 9.2V. This corresponds to the reference voltage of D32's cathode, and is applied to the base of Q29, resulting in a regulated voltage of about 9V which is taken out at the emitter of Q29.

The power source which is operative during reception supplies voltage to the RF amplifier, mixers, 1st stage of the IF amplifier, and SSB IF, Pass Band Tuning, and FM IF (In the optional FM unit) circuits through the mode switch. Similar to the constantly activated source in the receive mode power circuit, current flows through R142, D37 and D38. A reference voltage is supplied to the base of Q28 and regulated voltage is taken from the emitter of Q28.

The power source which is in operation during transmit supplies power to the 9MHz oscillator (In the optional FM unit), transmit mixer, IF amplifier, pre-driver and driver bias circuits, and exciting amplifier circuit.

Similar to the receive mode power circuit, in the transmit mode power circuit current flows through R146, D39, and D38. A reference voltage is supplied to the base of Q30, and regulated voltage is taken out from the emitter of Q30.

The ALC control circuit, driver amplifier, power amplifier, AF power amplifier and noise blanker circuits are supplied directly with 13.8V DC.

If the DC power supply is connected with polarity reversed, the equipment is protected. Since D4 and D5 become forward biased, a large current flows and causes the fuse in the external DC power supply cord to blow.

During reception, since the microphone push-to-talk (PTT) switch is OFF, there is no flow of current through D35, D36 and D41, receive power supply becomes operative, and receive +9V is obtained. A voltage is supplied through R148 and D40 to the base of Q32 and turns Q32 ON. The base of Q30 is connected to ground through Q32, and so the transmit power supply is inoperative, and the transceiver is set in the receive mode.

During transmission, the PTT switch is ON, Q28's base is connected to ground through D36, and the output voltage of the receive power supply becomes zero. D35 connected to the emitter of Q28 rapidly discharges voltage stored in the receive circuit capacitors to prevent receiver and transmitter from functioning simultaneously during switching. At the same time, Q32 is turned OFF, as its base is connected to ground through D41, and so the D32 reference voltage is applied to the base of Q35 through D39, +9V is obtained from the transmit power supply, and the transceiver will transmit.

3-4 PLL (PHASE LOCKED LOOP) UNIT

LOCAL OSCILLATOR CIRCUIT

This circuit is for the oscillation, in 100Hz steps, of the lowest two digits (0.0 ~ 9.9KHz) of the VCO output frequency of the PLL circuit. It consists of Q3 oscillator, and Q4 frequency doubler.

The crystal unit X2, a special VXO (Variable Xtal Oscillator) crystal, is connected to Q3's base and oscillates at about 18.010MHz. The oscillating frequency is altered in 100Hz steps by the voltage supplied to the anodes of D3 and D4 from the D/A (Digital to Analog) converter through IC6/2 operational amplifier. The 18MHz signal is doubled at Q4, thus the local oscillator output between 36.0185MHz and 36.0284MHz is obtained. The cathodes of D3 and D4 are connected to the RIT switch control Q13 and Q14 through the bias network R68 ~ R71.

When the set is in the transmit mode or the RIT is turned OFF, both Q13 and Q14 are turned ON and R68 is connected to ground through Q14. Thus a fixed voltage divided by R71, R69 and R68, is applied to D3 and D4.

When the set is in the receive mode and the RIT is turned ON, both Q13 and Q14 are turned OFF, and R68 is connected to the RIT control. A DC voltage from the RIT control is applied to D3 and D4, and the oscillating frequency will be shifted approximately ±800Hz. Q13 prevents Q14 from reverse flow caused by the diode phenomenon between the base and collector when negative voltage is supplied to the collector of Q14.

MIXER, LOW PASS FILTER, AND AMPLIFIER CIRCUIT

The output signals from the local oscillator circuit and the VCO signals are mixed by the double balanced mixer IC5. The output signals are fed to the low-pass filters to filter out only the signals below 15MHz. The output signals from the filter are amplified to the proper drive level (more than 3Vp-p) of the programmable divider IC1 by IC4 and Q5. Then the signals are fed to Pin 2 of IC1 through C14.

PROGRAMMABLE DIVIDER CIRCUIT

The input signals at Pin 2 of the programmable divider IC1 are divided by the BCD input signals at Pins 3 ~ 14.
The programmable divider is also called the 1/N counter and the BCD input is N. The relationship between the display frequency and the divide number N is as follows:

BCD code (N) = (display frequency of 10KHz and above) − 5000 + 497
Example: 50.3239MHz N = 5032 − 5000 + 497 = 529

The output signals (10KHz signals) from Pin 17 of the programmable divider are sent to phase detector IC2.

REFERENCE FREQUENCY GENERATOR CIRCUIT

Reference frequency generator IC3 consists of a crystal oscillator and a highspeed divider. X1 oscillates at 10.24MHz, which is divided by 1024. The 10KHz reference frequency is fed from Pin 17 to Pin 8 of phase detector IC2. This 10KHz reference frequency decides the variation step of the PLL output frequency and the divide number N decides the PLL output frequency.

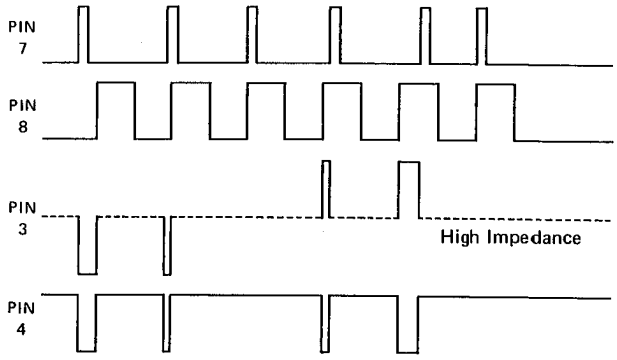
PLL output freq. = local oscillator freq. (MHz) + 0.01MHz (the reference freq.) x N (divide number of programmable divider)

When the last two digits of the display frequency are changed from 0 to 9.9KHz, the local oscillator frequency is changed from 36.0185 to 36.0284MHz. When the display frequency reaches 10.0KHz, the local oscillator frequency is set back to 36.0185 and 1 is added to N. Thus the frequency change by 10KHz steps is set by the divide number N and the frequency change below 10KHz steps is set by the 100Hz-step variation of the local oscillator (VXO) frequency.

PHASE DETECTOR AND LOOP FILTER CIRCUIT

Digital phase detector IC2 detects the phase difference of the pulse signals at Pin 7, the 10KHz reference frequency, signal and Pin 8, the output signal of the programmable divider, and proportionately puts out positive/negative pulse signals at Pin 3, which become high impedance when the PLL is locked. Pin 4 is for detecting the lock failures and changes to ground level according to the phase difference of the two pulse signals.

INPUT/OUTPUT WAVE FORMS OF PHASE DETECTOR IC2



The loop filter, consisting of R21, R22 and C26, converts the pulse signal from Pin 3 into a DC voltage and decides the response time of the whole loop. (R22 is for dumping adjustment.) The output signals are fed to tuning diode D1 of the VCO unit as the control voltage for the VCO frequency set.

A part of the output voltage of the loop filter is fed to noninverting amplifier IC6/1 and amplified. The output signal is fed to D2 of the VCO unit to preset the VCO frequency near the desired frequency.

BUFFER AMPLIFIER CIRCUIT

The VCO output signals are fed to buffer amplifier Q8. They are then fed to Pin 11 of mixer IC5, and to buffer

amplifiers Q6 and Q7, of which the output signals are fed through the low pass filter, consisting of L2, C51, C52 and C53, to the transmit and receive mixers in the Main Unit.

LOCK FAILURE DETECTOR AND MUTE CONTROL CIRCUIT

When the lock fails, the pulse signal from Pin 4 is integrated by R18 and C18. When the integrated signal level exceeds the junction voltage of Q1's base, Q1 is turned ON and then Q2 is turned ON. The collector of Q2 is connected to the base of Q6, so the base voltage of Q6 becomes ground level, and Q6 and Q7 are shut OFF to prevent transmitting unwanted signals.

POWER CIRCUIT

The PLL Unit has +8V and −8V regulated power circuits. When the power is turned ON, a current flow charges C61 through the emitter and the base of Q9. This turns Q9 ON, and regulator IC7 puts out a regulated 8V, which is then divided by R52 and R53 and fed to the base of Q10 to turn Q10 ON. The voltage at the emitter of Q10 becomes approximately 0.6V below the voltage at the base of Q10. Thus the input voltage of regulator IC7 is regulated at the total of the zener voltage of D2 and the emitter voltage of Q10. When the input voltage of IC7 varies, the emitter voltage of Q10 varies because the zener voltage is stable. The variation in the voltage controls Q9 by controlling the base current of Q9. Thus the input voltage of IC7 is regulated.

A −10V is supplied from IC18 DC-DC converted of the Driver Unit to the emitter of Q12 to obtain a regulated −8V. When the voltage varies from −8V, the collector current of the half of Q11 having R54 and R55 varies. Q11 works as a differential amplifier, so the collector current flows into the other half of Q11 and this flow controls Q12 to regulate −8V.

VCO UNIT

The VCO (Voltage-Controlled Oscillator) is a Colpitts circuit, using Q1, and oscillates in the 40MHz range. The oscillation frequency is controlled by a DC voltage which is supplied from the loop filter in the PLL unit to varactor diode D1 and from IC6/1 in the PLL unit to varactor diode D2, inserted in parallel with the oscillation coil.

The oscillator output is taken from the source of Q1, and fed to buffer amplifiers in the PLL unit to become the local oscillator signal for the transmitter and receiver, and to get a DC-voltage to control the frequency of the VCO.

D2 presets the VCO frequency near the desired frequency so that the voltage effect to D1 is reduced insuring a very pure output signal.

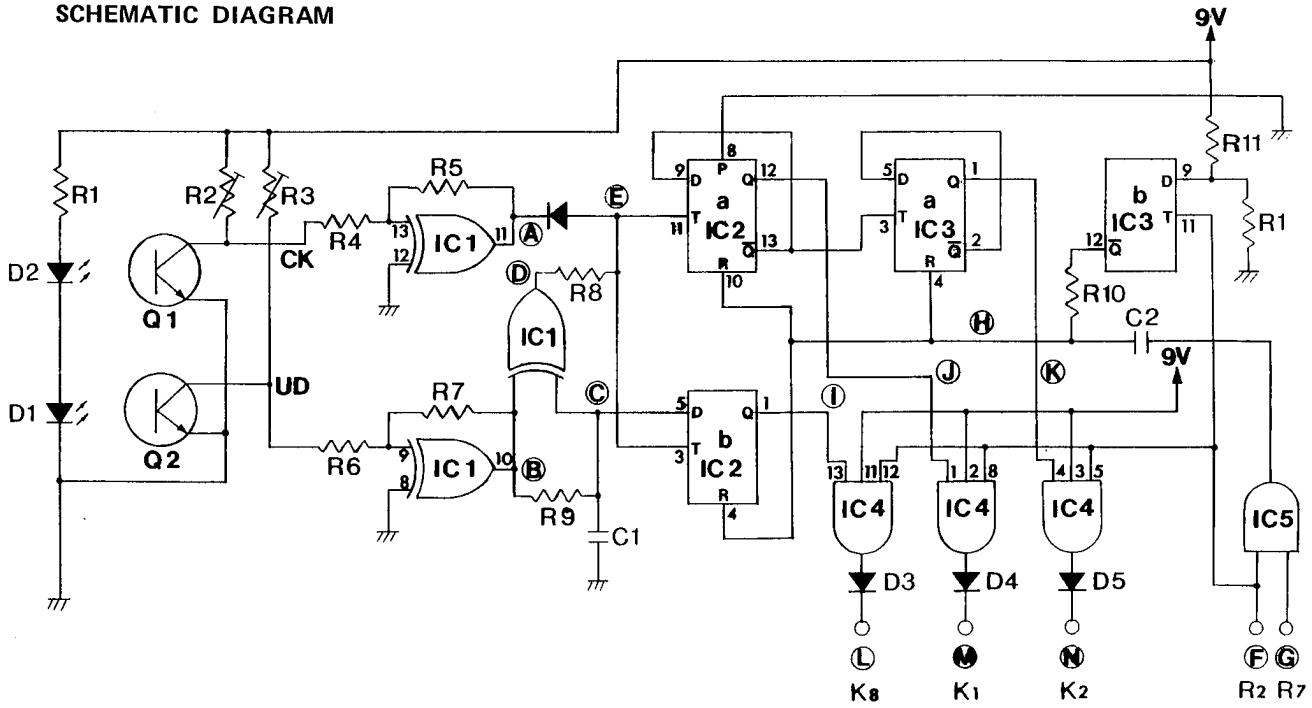
3-5 DRIVER UNIT

The frequency control of the set is controlled with a microcomputer which contains ICOM's original programs. The microcomputer provides various operating capabilities.

CLOCK PULSE GENERATOR AND UP/DOWN CONTROL CIRCUIT

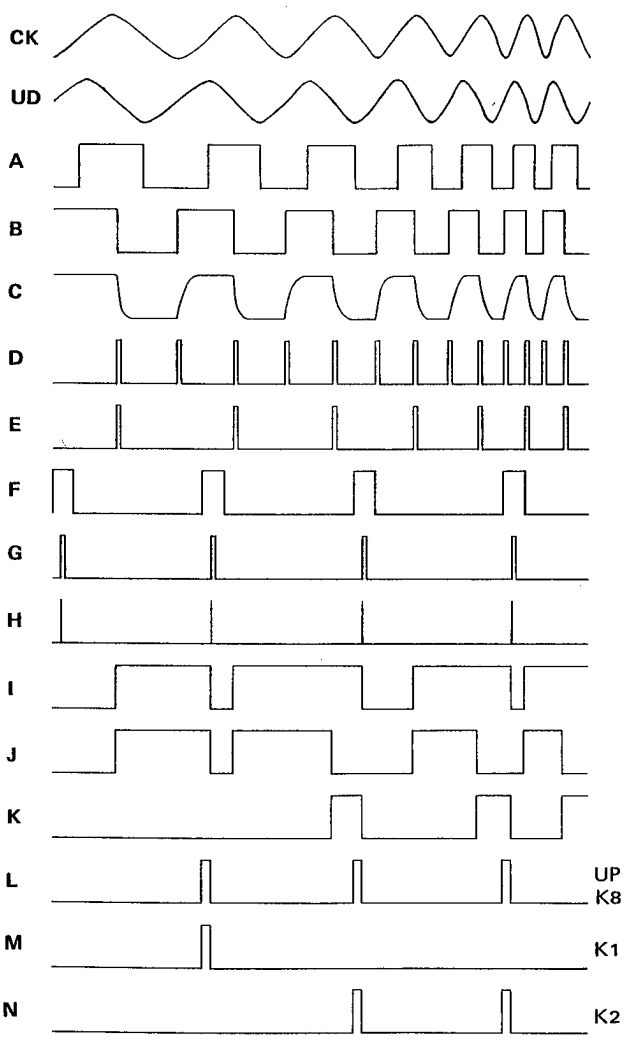
D1 and D2 are infrared LED diodes and Q1 and Q2 are the photo transistors. D1 sends a continuous light source to

UP/DOWN CONTROL CIRCUIT
SCHEMATIC DIAGRAM



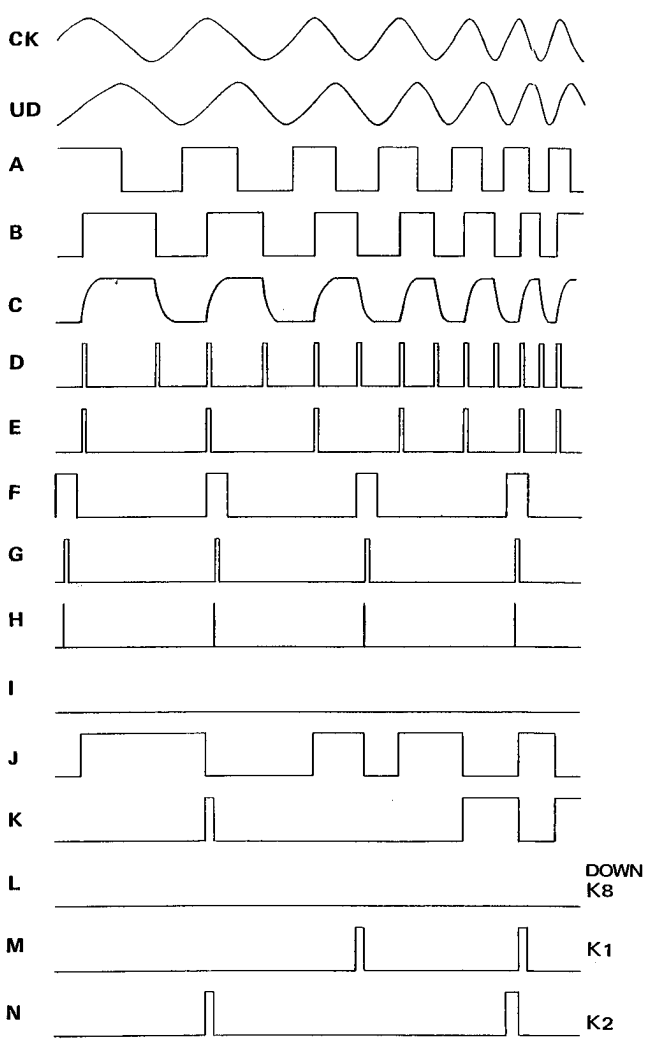
Timing Chart

UP Count



Timing Chart

DOWN Count



Q1 and D2 sends it to Q2. Between the diodes and the transistors is a windowed chopper disk which is connected directly to the shaft of the tuning knob. The diodes and photo transistors are set up so that a phase difference of 90 degrees results when the disk revolves.

As these 90 degree out of phase signals are similar to a sine wave, the signals are converted into logic level signals which have very short rise and fall times by the Schmitt trigger circuits of IC1.

With the logic level signals, clock pulse signals (CK1, 2) and UP/DOWN signals (UD) are generated by the UP/DOWN control circuit.

The flip-flop of ⓐ (1/2 IC2) and ⓑ (1/2 IC3) functions as a quad counter and stores the data (0-3) according to the dial rotating speed.

Qa	Qb	Data
L	L	0
L	H	1
H	L	2
H	H	3

L = 0V
H = 9V

When the power is turned ON, the counter programmed in the CPU sets the operating frequency at 50.1MHz in any mode and sets all of the memory channels at 51.0MHz. Then pulse signals are fed to R2 Ⓔ and R7 Ⓕ of the CPU and clear the necessary flip-flop. Also, when data between 0 and 3 is latched by the pulse signal generated by revolving the tuning knob, the gate of IC4 is controlled, synchronizing with the output signal from R2 Ⓔ of the CPU, and the datum between 0 and 3 is fed through D4 and D5 to the K1 Ⓜ and K2 Ⓝ terminals of the CPU. At the same time, an UP or DOWN signal (UD) is fed through D3 to the K8 Ⓛ terminal. The output of D3 becomes H-level at the UP count and L-level at the DOWN count. K1 and K2 data are added to or subtracted from the preset frequency (50.1 MHz) according to the UP/DOWN signal.

In other words, addition or subtraction functions are made according to the data read from the pulse interval of R2 and this operation is repeated after each clearance made by the pulse signals from R7.

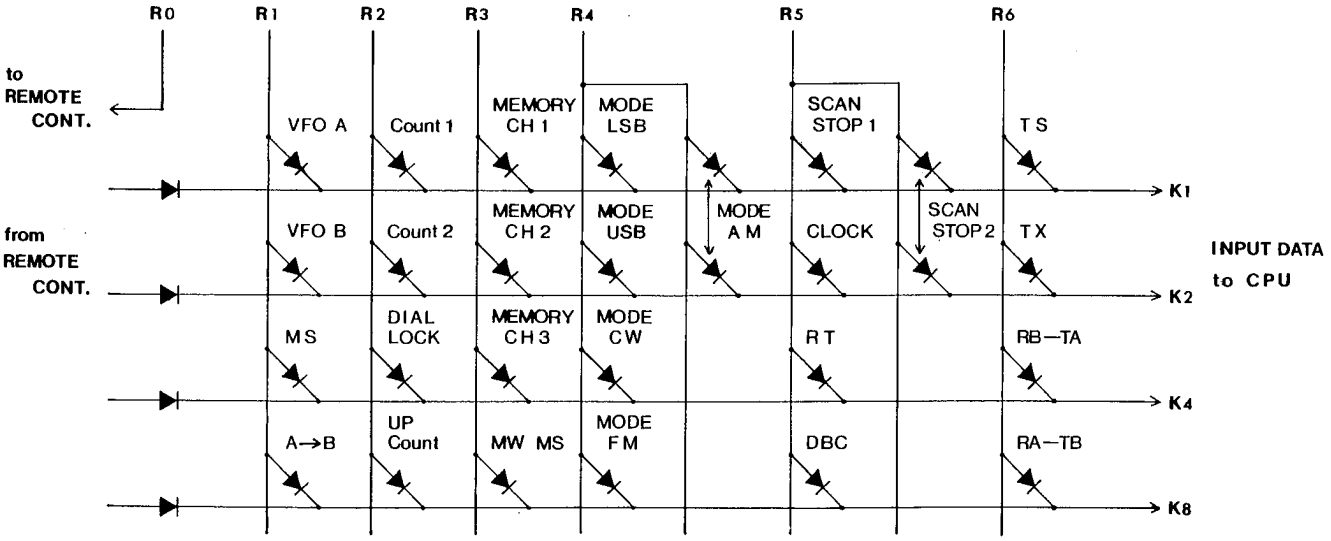
CPU CONTROL CIRCUIT

The CPU in the unit is a 4-bit CPU and the input terminals

are K1, K2, K4 and K8 only.

Since the CPU can not make many functions with the small number of K input signals, to increase the functions of the CPU, scanning R output signals (R0 ~ R6) are fed to K input terminals through the matrix circuit as shown in the figure below. The CPU reads the relationship of R output and K input signals to decide the function as follows:

INPUT CONTROL CIRCUIT



1 R1 → K1 (VFO A)
This flow occurs when the VFO select switch is set at "A", and the unit operates at the frequency set by "A" VFO.

2 R1 → K2 (VFO B)
This flow occurs when the VFO select switch is set at "B" and the unit operates at the frequency set by "B" VFO.

3 R1 → K4 (MS)
This flow occurs when the VFO select switch is set at "MS". In this setting, when the flow of ⑫ occurs, the three memory channels are scanned in the order of 1, 2, 3, 1, 2, 3, . . . with the flow of ⑲ as a clock.

4 R1 → K8 (A → B)
This flow occurs when the VFO select switch is set at "A → B". The data in the "A" VFO is input to the "B" VFO and the "B" VFO frequency becomes equal to that of the "A" VFO.

5 R2 → K1 (COUNT 1)

6 R2 → K2 (COUNT 2)
The signal of ⑤ and ⑥ express the data between 0 and 3 to add or subtract.

7 R2 → K4 (DIAL LOCK)
This flow occurs when the dial lock switch is set in the lock position.

8 R2 → K8 (Frequency UP)
This flow occurs when the frequency is moved up by turning the tuning control knob. When the frequency is moved down, the R2 signal is not fed to K8.

9 R3 → K1 (Memory 1)
This flow occurs when the VFO select switch is set at "Memory 1".

10 R3 → K2((Memory 2)
This flow occurs when the VFO select switch is set at "Memory 2".

11 R3 → K4 (Memory 3)
This flow occurs when the VFO select switch is set at "Memory 3".
In the condition of ⑨, ⑩ or ⑪, when the flow of ⑫ occurs, the data in "A" VFO is programmed in Memory Channel 1, 2 or 3, respectively.

12 R3 → K8 (MS/MW)
This flow occurs when the MS/MW button is pushed.

13 R4 → K1 (LSB)
This flow occurs when the MODE select switch is set at "LSB".
When this happens, the disply shows "L" and the carrier frequency.

14 R4 → K2 (USB)
This flow occurs when the MODE select switch is set at "USB".
When this happens, the display shows "U" and the carrier frequency.

15 R4 → K4 (CW)
This flow occurs when the MODE select switch is set at "CW".
When this flow occurs, the display shows "C" and the carrier frequency in the transmit mode and the 800Hz lower frequency in the receive mode.

16 R4 → K8 (FM)
This flow occurs when the MODE select switch is set at "FM".
When this happens, the display shows "F" and the carrier frequency.

17 R4 → K1, K2 (AM)
This flow occurs when the MODE select switch is set at "AM".
The display shows "A" and the carrier frequency.

18 R5 → K1 (STOP 1 Mode)
This flow occurs when the scan is stopped by use of the MS/MW button.

19 R5 → K2 (Clock)
The number of pulses from the scan control circuit are counted by use of the R5 pulse signals, and the sample signal is input to the K2 for the scan operation.

20 R5 → K4 (RT)

21 R5 → K8 (DBC)
These are used when an external controller is connected to the unit.

22 R5 → K1, K2 (STOP 2 Mode)
This flow occurs when the scan is stopped automatically. In this condition, the scan starts automatically from the frequency the scan has stopped at with the signal from the scan stop control circuit.

23 R6 → K1 (TS)
This flow occurs when the TS button is pushed.

24 R6 → K2 (TX)
This flow occurs when the unit is set in the transmit mode. The scan operation stops automatically.

25 R6 → K4 (RB-TA)
This flow occurs when the VFO select switch is set at "RB-TA". The "B" VFO operates in the receive mode and the "A" VFO operates in the transmit mode.

26 R6 → K8 (RA-TB)
This flow occurs when the VFO select switch is set at "RA-TB". The "A" VFO operates in the receive mode and the "B" VFO operates in the transmit mode.

FREQUENCY CONTROL, DISPLAY AND I/O CIRCUIT
The dynamic lighting display functions with the 7-segment data output at the O1 ~ O7 terminals of the CPU and the digit designation output signals at the R0 ~ R6 terminals. The two decimal points are illuminated with the current through diodes D6 and D7 only when the digit designation signals for the 1MHz and 1KHz order are put out. The O0 ~ O3 and R0 ~ R6 terminals are timeshared for the other data output. The O0 ~ O3 terminals also put out the divide number (N) for the PLL divider, and the signals from the R0 ~ R6 terminals are also supplied to the CPU control circuit.

When the power is turned ON, the CPU is initialized and then reads the mode setting and memorizes it. Then the CPU reads the control data from the external controller in the order of the numbers of the matrix and controls the various necessary operations. The data of the display, "A" VFO, "B" VFO, the frequency shift step pitch, Memories 1 ~ 3, and the divide number (N) are programmed in each RAM area for the initial presetting.

Then, at the CPU output terminals O0 ~ O3, the divide number and the VXO control data are put out in the BCD code. The data to designate the latch position (digit-position) are output at the CPU output R7 ~ R9 and the signals from R10 are latched as the strobe pulse in the Input/Output port IC10, of which the terminals A1 ~ D2 provide the VXO control data of which terminals A3 ~ D5 provide the divide number (N).

Synchronizing the output of R0 ~ R6, O0 ~ O7 provide the 7-segment display data and by the order pulse of R0 ~ R6, the mode, 10MHz digit, 1MHz digit, ..., 100Hz digit is driven. Thus the CPU outputs are alternately switched between these two operations.

CPU MALFUNCTION-PREVENT CIRCUIT
This circuit is to prevent the CPU from malfunctioning which may be caused by repeatedly turning the power ON and OFF, or by chattering when the power connector is plugged. The cause of this malfunction is that C7 starts recharging before it discharges completely and the CPU is not initialized. To prevent this, Q4 is turned ON and C7 is shorted when the power is OFF.

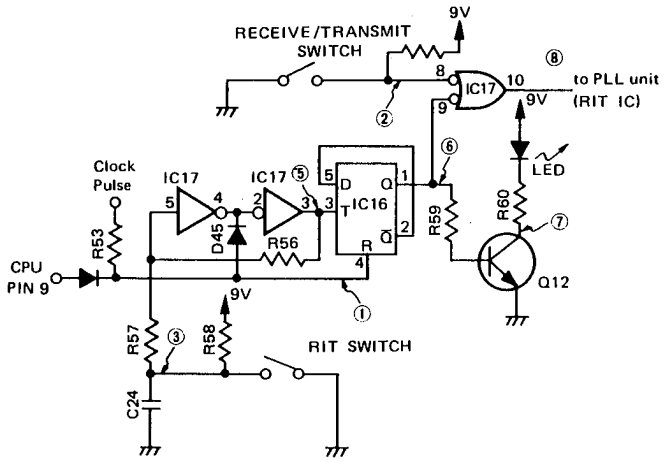
D/A (DIGITAL TO ANALOG) CONVERTER CIRCUIT
The signals from A1 ~ D2 of IC10 are supplied to R87 ~ R95 for D/A conversion through R82. This D/A converted voltage is fed to the PLL unit and changes in steps to give 100Hz step variation to the VXO frequency.

RIT CONTROL CIRCUIT
The RIT circuit in the unit is turned ON and OFF by operation of the RIT switch. When the RIT is ON, it may also be turned OFF by rotating the tuning control knob. When the RIT is switched ON, a pulse signal is generated and fed to the Schmitt trigger circuit which consists of two inverters of IC17 and R56. Any chatter is absorbed by R58 and C24. The square pulse achieved by this circuit is fed to flip-flop IC16. Then IC16 puts out an H-level signal at its Pin 1 which is fed to Pin 9 of IC17. Pin 8 of IC17 is H-level in the receive mode and Pin 10 is switched to the L-level, which turns OFF Q13 and Q14 in the PLL unit so that the VXO frequency can be adjusted with the RIT control.

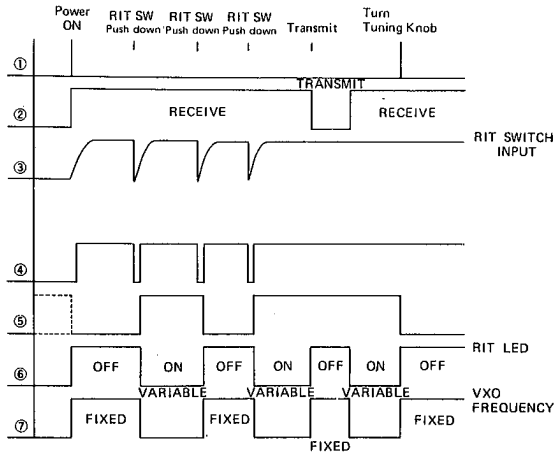
When the tuning control knob is rotated, a clock pulse signal through R53 resets the flip-flop IC16 and turns OFF the RIT.

When the unit is switched to the transmit mode while the RIT is ON, Pin 8 of IC17 becomes L-level and Pin 10 becomes H-level, so that Q13 and Q14 in the PLL unit are turned ON. In the receive mode, Q13 and Q14 are turned OFF and the receiving frequency goes back to the previous frequency with the RIT ON.

RIT CONTROL CIRCUIT SCHEMATIC DIAGRAM



TIMING CHART

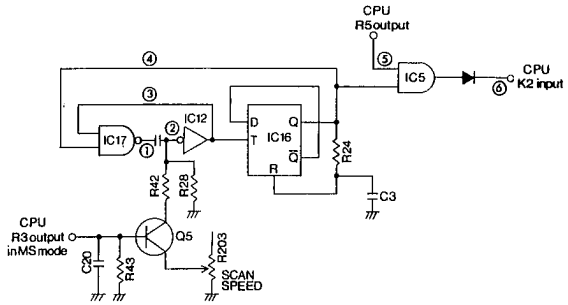


SCAN CLOCK GENERATOR AND CONTROL CIRCUIT

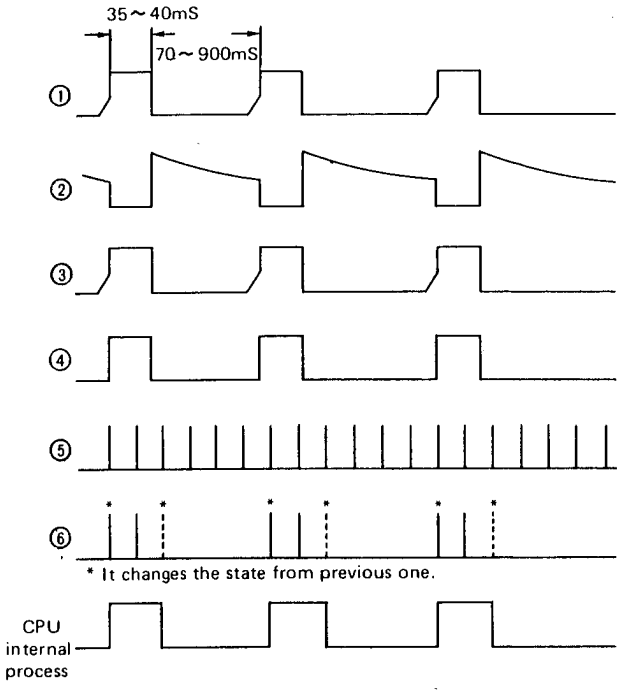
This circuit consists of a monostable multivibrator of 1/4 IC17 and 1/4 IC12, a flip-flop of 1/2 IC16, a sampling gate of 1/4 IC5 and Q5. The circuit samples the scan clock which is fed to Pin 9 of IC5 with the pulse signals from R5 of the CPU, and the sampled signals are fed to the K2 teminals of the CPU. In the Memory Scan (MS) mode, the output signals from the R3 terminal are charged by C20 so that Q5 is turned OFF, and the monostable multivibrator, consisting of IC12 and IC17, operates with the time constant set by R28 and C5. In the other scan mode, Q5 is turned ON so that the scan speed is decided by the time constant set by C5, R42, R28 and the scan speed control R203 under the access cover.

The K2 input signal is read and its positive edge and negative edge is detected by the CPU program. The CPU synchronizes to this period and decides the scanning speed.

SCAN CLOCK GENERATOR AND CONTROL CIRCUIT SCHEMATIC DIAGRAM



TIMING CHART



SCAN START/STOP CONTROL CIRCUIT

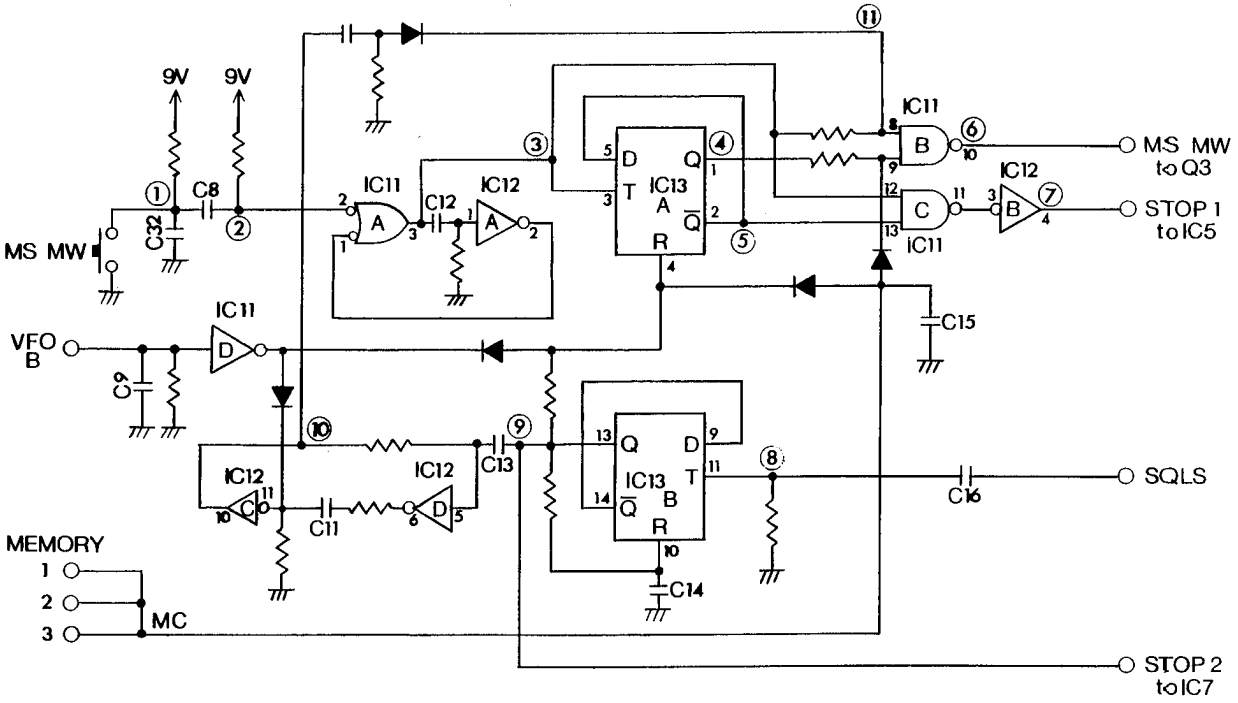
This circuit consists of three monostable multivibrators and one binary counter. The output signals from the circuit control the gates between the R output terminals of the CPU and the K input terminals to provide the scan START and STOP in the Scan "A", Scan "B" and Memory Scan operations, and the Memory Write operation.

IN THE SCAN "A" MODE

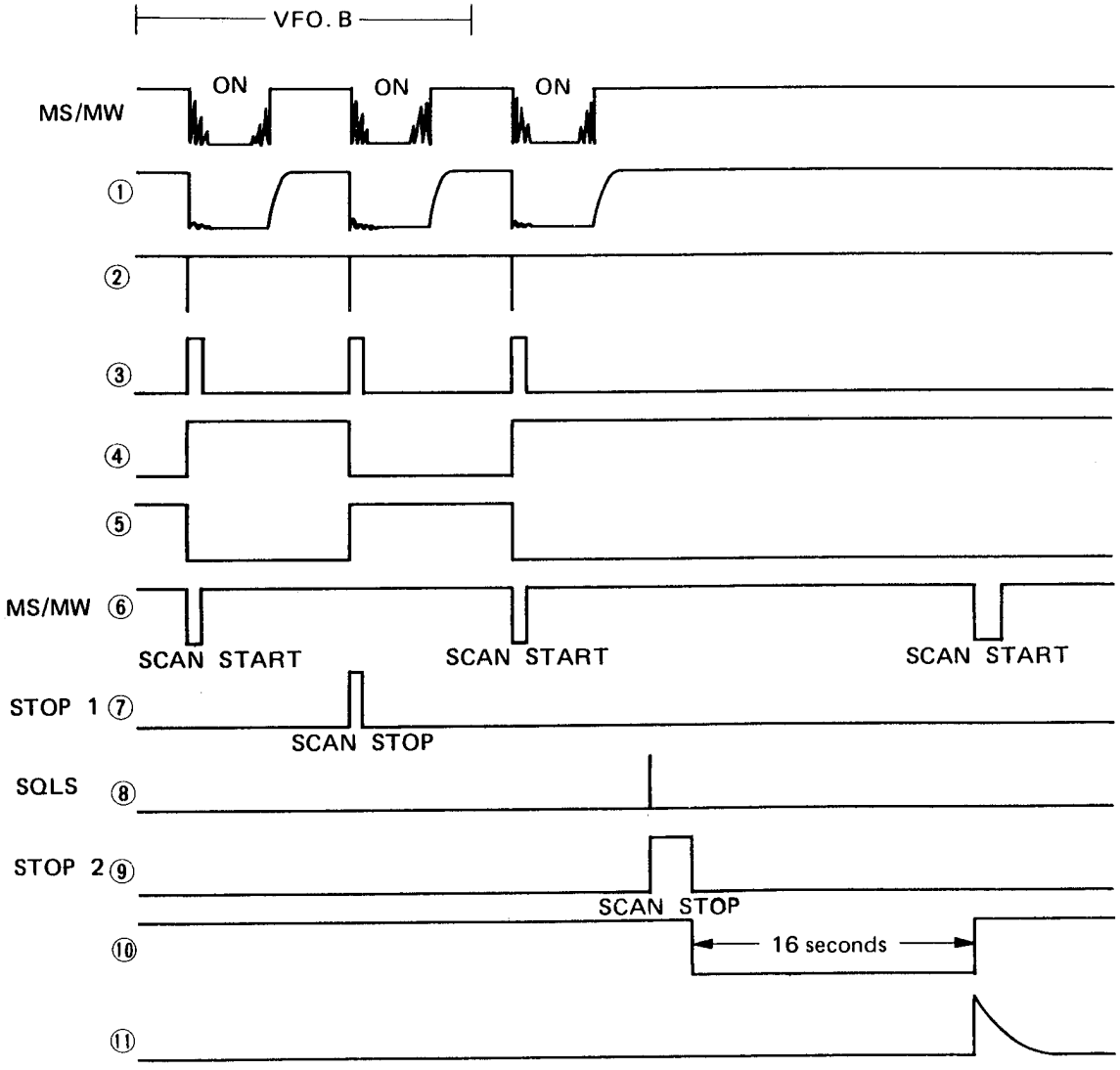
SCAN START

The signal generated by pushing the MS/MW button is differentiated by C8 and R31 and then fed to the monostable multivibrator of 1/4 IC11 and 1/4 IC12.

SCAN START/STOP CIRCUIT



SCAN START/STOP TIMING CHART



The output signal of the multivibrator drives the flip-flop of 1/2 IC13. The output signal at Pin 1 switches Pins 8 and 9 of IC11 to an H-level. Then Pin 10 of IC11 is switched to L-level and Q3 is turned ON so that the output from R5 of the CPU is input to the K8 terminal, and the scan operation starts.

SCAN STOP

When the MS/MW button is pushed again, the multivibrator consisting of IC11 and IC12 functions and the signal is fed to IC13, the output signal levels of which are then reversed, and Pin 1 output is L-level and Pin 2 output is H-level. Therefore the output at Pin 10 of IC11 and Pin 7 of IC12 become H-level, which is input to Pin 5 of IC5 as the STOP 1 signal. Then the output signal from the R5 terminal of the CPU is fed to the K1 terminal to stop the scan operation.

SCAN STOP BY A RECEIVED SIGNAL

While scanning, when a signal is received, SQL S signal is fed from Pin 7 of IC6 on the Main Unit. After being differentiated, the signal is fed to Pin 11 of IC13. The output signal at Pin 13 is fed to Pin 6 of IC7 as the STOP 2 signal so that the R5 output of the CPU is fed to K1 and K2 to stop the scan. Then, if the MS/MW switch is pushed again, the output signal from Pin 13 of IC13 is input to Pin 4 of IC13 to reset the circuit so that the L-level signal from Pin 10 of IC11 turns Q3 ON, and the R5 output of the CPU is sent to K8 to start the scan again.

IN THE SCAN "B" MODE

SCAN START/STOP

The scan START and scan STOP 1 function by use of the MS/MW button, and scan STOP 2 functions by receiving a signal, are the same as the operations for SCAN "A" mode.

AUTO SCAN START

In the SCAN "B" mode, the scanning stops by receiving a signal. After approximately 16 seconds, the scan re-starts automatically.

In SCAN "B" mode, Pin 4 of IC11 is at L-level and Pin 4 of IC13 is shunt to ground through D37 so that the output signal from Pin 13 of IC13 does not reset Pins 1 ~ 5 of IC13. As R81 has high resistance against the ground level, the signal from Pin 13 of IC13 through C13 drives the multivibrator consisting of IC12 (Pins 5, 6, 10 and 11), R97, R36, and C11. Approximately 16 seconds later, the multivibrator puts out a signal, which is input to Pin 8 of IC11 after being differentiated by C10 and R34. On the other hand, as Pin 1 of IC13 is not reset to H-level, the output signal at Pin 10 of IC11 becomes L-level, Q3 is turned ON and the output signal from the R5 terminal of the CPU is fed to the K5 terminal to start the scan again.

PUSHING THE MS/MW BUTTON DURING 16 SECONDS COUNTING

During the 16 seconds, as Pins 1 ~ 5 of IC13 are not reset, the operations are reversed by pushing the MS/MW button. Pin 1 becomes L-level and Pin 2 becomes H-level so that Pin 12 of IC11 becomes H-level and Pin 13 also becomes H-level. Then the IC12 puts out an H-level signal at Pin 4, which is fed to Pin 5 of IC5 so that the output signal from the R5 terminal of the CPU is fed to the K1 terminal for the Scan STOP 1 operation.

MEMORY WRITE

While the VFO select switch is set at the Memory 1, 2 or 3 position, the MC signal becomes H-level, which resets IC13/2 and sets Pin 9 of IC11 at H-level. The Memory Write operation is available by pushing the MS/MW button in this condition.

POWER CIRCUIT

This unit has a special power circuit to prevent the CPU from malfunctioning. When the power is turned ON, 13.8V is supplied to zener diode D44 and Q11 is turned ON so that the bases of Q9 and Q10 are shunt to the ground; Q9 is turned OFF and Q10 is turned ON. C22 is charged by the current through D42 and at the same time, a current flows to charge C21 by the diode effect between the emitter and base of Q7. This current turns ON Q7 as the base current of Q7. The current from the collector of Q7 charges C18 and the voltage starts rising. When the base voltage of Q8 becomes approximately 0.6V, Q8 is turned ON, the base current of Q7 flows through R49 and the collector and emitter of Q8, and the output voltage of Q7 keeps rising. When the voltage reaches approximately 7.6V, zener diode D41 is turned ON. By the voltage divided by R44 and R45, Q6 is turned ON and controls the base voltage of Q8 so that the output voltage of Q7 is regulated. When the input voltage of Q7 varies, Q6, Q8 and Q7, in this order, are controlled to regulate the output voltage. When the voltage drops suddenly, D44 is turned OFF, and the output signals of R3, R6 and R7 of the CPU are fed through IC19 to the base of Q11 so that Q11 is repeatedly turned ON and OFF, and Q9 and Q10 are alternately turned ON. By this operation, C22 is charged through D42 when Q10 is ON; and when Q9 is ON, the power voltage is added to the charged voltage of C22. Thus enough voltage is supplied to the emitter of Q7 to put out the regulated voltage.

3 - 6 AC POWER SUPPLY UNIT (IC-551)

The AC power supply built in the unit is a newly developed switching regulator system, providing light weight and a high level of efficiency.

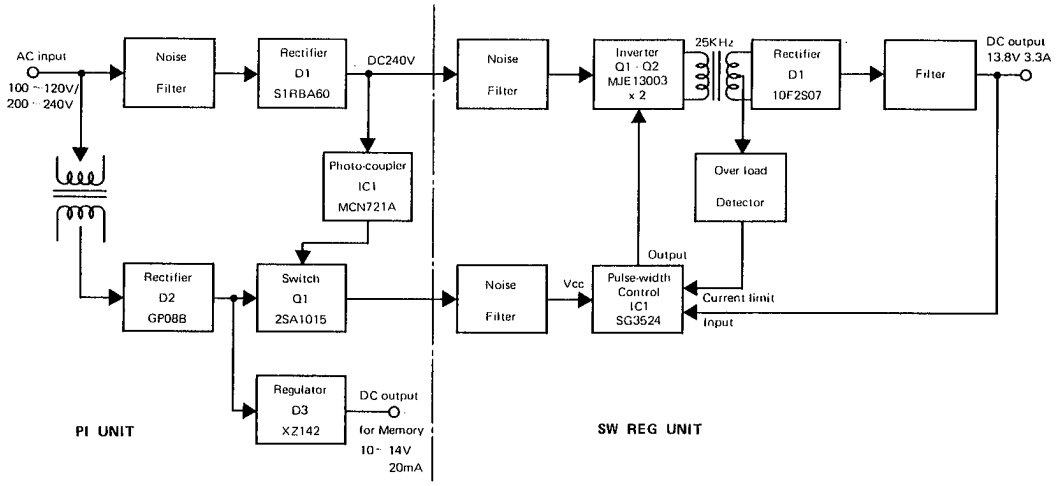
PI UNIT

The AC power supplied from Pins 2 and 3 of P1 is fed to the memory power transformer L2. The output voltage from the secondary of L2 is rectified and filtered by D2 and C7, and switched by Q1 before being fed to the SW REG Unit. The rectified and filtered power is put out also to the fourth Pin of P1 as the 10 ~ 14V memory power source. D3 is an overvoltage-protection zener diode, and D4 is a reverse-flow-protection diode. The AC power from Pins 1 and 3 of P1 through line filter L1 is rectified by D1 and supplied through filter C5 and C6 to the SW REG. IC1 is operated by the divided voltage with R5 and R6 to turn ON Q1.

SW REG (Switching Regulator) UNIT

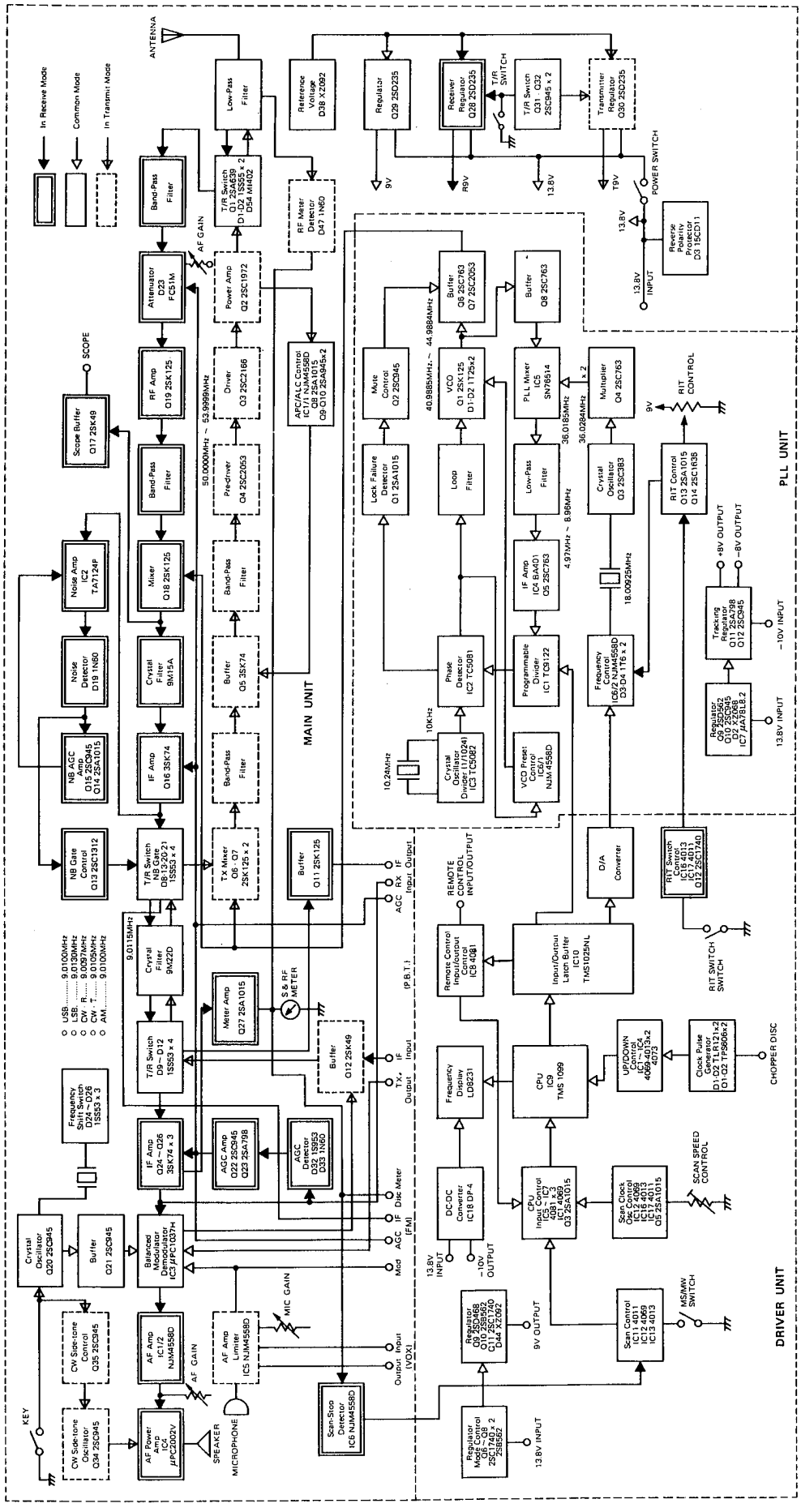
+120V from H1 and −120V from H2 are fed through various noise filters to the collector of Q1 and the emitter of Q2. IC1 is a switching regulator IC and contains a 5V reference voltage, oscillator circuit, op-amp, comparator, and current limit circuit. The oscillating frequency is set by the time constant circuit of R3 and C6. The pulse signals from Pins 12 and 13 are fed through the pulse transformer L5 to Q1, to switch Q1 and Q2 alternately so that the ±120V is put out at the primary of L6. The output voltage at the secondary is rectified by D1 and filtered by L7, L8, C13, and C14, and then 13.8V DC is put out at Pin 5 of P1.

POWER SUPPLY UNIT BLOCK DIAGRAM

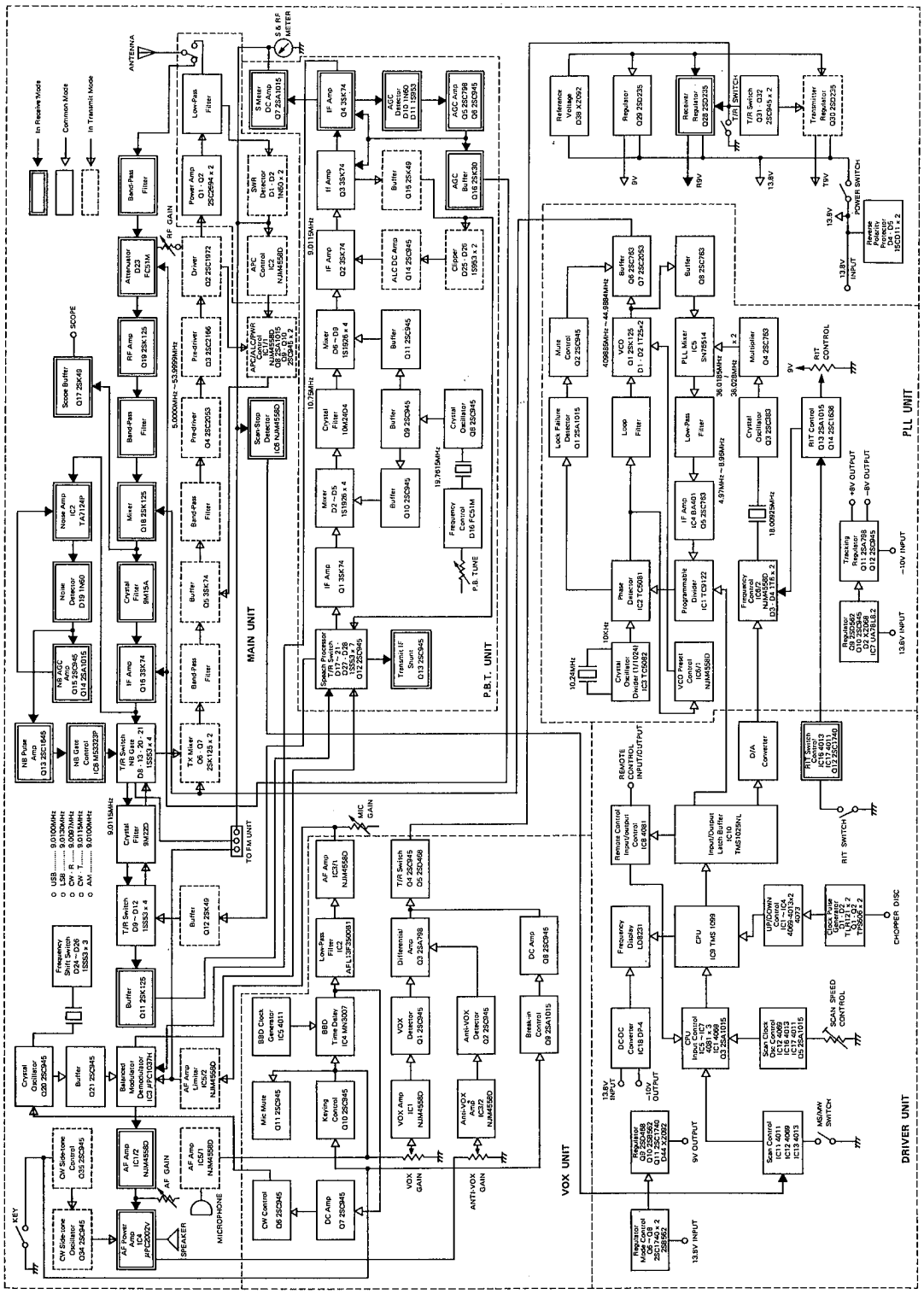


SECTION 4 BLOCK DIAGRAM

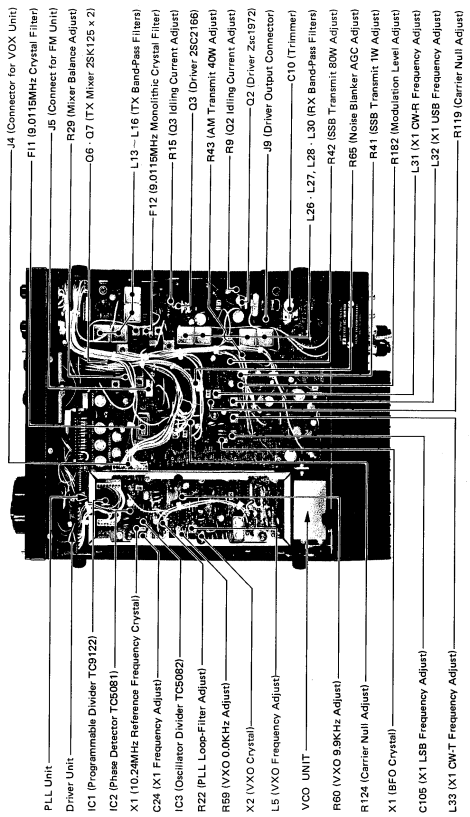
(IC-551)



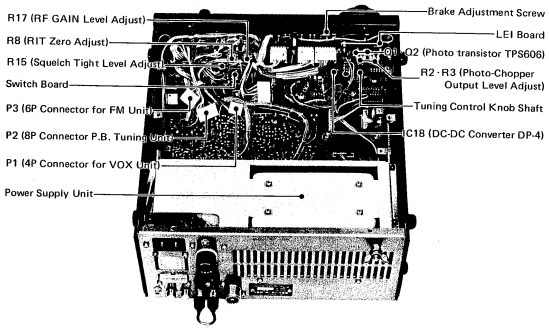
(IC-551D)

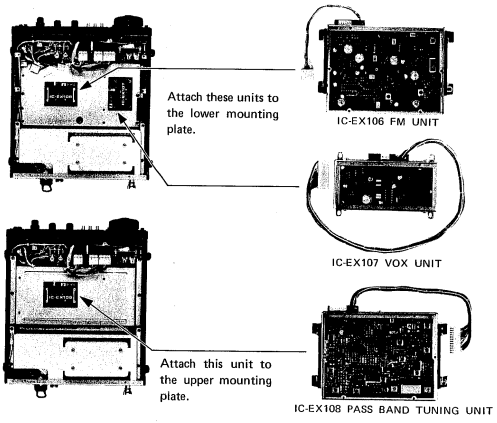

MAIN UNIT
P.B.T. UNIT
PLL UNIT
VOX UNIT
DRIVER UNIT
ANTENNA
SCOPE
KEY
SPEAKER
MICROPHONE
TO PA UNIT
MIC GAIN
AF GAIN
RF GAIN
VOX GAIN
ANTI-VOX GAIN
P.B. TUNE
RIT CONTROL
RIT SWITCH
SCAN SPEED CONTROL
MS/MV SWITCH
CHOPPER DISC
POWER SWITCH
REMOTE CONTROL INPUT/OUTPUT
In Receive Mode
Common Mode
In Transmit Mode
S & RF METER
13.8V INPUT
9V OUTPUT
-10V OUTPUT
+8V OUTPUT
-10V INPUT

(IC-551D)



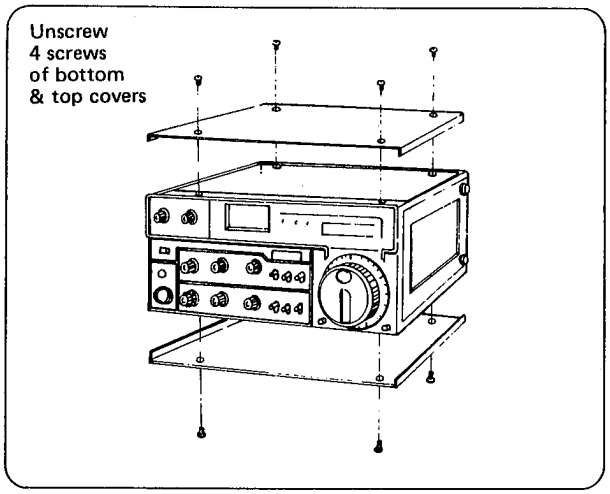
(IC-551)

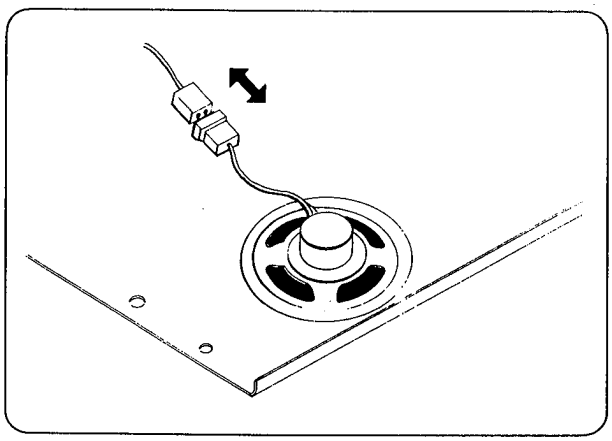




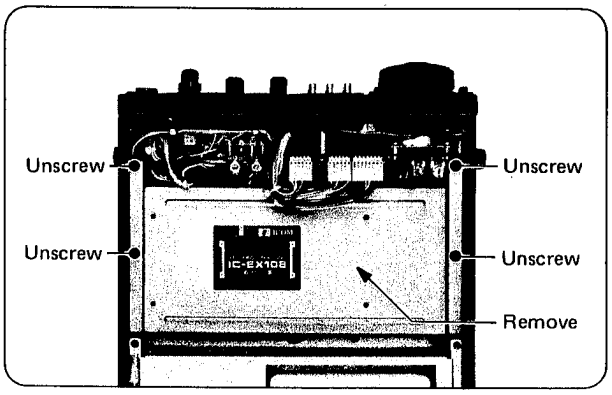
6 - 1 FM UNIT IC-EX106

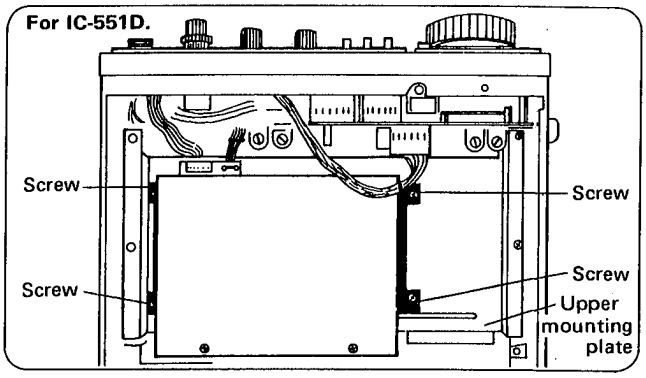
1. Turn the power switch off and unplug the power cord.
2. Remove the upper and lower covers by unscrewing the 4 screws in each.
3. Unplug the internal speaker connector.



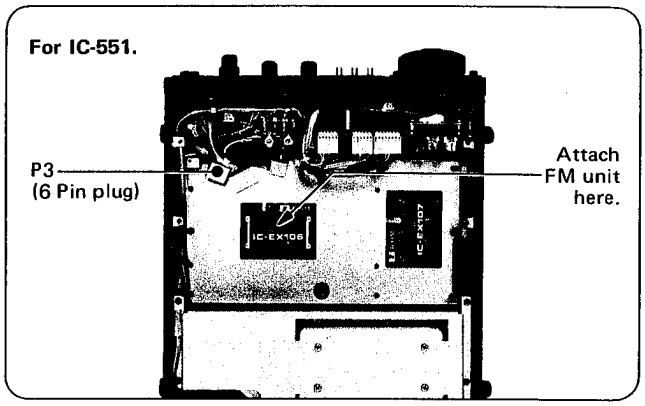


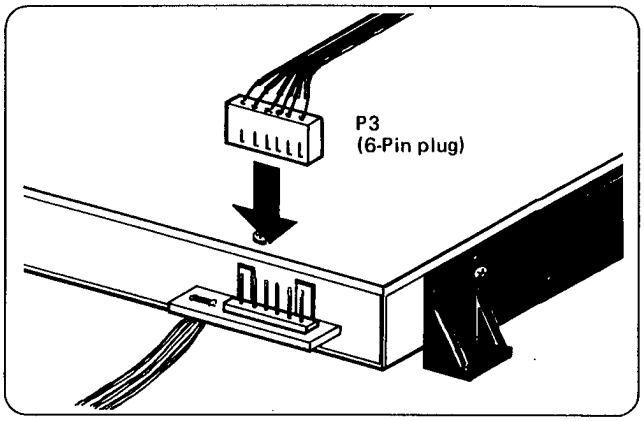
4. Turn the set bottom side upward.
5. Remove the mounting plate by unscrewing the 4 screws. (When this unit is installed in the IC-551D it should be attached to the upper mounting plate, so skip step 5.)

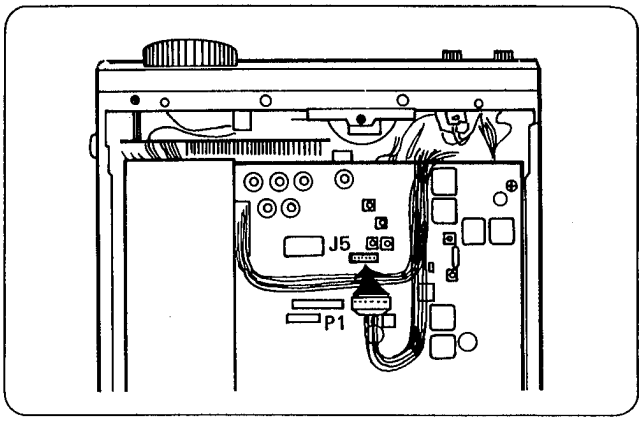




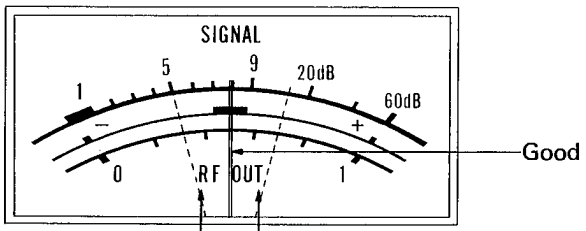
6. Attach the unit as shown in the above illustration with the four screws supplied.
7. Plug P3 of the IC-551/551D, the six-pin plug into socket J1.

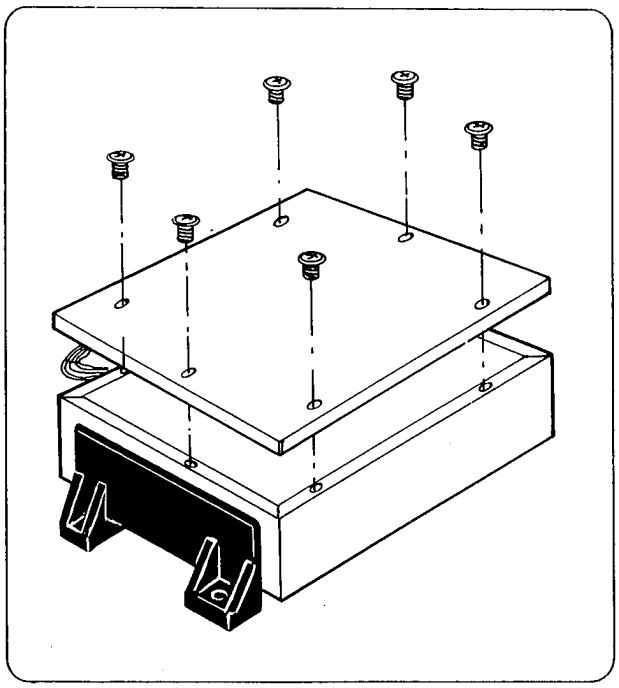




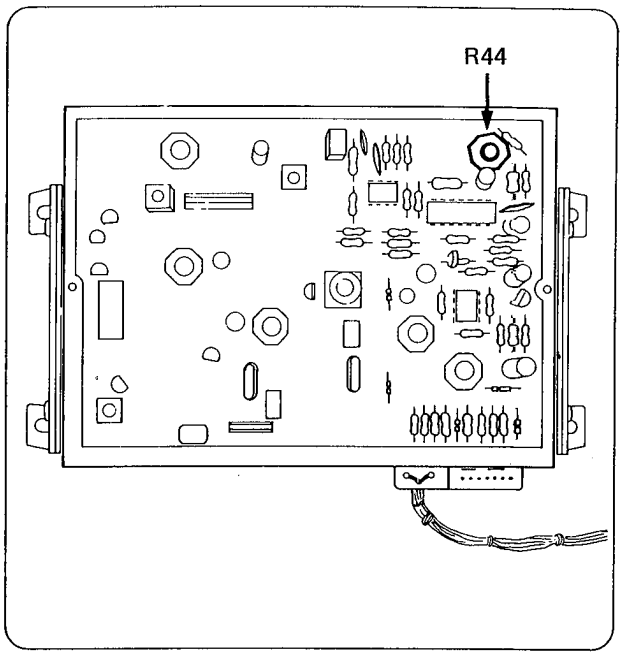


8. Put the cord with plug P1 (6-Pin) from the FM unit through the space between the front panel and the main board of the IC-551/551D.
9. Plug P1 into J5.
10. When you have finished these steps, check the reading of the discriminator meter by the following:
    a. Place the Mode Switch in the FM-c position, and turn on the power switch. (Do not connect an antenna.)
    b. The discriminator meter should be in the center position, if not, adjust the trimmer in the FM unit, by the following procedure:





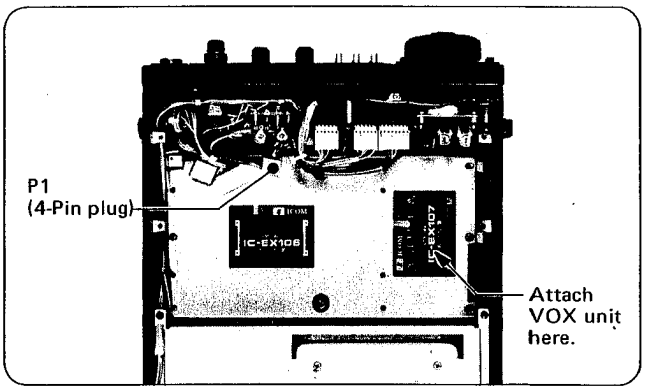
(1) Turn off the power switch.
(2) Remove the cover of the FM unit.
(3) Turn the power switch back on.
(4) Turn R44 on the FM unit while watching the needle until the needle is centered.
(5) Turn the power switch off and replace the cover of the FM unit.

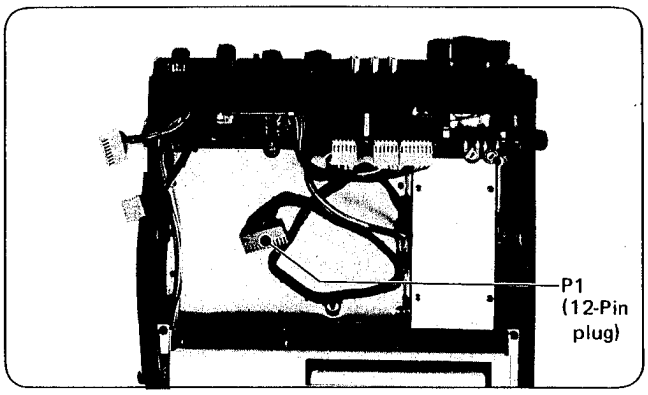


11. Replace the upper mounting plate.
12. Replace the upper and lower covers of the set, do not forget to plug in the internal speaker plug.

6 - 2 VOX UNIT IC-EX107
(The IC-551D has a VOX unit installed.)

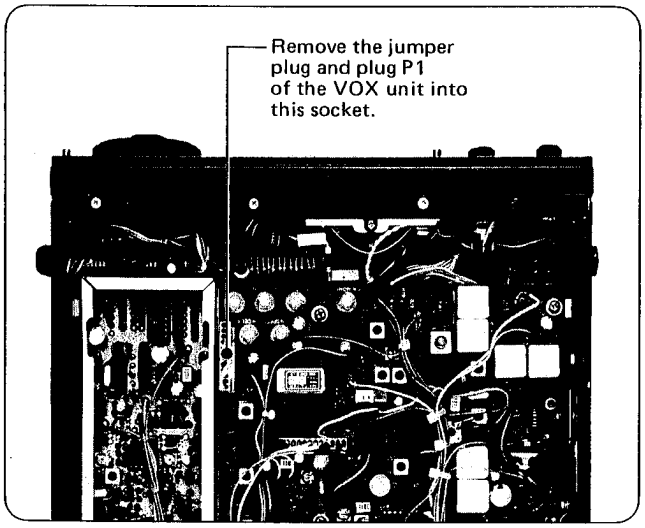
1. Follow steps one through six for installing the EX106.
2. Plug P1 of the set into J1 of the VOX unit.





3. Run the cord of the VOX unit with P1 (12-Pin plug) through the space between the front panel and the boards to the main board of the set.

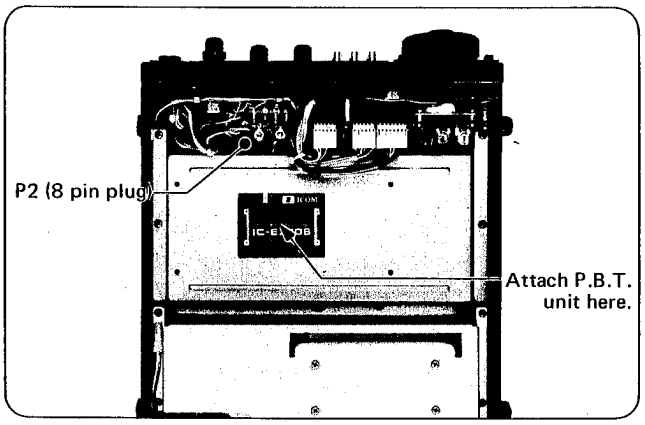
4. Remove the jumper plug which is plugged into J4 of the set, save the jumper in case you should decide to remove the VOX unit later.
5. Plug P1 of the VOX unit into J4.



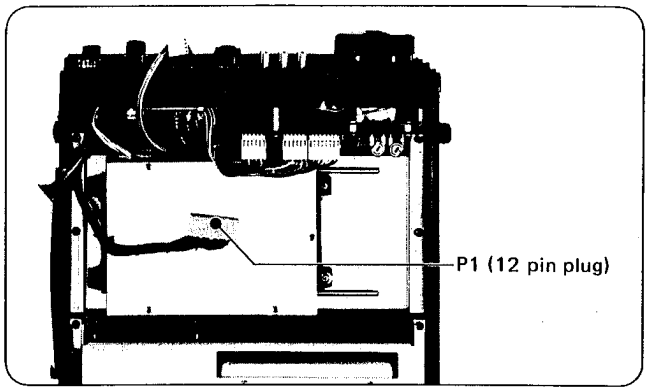
6. Replace the mounting plate and the upper and lower covers of the set. This completes the installation.

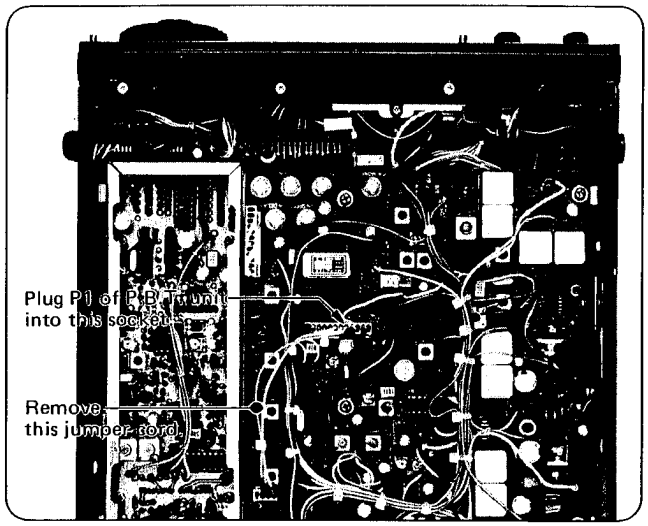
6 - 3 PASS BAND TUNING UNIT IC-EX108 (The IC-551D has a PBT unit installed.)

1. Follow the steps 1 through 4 of EX-106 installation.
2. Attach the unit to the place shown in the illustration, with the 4 screws supplied.



3. Plug P2 of the set (8-Pin plug) into J1 of the unit.
4. Run the cord with the 12-Pin plug from the unit through the space between the front panel and the boards to the main board of the set.
5. Remove the jumper cord that is installed between J2 and J3 of the set, save this jumper in case you should want to remove the PBT later.
6. Plug P1 (12-Pin plug) into J3, J2 will have nothing plugged into it.

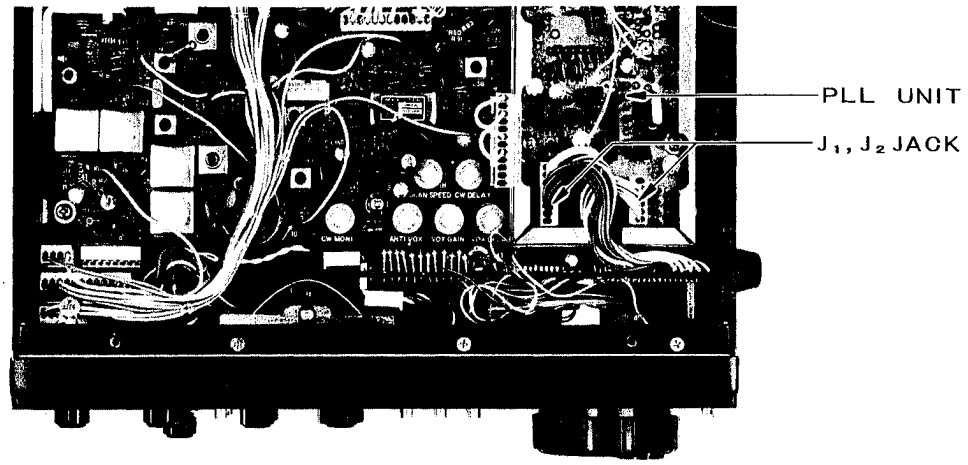




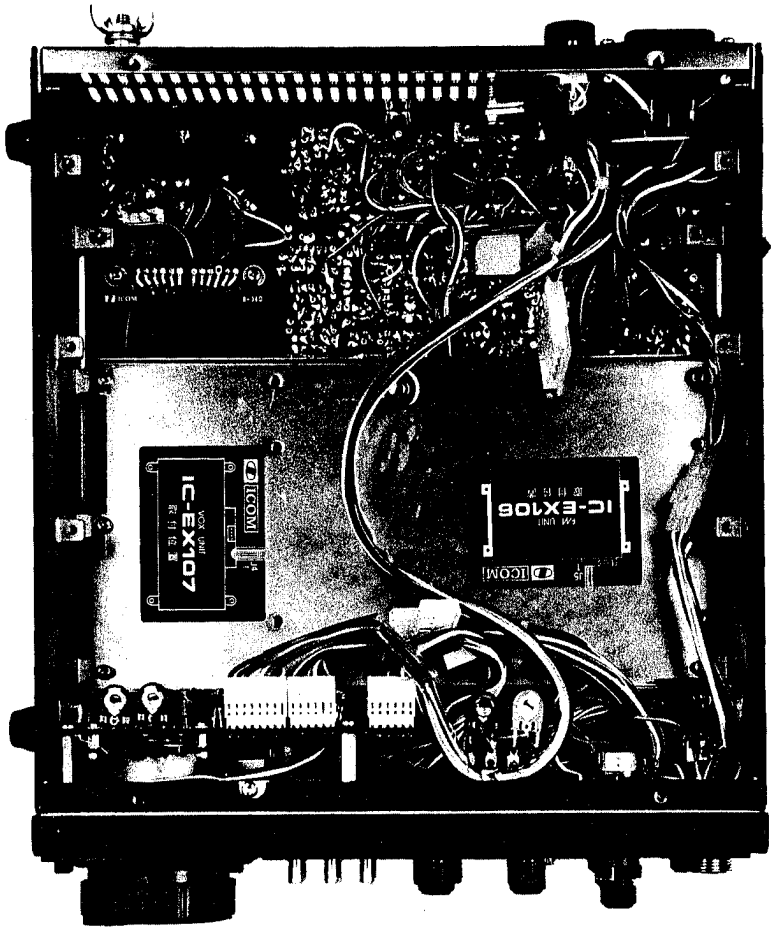
7. Replace the upper and lower covers. No adjustment is required.

SECTION 7 FRONT PANEL DISASSEMBLY

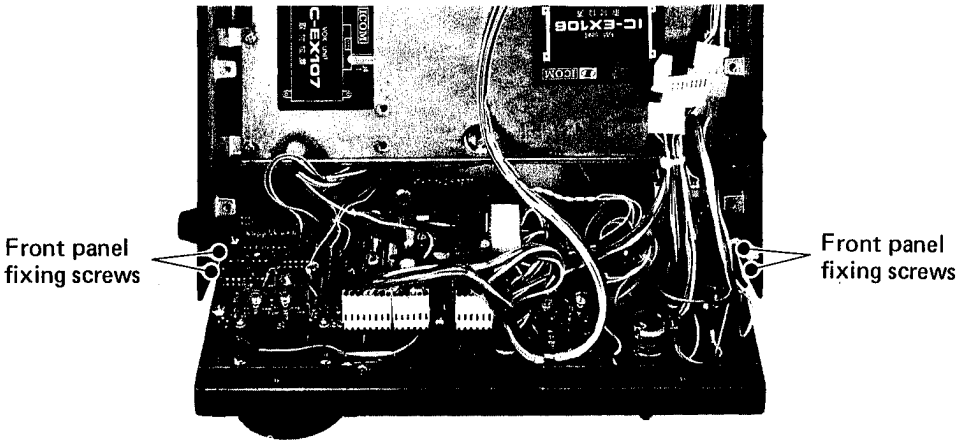
1. Turn the power switch off and unplug the power cord.
2. Remove the upper and lower covers by unscrewing the 4 screws in each.
3. Unplug the internal speaker connector.
4. Remove the cover of the PLL unit, and unplug the plugs connected to J1 and J2.



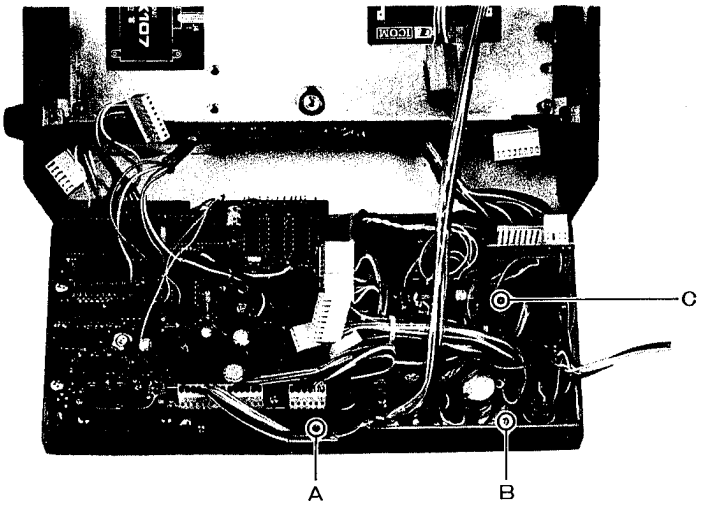
5. When optional units (FM unit, VOX unit and/or PASS BAND TUNING unit) are installed, remove them for convenience to unplug connectors.
6. It is recommended to unplug connectors for easy disassembling. At this time, make marks for each couples of the connectors to prevent wrong connections.



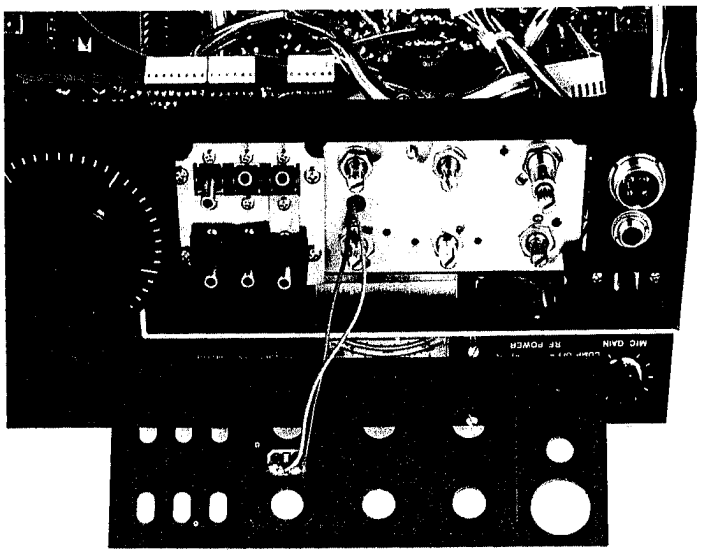
7. Remove the knobs of the SQUELCH, AF GAIN, P.B. TUNE, RIT controls and MODE, VFO switches by pulling them, and RF GAIN control by unscrewing its screw.
8. Remove the front panel fixing screws of each side.
9. Turn over the front panel with taking care not to cut its wiring harness.



10. Remove three screws of A, B and C (the front plate fixing screws).



11. Now you can remove the controls and switches by unscrewing the shaft clamping nuts.
12. When you wish to remove the toggle switches, you need to remove the driver unit located behind the switches first. At this time, take care not to break the chopper disk located behind the tuning control knob.



SECTION 8 MAINTENANCE AND ADJUSTMENT

8 - 1 MEASURING INSTRUMENTS REQUIRED FOR ADJUSTMENT

(1) FREQUENCY COUNTER	FREQUENCY RANGE	0.1 - 60MHz
	ACCURACY	BETTER THAN ±1 ppm
	SENSITIVITY	100mV or BETTER
(2) SIGNAL GENERATOR	FREQUENCY RANGE	0.1MHz - 60MHz
	OUTPUT VOLTAGE	−20 - 90dB (0dB = 1μV)
(3) MULTIMETER	50KΩ/Volt or better	
(4) AC MILLIVOLTMETER	MEASURING RANGE	10mV - 2V
(5) RF VOLTMETER	FREQUENCY RANGE	0.1 - 60MHz
	MEASURING RANGE	0.01 - 10V
(6) RF WATTMETER (Terminated Type)	MEASURING RANGE	20 - 100 Watts
	FREQUENCY RANGE	40 - 60MHz
	IMPEDANCE	50 OHMS
	SWR	LESS THAN 1.1
(7) AF OSCILLATOR	OUTPUT FREQUENCY	200 - 3000Hz
	OUTPUT VOLTAGE	0 - 100mV
	DISTORTION	LESS THAN 0.1%
(9) SWEEP GENERATOR	FREQUENCY RANGE	45 ~ 60MHz
	OUTPUT VOLTAGE	0 − 2V
(10) MARKER OSCILLATOR	FREQUENCY	50, 52, 54MHz
(11) FM DEVIATION METER	FREQUENCY RANGE	40 ~ 60MHz
	MEASURING RANGE	0 ~ ±10KHz
(12) DETECTOR	(Refer to 8 - 3 - 1 and 8 - 4 - 3.)	
(13) NOISE GENERATOR	(Generates ignition-like noise containing harmonics beyond 30MHz.)	

NOTE: ▭ indicates an adjusting or instrument connecting point.
○ indicates an instrument connecting point and its readings.
These also are used in the board layout and schematic diagrams.

8 - 2 PLL ADJUSTMENT

8 - 2 - 1 Local oscillator level adjustment

1. Instrument
   1) RF Voltmeter.
2. Adjusting procedure
   1) Set the MODE Switch in the USB position, and tune to 50.0985MHz.
   2) Connect the RF Voltmeter to the Check Point of R80. 101
   3) Adjust L6 and L7 for 10mV or more. 102 ④

8 - 2 - 2 Reference frequency (10.24MHz) adjustment

1. Instrument
   1) Frequency counter.
2. Adjusting procedure.
   1) Set the MODE to USB and tune to 50.0985MHz.
   2) Connect the frequency counter to the Check Point of R14. 103
   3) Adjust C24 for 5.0700MHz. 104

8 - 2 - 3 VXO frequency (100Hz steps) Adjustment

1. Instrument
   1) Frequency counter.
2. Adjusting procedure
   1) Connect the frequency counter to the Check Point of R44. 105 ①
   2) Set the MODE to USB and tune to 50.0985MHz. 106
      Adjust R59 for 41.08850MHz.
   3) Tune to 50.0984MHz and adjust R60 for 41.08840MHz. 107
   4) Repeat 2) and 3) to obtain the respective frequencies.

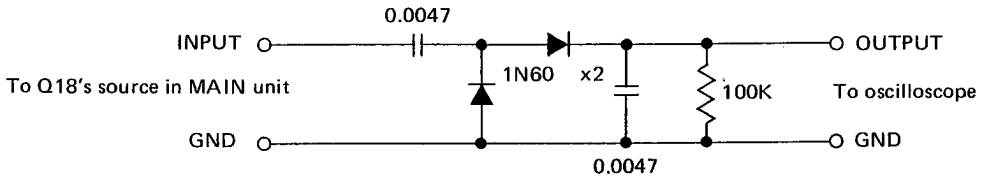
8 - 2 - 4 Photo-Chopper Adjustment (Driver Unit)

1. Instrument
   1) Oscilloscope.
2. Adjusting procedure
   1) Connect the oscilloscope to the Check Point of R6. 108
   2) Turn fast the tuning knob and adjust R2 so that vertically symmetrical waveforms and about 8V peak-to-peak voltage are obtained. 109 ⑧
   3) Connect the oscilloscope to the Check Point of R7. 110
   4) Adjust R3 such as 2). 111 ⑧

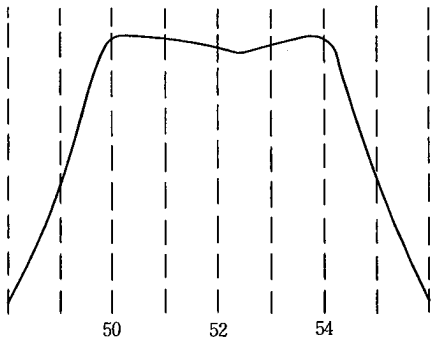
8 - 3 RECEIVER ADJUSTMENT

8 - 3 - 1 RF Band-Pass Filter Adjustment

1. Instruments
   1) Sweep generator
   2) Marker oscillator.
   3) Oscilloscope.
   4) Detector.



2. Adjusting procedure
   1) Solder the INPUT terminal of the detector to Q18's source in the MAIN unit, and the GND terminal to ground foil of the board.
   2) Make a short circuit across C89 (L25 Pin 1 and Pin 3) in the MAIN unit.
   3) Connect the OUTPUT and GND terminals of the detector to the vertical input terminals of the oscilloscope.
   4) Connect the sweep generator and the marker oscillator outputs to the antenna connector of the set.
   5) Connect the sweep generator's sweep signal output to the horizontal input terminals of the oscilloscope.
   6) Set the sweep width control maximum, and tune the sweep center frequency to 52MHz.
   7) Adjust the oscilloscope Horizontal gain control to obtain 1MHz/Division sweep width.
   8) Adjust the sweep generator output level and the oscilloscope Vertical gain to make a waveform on the scope such as the following figure.
   9) Adjust L26, L27, L29, L30 so that waveform on the scope should be as shown below. 201
   10) After adjusting, remove the short circuit across C89.



8 - 3 - 2 AGC Threshold Adjustment

1. Instrument
   1) Multimeter.
2. Adjusting procedure
   1) Connect the multimeter to Q22 collector (Pin 1 of J2) in the MAIN unit.
   2) Adjust R111 for 4V, when no signal is received. 202
      IC-551D: Connect the multimeter to Q6 collector in the PBT unit, and adjust R21 for 4V, when no signal is received.

8 - 3 - 3 IF Circuit Adjustment

1. Instrument
   1) Signal generator.
   2) AC Millivoltmeter.
   3) 8 ohm speaker or 8 ohm dummy load.
2. Adjusting procedure
   1) Set the MODE to USB and tune the set to 52.000.0MHz.
   2) Connect the signal generator output to the antenna connector, and the speaker or dummy load to the external speaker jack. Connect the AC millivoltmeter across the speaker or dummy load.
   3) Adjust the signal generator output level to −10dB (0dB = 1μV), and tune to 52MHz to make a 1000Hz beat. If the signal is too weak, increase the signal generator output level to make sufficent audio output.
   4) Adjust L21, L35, L36, L37 for maximum audio output. 203
      IC-551D: Adjust L1, L2, L5, L6, L9, L10, L11, L12 in the PBT unit for maximum audio output.

8 - 3 - 4 S-Meter Adjustment

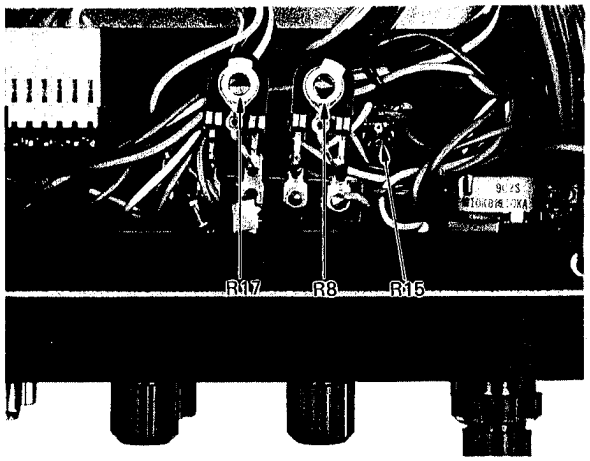
1. Instrument
   1) Signal generator.
2. Adjusting procedure
   1) Set the MODE to USB and tune the set to 52.000.0MHz.
   2) Connect the signal generator output to the antenna connector, and tune the generator to 52MHz to make a 1000Hz beat.
   3) Set the signal generator output level to 0dB, and adjust R88 in the MAIN unit for S-5 reading on the S-meter. 204
      IC-551D: Adjust R25 in the PBT unit for S-5 reading.
   4) Increase the signal generator output level to 90dB, and adjust R87 for full scale on the S-meter. 205
      IC-551D: Adjust R26 in the PBT unit for full scale.
   5) Repeat 3) and 4) several times.

8 - 3 - 5 Noise Blanker Adjustment

1. Instrument
   1) Noise generator.
2. Adjusting procedure
   1) Connect the noise generator output to the antenna connector. 206
   2) Turn the N.B. switch ON, and set R65 in the center position. 207
   3) Adjust L19 to make minimum noise reception.

8 - 3 - 6 SSB Squelch Adjustment

1. Adjusting procedure
   1) Set the MODE to USB.
   2) Set the SQUELCH control to 11 o'clock position.
   3) Set R15 located behind the PBT control to threshold point. 208



8 - 3 - 7 RIT Frequency Adjustment

1. Instrument
   1) Frequency counter.
2. Adjusting Procedure
   1) Connect the frequency counter across the Check Point of R80 and ground in the PLL unit.
   2) Set the RIT control in the center (12 o'clock) position.
   3) Turn the RIT Switch ON and OFF alternately and adjust R8 located behind the PBT control (Refer to above picture.) so that the frequency does not differ when the RIT switch is ON and OFF.

101

8 - 4 TRANSMITTER ADJUSTMENT

8 - 4 - 1 BFO Frequency Adjustment

1. Instruments
   1) Frequency counter.
   2) RF Voltmeter.
2. Adjusting procedure
   1) Connect the frequency counter and RF voltmeter across the Check Point of R121 and ground. 301
   2) Set the MODE to LSB, and adjust C105 for 9.0130MHz. 302
   3) Set the MODE to CW and in the transmit (Do not Key down.), and adjust L33 for 9.0105 MHz. 303
   4) Set the MODE to USB, and adjust L32 for 9.0100MHz. 304
   5) Set the MODE to CW and in the receive, and adjust L31 for 9.0097MHz. 305
   6) These adjustments interact and if difficulty is encountered, go back to 2).
   7) Make sure the RF voltage is 200mV or more, on any modes.

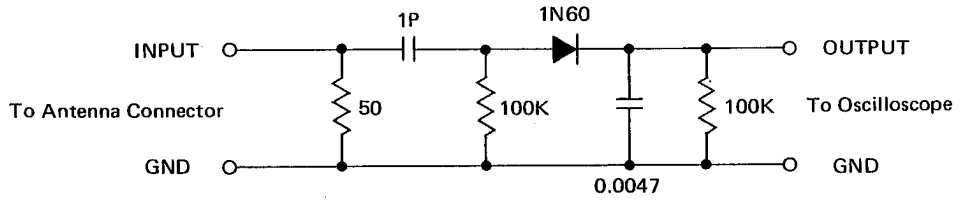
(40)

8 - 4 - 2 Idling Current Adjustment

1. Instrument
   1) Multimeter.
2. Adjusting procedure
   1) Resolder the one end of R12 at soldered point, and connect the multimeter in the 100mA range, between R12 and the resoldered point in series.
   2) Set the MODE to USB in the transmit and no modulation, and adjust R15 for 30mA. (This is Q3's idling current.) 306
   3) After adjusting, solder the resoldered point of R12.
   4) Resolder one end of R6 at soldered point, and connect the multimeter in the 100mA range, between R6 and the resoldered point.
   5) Adjust R9 for 50mA. (This is Q2's idling current.) 307
   6) After adjusting, solder the resoldered point of R6.

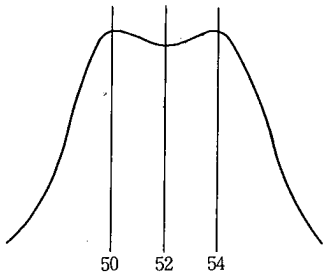
8 - 4 - 3 Band-Pass Filter Adjustment

1. Instruments
   1) Sweep generator.
   2) Marker oscillator.
   3) Oscilloscope.
   4) Detector.



2. Adjusting procedure
   1) Connect the INPUT and GND terminals of the detector to the antenna connector.
   2) Connect the OUTPUT and GND terminals of the detector to the vertical input terminals of the oscilloscope.
   3) Connect the sweep generator and the marker oscillator outputs to Pin 6 of P4 located reverse side of the MAIN board.
   4) Connect the sweep generator's sweep signal output to the horizontal input terminals of the oscilloscope.
   5) Set the sweep width control maximum, and tune the sweep center frequency to 52MHz.
   6) Adjust the oscilloscope horizontal gain control to obtain 1MHz/Division sweep width.
   7) Adjust the sweep generator output level and the oscilloscope vertical gain to make a waveform on the scope such as the following figure.
   8) Set R29 in maximum position.

9) Adjust L13 ~ L17 so that waveform on the scope should be as shown below. 308
10) After adjusting, adjust R29 so that the source voltages of Q6 and Q7 do not differ.



8 - 4 - 4 RF Power Amplifier Adjustment

1. Instrument
   1) RF Wattmeter.
2. Adjusting Procedure
   1) Connect the RF wattmeter to the antenna connector.
   2) Make a short circuit across R6 in the MAIN unit to do not function the ALC. 309
   3) Set the MODE to CW in transmit and key down.
   4) Tune to 52MHz, and adjust L17, L18 and C10 for maximum output power. 310
   5) Tune to 50MHz and 54MHz alternately, and adjust the pitch of L4 (IC-551D: L1 in the FIL unit.) so that the output power does not differ. 311
   6) After adjusting, remove the short circuit across R6.

8 - 4 - 5 Carrier Suppression Adjustment

1. Instrument
   1) RF Voltmeter.
2. Adjusting Procedure
   1) Place the set in the transmit mode in USB or LSB.
   2) Turn the RF POWER and the MIC GAIN controls fully counterclockwise.
   3) Connect the RF voltmeter across the antenna connector and ground.
   4) Adjust R119 and R124 in the MAIN unit for minimum (less than 150mV) in both USB and LSB. 312

8 - 4 - 6 ALC (RF POWER) Adjustment

1. Instrument
   1) RF wattmeter.
2. Adjusting Procedure.
   1) Connect the RF wattmeter to the antenna connector.
   2) Place the set in the transmit mode in CW, and the RF POWER control fully clockwise.
   3) Tune to 52MHz and key down.
   4) Adjust R42 for 12 watts output. (IC-551D: for 80 watts) 313
   5) Turn the RF POWER control fully counterclockwise (just before click OFF), and adjust R41 for 1 watt output. 314
   6) Repeat 4) and 5) several times.
   7) Set the MODE to AM, and turn the RF POWER control counterclockwise to click OFF.
   8) Adjust R43 for 4.5 watts output. (IC-551D: for 40W watts) 315

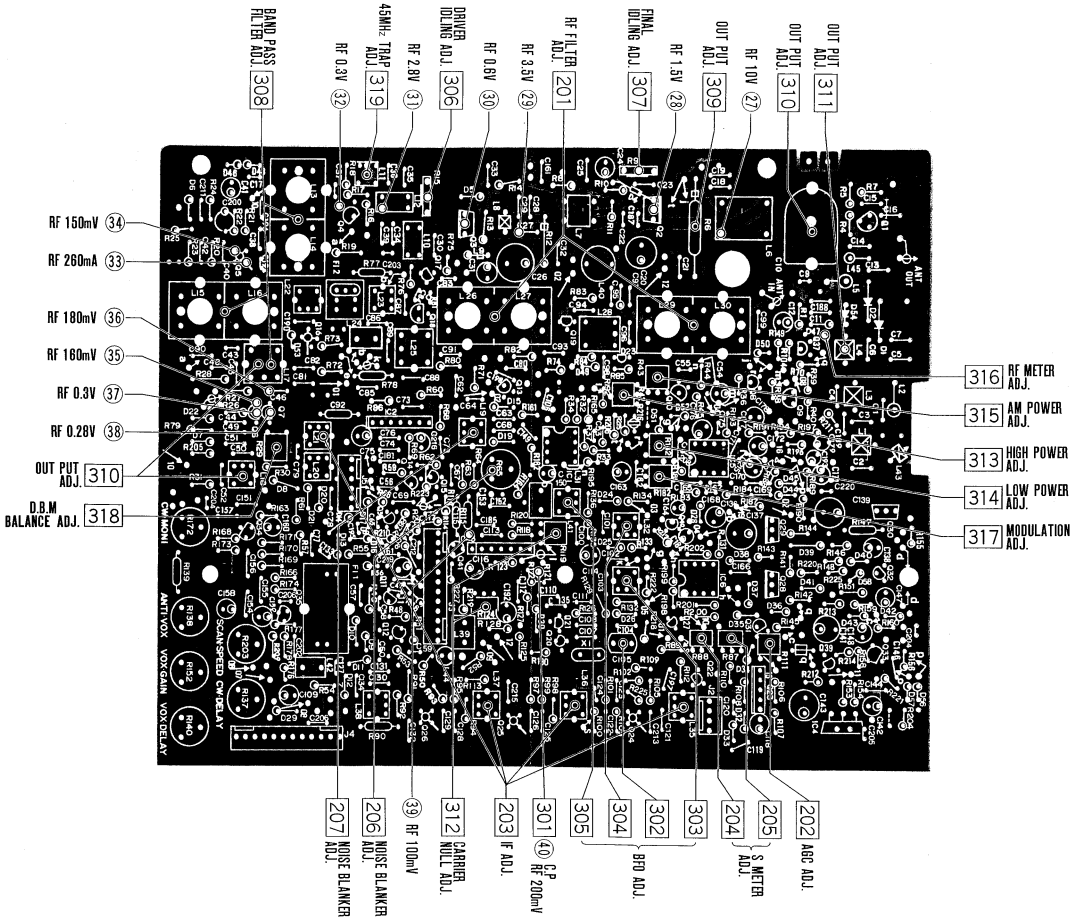
8 - 4 - 7 RF Meter Adjustment

1. Instrument
   1) RF wattmeter.
2. Adjusting Procedure
   1) Place the set in the transmit mode in CW, and the RF POWER control fully clockwise and key down.
   2) Adjust the coupling between D47 and L4, so that the meter indicates 80% on the RF OUT scale. (IC-551D: Adjust R19 in the Auto Power Control Board.) 316

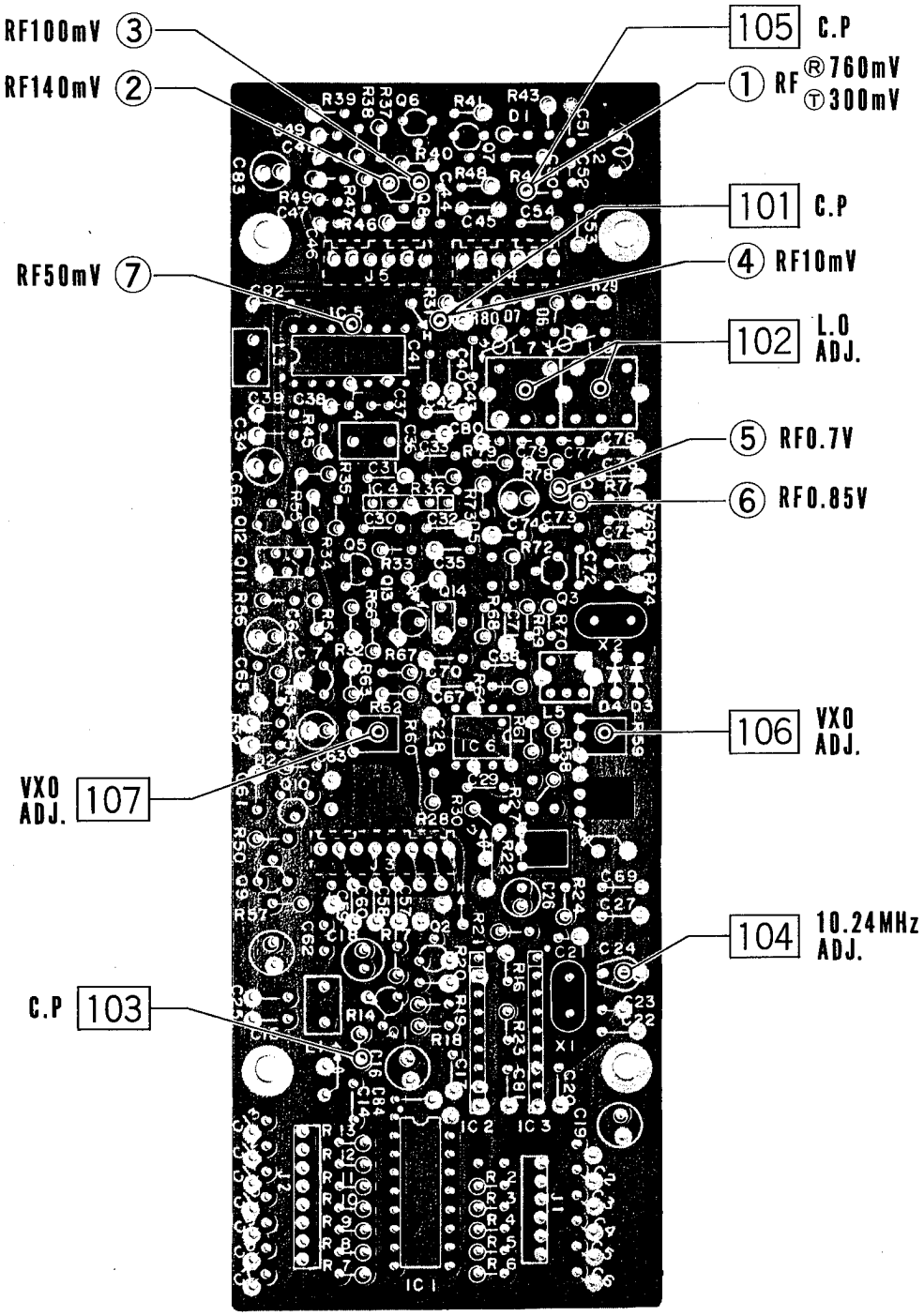
8-4-8 MIC GAIN (Modulation) Adjustment

1. Instruments
   1) RF wattmeter.
   2) AF oscillator.
2. Adjusting Procedure
   1) Connect the RF wattmeter to the antenna connector and the AF oscillator across Pin 1, the input, and Pin 4, ground of the mic connector, and apply an input of 1mV at 1500Hz.
   2) Place the set in the transmit in USB or LSB, and turn the MIC GAIN control fully clockwise.
   3) Make a short circuit across R6.
   4) Adjust R182 for 8 watts output (IC-551D: for 60 watts)
   5) After adjusting, Remove the short circuit across R6.

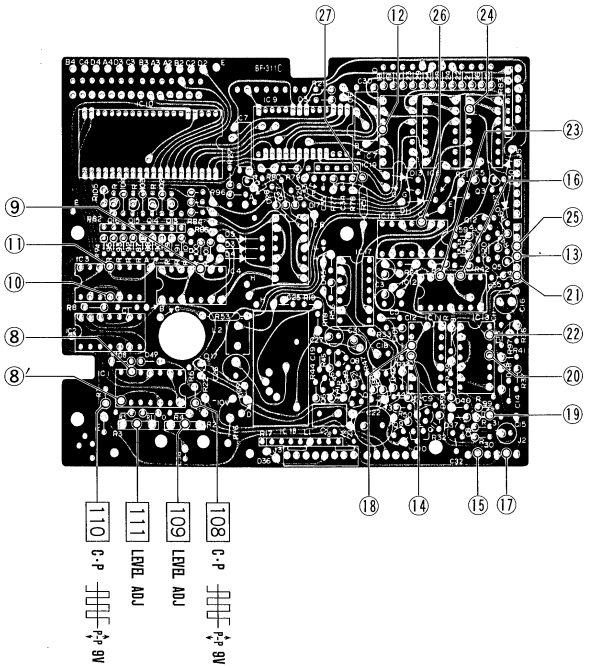
MAIN UNIT


BAND PASS FILTER ADJ. 308
RF 0.3V (32)
45MHz TRAP ADJ. 319
RF 2.8V (31)
DRIVER IDLING ADJ. 306
RF 0.6V (30)
RF 3.5V (29)
RF FILTER ADJ. 201
FINAL IDLING ADJ. 307
RF 1.5V (28)
OUT PUT ADJ. 309
RF 10V (27)
OUT PUT ADJ. 310
OUT PUT ADJ. 311
RF 150mV (34)
RF 260mA (33)
RF 180mV (36)
RF 160mV (35)
RF 0.3V (37)
RF 0.28V (38)
OUT PUT ADJ. 310
D.B.M BALANCE ADJ. 318
316 RF METER ADJ.
315 AM POWER ADJ.
313 HIGH POWER ADJ.
314 LOW POWER ADJ.
317 MODULATION ADJ.
207 NOISE BLANKER ADJ.
206 NOISE BLANKER ADJ.
39 RF 100mV
312 CARRIER NULL ADJ.
203 IF ADJ.
301 40 C.P. RF 200mV
305
304
302
303
BFO ADJ.
204
205
S METER ADJ.
202 AGC ADJ.

PLL UNIT


RF100mV ③
RF140mV ②
RF50mV ⑦
105 C.P
① RF Ⓡ760mV Ⓣ300mV
101 C.P
④ RF10mV
102 L.O ADJ.
⑤ RF0.7V
⑥ RF0.85V
106 VXO ADJ.
VXO ADJ. 107
104 10.24MHz ADJ.
C.P 103

DRIVER UNIT



(8) 9v / 0v — at UP count

(8') 9v / 0v — at DOWN count

(9) 9v / 0v — 0.75ms, 14-15 ms — at UP count / at DOWN count ; L

(10) 7v / 4.5v — 0.5ms — 14-15ms

(11) 9v / 0v — 0.75ms, 14-15 ms

(12) 7ms, 15.2 ms

(13) 8v / 7.2v / 0v — at MS

(14) 9v / 0v — VFO B

(15) 8v / 7.5v / 0v — at VFO B

(16) 9v / 0v — 16s

(17) 8v / 7.5v / 0v — at memory 1-3

(18) 9v / 0v — 32ms — MS/MW on

(19) 9v / 0v — 53ms, 16s, 4.5v — Squelch opens

(20) 6v / 0v — 1ms, 4.5v — Squelch opens

(21) 6v / 0v — Squelch opening

(22) 9v / 0v — Squelch opens — 32ms

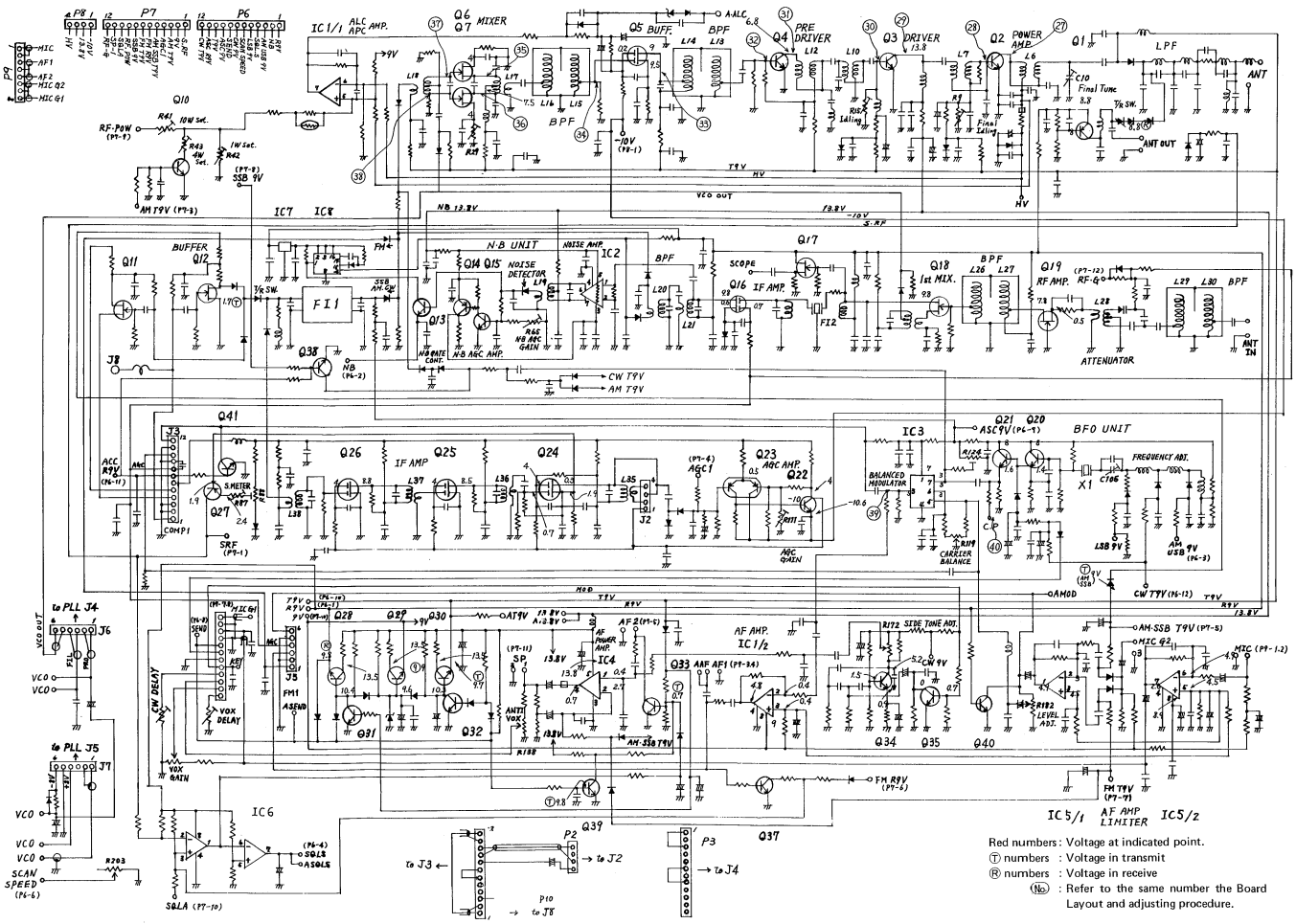
(23) 9v / 0v — 35-40ms — 70-90ms

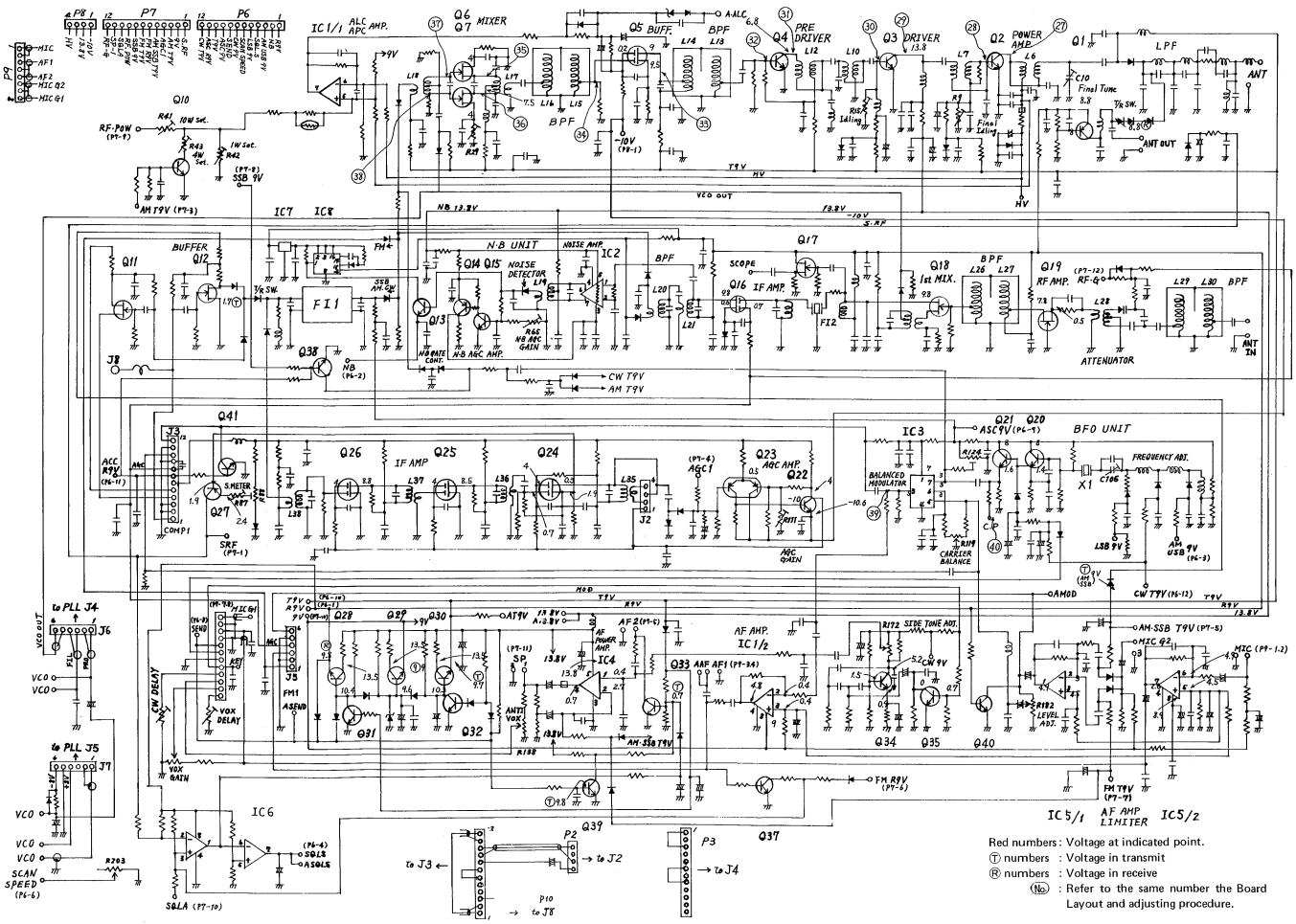
(24) 9v / 0v — 30-40ms — 70-90ms

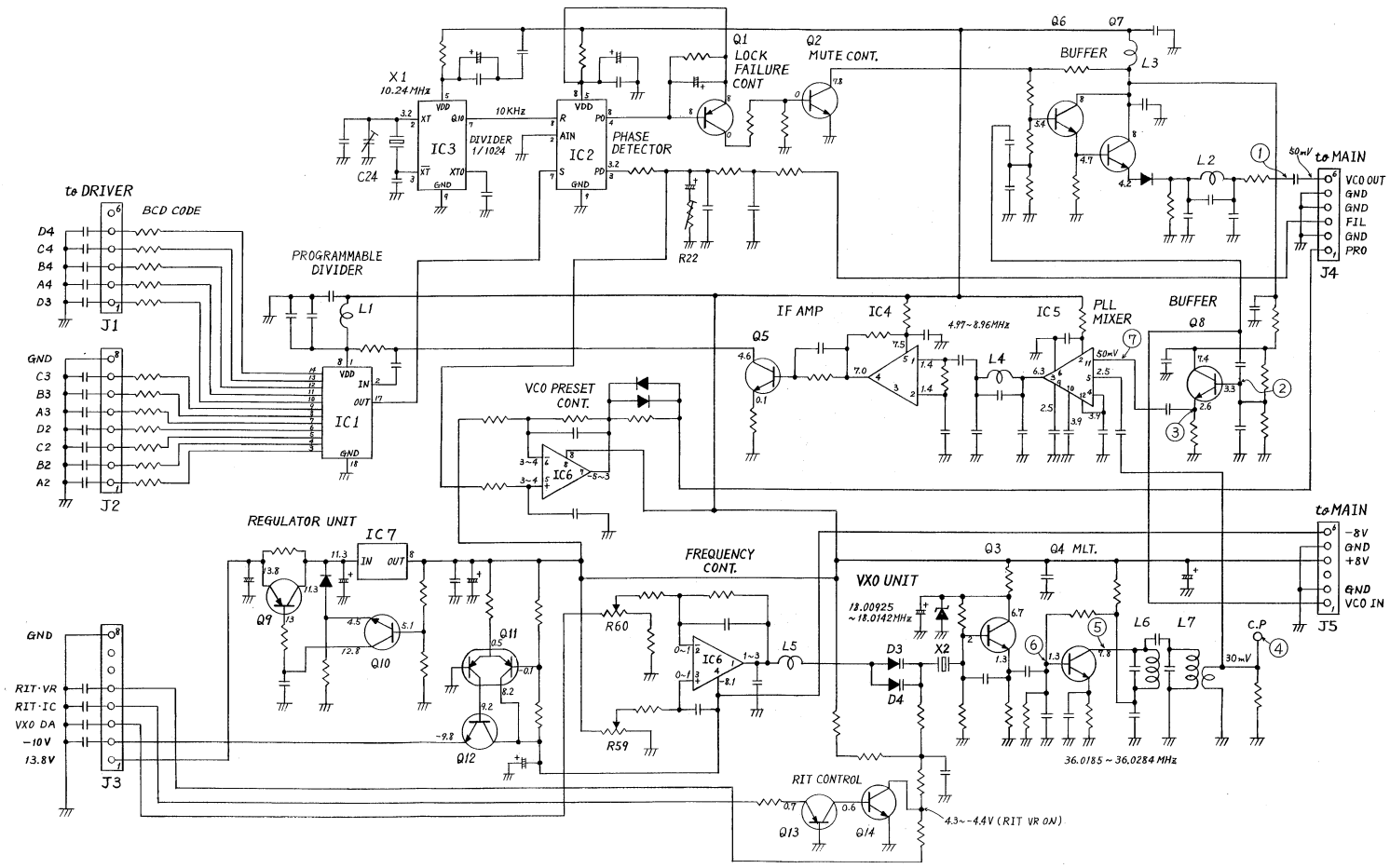
(25) 9v / 0v — RIT SW pushing — 10ms — RIT SW releases

(26) 9v / 0v — RIT SW pushing — 7ms — RIT SW releases

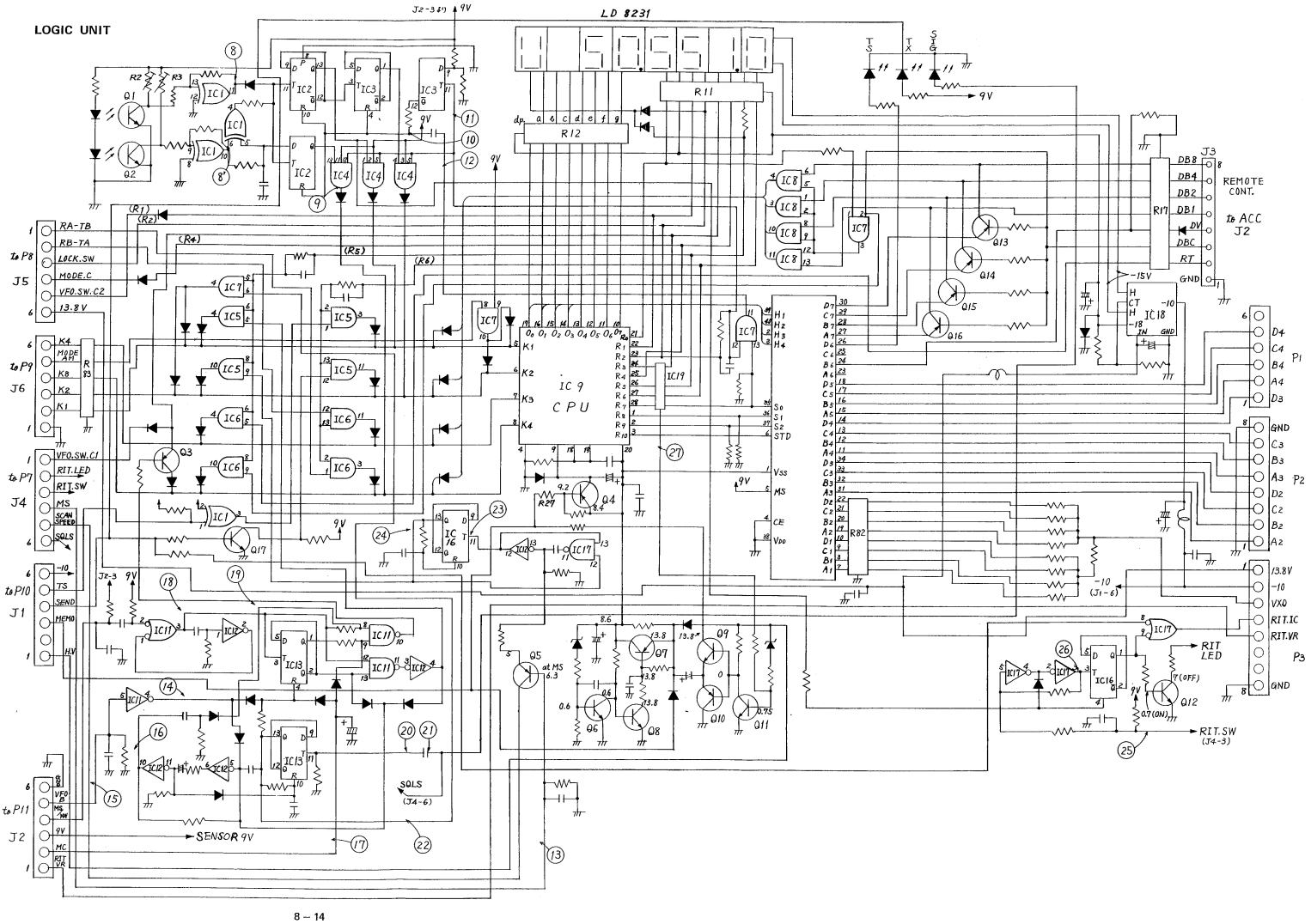
(27) 9v / 0v — 1.16, 0.3, 0.4, 0.2, 0.3, 0.3, 1.35, 1.69, 1.3, 1.01, 2.59, 1.1

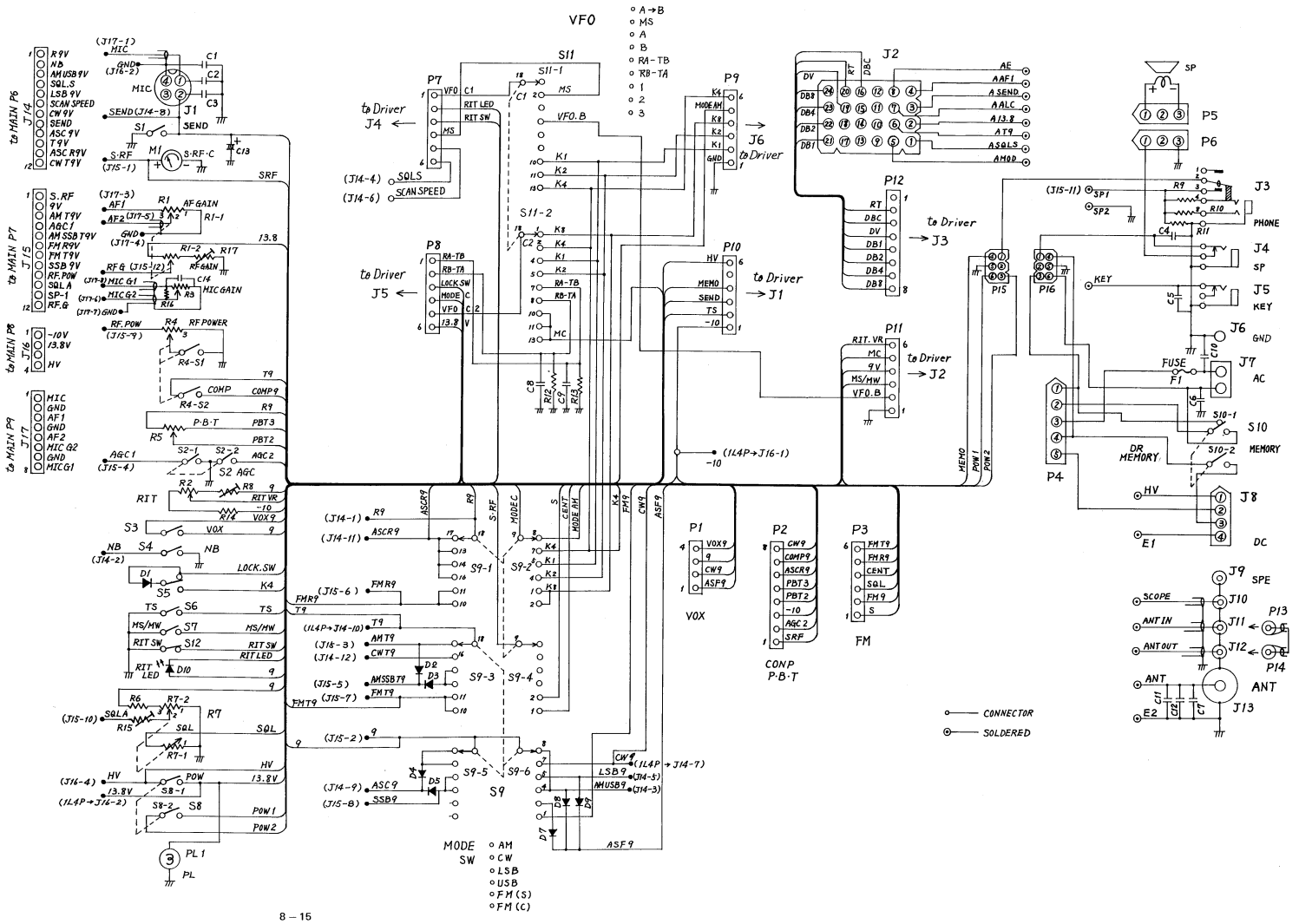

IC1/1 ALC APC AMP.
Q6 Q7 MIXER
Q5 BUFF.
Q4 PRE DRIVER
Q3 DRIVER
Q2 POWER AMP.
Q1
LPF
ANT
ANT OUT
HV
VCO OUT
N-B UNIT
NOISE AMP.
NOISE DETECTOR
IC2
BPF
IF AMP.
1st MIX.
RF AMP.
ATTENUATOR
ANT IN
BUFFER
FI1
FI2
BFO UNIT
IC3
BALANCED MODULATOR
FREQUENCY ADJ.
CARRIER BALANCE
S.METER
COMP1
IF AMP
AGC AMP.
AGC GAIN
SCOPE
to PLL J4
to PLL J5
VCO
VCO
VCO
SCAN SPEED (P6-6)
CW DELAY
VOX DELAY
VOX GAIN
IC6
SOLA (P7-10)
AF AMP.
IC1/2
AF Power AMP.
IC4
SIDE TONE ADJ.
LEVEL ADJ.
IC5/1 AF AMP LIMITER
IC5/2
P2
P3
P10
to J2
to J3
to J4
to J8
Red numbers : Voltage at indicated point.
Ⓣ numbers : Voltage in transmit
Ⓡ numbers : Voltage in receive
(No.) : Refer to the same number the Board Layout and adjusting procedure.


IC1/1 ALC APC AMP.
Q6 Q7 MIXER
Q5 BUFF.
Q4 PRE DRIVER
Q3 DRIVER
Q2 POWER AMP.
Q1
LPF
ANT
ANT OUT
HV
VCO OUT
N-B UNIT
NOISE AMP.
NOISE DETECTOR
IC2
BPF
IF AMP.
1st MIX.
RF AMP.
ATTENUATOR
ANT IN
BUFFER
FI1
FI2
BFO UNIT
IC3
BALANCED MODULATOR
FREQUENCY ADJ.
CARRIER BALANCE
S.METER
COMP1
IF AMP
AGC AMP.
AGC GAIN
SCOPE
to PLL J4
to PLL J5
VCO
VCO
VCO
SCAN SPEED (P6-6)
CW DELAY
VOX DELAY
VOX GAIN
IC6
SOLA (P7-10)
AF AMP.
IC1/2
AF Power AMP.
IC4
SIDE TONE ADJ.
LEVEL ADJ.
IC5/1 AF AMP LIMITER
IC5/2
P2
P3
P10
to J2
to J3
to J4
to J8
Red numbers : Voltage at indicated point.
Ⓣ numbers : Voltage in transmit
Ⓡ numbers : Voltage in receive
(No.) : Refer to the same number the Board Layout and adjusting procedure.

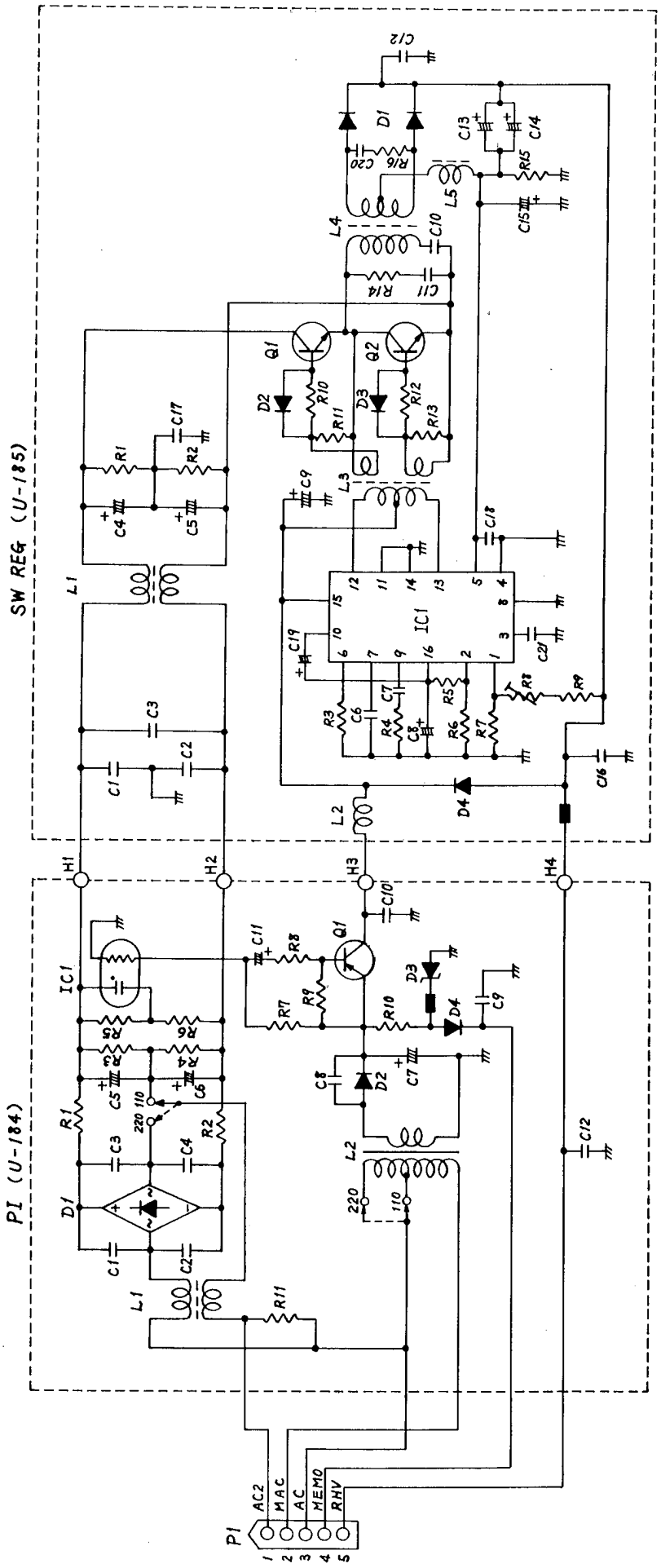

to DRIVER
BCD CODE
D4
C4
B4
A4
D3
J1
GND
C3
B3
A3
D2
C2
B2
A2
J2
PROGRAMMABLE DIVIDER
L1
IC1
VDD
IN
OUT
GND
X1
10.24MHz
C24
IC3
DIVIDER 1/1024
10KHz
IC2
PHASE DETECTOR
R22
Q1
LOCK FAILURE CONT
Q2
MUTE CONT.
Q6
Q7
BUFFER
L3
L2
50mV
to MAIN
VCO OUT
GND
GND
FIL
GND
PRO
J4
IF AMP
IC4
4.97~8.96MHz
IC5
PLL MIXER
Q5
L4
BUFFER
Q8
VCO PRESET CONT.
IC6
REGULATOR UNIT
IC7
IN
OUT
Q9
Q10
Q11
Q12
FREQUENCY CONT.
R60
R59
IC6
L5
VXO UNIT
18.00925 ~ 18.0142MHz
Q3
Q4 MLT.
D3
D4
X2
L6
L7
C.P
30mV
36.0185 ~ 36.0284 MHz
to MAIN
-8V
GND
+8V
GND
VCO IN
J5
GND
RIT·VR
RIT·IC
VXO DA
-10V
13.8V
J3
RIT CONTROL
Q13
Q14
4.3~4.4V (RIT VR ON)

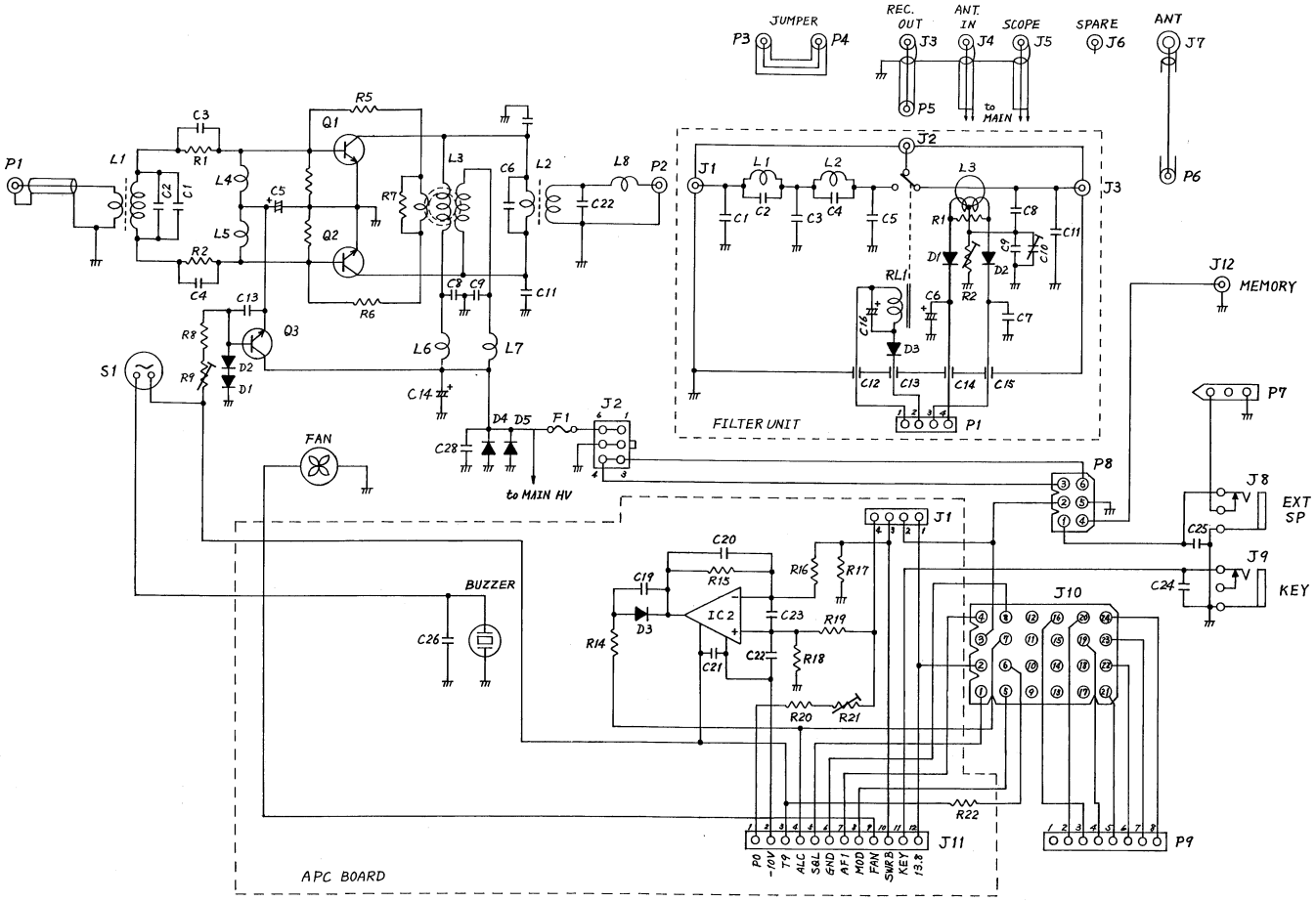
LOGIC UNIT


LD 8231
CPU
IC 9
RA-TB
RB-TA
LOCK.SW
MODE.C
VFO.SW.C2
13.8V
VFO.SW.C1
RIT.LED
RIT.SW
MS
SCAN SPEED
SQLS
TS
SEND
MEMO
HV
WFD
MS SW
9V
MC
RIT VR
SENSOR 9V
SQLS (J4-6)
REMOTE CONT.
to ACC J2
RIT LED
RIT.SW (J4-3)
-10 (J1-6)
0.7 (ON)
7 (OFF)
at MS 6.3

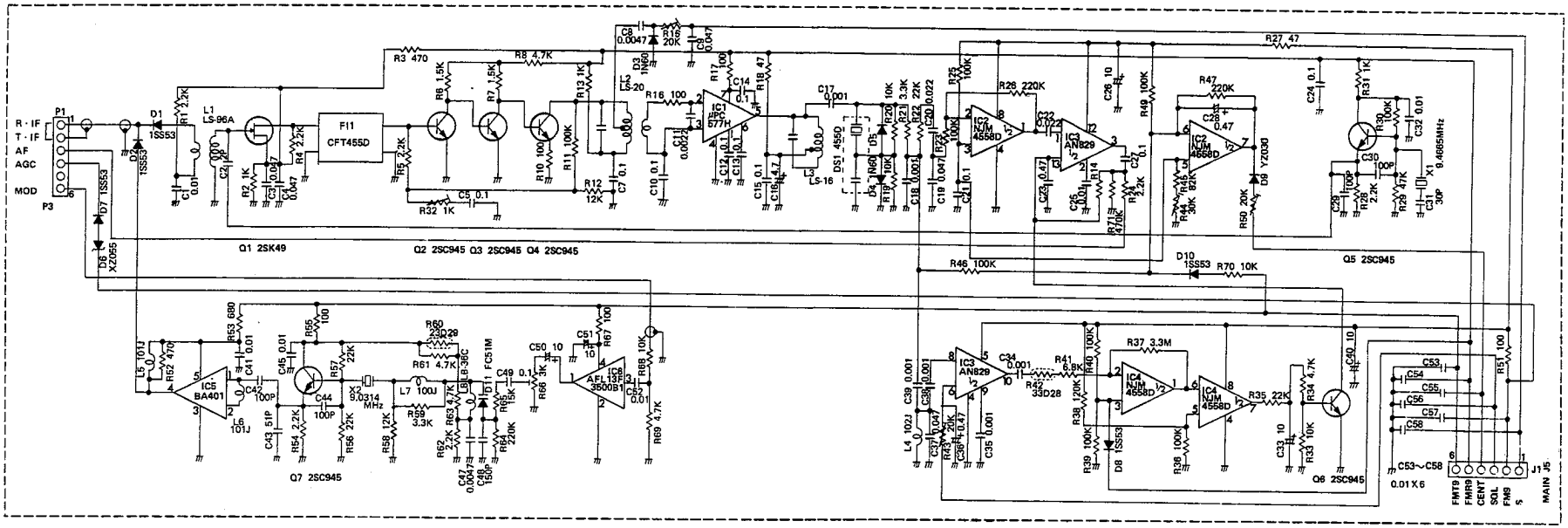

VFO
A→B
MS
A
B
RA-TB
RB-TA
1
2
3
to MAIN P6 J14
R9V
NB
AM USB 9V
SQL.S
LSB 9V
SCAN.SPEED
CW 9V
SEND
ASC 9V
T9V
ASC R9V
CW T9V
to MAIN P7 J15
S.RF
9V
AM T9V
AGC 1
AM SSB T9V
FM R9V
FM T9V
SSB 9V
RF.POW
SQL A
SP-1
RF.G
to MAIN P8 J16
-10V
13.8V
HV
to MAIN P9 J17
MIC
GND
AF1
GND
AF2
MIC G2
GND
MIC G1
(J17-1) MIC
GND (J16-2)
MIC
C1
C2
C3
J1
SEND (J14-8)
SEND
S1
M1
S.RF·C
C13
S.RF (J15-1)
SRF
(J17-3) AF1
AF2 (J17-5)
GND (J17-4)
R1
AF GAIN
R1-1
R1-2
R17
13.8
RF G (J15-12)
(J17-2) MIC G1
(J17-6) MIC G2
(J17-7) GND
C14
R16
R3
RF GAIN
MIC GAIN
RF.POW (J15-9)
R4
RF POWER
R4-S1
T9
COMP
R4-S2
COMP9
R9
R5
P·B·T
PBT3
PBT2
AGC1 (J15-4)
S2-1
S2-2
AGC2
S2 AGC
R2
R8
RIT VR
-10
RIT
R14
VOX9
S3
VOX
9
NB
S4
NB (J14-2)
D1
S5
LOCK.SW
K4
TS
S6
TS
MS/MW
S7
MS/MW
RIT SW
S12
RIT SW
RIT LED
D10
RIT LED
9
R6
R7-2
(J15-10) SQL A
R15
RT
SQL
R7-1
HV
POW
13.8V
(J16-4) HV
13.8V
(1L4P→J14-2)
S8-1
S8-2
S8
POW1
POW2
PL1
PL
S11
S11-1
MS
VFO.B
S11-2
K1
K2
K4
MC
P7
VFO
C1
RIT LED
RIT SW
MS
to Driver J4
(J14-4) SQLS
(J14-6) SCAN.SPEED
P8
RA-TB
RB-TA
LOCK.SW
MODE
VFO
13.8
to Driver J5
P9
K4
MODE AM
K2
K1
GND
to Driver J6
P10
HV
MEMO
SEND
TS
-10
to Driver J1
(1L4P→J16-1) -10
C8
R12
C9
R13
P11
RIT.VR
MC
9V
MS/MW
VFO.B
to Driver J2
P12
RT
DBC
DV
DB1
DB2
DB4
DB8
to Driver J3
J2
AE
AAF1
A SEND
AALC
A13.8
AT9
ASQLS
AMOD
SP
P5
P6
J3
PHONE
J4
SP
J5
KEY
J6
GND
J7
AC
FUSE
F1
S10
MEMORY
DR MEMORY
J8
DC
E1
P15
P16
P4
MEMO
POW1
POW2
J9
SPE
J10
J11
J12
P13
P14
ANT
J13
SCOPE
ANT IN
ANT OUT
E2
C11
C12
C7
R9
R10
R11
C4
C5
C6
C10
(J15-11) SP1
SP2
(J14-1) R9
(J14-11) ASCR9
ASCR9
R9
S·RF
MODE C
S
CENT
MODE AM
K4
FM9
CW9
ASF9
S9-1
S9-2
S9-3
S9-4
S9-5
S9-6
S9
(J15-6) FMR9
FMR9
T9
(1L4P→J14-10) T9
(J16-3) AM T9
(J14-12) CW T9
(J15-5) AMSSB T9
(J15-7) FM T9
FM T9
(J15-2) 9
D2
D3
D4
D5
D6
D7
D8
(J14-9) ASC 9
(J15-8) SSB 9
CW 9 (1L4P→J14-7)
LSB 9 (J14-5)
AMUSB 9 (J14-3)
ASF 9
MODE SW
AM
CW
LSB
USB
FM (S)
FM (C)
P1
VOX9
9
CW9
ASF9
VOX
P2
CW9
COMP9
ASCR9
PBT3
PBT2
-10
AGC 2
SRF
CONP P·B·T
P3
FM T9
FM R9
CENT
SQL
FM9
S
FM
CONNECTOR
SOLDERED

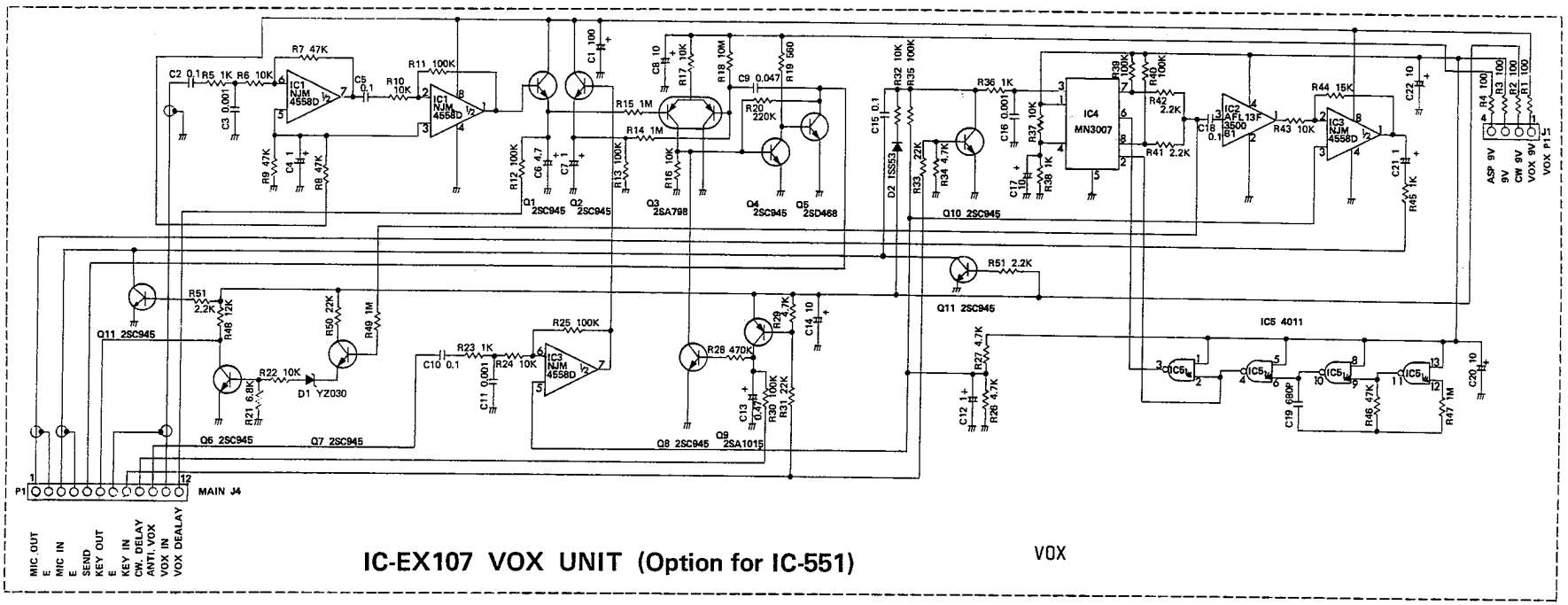
POWER SUPPLY UNIT SCHEMATIC DIAGRAM




JUMPER
P3
P4
REC. OUT
ANT. IN
SCOPE
SPARE
ANT
J3
J4
J5
J6
J7
P5
to MAIN
P6
J2
J1
L1
L2
L3
C1
C2
C3
C4
C5
C8
C11
D1
D2
C9
C10
R1
R2
RL1
C6
C7
C14
D3
C12
C13
C14
C15
P1
FILTER UNIT
J3
J12
MEMORY
P7
J8
EXT SP
J9
KEY
P8
C25
C24
P1
R5
Q1
Q2
C3
R1
L4
L5
C5
R7
L3
C6
L2
L8
P2
C22
R2
C4
R6
C8
C9
C11
C13
Q3
R8
R9
D2
D1
L6
L7
C14
S1
FAN
C28
D4
D5
F1
J2
to MAIN HV
J1
C20
R15
C19
D3
IC2
C23
R16
R17
R19
R14
C22
C21
R18
R20
R21
BUZZER
C26
J10
R22
J11
P9
P0
-10V
T9
ALC
SGL
GND
AF1
MOD
FAN
SMRB
KEY
13.8
APC BOARD

IC-EX106 FM UNIT (Option for IC-551/551D)

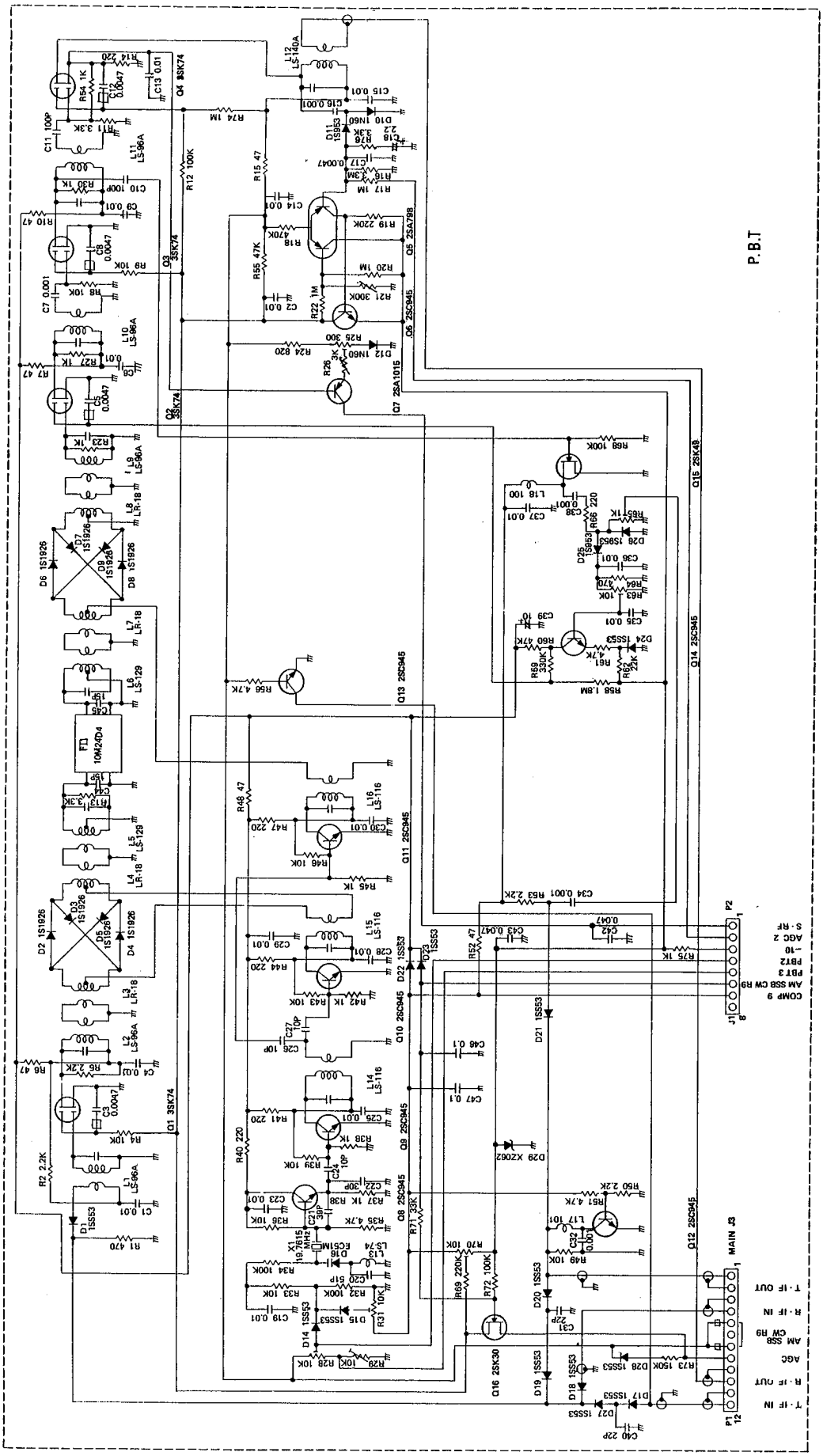




IC-EX107 VOX UNIT (Option for IC-551)

VOX

IC-EX108 PASS BAND TUNING UNIT (Option for IC-551)



MAIN UNIT IC IN TRANSMIT MODE (USB)

IC No.	PIN No.														Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
IC1	4.8	0.4	4.4	GND	7.3	7.1	8.2	9.0							APC, ALC Cont.
IC2	3.1	3.1	0	GND	10.3	13.5	13.5								Noise Amp.
IC3	7.0	6.2	5.6	GND	3.2	3.2	3.2								Balanced Modulator
IC4	0.4	2.7	GND	0.7	13.8										AF Power Amp.
IC5	4.9	3.0	4.5	GND	4.5	4.9	2.6	8.9							AF Amp, Limiter
IC6	0.1	0	0	GND	0	0	0	0							Scan-Stop Detector

MAIN UNIT IC IN RECEIVE MODE (USB, Squelch opened)

IC No.	PIN NO.														Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
IC1	4.8	0.4	4.4	GND	7.3	7.1	8.2	9.0							AF Amp.
IC2	3.1	3.1	0	GND	10.3	13.5	13.5								Noise Amp.
IC3	7.0	6.2	5.6	GND	3.2	3.2	3.2								Demodulator
IC4	0.4	0.7	GND	7.0	13.8										AF Power Amp.
IC5	4.9	3.0	4.5	GND	4.5	4.9	2.6	8.0							AF Amp, Limiter
IC6	1.3	0.6	0.7	GND	1.3	1.3	7.9	9.7							Scan-Stop Detector

PLL UNIT IC

IC No.	PIN No.																		Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
IC1	8.0	2.7	*	*	*	*	*	*	*	*	*	*	*	*	NC	NC	0	GND	Programmable Div.
IC2	8.0	GND	3.2	8.0	8.0	0	0	3.6	GND										Phase Detector
IC3	2.6	3.2	3.2	0	7.1	0	0	3.5	GND										Oscillator Divider
IC4	1.4	1.4	GND	7.0	7.5														IF Amp.
IC5	0	7.6	6.3	3.9	2.5	GND	0	0	2.5	3.9	3.9	3.9	6.8	0					PLL Mixer
IC6	1~3	0~1	0~1	−8.1	3~4	3~4	−5~−3	8.0											VCO Preset Frequency Cont
IC7	11.2	GND	8.0																Regulator

* 7.4V or 0V according to operating frequency

VOLTAGE CHART

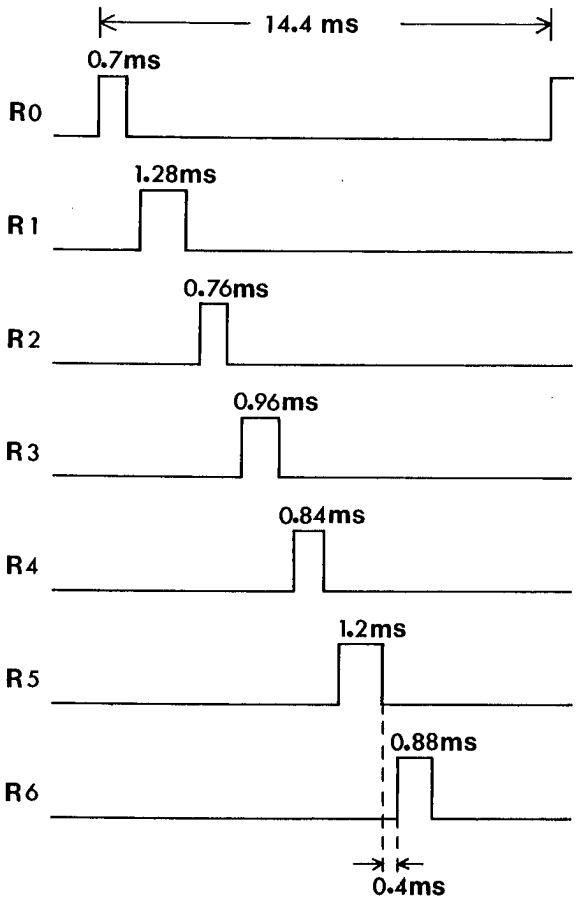
NOTE: Measuring instrument is a 50KΩ/V multimeter
In the USB mode and RF POWER control in the COMP OFF position

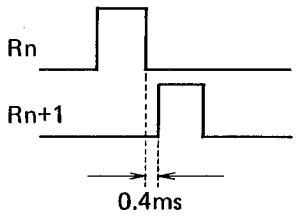
Unit	Q No.	TRANSMIT				RECEIVE				Remarks
		Base or Gate 1	Gate 2	Collector or Drain	Emitter or Source	Base or Gate 1	Gate 2	Collector or Drain	Emitter or Source	
PLL	Q 1	8.0		0	8.0	7.2		7.8	7.8	Lock Failure Det. (UN LOCK)
PLL	Q 2	0		7.8	GND	0.7		0	GND	Mute Control
PLL	Q 3	2.0		6.7	1.3					Crystal Oscillator
PLL	Q 4	1.3		7.8	1.0					Multiplier
PLL	Q 5	0.9		4.6	0.1					IF Amp.
PLL	Q 6	5.4		8.0	4.7	0		8.0	0	Buffer (UN LOCK)
PLL	Q 7	4.7		8.0	4.2	0		8.0	0	Buffer (UN LOCK)
PLL	Q 8	3.3		7.4	2.6					Buffer
PLL	Q 9	13.0		11.3	13.8					Regulator
PLL	Q10	5.1		12.8	4.5					Regulator
PLL	Q11	0.1 GND		−8.2 −9.2	−9.2	0.5				Regulator
PLL	Q12	−9.2		−8.2	−9.8					Regulator
PLL	Q13	GND		0.6	0.7	GND		0~−2.0	0	RIT (ON)
PLL	Q14	0.6		0	GND	0~−2.0		4.3~−4.4	GND	RIT (VR ON)
VCO	Q 1	0		6.5	2.3					
MAIN	Q 1	0		0	0	8.0		8.8	8.8	T/R Switch
MAIN	Q 2	0.7		13.8	GND	0		13.8	GND	Power Amp.
MAIN	Q 3	0.7		13.8	GND	0		13.8	GND	Driver
MAIN	Q 4	0.7		6.8	GND	0		0	GND	Pre-Driver
MAIN	Q 5	0	0.2	0.9	0.5	0	0.2	0	0.5	Buffer
MAIN	Q 6	0		7.5	4.0	0		0	0	Tx Mixer
MAIN	Q 7	0		7.5	4.0	0		0	0	Tx Mixer
MAIN	Q10	0		1.2	GND	0		1.2	GND	APC. ALC Buffer
MAIN	Q11	0		0	0	0		0	0	Buffer
MAIN	Q12	0		1.7	0	0		0	0	Buffer
MAIN	Q13	0		0	0	0		6.6	0	Noise Blanker Gate Control
MAIN	Q14	10.4		0	0	10.2		10.2	0	N.B Cont.
MAIN	Q15	0		10.2	0	0		10.2	0	N.B AGC Amp.
MAIN	Q16	0	0	0	0	0	0.7	9.8	0.6	IF Amp.
MAIN	Q17	0		0	0	0		9.8	0.4	Buffer
MAIN	Q18	0		0	0	0		9.8	0	1st Mixer
MAIN	Q19	GND		0	0	GND		7.8	0.5	RF Amp.
MAIN	Q20	1.6		8.0	1.4	1.6		8.0	1.4	BFO OSC.
MAIN	Q21	1.9		8.0	1.6	1.9		8.0	1.6	Buffer
MAIN	Q22	−10.1		4.0	−10.6	−10.1		4.0	−10.6	AGC Amp.

Unit	Q No.	TRANSMIT				RECEIVE				Remarks
		Base or Gate 1	Gate 2	Collector or Drain	Emitter or Source	Base or Gate 1	Gate 2	Collector or Drain	Emitter or Source	
MAIN	Q23	0 0		−10.0 −10.5	0.5	0 0		−10.0 −10.5	0.5	AGC Amp.
MAIN	Q24	0	0.4	0	0	0.7	4.0	9.3	1.9	IF Amp.
MAIN	Q25	0	0.4	0	GND	0	4.0	8.5	GND	IF Amp.
MAIN	Q26	0	0.7	0	0	0	4.0	8.8	0	IF Amp.
MAIN	Q27	0		0	0	1.9		0	2.4	S. Meter Amp.
MAIN	Q28	0		13.5	0	10.4		13.5	9.8	Regulator
MAIN	Q29	9.6		13.5	9.0	9.6		13.5	9.0	Regulator
MAIN	Q30	10.3		13.5	9.7	0		13.5	0	Regulator
MAIN	Q31	0.7		0	GND	0.2		10.4	GND	T/R Switch
MAIN	Q32	0.2		10.3	GND	0.7		0	GND	T/R Switch
MAIN	Q33	0.7		0	GND	0.3		0	GND	SQL Cont.
MAIN	Q34	1.5		5.2	0.9	1.5		5.2	0.9	CW (Key opened)
MAIN	Q35	0.7		0	GND	0.7		5.2	GND	CW (Key opened)
MAIN	Q37									SQL Cont.
MAIN	Q38	0.7		0	GND	0.7		0	GND	
MAIN	Q39	0		9.8	GND	0.7		0	GND	Regulator
MAIN	Q40	0		0	GND	0.7		0	GND	T/R Switch
DRIVER	Q 4					9.2		0	8.4	Regulator
DRIVER	Q 5					6.3		0	5	at Memory Scan
DRIVER	Q 6					0.6		0.6	0	Regulator
DRIVER	Q 7					13.8		8.6	13.8	Regulator
DRIVER	Q 8					0.65		13.8	0	Regulator
DRIVER	Q 9					0		13.8	0	Regulator
DRIVER	Q10					0		0	0	Regulator
DRIVER	Q11					0.75		0	0	Regulator
DRIVER	Q12					0.7		0	0	RIT (ON)
DRIVER	Q12					0		7.0	0	RIT (OFF)

NOTE:
Other devices work in C-MOS level and with pulse signals, so the voltages can not be measured with a 50KΩ/V multimeter.
The function of the CPU is identified with reading the relationship between the R output and the K input signals.
The relationship between the R output and the K input signals can be checked with a dual trace oscilloscope, and also the level of these signals can be measured with the scope.
The driver unit consists of several C-MOS IC's and P-MOS IC's. P-MOS IC's are IC9 TMS1099 CPU and IC10 TMS1025 I/O port, and the others are C-MOS IC's.
Refer to the threshold level chart for measuring these levels.

R OUTPUT TIMING CHART



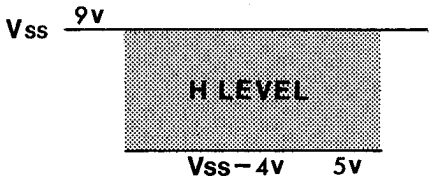


Each R output has a 0.4 milliseconds interval.

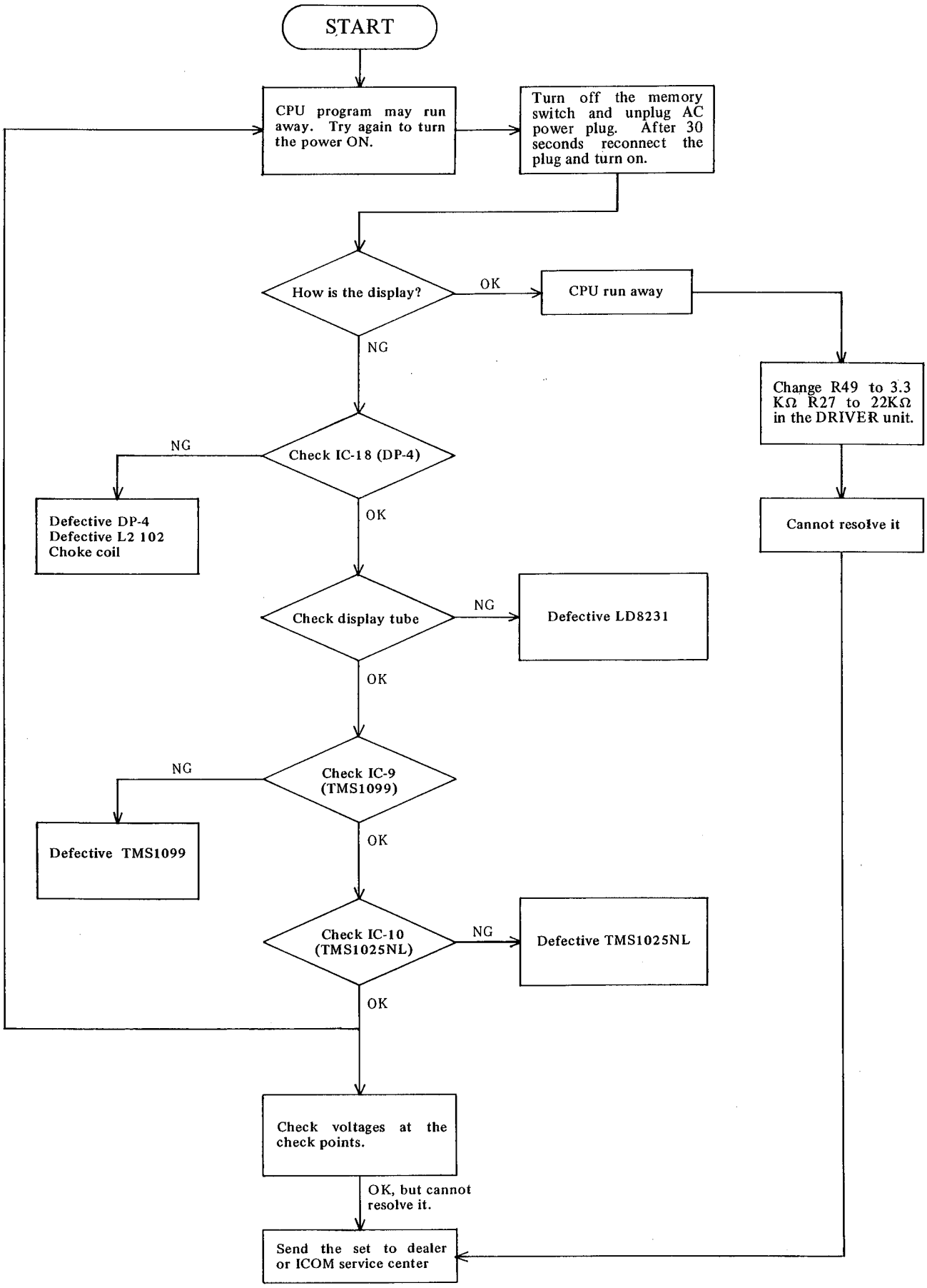
THRESHOLD LEVEL CHART

C-MOS IC

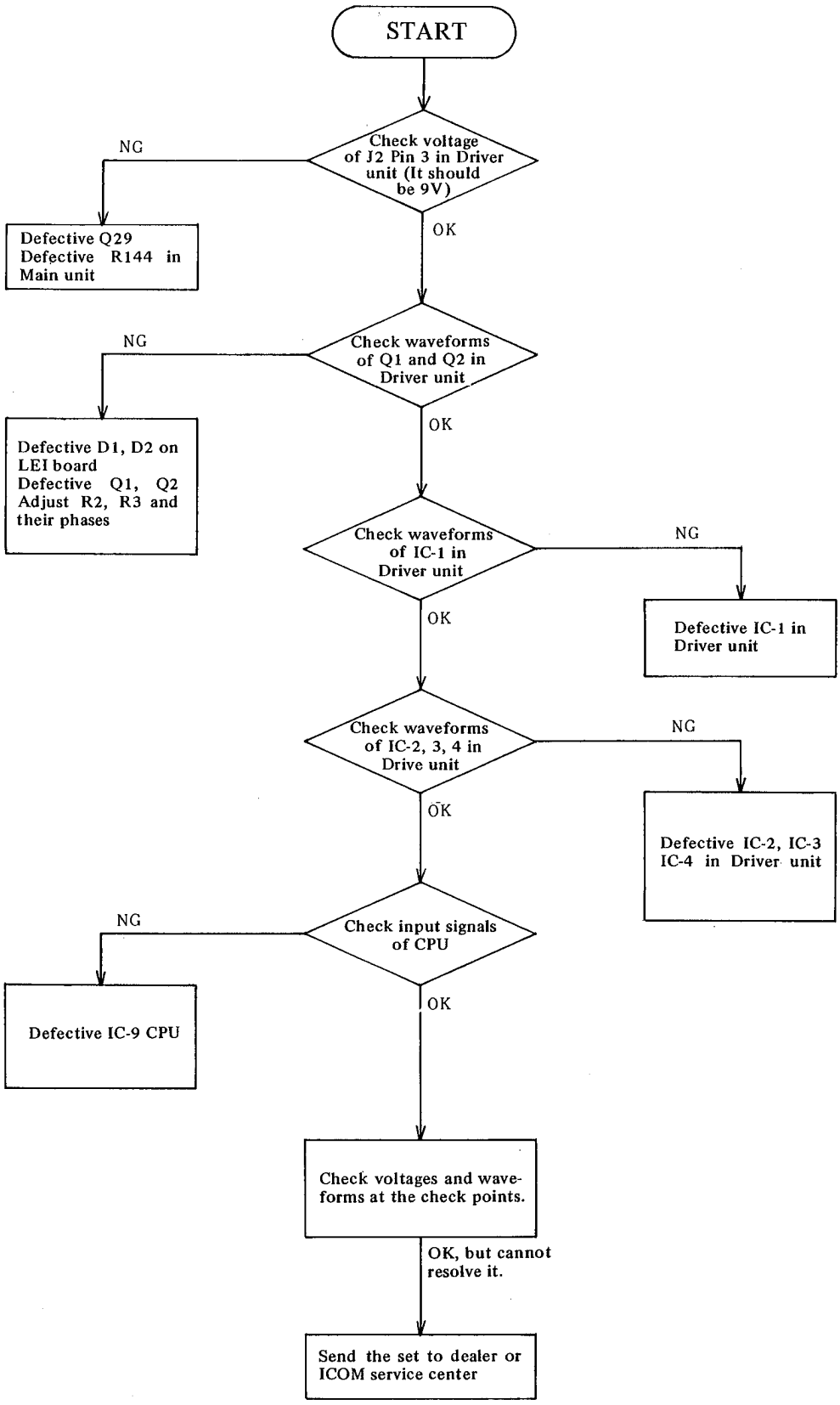
P-MOS IC



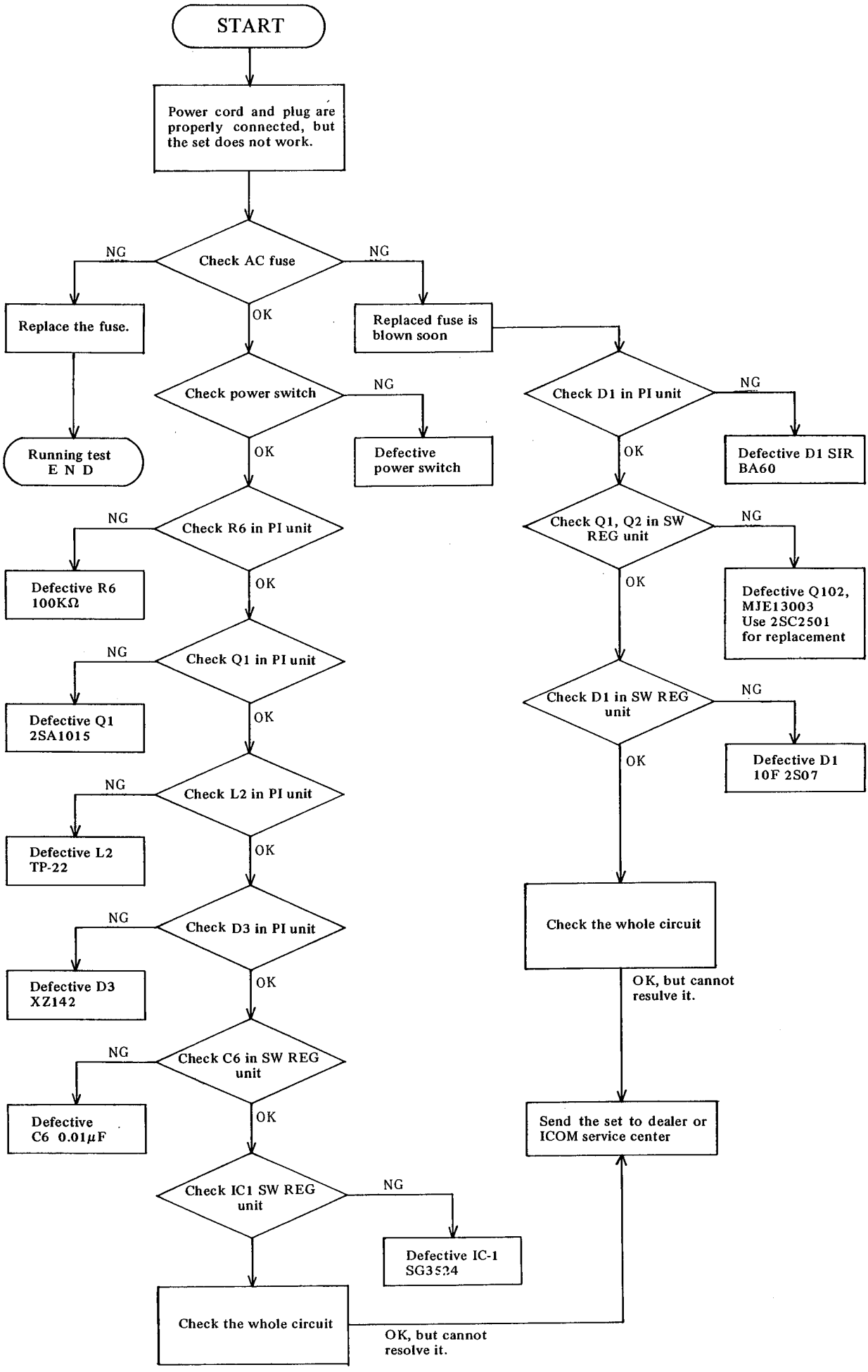
Display fails to illuminate.
Abnormal figure is displayed.



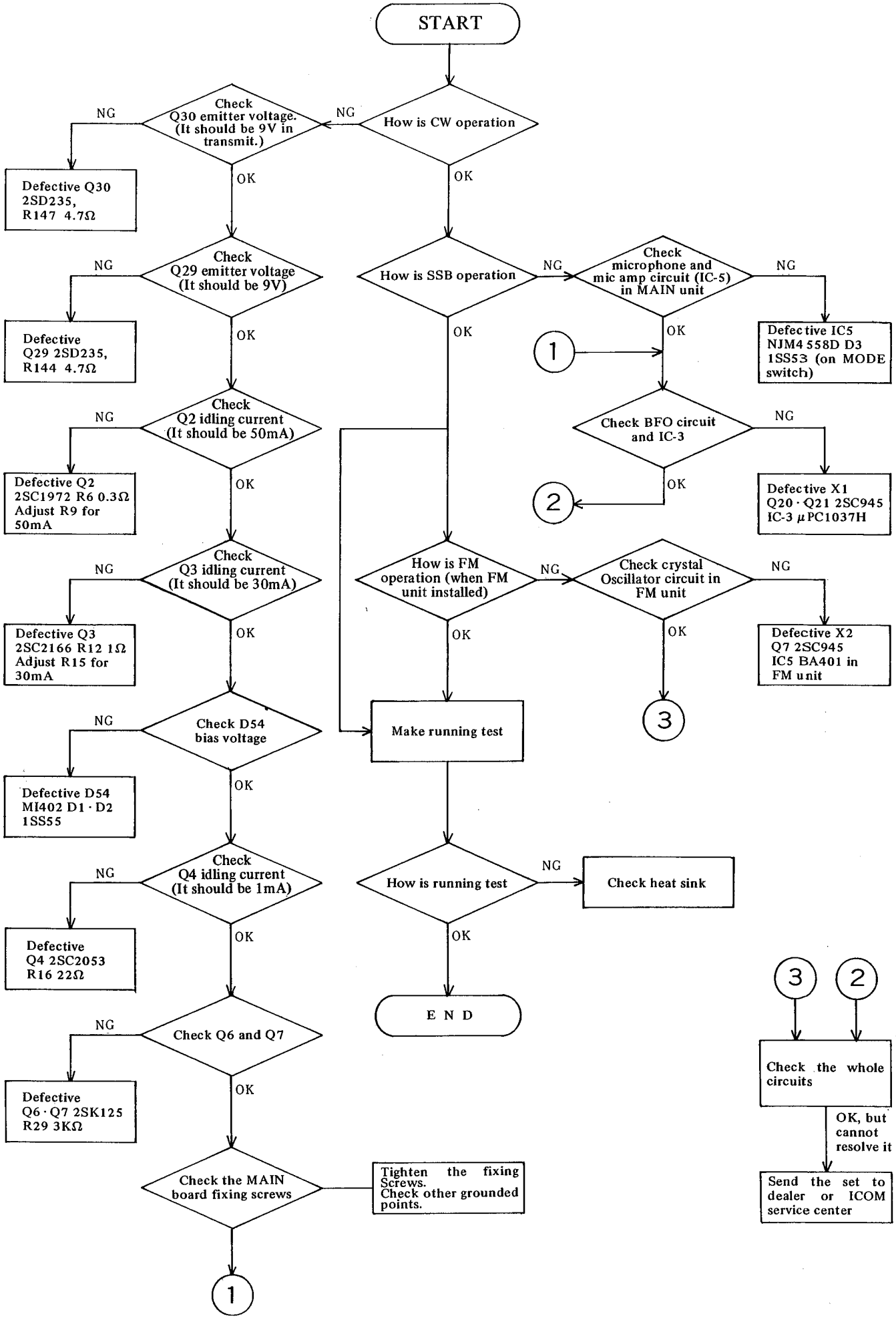
Display does not change



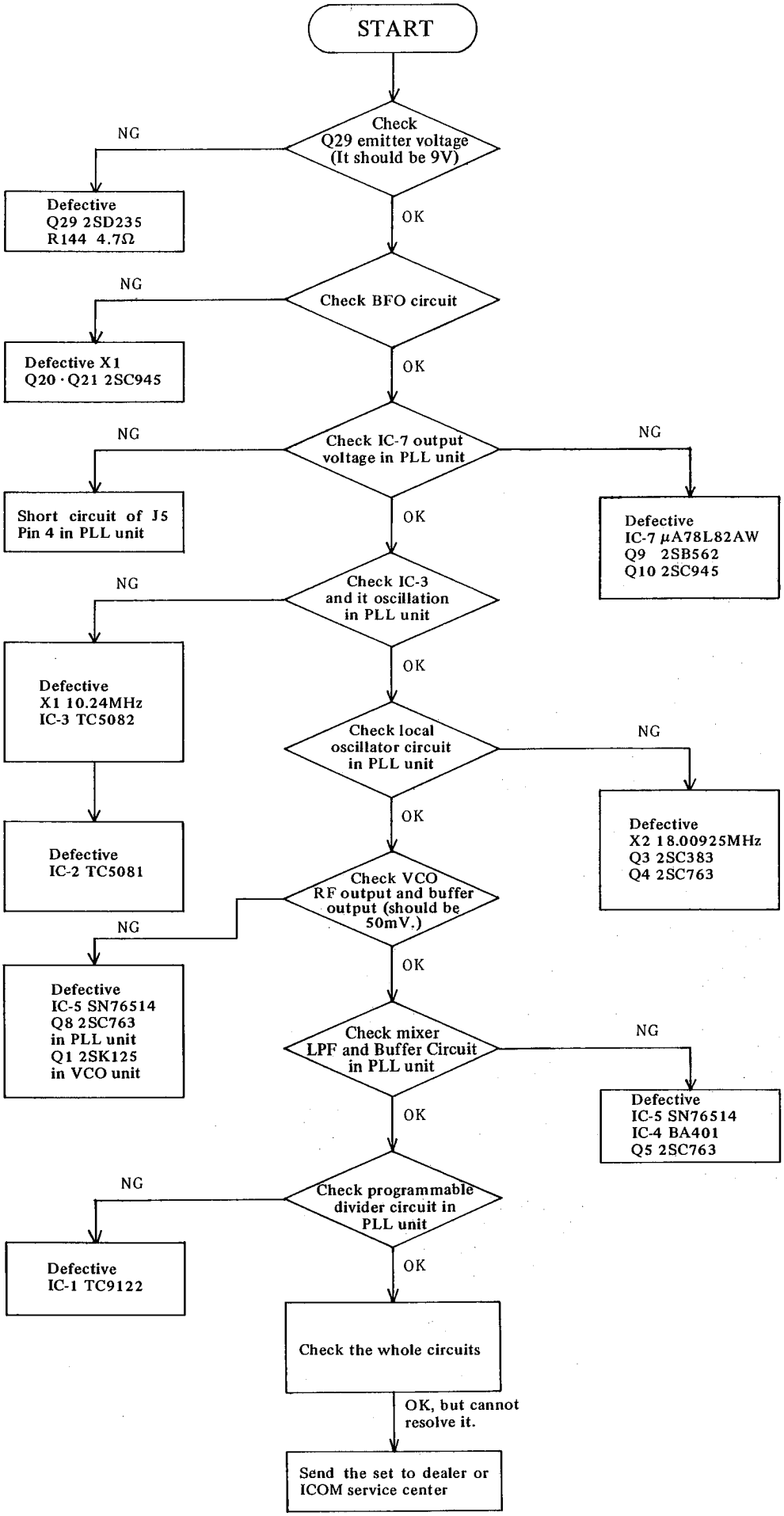
The set does not work with AC power source.



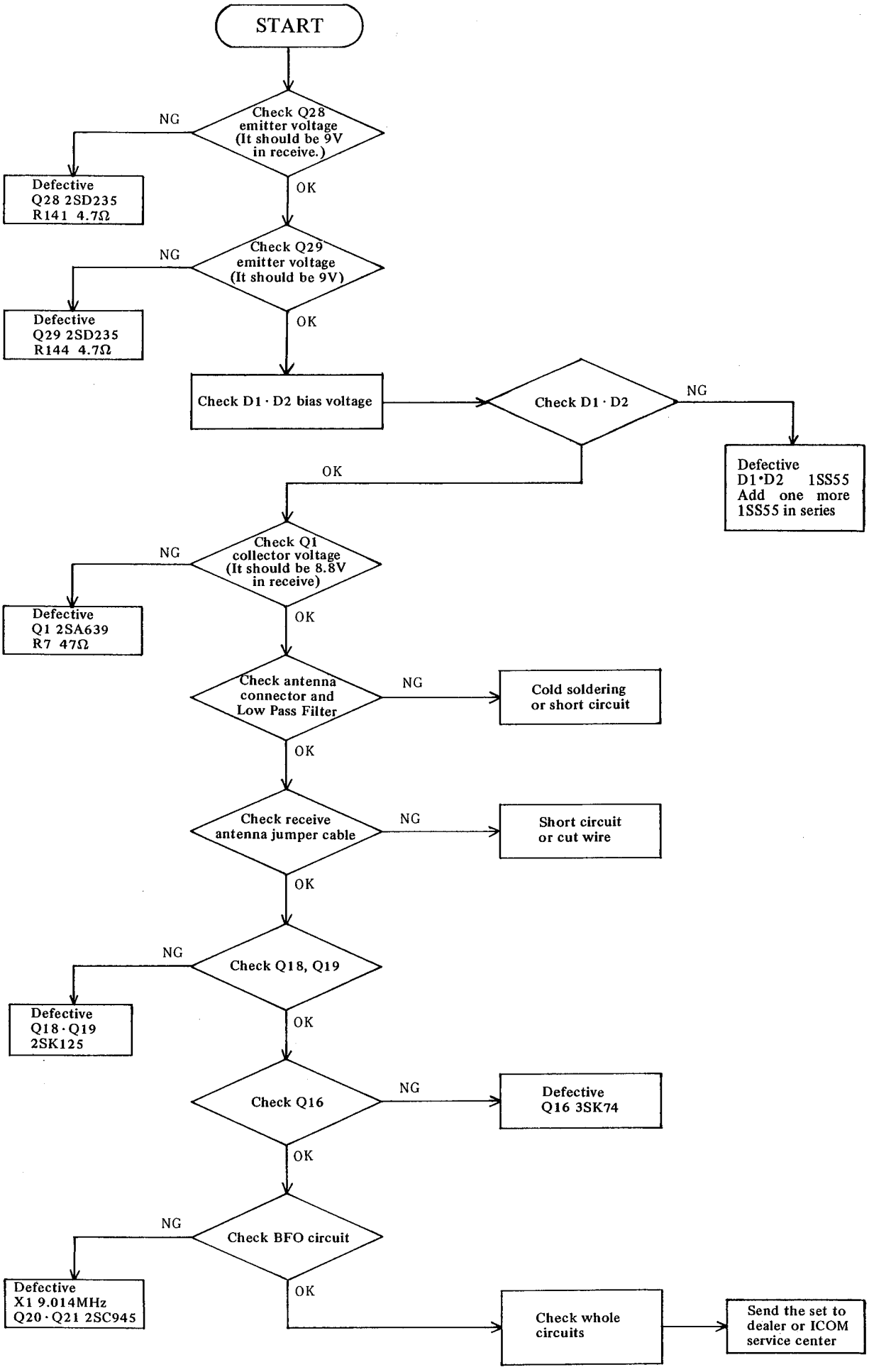
No output power



No receive and transmit



No receive


START
Check Q28 emitter voltage (It should be 9V in receive.)
NG
Defective Q28 2SD235 R141 4.7Ω
OK
Check Q29 emitter voltage (It should be 9V)
NG
Defective Q29 2SD235 R144 4.7Ω
OK
Check D1 · D2 bias voltage
Check D1 · D2
NG
Defective D1•D2 1SS55 Add one more 1SS55 in series
OK
Check Q1 collector voltage (It should be 8.8V in receive)
NG
Defective Q1 2SA639 R7 47Ω
OK
Check antenna connector and Low Pass Filter
NG
Cold soldering or short circuit
OK
Check receive antenna jumper cable
NG
Short circuit or cut wire
OK
Check Q18, Q19
NG
Defective Q18 · Q19 2SK125
OK
Check Q16
NG
Defective Q16 3SK74
OK
Check BFO circuit
NG
Defective X1 9.014MHz Q20 · Q21 2SC945
OK
Check whole circuits
Send the set to dealer or ICOM service center

TMS1025 (MICROCOMPUTER I/O EXPANDERS)

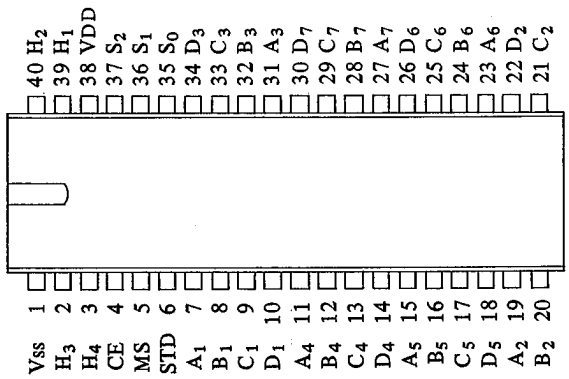
MAXIMUM RATINGS (Ta = 25°C)

SYMBOL	DESCRIPTION	RATINGS	UNIT
V_{OUT}	Voltage applied to device terminal	−20	V
V_{DD}	Supply Voltage, V_{DD}	−20 ~ 3	V
T_{OPR}	Operating free air temperature range	0 ~ 70	°C
T_{STG}	Storage temperature range	−55 ~ 150	°C

TYPICAL OPERATION

SYMBOL	DESCRIPTION	MIN.	TYP.	MAX.	UNIT
V_{DD}	Supply Voltage	− 14	−15	− 18	V
V_{IH}	High Level Input Voltage	−1.3		0	V
V_{IL}	Low Level Input Voltage	V_{DD}		− 4.0	V
V_{OH}	High Level Output Voltage (Io=−2.0mA)	−0.75		−0.4	V
I_{OL}	Low Level Output Current (V_{OL}=V_{DD})			−100	μA

PIN CONNECTION

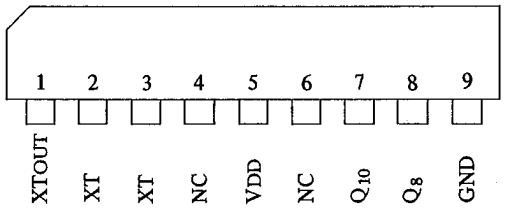


TC-5082 (OSCILLATOR AND 10 STAGE DIVIDER)

MAXIMUM RATINGS (Ta = 25°C)

SYMBOL	DESCRIPTION	RATINGS	UNIT
V_{DD}	Supply Voltage	10	V
V_{IN}	Input Voltage	−0.3 ~ V_{DD} +0.3	V
TOPR	Operating Temperature	−30 ~ 75	°C
TSTR	Storage Temperature	−55 ~ 125	°C

PIN CONNECTION

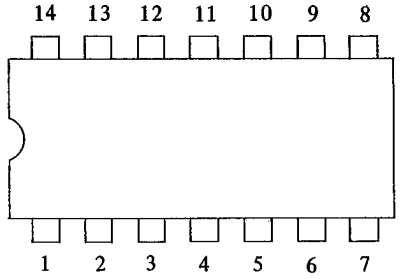


TC-4013 (DUAL D-TYPE FLIP FLOP)
TC-4030 (QUAD EXCLUSIVE-OR GATE)
TC-4069 (HEX. INVERTER)
TC-4081 (QUAD 2-INPUT POSITIVE AND GATE)

MAXIMUM RATINGS (Ta = 25°C)

SYMBOL	DESCRIPTION	RATINGS	UNIT
V_{DD}	Supply Voltage	Vss −0.5 ~ Vss +20	V
V_{IN}	Input Voltage	Vss −0.5 ~ V_{DD} +0.5	V
V_{OUT}	Output Voltage	Vss −0.5 ~ V_{DD} +0.5	V
I_{IN}	Input Current	±10	mA
TSTG	Storage Temperature	−65 ~ 150	°C

PIN NUMBER

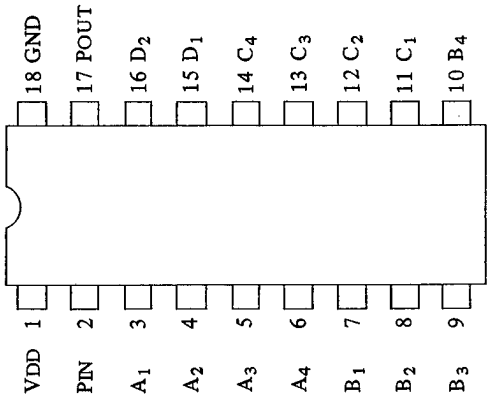


TC9122P (BCD PROGRAMMABLE COUNTER)

MAXIMUM RATINGS (Ta = 25°C)

SYMBOL	DESCRIPTION	RATINGS	UNIT
V_{DD}	Supply Voltage	10	V
V_{IN}	Input Voltage	−0.3 ~ V_{DD} +0.3	V
T_{OPR}	Operating Temperature	−30 ~ 75	°C
T_{STR}	Storage Temperature	−55 ~ 125	°C

PIN CONNECTION

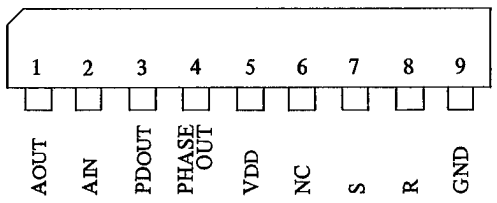


TC5081 (PHASE COMPARATOR)

MAXIMUM RATINGS (Ta = 25°C)

SYMBOL	DESCRIPTION	RATINGS	UNIT
V_{DD}	Supply Voltage	10	V
V_{IN}	Input Voltage	−0.3 ~ V_{DD} +0.3	V
T_{OPR}	Operating Temperature	−30 ~ 75	°C
T_{STR}	Storage Temperature	−55 ~ 125	°C

PIN CONNECTION

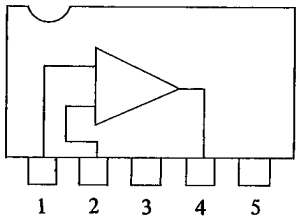


BA401 (FM/IF LIMITER)

MAXIMAM RATINGS (Ta = 25°C)

SYMBOL	DESCRIPTION	RATINGS	UNIT
VCC	Supply Voltage	15	V
VOUT	Output Voltage	24	V
VIN	Input Voltage	±3	V
TOPR	Operating Temperature	−25 ~ +75	°C
TSTG	Storage Temperature	−55 ~ +125	°C

BLOCK DIAGRAM

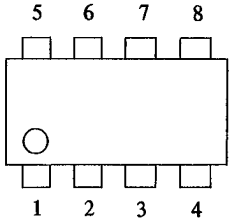


NJM4558D (DUAL LOW NOISE AMP.)

MAXIMUM RATINGS (Ta = 25°C)

SYMBOL	DESCRIPTION	RATINGS	UNIT
VCC	Supply Voltage	18	V
VIN	Input Voltage	15	V
TOPR	Operating Temperature	−20 ~ +75	°C
TSTG	Storage Temperature	−40 ~ +125	°C

PIN NUMBER

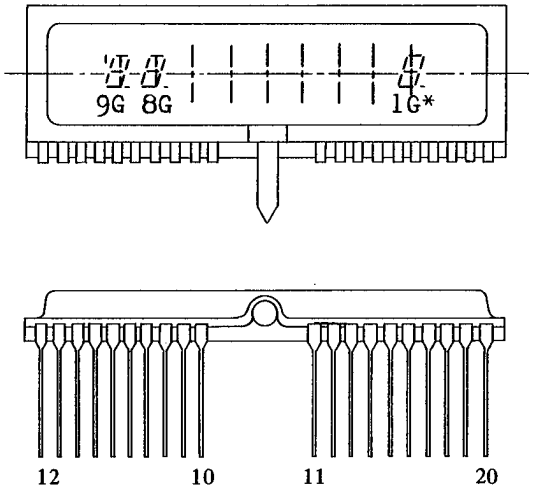


LD8231 (FLUORESCENT INDICATOR PANEL)

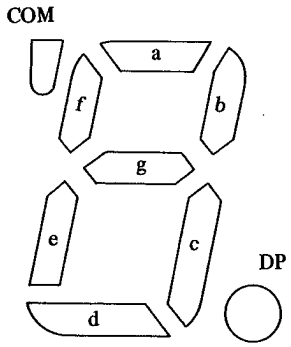
MAXIMUM ABSOLUTE RATING

SYMBOL	DESCRIPTION	MIN.	NOM.	MAX.	UNIT
Ef	Filament Voltage	2.97	3.3	3.63	Vac
e b	Anode Voltage	20	24	36	Vp-p
ec	Grid Voltage	20	24	36	Vp-p

OUTLINE DRAWING



PATTERN



TERMINAL CONNECTION

Terminal No.	1	2	3	4	5	6	7	8	9	10
Electrode	F	P(COM)	P(a)	P(b)	P(g)	P(f)	P(c)	P(e)	P(d)	P(DP)
Terminal No.	11	12	13	14	15	16	17	18	19	20
Electrode	9G	8G	7G	6G	5G	4G	3G	2G	1G	F

SECTION 12 PARTS LIST

[MAIN] UNIT (IC-551)

REF. NO.	DESCRIPTION	PART NO.
IC1	IC	NJM4558D
IC2	IC	TA7124P
IC3	IC	μPC1037H
IC4	IC	μPC2002V
IC5	IC	NJM4558D
IC6	IC	NJM4558D
D1	Diode	1SS55
D2	Diode	1SS55
D3	Diode	15CD11
D4	Diode	GP08
D5	Diode	1SS53
D6	Diode	1N60
D7	Diode	1SS53
D8	Diode	1SS53
D9	Diode	1SS53
D10	Diode	1SS53
D11	Diode	1SS53
D12	Diode	1SS53
D13	Diode	1SS53
D14	Diode	1SS53
D15	Diode	1N60
D16	Diode	1SS53
D17	Diode	1SS53
D19	Diode	1N60
D20	Diode	1SS53
D21	Diode	1SS53
D22	Diode	1SS53
D23	Diode	FC52M
D24	Diode	1SS53
D25	Diode	1SS53
D26	Diode	1SS53
D28	Diode	1SS53
D29	Diode	1SS53
D30	Diode	1SS53
D32	Diode	1S953
D33	Diode	1N60
D34	Diode	1N60
D35	Diode	GP08
D36	Diode	1SS53
D37	Diode	1SS53
D38	Zener	XZ092
D39	Diode	1SS53
D40	Diode	1SS53
D41	Diode	1SS53
D42	Diode	1SS53
D43	Diode	1SS53
D44	Diode	1SS53
D45	Diode	1SS53
D46	Zener	YZ030
D47	Diode	1N60
D48	Diode	1SS53
D49	Diode	1SS53
D50	Diode	1SS53
D51	Diode	1SS53
D52	Diode	1SS53
D53	Diode	1SS53
D54	Diode	MI402
D55	Diode	1SS53
D56	Diode	1SS53
D57	Diode	1SS53
D58	Diode	1SS53
Q1	Transistor	2SA639Q

[MAIN] UNIT (IC-551)

REF. NO.	DESCRIPTION	PART NO.
Q2	Transistor	2SC1972
Q3	Transistor	2SC2166
Q4	Transistor	2SC2053
Q5	FET	3SK74M
Q6	FET	2SK125
Q7	FET	2SK125
Q10	Transistor	2SC945P
Q11	FET	2SK125
Q12	FET	2SK49H2
Q13	Transistor	2SC1312
Q14	Transistor	2SA1015
Q15	Transistor	2SC945P
Q16	FET	3SK74M
Q17	FET	2SK49H2
Q18	FET	2SK125
Q19	FET	2SK125
Q20	Transistor	2SC945P
Q21	Transistor	2SC945P
Q22	Transistor	2SC945P
Q23	Transistor	2SA798
Q24	FET	3SK74K
Q25	FET	3SK74K
Q26	FET	3SK74K
Q27	Transistor	2SA1015
Q28	Transistor	2SD235
Q29	Transistor	2SD235
Q30	Transistor	2SD235
Q31	Transistor	2SC945P
Q32	Transistor	2SC945P
Q33	Transistor	2SC945P
Q34	Transistor	2SC945P
Q35	Transistor	2SC945P
Q37	Transistor	2SC945P
Q38	Transistor	2SC945P
Q39	Transistor	2SC945P
Q40	Transistor	2SC945P
L1	Coil	LA-35
L2	Coil	LW-5
L3	Coil	LA-106
L4	Coil	LA-35
L5	Coil	LW-10
L6	Coil	LR-63
L7	Coil	LR-19
L8	Choke	LA-121
L9	Choke	LW-1
L10	Coil	LR-61
L11	Coil	LB-75
L12	Coil	LR-61
L13	Coil	LB-81
L14	Coil	LB-69A
L15	Coil	LB-68A
L16	Coil	LB-67A
L17	Coil	LS-143
L18	Coil	LS-68
L19	Coil	LS-137
L20	Coil	LS-144
L21	Coil	LS-136
L22	Coil	LS-136
L23	Coil	LS-96
L24	Choke	101 (LB4)
L25	Coil	LS-142
L26	Coil	LB-70A
L27	Coil	LB-71A

[MAIN] UNIT (IC-551)

REF. NO.	DESCRIPTION	PART NO.
L28	Coil	LR-18
L29	Coil	LB-72A
L30	Coil	LB-69A
L31	Coil	LS-135
L32	Coil	LS-134
L33	Coil	LS-133A
L35	Coil	LS-140A
L36	Coil	LS-96A
L37	Coil	LS-96A
L38	Coil	LS-136
L39	Choke	101 (LB4)
L40	Choke	LW-12
L41	Choke	101 (LB4)
L42	Choke	101 (LB4)
L43	Coil	LA-8
L44	Choke	101
L45	Choke	LW-10
X1	Xtal	9.0145MHz HC-18/U
FI1	Xtal Filter	9M22D
FI2	Xtal Filter	9M15A
B1	PC Board	B-306D
B2	PC Board	B-220A
B3	PC Board	B-340
J2	Connector	5045-04A
J3	Connector	5045-12A
J4	Connector	5045-12A
J5	Connector	5045-06A
J6	Connector	3024-6C
J7	Connector	3024-6C
J8	AMP pin	171255-1 (AMP)
P1	Connector	3021-12
P2	Connector	3021-04
P3	Connector	3021-12
P6	Connector	3021-12
P7	Connector	3021-12
P8	Connector	3021-04
P9	Connector	3021-08
P10	Connector	Contact pin (AMP)
R1	Resistor	1K ELR25
R4	Resistor	4.7K ELR25
R5	Resistor	1K ELR25
R6	Resistor	0.3 2W
R7	Resistor	47 ELR25
R8	Resistor	100 ELR50 1/2W
R9	Trimmer R	100 FR-10
R10	Resistor	2.2 ELR25
R11	Resistor	100 ELR25
R12	Resistor	1 R25
R13	Resistor	33 ELR25
R14	Resistor	270 ELR25
R15	Trimmer R	300 FR-10
R16	Resistor	22 ELR25
R17	Resistor	4.7K ELR25
R18	Resistor	2.2K ELR25
R19	Resistor	100 ELR25
R20	Resistor	100 ELR25
R21	Resistor	1M ELR25
R22	Resistor	220K ELR25

[MAIN] UNIT (IC-551)

REF. NO.	DESCRIPTION	PART NO.
R23	Resistor	1K ELR25
R24	Resistor	470K ELR25
R25	Resistor	1K ELR25
R26	Resistor	1K ELR25
R27	Resistor	220 ELR25
R28	Resistor	47 ELR25
R29	Trimmer R	3K RGP055
R30	Resistor	100K ELR25
R31	Resistor	2.2K ELR25
R32	Resistor	22K ELR25
R33	Resistor	22K R25
R34	Resistor	22K ELR25
R35	Resistor	330K ELR25
R37	Resistor	470K ELR25
R41	Trimmer R	10K RGP05
R42	Trimmer R	10K RGP05
R43	Trimmer R	100K RGP05
R44	Resistor	4.7K ELR25
R45	Resistor	10K ELR25
R46	Resistor	47 ELR25
R48	Resistor	100K ELR25
R49	Resistor	680 ELR25
R50	Resistor	1K ELR25
R51	Resistor	100K ELR25
R52	Resistor	220 ELR25
R53	Resistor	560 ELR25
R54	Resistor	100 ELR25
R55	Resistor	2.2K ELR25
R56	Resistor	2.2K ELR25
R57	Resistor	2.2K ELR25
R59	Resistor	47K ELR25
R60	Resistor	470 ELR25
R61	Resistor	470 ELR25
R62	Resistor	10K ELR25
R63	Resistor	4.7K ELR25
R64	Resistor	10K ELR25
R65	Trimmer R	100KB SR19R
R66	Resistor	1.5K R25
R67	Resistor	2.2K ELR25
R68	Resistor	100 ELR25
R69	Resistor	3.3K ELR25
R70	Resistor	47K ELR25
R71	Resistor	22K ELR25
R72	Resistor	47 ELR25
R73	Resistor	1M ELR25
R74	Resistor	220K ELR25
R75	Resistor	220 ELR25
R76	Resistor	100K ELR25
R77	Resistor	1K R25
R78	Resistor	1K R25
R79	Resistor	2.2K ELR25
R80	Resistor	330 ELR25
R81	Micro R	4.7K 1/16W
R82	Resistor	47 ELR25
R83	Resistor	10 ELR25
R84	Resistor	1M ELR25
R85	Resistor	100K ELR25
R86	Resistor	10K ELR25
R87	Trimmer R	10K RGP053
R88	Trimmer R	500 RGP053
R89	Resistor	820 ELR25
R90	Resistor	1K R25
R91	Resistor	220 ELR25
R92	Resistor	4.7K ELR25

[MAIN] UNIT (IC-551)

REF. NO.	DESCRIPTION	PART NO.	
C1	Ceramic	100P	50V
C2	Ceramic	5P	50V
C3	Ceramic	120P	50V
C4	Ceramic	5P	50V
C5	Ceramic	120P	50V
C6	Ceramic	33P	50V
C7	Ceramic	68P	50V
C9	Ceramic	33P	50V
C10	Trimmer	CV01B300	
C11	Ceramic	0.0047	50V
C12	Electroly	4.7	25V
C13	Ceramic	0.0047	50V
C14	Ceramic	0.0047	50V
C15	Ceramic	0.0047	50V
C16	Ceramic	0.0047	50V
C17	Ceramic	0.001	50V
C18	Ceramic	0.0047	50V
C19	Barrier L	0.1	12V
C20	Electroly	220	16V
C21	Ceramic	0.0047	50V
C22	Ceramic	47P	50V
C23	Ceramic	0.0047	50V
C24	Electroly	10	16V
C25	Ceramic	0.0047	50V
C26	Electroly	120	16V
C27	Ceramic	120P	50V
C28	Ceramic	0.0047	50V
C29	Barrier L	0.1	12V
C30	Ceramic	330P	50V
C31	Electroly	10	16V
C32	Ceramic	0.0047	50V
C33	Ceramic	0.0047	50V
C34	Ceramic	0.0047	50V
C35	Ceramic	33P	50V
C36	Ceramic	0.0047	50V
C37	Ceramic	40P	50V
C38	Ceramic	0.0047	50V
C39	Ceramic	0.0047	50V
C40	Ceramic	0.0047	50V
C41	Electroly	4.7	25V
C42	Ceramic	0.0047	50V
C43	Ceramic	12P	50V
C44	Ceramic	0.0047	50V
C45	Ceramic	68P	50V
C46	Ceramic	68P	50V
C47	Ceramic	0.0047	50V
C48	Ceramic	0.0047	50V
C49	Ceramic	0.0047	50V
C50	Ceramic	150P	50V
C51	Ceramic	0.0047	50V
C52	Ceramic	0.0047	50V
C53	Ceramic	470P	50V
C55	Ceramic	0.0047	50V
C56	Barrier L	0.1	12V
C57	Ceramic	0.0047	50V
C58	Ceramic	0.001	50V
C59	Ceramic	0.001	50V
C60	Ceramic	0.0047	50V
C61	Ceramic	0.0047	50V
C62	Barrier	0.1	12V
C63	Mylar	0.022	50V
C64	Barrier L	0.1	12V
C65	Ceramic	15P	50V
C67	Ceramic	0.0047	50V

[MAIN] UNIT (IC-551)

REF. NO.	DESCRIPTION	PART NO.	
C68	Ceramic	150P	50V
C69	Ceramic	0.001	50V
C71	Ceramic	0.0047	50V
C73	Ceramic	0.0047	50V
C74	Ceramic	0.0047	50V
C75	Electroly	0.47	50V
C76	Ceramic	0.0047	50V
C77	Ceramic	0.0047	50V
C78	Ceramic	68P	50V
C79	Ceramic	5P	50V
C80	Ceramic	0.0047	50V
C81	Ceramic	0.0047	50V
C82	Barrier L	0.047	50V
C83	Ceramic	0.001	50V
C84	Ceramic	5P	50V
C85	Barrier L	0.1	12V
C86	Ceramic	330P	50V
C87	Ceramic	330P	50V
C88	Barrier L	0.1	12V
C89	Ceramic	27P	50V
C90	Ceramic	0.0047	50V
C91	Barrier L	0.1	12V
C92	Ceramic	10P (UP125SL10P)	
C93	Ceramic	0.0047	50V
C94	Ceramic	0.0047	50V
C95	Ceramic	82P	50V
C96	Ceramic	0.0047	50V
C97	Ceramic	56P	50V
C98	Ceramic	0.0047	50V
C99	Ceramic	22P	50V
C100	Ceramic	0.001	50V
C101	Ceramic	0.0047	50V
C102	Ceramic	0.0047	50V
C103	Ceramic	0.0047	50V
C104	Dip Mica	51P	50V
C105	Trimmer	CV05D3001	
C106	Barrier L	0.1	12V
C107	Dip Mica	150P	50V
C108	Dip Mica	150P	50V
C109	Electroly	0.47	50V
C110	Ceramic	0.0047	50V
C111	Ceramic	0.0047	50V
C112	Ceramic	0.100P	50V
C113	Ceramic	0.0047	50V
C114	Electroly	10	16V
C115	Ceramic	0.01 (UP125X103M)	
C116	Electroly	220	10V
C117	Ceramic	0.001	50V
C118	Electroly	2.2	50V
C119	Ceramic	33P	50V
C120	Ceramic	0.001	50V
C121	Barrier L	0.1	12V
C122	Ceramic	0.0047	50V
C123	Ceramic	0.0047	50V
C124	Ceramic	0.001	50V
C125	Ceramic	0.0047	50V
C126	Ceramic	0.0047	50V
C127	Ceramic	15P	50V
C128	Ceramic	0.0047	50V
C129	Ceramic	0.0047	50V
C130	Ceramic	0.0047	50V
C131	Barrier L	0.1	12V
C132	Ceramic	0.0047	50V
C133	Ceramic	15P	50V

[MAIN] UNIT (IC-551)

REF. NO.	DESCRIPTION	PART NO.	
C134	Ceramic	0.0047	50V
C135	Ceramic	0.0047	50V
C136	Electroly	33μ	16V
C137	Electroly	100	16V
C138	Electroly	100	16V
C139	Electroly	470	16V
C141	Electroly	100	16V
C142	Electroly	4.7	25V
C143	Electroly	470	16V
C144	Ceramic	0.0022	50V
C146	Barrier L	0.1	12V
C147	Electroly	10	16V
C148	Electroly	22	16V
C149	Barrier L	0.1	12V
C150	Electroly	10	16V
C151	Ceramic	0.0047	50V
C152	Barrier L	0.1	12V
C153	Barrier L	0.1	12V
C154	Mylar	0.022	50V
C155	Mylar	0.022	50V
C156	Mylar	0.022	50V
C157	Barrier L	0.1	12V
C158	Electroly	22	16V
C159	Electroly	10	16V
C160	Electroly	10	16V
C161	Ceramic	0.0047	50V
C162	Ceramic	0.0047	50V
C163	Electroly	1	50V
C164	Electroly	1	50V
C165	Ceramic	68P	50V
C166	Ceramic	0.0047	50V
C167	Ceramic	0.001	50V
C168	Ceramic	0.001	50V
C169	Mylar	0.01	50V
C170	Mylar	0.0033	50V
C171	Electroly	0.47	50V
C172	Electroly	0.47	50V
C173	Ceramic	100P	50V
C174	Electroly	10	16V
C175	Ceramic	0.001	50V
C176	Electroly	47	10V
C177	Ceramic	0.001	50V
C178	Electroly	0.47	50V
C179	Electroly	10	16V
C180	Electroly	100	10V
C181	Ceramic	0.0047	50V
C182	Electroly	33	16V
C183	Ceramic	0.0047	50V
C184	Electroly	3.3	25V
C185	Ceramic	22P	50V
C187	Ceramic	15P	50V
C188	Button Ceramic	0.001	
C189	Ceramic	0.0047	50V
C190	Ceramic	0.0047	50V
C191	Barrier L	0.1	12V
C192	Electroly	2.2	50V
C193	Electroly	1	50V
C194	Ceramic	15P	50V
C195	Ceramic	15P	50V
C196	Ceramic	0.0047	50V
C197	Barrier L	0.1	12V
C198	Barrier L	0.1	12V
C199	Ceramic	100P	50V
C200	Electroly	10	16V

[MAIN] UNIT (IC-551)

REF. NO.	DESCRIPTION	PART NO.	
C202	Ceramic	0.0047	50V
C203	Ceramic	33P	50V
C204	Ceramic	0.001	50V
C205	Ceramic	0.001	50V
C206	Ceramic	0.001	50V
C207	Ceramic	0.001	50V
C208	Ceramic	0.001	50V
C209	Ceramic	0.0047	50V
C210	Chip Creramic	GR42-6W5R102	
C211	Ceramic	0.0047	50V
C212	Ceramic	0.0047	50V
C213	Ceramic	0.0047	50V
C214	Ceramic	0.0047	50V
C215	Ceramic	0.0047	50V
C216	Electrolytic	10μ	16V
C217	Barrier L	0.1	12V
C218	Ceramic	0.001	50V

[PLL] UNIT (IC-551/551D)

REF. NO.	DESCRIPTION	PART NO.
IC1	IC	TC9122
IC2	IC	TC5081
IC3	IC	TC5082
IC4	IC	BA401
IC5	IC	SN76514
IC6	IC	NJM4558D
IC7	IC	μA78L8.2AWC
Q1	Transistor	2SA1015
Q2	Transistor	2SC945
Q3	Transistor	2SC383
Q4	Transistor	2SC763 C
Q5	Transistor	2SC763 C
Q6	Transistor	2SC763 C
Q7	Transistor	2SC2053
Q8	Transistor	2SC763 C
Q9	Transistor	2SB562
Q10	Transistor	2SC945 P
Q11	Transistor	2SA798 G
Q12	Transistor	2SC945 K
Q13	Transistor	2SA1015
Q14	Transistor	2SC1636
D1	Diode	1SS53
D2	Zener	XZ068
D3	Varicap	1T6
D4	Varicap	1T6
D5	Zener	XZ068
D6	Diode	1SS53
D7	Diode	1SS53
L1	Coil	LB4 100J
L2	Coil	LA118
L3	Coil	LB4 100J
L4	Coil	LB4 5R6J
L5	Coil	LS109
L6	Coil	LS38
L7	Coil	LS38
R2	Resistor	470 ELR25
R3	Resistor	470 ELR25
R4	Resistor	470 ELR25
R5	Resistor	470 ELR25
R6	Resistor	470 ELR25
R7	Resistor	470 ELR25
R8	Resistor	470 ELR25
R9	Resistor	470 ELR25
R10	Resistor	470 ELR25
R11	Resistor	470 ELR25
R12	Resistor	470 ELR25
R13	Resistor	470 ELR25
R14	Resistor	470 ELR25
R16	Resistor	470 ELR25
R17	Resistor	10K ELR25
R18	Resistor	47K ELR25
R19	Resistor	22K ELR25
R20	Resistor	10K ELR25
R21	Resistor	10K ELR25
R22	Trimmer	3K RGP053
R23	Resistor	220 ELR25
R24	Resistor	10K ELR25
R27	Resistor	150K ELR25
R28	Resistor	150K ELR25
R29	Resistor	1K ELR25

[PLL] UNIT (IC-551/551D)

REF. NO.	DESCRIPTION	PART NO.
R30	Resistor	220K ELR25
R31	Resistor	1K ELR25
R32	Resistor	22 ELR25
R33	Resistor	68K ELR25
R34	Resistor	470 ELR25
R35	Resistor	100 ELR25
R36	Resistor	470 ELR25
R37	Resistor	15K ELR25
R38	Resistor	47 ELR25
R39	Resistor	100K ELR25
R40	Resistor	2.2K ELR25
R41	Resistor	680 ELR25
R43	Resistor	100 ELR25
R44	Resistor	22 R25
R45	Resistor	100 ELR25
R46	Resistor	220 ELR25
R47	Resistor	22K ELR25
R48	Resistor	1K ELR25
R49	Resistor	22K ELR25
R50	Resistor	470 ELR25
R51	Resistor	1K ELR25
R52	Resistor	4.7K ELR25
R53	Resistor	2.7K ELR25
R54	Resistor	10K R25
R55	Resistor	10K R25
R56	Resistor	4.7K ELR25
R57	Resistor	6.8K ELR25
R58	Resistor	47L ELR25
R59	Trimmer	10K RGP053
R60	Trimmer	50K RGP053
R61	Resistor	390K ELR25
R62	Resistor	470K ELR25
R63	Resistor	4.7K ELR25
R64	Resistor	1.8M ELR25
R66	Resistor	10K ELR25
R67	Resistor	47 ELR25
R68	Resistor	820K ELR25
R69	Resistor	100K ELR25
R70	Resistor	100K ELR25
R72	Resistor	22K ELR25
R73	Resistor	220 ELR25
R74	Resistor	10K ELR25
R75	Resistor	1K ELR25
R76	Resistor	4.7K ELR25
R77	Resistor	1K ELR25
R78	Resistor	22K ELR25
R79	Resistor	220 ELR25
R80	Resistor	22 R25
R81	Resistor	100 R25
C2	Ceramic	DD104 B 471K 50V02
C3	Ceramic	DD104 B 471K 50V02
C4	Ceramic	DD104 B 471K 50V02
C5	Ceramic	DD104 B 471K 50V02
C6	Ceramic	DD104 B 471K 50V02
C7	Ceramic	DD104 B 471K 50V02
C8	Ceramic	DD104 B 471K 50V02
C9	Ceramic	DD104 B 471K 50V02
C10	Ceramic	DD104 B 471K 50V02
C11	Ceramic	DD104 B 471K 50V02
C12	Ceramic	DD104 B 471K 50V02
C13	Ceramic	DD104 B 471K 50V02
C14	Barrier L	BD10X 104M
C15	Ceramic	DD108 B 472K 50V02

[PLL] UNIT (IC-551/551D)

REF. NO.	DESCRIPTION	PART NO.
C16	Electroly	100 10V
C17	Ceramic	DD108 B 472K 50V02
C18	Electroly	22 16V
C19	Electroly	100 10V
C20	Ceramic	DD108 B 472K 50V02
C21	Ceramic	DD340 B 150K 50V02
C22	DIP Mica	51P 50V
C23	DIP Mica	39P 50V
C24	Trimmer	CV05E-300
C25	Ceramic	DD108 B 472K 50V02
C26	Electroly	0.47 50V
C27	Ceramic	DD108 B 472K 50V02
C28	Barrier L	0.047 25V
C29	Barrier L	BD10X 104M
C30	Ceramic	DD108 B 472K 50V02
C31	Ceramic	DD108 B 472K 50V02
C32	Ceramic	DD108 B 472K 50V02
C33	Ceramic	DD108 B 472K 50V02
C34	Ceramic	DD108 B 472K 50V02
C35	Ceramic	DD108 B 472K 50V02
C36	Ceramic	DD340 B 220K 50V02
C37	Ceramic	DD340 SL100K 50V02
C38	Ceramic	DD340 SL330K 50V02
C39	Ceramic	DD108 B 472K 50V02
C40	Ceramic	DD108 B 472K 50V02
C41	Ceramic	DD108 B 472K 50V02
C42	Ceramic	DD108 B 472K 50V02
C43	Ceramic	DD108 B 472K 50V02
C44	Ceramic	DD108 B 472K 50V02
C45	Ceramic	DD108 B 472K 50V02
C46	Ceramic	3P 50V
C47	Ceramic	8P 50V
C48	Ceramic	10P 50V
C49	Ceramic	3P 50V
C50	Ceramic	DD108 B 472K 50V02
C51	Ceramic	DD350-257 680 50V02
C52	Ceramic	DD340 B 220K 50V02
C53	Ceramic	DD350-257 680 50V02
C54	Ceramic	DD108 B 472K 50V02
C57	Ceramic	DD108 B 472K 50V02
C58	Ceramic	DD108 B 472K 50V02
C59	Ceramic	DD104 B 102K 50V02
C60	Ceramic	DD108 B 472K 50V02
C61	Barrier L	BD10X 104M
C62	Electroly	47 16V
C63	Electroly	10 16V
C64	Electroly	10 16V
C65	Ceramic	DD108 B 472K 50V02
C66	Electroly	10 16V
C67	Ceramic	DD108 B 472K 50V02
C68	Ceramic	DD106 B 222K 50V02
C69	Ceramic	DD108 B 472K 50V02
C70	Ceramic	DD108 B 472K 50V02
C71	Ceramic	DD108 B 472K 50V02
C72	Ceramic	DD310 SL221K 50V02
C73	Ceramic	DD310 SL221K 50V02
C74	Electroly	10 16V
C75	Ceramic	DD310 SL221K 50V02
C76	Ceramic	DD108 B 472K 50V02
C77	Ceramic	DD340 SL470K 50V02
C78	Ceramic	DD108 B 472K 50V02
C79	Ceramic	USD04AK0R35C 50V
C80	Ceramic	DD340 SL470K 50V02
C81	Ceramic	DD108 B 472K 50V02

[PLL] UNIT (IC-551/551D)

REF. NO.	DESCRIPTION	PART NO.
C82	Ceramic	DD108 B 472K 50V02
C83	Electroly	10 16V
C84	Barrier L	BD10X 104M
X1	Xtal	10.24MHz HC-43/U
X2	Xtal	18.00925MHz HC-43/U
J1	Connector	5041-06A
J2	Connector	5041-08A
J3	Connector	5045-8A
J4	Connector	3022-06
J5	Connector	3022-06
CP1	Test point	
B1	PC board	B-313A 41512
	PLL case	41513
		41515
		41514

[DRIVER] UNIT (IC-551/551D)

REF. NO.	DESCRIPTION	PART NO.
IC1	IC	4030
IC2	IC	4013
IC3	IC	4013
IC4	IC	4073
IC5	IC	4081
IC6	IC	4081
IC7	IC	4081
IC8	IC	4081
IC9	IC	TMS1099
IC10	IC	TMS1025NL
IC11	IC	4011
IC12	IC	4069
IC13	IC	4013
IC16	IC	4013
IC17	IC	4011
IC18	DC-DC	DP-4
IC19	Diode arr.	DNA-401
Q1	Photo	TPS606
Q2	Photo	TPS606
Q3	Transistor	2SA1015
Q4	Transistor	2SA1015
Q5	Transistor	2SA1015
Q6	Transistor	2SC1740
Q7	Transistor	2SB562
Q8	Transistor	2SC1740
Q9	Transistor	2SD468
Q10	Transistor	2SB562
Q11	Transistor	2SC1740
Q12	Transistor	2SC1740
Q13	Transistor	2SA1015
Q14	Transistor	2SA1015
Q15	Transistor	2SA1015
Q16	Transistor	2SA1015
Q17	Transistor	2SC945P
D1	LED	TLR121
D2	LED	TLR121
D3	Diode	1SS53
D4	Diode	1SS53
D5	Diode	1SS53
D6	Diode	1SS55
D7	Diode	1SS55
D8	LED	SEL-103S
D9	LED	SEL-103S
D10	LED	SEL-303E
D11	Diode	1SS53
D12	Diode	1SS53
D13	Diode	1SS53
D14	Diode	1SS53
D15	Diode	1SS53
D16	Diode	1SS53
D17	Diode	1SS53
D18	Diode	1SS53
D19	Diode	1SS53
D20	Diode	1SS53
D21	Diode	1SS53
D22	Diode	1SS53
D23	Diode	1SS53
D24	Diode	1SS53
D25	Diode	1SS53
D26	Diode	1SS53
D27	Diode	1SS53
D28	Diode	1SS53

[DRIVER] UNIT (IC-551/551D)

REF. NO.	DESCRIPTION	PART NO.	
D29	Diode	1SS53	
D30	Diode	1SS53	
D31	Diode	1SS53	
D36	Diode	1SS53	
D37	Diode	1SS53	
D38	Diode	1SS53	
D39	Diode	1SS53	
D40	Zener	XZ076	
D41	Diode	GP08A	
D42	Diode	GP08A	
D43	Zener	XZ092	
D44	Diode	1SS53	
D45	Diode	1SS53	
D47	Diode	1SS53	
D48	Diode	1SS53	
D49	Diode	1N60	
D50	Diode	1SS53	
D51	Diode	1SS53	
D52	Diode	1SS53	
L1	Choke	101J	
L2	Choke	102J	
R1	Resistor	680	ELR25
R2	Trimmer	50K	FR10
R3	Trimmer	50K	FR10
R4	Resistor	220K	R25
R5	Resistor	220K	R25
R6	Resistor	1M	R25
R7	Resistor	1M	R25
R8	Resistor	10K	ELR25
R11	Array	47K	RM8
R12	Array	47K	RM8
R13	Resistor	1K	R25
R14	Resistor	1K	R25
R15	Resistor	1K	R25
R16	Resistor	4.7K	R25
R17	Array	47K	RM8
R18	Resistor	470	ELR25
R19	Resistor	2.2K	ELR25
R21	Resistor	470K	ELR25
R22	Resistor	22K	ELR25
R23	Resistor	10K	ELR25
R24	Resistor	47K	ELR25
R27	Resistor	10K	ELR25
R28	Resistor	1M	ELR25
R29	Resistor	47K	ELR25
R30	Resistor	1M	ELR25
R31	Resistor	10K	ELR25
R32	Resistor	1.8M	ELR25
R33	Resistor	470K	ELR25
R34	Resistor	3.3M	ELR25
R35	Resistor	100K	ELR25
R36	Resistor	1M	ELR25
R37	Resistor	470K	ELR25
R39	Resistor	1M	ELR25
R41	Resistor	1M	ELR25
R42	Resistor	47K	ELR25
R43	Resistor	1M	ELR25
R44	Resistor	470	ELR25
R45	Resistor	470	ELR25
R46	Resistor	4.7K	ELR25
R47	Resistor	4.7K	ELR25
R49	Resistor	3.3K	ELR25

[DRIVER] UNIT (IC-551/551D)

REF. NO.	DESCRIPTION	PART NO.		
R50	Resistor	3.3K	ELR25	
R51	Resistor	10K	R25	
R52	Resistor	2.2K	ELR25	
R53	Resistor	1M	R25	
R56	Resistor	470K	ELR25	
R57	Resistor	100K	ELR25	
R58	Resistor	100K	ELR25	
R59	Resistor	22K	ELR25	
R60	Resistor	1K	ELR25	
R77	Resistor	470K	ELR25	
R78	Resistor	470K	ELR25	
R79	Resistor	470K	ELR25	
R80	Resistor	470K	ELR25	
R81	Resistor	1M	ELR25	
R82	Array	2.2K	RM8	
R83	Array	100K	RM6	
R84	Resistor	470K	ELR25	
R85	Resistor	470K	ELR25	
R86	Resistor	470K	ELR25	
R87	Resistor	100K	CRA1/8	
R88	Resistor	200K	CRA1/8	
R89	Resistor	400K	CRA1/8	
R90	Resistor	800K	CRB1/4FX	
R91	Resistor	480K	CRA1/8	
R92	Resistor	100K	CRA1/8	
R93	Resistor	200K	CRA1/8	
R94	Resistor	400K	CRA1/8	
R95	Resistor	800K	CRB1/4FX	
R96	Resistor	3.3K	ELR25	
R97	Resistor	1K	ELR25	
R98	Resistor	10K	ELR25	
R99	Resistor	1M	ELR25	
R100	Resistor	82K	ELR25	
R101	Resistor	22K	ELR25	
R102	Resistor	470K	ELR25	
R103	Resistor	470K	ELR25	
R104	Resistor	470K	ELR25	
R105	Resistor	470K	ELR25	
R106	Resistor	10K	R25	
R108	Resistor	22K	ELR25	
R109	Resistor	10K	ELR25	
R110	Resistor	47K	ELR25	
R111	Resistor	47K	R25	
C1	Ceramic	DD104	B 101K	50V02
C3	Electroly	1	50V	
C5	Electroly	1	50V	
C6	Ceramic	DD340	SL220K	50V02
C7	Electroly	2.2	50V	
C8	Ceramic	0.001	50V	
C9	Barrier lay	0.1	12V	
C10	Barrier lay	0.1	12V	
C11	Electroly	47	16V	
C12	Barrier lay	0.1	12V	
C13	Barrier lay	0.1	12V	
C14	Barrier lay	0.1	12V	
C15	Electroly	0.47	50V	
C16	Barrier lay	0.1	12V	
C18	Electroly	220	10V	
C19	Barrier lay	0.047	25V	
C20	Barrier lay	0.1	12V	
C21	Barrier lay	0.1	12V	
C22	Electroly	220	16V	
C24	Barrier lay	0.1	12V	

[DRIVER] UNIT (IC-551/551D)

REF. NO.	DESCRIPTION	PART NO.	
C25	Barrier lay	0.1	12V
C26	Electroly	47	16V
C27	Electroly	47	10V
C28	Barrier lay	0.047	25V
C30	Electroly	220	10V
C31	Electroly	10	25V
C32	Barrier lay	0.1	12V
C33	Ceramic	47P	50V
C34	Ceramic	47P	50V
C35	Ceramic	47P	50V
C36	Ceramic	0.001	50V
	FIP	LD8231	
	Jumper	JPW03A-EL01	
J1	Connector	5045-6A	
J2	Connector	5045-6A	
J3	Connector	5045-8A	
J4	Connector	3094-6A	
J5	Connector	3094-6A	
J6	Connector	3094-6A	
P1	Connector	3021-6A	
P2	Connector	3021-8A	
P3	Connector	3021-8A	
B1	PC board	B-311C	
B2	PC board	B-203B	
B3	PC board	B-312A	

[VCO] UNIT (IC-551/551D)

REF. NO.	DESCRIPTION	PART NO.
Q1	FET	2SK125
D1	Varicap	1T25
D2	Varicap	1T25
D3	Zener	XZ068
L1	Coil	LB4 100J
L2	Coil	LB4 100J
L3	Coil	LB-74A
L4	Coil	LB4 5R6J
R1	Resistor	68 ELR25
R2	Resistor	47 ELR25
R3	Resistor	10 ELR25
R4	Resistor	100K ELR25
R5	Resistor	330 ELR25
C1	Ceramic	0.001 50V
C2	Ceramic	0.001 50V
C3	Ceramic	UJ 22P 50V
C4	Ceramic	470P 50V
C5	Ceramic	UJ 47P 50V
C6	Ceramic	UJ 47P 50V
C7	Ceramic	CH 47P 50V
C8	Ceramic	0.0047 50V
C9	Electroly	10 16V
C10	Ceramic	0.0047 50V
C11	Ceramic	0.0047 50V
C12	Ceramic	0.001 50V
	VCO SHIELD CASE	41382
	VCO SHIELD CASE COVER (B)	41382
B1	PC board	B-314

PARTS LIST

PI UNIT (IC-551)

REF. NO.	CATEGORY	DISCRIPTION PART NO.			
		NEW		OLD	
Q 1	TRANSISTOR	2SA1015		2SA1015	
D 1	DIODE	KBP-06		S1RBA60	
D 2	DIODE	GP-08B		GP-08B	
D 3	ZENER	XZ-142		XZ-142	
D 4	DIODE	GP-08B		GP-08B	
IC 1	PHOTO CUP.	N-110		MCN-721A	
C 1	CERAMIC	0.0022	500V	0.001	500V
C 2	CERAMIC	0.0022	500V	0.001	500V
C 3	CERAMIC	0.0022	500V	0.001	500V
C 4	CERAMIC	0.0022	500V	0.001	500V
C 5	ELECTROLY	220	200V	220	200V
C 6	ELECTROLY	220	200V	220	200V
C 7	ELECTROLY	470	25V	470	25V
C 8	CERAMIC	0.0047	50V	0.01	50V
C 9	BARRIER	0.047	25V	CERAMIC 0.0047	50V
C10	CERAMIC	0.001	50V	—	
C11	ELECTROLY	10	25V	—	
C12	CHIP	0.68	25V	—	
R 1	RESISTOR	2W	2.2	2W	3
R 2	RESISTOR	2W	2.2	2W	3
R 3	RESISTOR	ELR25	120K	ELR25	120K
R 4	RESISTOR	ELR25	120K	ELR25	120K
R 5	RESISTOR	ELR25	68K	ELR25	56K
R 6	RESISTOR	R50	150K	1W	100K
R 7	RESISTOR	ELR25	10K	ELR25	470
R 8	RESISTOR	ELR25	2.2K	ELR25	470
R 9	RESISTOR	ELR25	4.7K	ELR25	220
R10	RESISTOR	ELR25	220	—	
R11	SURGE ABSORBER	ERZ-C07DK431		—	
L 1	CHOKE	LR-92		LR-59A	
L 2	TRANSFORM	TP-22		TP-22	
P 1	CONNECTOR	1653-5P1		1653-5P1	
B 1	PC BOARD	B-422A		B-303A	

SW REG. UNIT (IC-551)

REF. NO.	CATEGORY	DISCRIPTION PART NO.			
		NEW		OLD	
Q 1	TRANSISTOR	2SC2501		MJE13003	
Q 2	TRANSISTOR	2SC2501		MJE13003	
D 1	DIODE	10F2S07		10F2S07	
D 2	DIODE	V19B		—	
D 3	DIODE	V19B		—	
D 4	DIODE	GP-08B		—	
IC 1	IC	SG3524N (HA17524P)		SG3524	
C 1	MP	0.001	250V	0.001	250V
C 2	MP	0.001	250V	0.001	250V
C 3	CERAMIC	0.022	500V	0.0022	500V
C 4	ELECTROLY	3.3	200V	4.7	250V
C 5	ELECTROLY	3.3	200V	4.7	250V
C 6	MYLAR	0.01	50V	0.01	50V
C 7	MYLAR	0.01	50V	0.0047	50V
C 8	ELECTROLY	0.047	50V	0.47	50V
C 9	ELECTROLY	10	25V	10	25V
C10	METALLIZED	0.47	400V	0.47	400V
C11	CERAMIC	470P	500V	0.001	500V
C12	CERAMIC	0.0047	50V	—	
C13	ELECTROLY	680	16V	470	16V
C14	ELECTROLY	680	16V	470	16V
C15	ELECTROLY	47	10V	47	10V
C16	CHIP	0.68	25V	0.68	25V
C17	MP	0.0022	250V	0.001	250V
C18	CERAMIC	0.001	50V	0.0047	50V
C19	ELECTROLY	10	16V	10	16V
C20	CERAMIC	0.0047	50V	MYLAR 0.0022	50V
C21	MYLAR	0.001	50V	—	
R 1	RESISTOR	ELR25	120K	ELR25	120K
R 2	RESISTOR	ELR25	120K	ELR25	120K
R 3	RESISTOR	ELR25	2.2K	ELR25	2.2K
R 4	RESISTOR	ELR25	33K	ELR25	33K
R 5	RESISTOR	ELR25	4.7K	ELR25	4.7K
R 6	RESISTOR	ELR25	4.7K	ELR25	4.7K
R 7	RESISTOR	ELR25	4.7K	ELR25	4.7K
R 8	TRIMMER	RGP053	10K	RGP053	10K
R 9	RESISTOR	ELR25	15K	ELR25	15K
R10	RESISTOR	ELR25	10	ELR25	10
R11	RESISTOR	ELR25	22	ELR25	22
R12	RESISTOR	ELR25	10	ELR25	10
R13	RESISTOR	ELR25	22	ELR25	22
R14	RESISTOR	ELR25	390	ELR25	220
R15	RESISTOR	1W	0.04	1W	0.054
R16	RESISTOR	ELR25	33	ELR25	33
L 1	CHOKE	LR-59A		102J	L8
L 2	CHOKE	102J	LB4	102J	L8
L 3	TRANSFORM	TI-5		CHOKE	LR-59A
L 4	TRANSFORM	TO-5		CHOKE	102J LB4
L 5	CHOKE	LR-93		TRANSFORM	TI-5
L 6		—		TRANSFORM	TO-5
L 7		—		CHOKE	SN-10-500
L 8				CHOKE	SN-10-500
B 1	PC BOARD	B-423A		B-304A	

[MAIN] UNIT (IC-551D)

REF. NO.	DESCRIPTION	PART NO.
IC1	IC	NJM4558D
IC2	IC	TA7124P
IC3	IC	μPC1037H
IC4	IC	μPC2002V
IC5	IC	NJM4558D
IC6	IC	NJM4558D
IC7	IC	μA78L05
IC8	IC	M53323P
Q2	Transistor	2SC1972
Q3	Transistor	2SC2166
Q4	Transistor	2SC2053
Q5	FET	3SK74M
Q6	FET	2SK125
Q7	FET	2SK125
Q8	Transistor	2SA1015
Q9	Transistor	2SC945P
Q10	Transistor	2SC945P
Q11	FET	2SK125
Q12	FET	2SK49H2
Q13	Transistor	2SC1645
Q14	Transistor	2SA1015
Q15	Transistor	2SC945P
Q16	FET	3SK74M
Q17	FET	2SK49H2
Q18	FET	2SK125
Q19	FET	2SK125
Q20	Transistor	2SC945P
Q21	Transistor	2SC945P
Q28	Transistor	2SD235
Q29	Transistor	2SD235
Q30	Transistor	2SD235
Q31	Transistor	2SC945P
Q32	Transistor	2SC945P
Q33	Transistor	2SC945P
Q34	Transistor	2SC945P
Q35	Transistor	2SC945P
Q37	Transistor	2SC945P
Q38	Transistor	2SC945P
Q39	Transistor	2SC945P
Q40	Transistor	2SC945P
Q41	Transistor	2SC945P
D4	Diode	GP08B
D5	Diode	1SS53
D6	Diode	1N60
D7	Diode	1SS53
D8	Diode	1SS53
D9	Diode	1SS53
D10	Diode	1SS53
D11	Diode	1SS53
D13	Diode	1SS53
D14	Diode	1SS53
D15	Diode	1SS53
D16	Diode	1SS53
D17	Diode	1SS53
D19	Diode	1N60
D20	Diode	1SS53
D21	Diode	1SS53
D22	Diode	1SS53
D23	Diode	FC52M
D24	Diode	1SS53
D25	Diode	1SS53
D26	Diode	1SS53

[MAIN] UNIT (IC-551D)

REF. NO.	DESCRIPTION	PART NO.
D28	Diode	1SS53
D29	Diode	1SS53
D30	Diode	1SS53
D35	Diode	GP08B
D36	Diode	1SS53
D37	Diode	1SS53
D38	Zener	XZ092
D39	Diode	1SS53
D40	Diode	1SS53
D41	Diode	1SS53
D42	Diode	1SS53
D43	Diode	1SS53
D44	Diode	1SS53
D45	Diode	1SS53
D46	Zener	MZ303B
D48	Diode	1SS53
D49	Diode	1SS53
D50	Diode	1SS53
D51	Diode	1SS53
D52	Diode	1SS53
D53	Diode	1SS53
D55	Diode	1SS53
D56	Diode	1SS53
D57	Diode	1SS53
D58	Zener	XZ157
D59	Diode	GP08B
FI1	Crystal Filter	9M22D
FI2	Crystal Filter	9M15B
X1	Crystal	9.0145MHz HC-18/U
L1	Coil	LA-106
L2	Coil	LW-5
L3	Coil	LA-35
L6	Coil	LR-63
L7	Coil	LR-19
L8	Coil	LA-121
L9	Coil	LA-121
L10	Coil	LR-61
L11	Coil	LB-75
L12	Coil	LR-61
L13	Coil	LB-81
L14	Coil	LB-69A
L15	Coil	LB-68A
L16	Coil	LB-67A
L17	Coil	LS-143
L18	Coil	LS-68
L19	Coil	LS-137
L20	Coil	LS-144
L21	Coil	LS-136
L22	Coil	LS-136
L23	Coil	LS-96
L24	Choke	101
L25	Coil	LS-142
L26	Coil	LB-70A
L27	Coil	LB-71A
L28	Coil	LR-18
L29	Coil	LB-72A
L30	Coil	LB-69A
L31	Coil	LS-135
L32	Coil	LS-134
L33	Coil	LS-133A
L40	Choke	LW-12

[MAIN] UNIT (IC-551D)

REF. NO.	DESCRIPTION		PART NO.
L41	Choke	101	
L42	Choke	101	
L43	Coil	LA-83	
L46	Choke	101 (L4)	
R6	Resistor	0.6	2W
R8	Resistor	100	R50
R9	Trimmer	100	FR-10
R10	Resistor	2.2	ELR25
R11	Resistor	100	ELR25
R12	Resistor	1	R25
R13	Resistor	33	ELR25
R14	Resistor	270	ELR25
R15	Trimmer	300	FR-10
R16	Resistor	22	ELR25
R17	Resistor	4.7K	ELR25
R18	Resistor	2.2K	ELR25
R19	Resistor	100	ELR25
R20	Resistor	100	ELR25
R21	Resistor	1M	ELR25
R22	Resistor	220K	ELR25
R23	Resistor	1K	ELR25
R24	Resistor	470K	ELR25
R25	Resistor	100	ELR25
R26	Resistor	1K	ELR25
R28	Resistor	47	ELR25
R29	Trimmer	3K	RGP05
R30	Resistor	100K	ELR25
R31	Resistor	2.2K	ELR25
R32	Resistor	22K	ELR25
R33	Resistor	22K	ELR25
R34	Resistor	22K	ELR25
R35	Resistor	330K	ELR25
R36	Resistor	22K	ELR25
R37	Resistor	470K	ELR25
R38	Resistor	47K	ELR25
R39	Resistor	100K	ELR25
R40	Resistor	10K	ELR25
R41	Trimmer	10K	RGP05
R42	Trimmer	10K	RGP05
R43	Trimmer	50K	RGP053
R44	Resistor	4.7K	ELR25
R45	Resistor	10K	ELR25
R46	Resistor	47	ELR25
R48	Resistor	100K	ELR25
R49	Resistor	680	ELR25
R50	Resistor	1K	ELR25
R51	Resistor	100K	ELR25
R52	Resistor	220	ELR25
R53	Resistor	560	ELR25
R54	Resistor	100	ELR25
R55	Resistor	2.2K	ELR25
R56	Resistor	220	ELR25
R57	Resistor	2.2K	ELR25
R59	Resistor	47K	ELR25
R60	Resistor	470	ELR25
R61	Resistor	470	ELR25
R62	Resistor	10K	ELR25
R63	Resistor	4.7K	ELR25
R64	Resistor	10K	ELR25
R65	Trimmer	100KB	SR19R
R66	Resistor	2.2K	ELR25
R67	Resistor	2.2K	ELR25
R68	Resistor	100	ELR25

[MAIN] UNIT (IC-551D)

REF. NO.	DESCRIPTION		PART NO.
R69	Resistor	3.3K	ELR25
R70	Resistor	47K	ELR25
R71	Resistor	22K	ELR25
R72	Resistor	47	ELR25
R73	Resistor	1M	ELR25
R74	Resistor	220K	ELR25
R75	Resistor	220	ELR25
R76	Resistor	100K	ELR25
R77	Resistor	1K	R25
R78	Resistor	1K	R25
R79	Resistor	2.2K	ELR25
R80	Resistor	330	ELR25
R81	Resistor	4.7K	1/16W
R82	Resistor	47	ELR25
R83	Resistor	10	ELR25
R84	Resistor	1M	ELR25
R85	Resistor	100K	ELR25
R86	Resistor	10K	ELR25
R104	Resistor	100K	ELR25
R114	Resistor	1K	ELR25
R115	Resistor	2.2K	R25
R116	Resistor	3.3K	ELR25
R118	Resistor	47K	ELR25
R119	Trimmer	100K	RGP053
R120	Resistor	47K	ELR25
R122	Resistor	1K	R25
R123	Resistor	10K	ELR25
R124	Trimmer	100K	RGP053
R125	Resistor	100	ELR25
R126	Resistor	2.2K	ELR25
R127	Resistor	4.7K	ELR25
R128	Resistor	2.2K	ELR25
R129	Resistor	4.7K	ELR25
R130	Resistor	15K	ELR25
R131	Resistor	150K	ELR25
R132	Resistor	220	ELR25
R133	Resistor	220	ELR25
R134	Resistor	220	ELR25
R135	Resistor	2.2K	ELR25
R136	Resistor	47K	ELR25
R137	Trimmer	1MB	SR19D
R138	Trimmer	10KB	SR19D
R139	Resistor	2.2K	R25
R140	Trimmer	1MB	SR19D
R141	Resistor	4.7	R25
R142	Resistor	470	ELR25
R143	Resistor	470	ELR25
R144	Resistor	4.7	R25
R145	Resistor	22K	ELR25
R146	Resistor	470	ELR25
R147	Resistor	2.2	ELR25
R148	Resistor	10K	ELR25
R149	Resistor	470K	ELR25
R151	Resistor	2.2K	ELR25
R152	Trimmer	10KB	SR19D
R153	Resistor	2.2	ELR25
R154	Resistor	100	ELR25
R156	Resistor	22K	ELR25
R158	Resistor	4.7K	ELR25
R159	Resistor	10K	ELR25
R160	Resistor	4.7K	ELR25
R161	Resistor	4.7K	ELR25
R162	Resistor	3.3M	ELR25
R164	Resistor	15K	ELR25

[MAIN] UNIT (IC-551D)

REF. NO.	DESCRIPTION		PART NO.
R165	Resistor	100K	ELR25
R166	Resistor	4.7K	ELR25
R168	Resistor	22K	ELR25
R169	Resistor	4.7K	ELR25
R170	Resistor	4.7K	ELR25
R171	Resistor	330	ELR25
R172	Trimmer	10KB	SR19D
R173	Resistor	1.5K	ELR25
R174	Resistor	100K	ELR25
R175	Resistor	4.7K	ELR25
R176	Resistor	1K	ELR25
R177	Resistor	2.2K	ELR25
R178	Resistor	10K	ELR25
R182	Trimmer	10K	RGP053
R183	Resistor	1M	ELR25
R184	Resistor	330K	ELR25
R185	Resistor	15K	ELR25
R187	Resistor	22K	ELR25
R188	Resistor	22K	ELR25
R189	Resistor	22K	ELR25
R190	Resistor	33K	ELR25
R191	Resistor	270K	ELR25
R192	Resistor	22	ELR25
R193	Resistor	120K	ELR25
R194	Resistor	2.2K	ELR25
R195	Resistor	1K	ELR25
R196	Resistor	2.2K	ELR25
R197	Resistor	2.2K	ELR25
R198	Resistor	470K	ELR25
R199	Resistor	1.8M	ELR25
R200	Resistor	390K	ELR25
R201	Resistor	1.8M	ELR25
R202	Resistor	470K	ELR25
R203	Trimmer	1MB	SR19D
R204	Resistor	10K	ELR25
R205	Resistor	1K	ELR25
R206	Resistor	18K	ELR25
R207	Resistor	100	ELR25
R208	Resistor	22K	ELR25
R209	Resistor	220	ELR25
R210	Resistor	22K	ELR25
R212	Resistor	47K	ELR25
R213	Resistor	4.7K	ELR25
R214	Resistor	10K	ELR25
R215	Resistor	1.5K	ELR25
R217	Resistor	10K	ELR25
R218	Resistor	15	ELR25
R219	Resistor	47	ELR25
R221	Resistor	1M	ELR25
R222	Resistor	100K	R25
R223	Resistor	22K	ELR25
R224	Resistor	10K	ELR25
R225	Resistor	2.2K	ELR25
R226	Trimmer	10K	RGP053
R227	Resistor	3.3K	ELR25
R229	Resistor	47	R25
R230	Resistor	4.7K	R25
R231	Resistor	47K	R25
R232	Resistor	56	ELR25
R233	Resistor	100	ELR25
C1	Ceramic	68P	50V
C2	Ceramic	68P	50V
C3	Ceramic	120P	50V

[MAIN] UNIT (IC-551D)

REF. NO.	DESCRIPTION		PART NO.
C4	Ceramic	33P	50V
C5	Ceramic	68P	50V
C6	Ceramic	68P	50V
C7	Ceramic	5P	50V
C9	Ceramic	47P	50V
C10	Trimmer	CV01B	300
C17	Ceramic	0.001	50V
C18	Ceramic	0.0047	50V
C19	Barrier L.	0.1	12V
C20	Electroly	220	16V
C21	Ceramic	0.0047	50V
C22	Ceramic	47P	50V
C23	Ceramic	0.0047	50V
C24	Electroly	10	16V
C25	Ceramic	0.0047	50V
C26	Electroly	220	16V
C27	Ceramic	120P	50V
C28	Ceramic	0.0047	50V
C29	Barrier L.	0.1	12V
C30	Ceramic	330P	50V
C31	Electroly	10	16V
C32	Ceramic	0.0047	50V
C33	Ceramic	0.0047	50V
C34	Ceramic	0.0047	50V
C35	Ceramic	33P	50V
C36	Ceramic	0.0047	50V
C37	Ceramic	40P	50V
C38	Ceramic	0.0047	50V
C39	Ceramic	0.0047	50V
C40	Ceramic	0.0047	50V
C41	Electroly	4.7	25V
C42	Ceramic	0.0047	50V
C43	Ceramic	12P	50V
C44	Ceramic	0.0047	50V
C45	Ceramic	68P	50V
C46	Ceramic	68P	50V
C47	Ceramic	0.0047	50V
C48	Ceramic	0.0047	50V
C49	Ceramic	0.0047	50V
C50	Ceramic	150P	50V
C51	Ceramic	0.0047	50V
C52	Ceramic	0.0047	50V
C53	Ceramic	470P	50V
C54	Mylar	0.056	50V
C55	Ceramic	0.0047	50V
C56	Barrier L.	0.1	12V
C57	Ceramic	0.0047	50V
C58	Ceramic	0.001	50V
C59	Ceramic	0.001	50V
C60	Ceramic	0.0047	50V
C61	Ceramic	0.0047	50V
C62	Barrier L.	0.1	12V
C63	Mylar	0.022	50V
C64	Barrier L.	0.1	12V
C65	Ceramic	15P	50V
C67	Ceramic	0.0047	50V
C68	Ceramic	150P	50V
C69	Ceramic	0.001	50V
C71	Ceramic	0.0047	50V
C73	Ceramic	0.0047	50V
C74	Ceramic	0.0047	50V
C75	Electroly	0.47	50V
C76	Ceramic	0.0047	50V
C77	Ceramic	0.0047	50V

[MAIN] UNIT (IC-551D)

REF. NO.	DESCRIPTION	PART NO.	
C78	Ceramic	68P	50V
C79	Ceramic	5P	50V
C80	Ceramic	0.0047	50V
C81	Ceramic	0.0047	50V
C82	Barrier L.	0.47	12V
C83	Ceramic	0.001	50V
C84	Ceramic	5P	50V
C85	Barrier L.	0.1	12V
C86	Ceramic	330P	50V
C87	Ceramic	330P	50V
C88	Barrier L.	0.1	12V
C89	Ceramic	27P	50V
C90	Ceramic	0.0047	50V
C91	Barrier L.	0.1	12V
C92	Cylinder	UP125SL10P	
C93	Ceramic	0.0047	50V
C94	Ceramic	0.0047	50V
C95	Ceramic	82P	50V
C96	Ceramic	0.0047	50V
C97	Ceramic	47P	50V
C98	Ceramic	0.0047	50V
C99	Ceramic	22P	50V
C100	Mylar	0.001	50V
C101	Ceramic	0.0047	50V
C102	Ceramic	0.0047	50V
C103	Ceramic	0.0047	50V
C104	Dip Mica	51P	50V
C105	Trimmer	CV05D3001	
C106	Barrier L.	0.1	12V
C107	Dip Mica	150P	50V
C108	Dip Mica	150P	50V
C109	Electroly	0.47	50V
C110	Ceramic	0.0047	50V
C111	Ceramic	0.0047	50V
C112	Ceramic	100P	50V
C113	Ceramic	0.0047	50V
C114	Electroly	10	16V
C115	Cylinder	UP125X103M	
C116	Electroly	220	10V
C117	Ceramic	0.001	50V
C127	Ceramic	15P	50V
C133	Ceramic	15P	50V
C135	Ceramic	0.0047	50V
C136	Electroly	33	16V
C137	Electroly	100	16V
C138	Electroly	100	16V
C139	Electroly	470	16V
C141	Electroly	100	16V
C142	Electroly	4.7	25V
C143	Electroly	470	16V
C144	Ceramic	0.0022	50V
C146	Barrier L.	0.1	12V
C147	Electroly	10	16V
C148	Electroly	22	16V
C149	Barrier L.	0.1	12V
C150	Electroly	10	16V
C151	Ceramic	0.0047	50V
C152	Barrier L.	0.1	12V
C153	Barrier L.	0.1	12V
C154	Mylar	0.022	50V
C155	Mylar	0.022	50V
C156	Mylar	0.022	50V
C157	Barrier L.	0.1	12V
C158	Electroly	22	16V

[MAIN] UNIT (IC-551D)

REF. NO.	DESCRIPTION	PART NO.	
C159	Electroly	10	16V
C160	Electroly	10	16V
C161	Ceramic	0.0047	50V
C162	Ceramic	0.0047	50V
C163	Electroly	1	50V
C164	Electroly	1	50V
C165	Ceramic	68P	50V
C166	Ceramic	0.0047	50V
C167	Ceramic	0.001	50V
C168	Ceramic	0.001	50V
C169	Mylar	0.01	50V
C170	Mylar	0.0033	50V
C171	Electroly	0.47	50V
C172	Electroly	0.47	50V
C173	Ceramic	100P	50V
C174	Electroly	10	16V
C175	Ceramic	0.001	50V
C176	Electroly	47	10V
C177	Ceramic	0.001	50V
C178	Electroly	0.47	50V
C179	Electroly	10	16V
C180	Electroly	100	10V
C181	Ceramic	0.0047	50V
C182	Electroly	33	16V
C183	Ceramic	0.0047	50V
C184	Electroly	3.3	25V
C185	Ceramic	22P	50V
C187	Ceramic	15P	50V
C190	Ceramic	0.0047	50V
C191	Barrier L.	0.1	12V
C192	Electroly	2.2	50V
C193	Electroly	1	50V
C194	Ceramic	15P	50V
C195	Ceramic	15P	50V
C196	Ceramic	0.0047	50V
C198	Barrier L.	0.1	12V
C200	Electroly	10	16V
C202	Ceramic	0.0047	50V
C203	Ceramic	33P	50V
C204	Ceramic	0.001	50V
C205	Ceramic	0.001	50V
C206	Ceramic	0.001	50V
C207	Ceramic	0.001	50V
C208	Ceramic	0.001	50V
C209	Ceramic	0.0047	50V
C210	Chip Ceramic	GR42-6W5R102	
C211	Ceramic	0.0047	50V
C212	Ceramic	0.0047	50V
C214	Ceramic	0.001	50V
C215	Ceramic	0.001	50V
C216	Electroly	10	16V
C217	Barrier L.	0.1	12V
C218	Ceramic	3P	50V
C219	Electroly	10	16V
C220	Ceramic	0.001	50V
B1	PC Board	B-306D	
B2	PC Board	B-340	
B3	PC Board	B-350A	
J3	Connector	5045-12A	
J4	Connector	5045-12A	
J5	Connector	5045-06A	
J6	Connector	3024-06C	

[MAIN] UNIT (IC-551D)

REF. NO.	DESCRIPTION	PART NO.
J7	Connector	3024-06C
J9	Connector	CN-3561S
J10	Connector	171255-1
J11	Connector	171255-1
P6	Connector	3021-12
P7	Connector	3021-12
P8	Connector	3021-04
P9	Connector	3021-08
P10	Connector	3021-12
S1	Switch	SSS012

[PA] UNIT (IC-551D)

REF. NO.	DESCRIPTION	PART NO.
IC2	IC	NJM4558D
Q1	Transistor	2SC2694
Q2	Transistor	2SC2694
Q3	Transistor	2SD235Y
D1	Diode	GP08B
D2	Diode	GP08B
D3	Diode	1SS53
D4	Diode	15CD11
D5	Diode	15CD11
L1	Coil	LR-70
L2	Coil	LR-71
L3	Coil	LR-72
L4	Choke	1R2 (L4)
L5	Choke	1R2 (L4)
L6	Choke	LR-39
L7	Choke	LR-39
L8	Coil	LA-133
R1	Resistor	3.3 1W
R2	Resistor	3.3 1W
R3	Resistor	10 R50
R4	Resistor	10 R50
R5	Resistor	3.3 1W
R6	Resistor	3.3 1W
R7	Resistor	3.3 1W
R8	Resistor	330 ELR25
R9	Trimmer	3K FR-10
R14	Resistor	47 ELR25
R15	Resistor	1M ELR25
R16	Resistor	220K ELR25
R17	Resistor	8.2K ELR25
R18	Resistor	100K ELR25
R19	Resistor	220K ELR25
R20	Resistor	1K ELR25
R21	Trimmer	10K RGP053
R22	Resistor	470 ELR25
C1	Ceramic	330P 50V
C2	Chip Ceramic	GR44CH102K50V
C3	Chip Ceramic	GR44CH392K50V
C4	Chip Ceramic	GR44CH392K50V
C5	Electroly	100 10V
C6	Ceramic	330P 500V
C8	Chip Ceramic	GR44Y5V684Z25V
C9	Chip Ceramic	GR44Y5V684Z25V
C10	Ceramic	47P 500V
C11	Ceramic	47P 500V
C13	Barrier L.	0.047 12V
C14	Electroly	470 25V
C19	Ceramic	0.0047 50V
C20	Ceramic	470P 50V
C21	Ceramic	0.0047 50V
C22	Ceramic	0.0047 50V
C23	Ceramic	220P 50V
C24	Ceramic	0.0047 50V
C25	Ceramic	0.0047 50V
C26	Ceramic	0.0047 50V
C27	Ceramic	27P 500V
C28	Ceramic	0.0047 50V
P7	Connector	1625-03R-1

[PA] UNIT (IC-551D)

REF. NO.	DESCRIPTION	PART NO.
P8	Connector	1625-06R-1
P9	Connector	3021-08
J1	Connector	5045-04A
J2	Connector	LLR-6
J3	Connector	AT-700
J4	Connector	AT-700
J5	Connector	AT-700
J6	Connector	AT-700
J7	Connector	FM-MDRMI
J8	Connector	SJ-296
J9	Connector	SJ-296
J10	Connector	1625-24R
J11	Connector	5045-12A
J12	Connector	AT-700
S1	Thermal switch	OHD-80M
F	Fuse	20A
	Fuse Holder	S-N-2054
B1	PC Board	B-226C (PA)
B2	PC Board	B-363A (APC)
	Fan Motor	M9N12T24-5
	Piezo Buzzer	EAL-120B

[FILTER] UNIT (IC-551D)

REF. NO.	DESCRIPTION	PART NO.
D1	Diode	1N60
D2	Diode	1N60
D3	Diode	GP08B
D4	Diode	GP08B
L1	Coil	LA-130
L2	Coil	LA-130
L3	Coil	LR-69
R1	Resistor	33 R25
R2	Trimmer	300 RGP-05
C1	Ceramic	47P 500V
C2	Ceramic	6P 500V
C3	Ceramic	82P 500V
C4	Ceramic	18P 500V
C5	Ceramic	39P 500V
C6	Electroly	10 16V
C7	Ceramic	0.0047 50V
C8	Ceramic	1P 500V
C9	Ceramic	47P 50V
C10	Trimmer	C-1P-2
C11	Ceramic	18P 500V
C12	Feed Through	IHB363Y-R 102P
C13	Feed Through	IHB363Y-R 102P
C14	Feed Through	IHB363Y-R 102P
C15	Feed Through	IHB363Y-R 102P
RL1	Relay	NC2-P-DC12V
J1	Connector	CN-3561-S
J2	Connector	CN-3561-S
J3	Connector	CN-3561-S
P1	Connector	3021-04
B1	P.C. Board	B-362

[IC-EX106] FM UNIT (OPTION)

REF. NO.	DESCRIPTION	PART NO.
IC1	IC	μPC577H
IC2	IC	NJM4558D
IC3	IC	AN829
IC4	IC	NJM4558D
IC5	IC	BA401
IC6	IC	AFL13F3500B1
Q1	FET	2SK49H2
Q2	Transistor	2SC945P
Q3	Transistor	2SC945P
Q4	Transistor	2SC945P
Q5	Transistor	2SC945P
Q6	Transistor	2SC945P
Q7	Transistor	2SC945P
D1	Diode	1SS53
D2	Diode	1SS53
D3	Diode	1N60
D4	Diode	1N60
D5	Diode	1N60
D6	Zener	XZ055
D7	Diode	1SS53
D8	Diode	1SS53
D9	Zener	YZ030
D10	Diode	1SS53
D11	Varicap	FC51M
R1	Resistor	2.2K R25
R2	Resistor	1K R25
R3	Resistor	470 R25
R4	Resistor	2.2K R25
R5	Resistor	2.2K R25
R6	Resistor	1.5K R25
R7	Resistor	1.5K R25
R8	Resistor	4.7K R25
R10	Resistor	100 R25
R11	Resistor	100K R25
R12	Resistor	12K R25
R13	Resistor	1K R25
R14	Resistor	22K R25
R15	Trimmer	20K RGP102
R16	Resistor	100 R25
R17	Resistor	100 R25
R18	Resistor	47 R25
R19	Resistor	10K R25
R20	Resistor	10K R25
R21	Resistor	3.3K R25
R22	Resistor	22K R25
R23	Resistor	100K R25
R24	Resistor	2.2K R25
R25	Resistor	100K R25
R26	Resistor	220K R25
R27	Resistor	47 R25
R28	Resistor	2.2K R25
R29	Resistor	47K R25
R30	Resistor	100K R25
R31	Resistor	1K R25
R32	Trimmer	1K RGP102
R33	Resistor	10K R25
R34	Resistor	4.7K R25
R35	Resistor	22K R25
R36	Resistor	100K R25
R37	Resistor	3.3M R25
R38	Resistor	120K R25

[IC-EX106] FM UNIT (OPTION)

REF. NO.	DESCRIPTION	PART NO.
R39	Resistor	100K R25
R40	Resistor	100K R25
R41	Resistor	6.8K R25
R42	Thermistor	33D28
R43	Trimmer	20K RGP102
R44	Trimmer	30K RGP102
R45	Resistor	82K R25
R46	Resistor	100K R25
R47	Resistor	220K R25
R49	Resistor	100K R25
R50	Trimmer	20K RGP102
R51	Resistor	100 R25
R52	Resistor	470 R25
R53	Resistor	680 R25
R54	Resistor	2.2K R25
R55	Resistor	100 R25
R56	Resistor	22K R25
R57	Resistor	22K R25
R58	Resistor	12K R25
R59	Resistor	3.3K R25
R60	Thermistor	23D29
R61	Resistor	4.7K R25
R62	Resistor	2.2K R25
R63	Resistor	4.7K R25
R64	Resistor	220K R25
R65	Resistor	15K R25
R66	Trimmer	3K RGP102
R67	Resistor	100 R25
R68	Resistor	10K R25
R69	Resistor	4.7K R25
R70	Resistor	10K R25
R71	Resistor	470K R25
R72	Resistor	680 R25
C1	Cylinder	0.01 25V
C2	Cylinder	2P 50V
C3	Barrier L.	0.047 25V
C4	Barrier L.	0.047 25V
C5	Barrier L.	0.1 12V
C7	Barrier L.	0.1 12V
C8	Cylinder	0.0047 50V
C9	Barrier L.	0.047 25V
C10	Barrier L.	0.1 12V
C11	Cylinder	0.0022 50V
C12	Barrier L.	0.1 12V
C13	Barrier L.	0.1 12V
C14	Barrier L.	0.1 12V
C15	Barrier L.	0.1 12V
C16	Electroly	4.7 25V
C17	Cylinder	0.001 50V
C18	Cylinder	0.001 50V
C19	Barrier L.	0.047 25V
C20	Cylinder	0.022 25V
C21	Barrier L.	0.1 12V
C22	Cylinder	0.022 25V
C23	Electroly	0.47 50V
C24	Barrier L.	0.1 12V
C25	Cylinder	0.01 25V
C26	Electroly	10 16V
C27	Barrier L.	0.1 12V
C28	Electroly	0.47 50V
C29	Dip Mica	100P 50V
C30	Dip Mica	100P 50V
C31	Dip Mica	30P 50V

[IC-EX106] FM UNIT (OPTION)

REF. NO.	DESCRIPTION	PART NO.	
C32	Cylinder	0.01	25V
C33	Electroly	10	16V
C34	Cylinder	0.001	50V
C35	Cylinder	0.001	50V
C36	Electroly	0.47	50V
C37	Barrier L.	0.001	25V
C38	Cylinder	0.001	50V
C39	Cylinder	0.01	50V
C40	Electroly	10	16V
C41	Cylinder	0.01	25V
C42	Cylinder	100P	50V
C43	Dip Mica	51P	50V
C44	Dip Mica	100P	50V
C45	Cylinder	0.01	25V
C47	Cylinder	0.0047	25V
C48	Dip Mica	150P	25V
C49	Barrier L.	0.1	12V
C50	Electroly	10	16V
C51	Electroly	10	16V
C52	Cylinder	0.01	25V
C53	Cylinder	0.01	25V
C54	Cylinder	0.01	25V
C55	Cylinder	0.01	25V
C56	Cylinder	0.01	25V
C57	Cylinder	0.01	25V
C58	Cylinder	0.01	25V
L1	Coil	LS-96A	
L2	Coil	LS-20	
L3	Coil	LS-16	
L4	Choke	102J	(LB-4)
L5	Choke	101J	(LB-4)
L6	Choke	101J	(LB-4)
L7	Choke	100J	(LB-4)
L8	Coil	LB-36C	
FI1	Ceramic Filter	CFT455D	
X1	Crystal	9.4665MHz (HC-43/U)	
X2	Crystal	9.0314MHz (HC-43/U)	
DS1	Ceramic Discrim	455D	
P1	Connector	3021-06	
J1	Connector	5045-06A	
B1	P.C. Board	B-308B	

[IC-EX107] VOX UNIT (IC-551D)

REF. NO.	DESCRIPTION	PART NO.	
IC1	IC	NJM4558D	
IC2	IC	AFL13F3500B1	
IC3	IC	NJM4558D	
IC4	IC	MN3007	
IC5	IC	4011	
Q1	Transistor	2SC945P	
Q2	Transistor	2SC945P	
Q3	Transistor	2SA798G	
Q4	Transistor	2SC945P	
Q5	Transistor	2SD468C	
Q6	Transistor	2SC945P	
Q7	Transistor	2SC945P	
Q8	Transistor	2SC945P	
Q9	Transistor	2SA1015	
Q10	Transistor	2SC945P	
Q11	Transistor	2SC945P	
D1	Zener	YZ030	
D2	Diode	1SS53	
R1	Resistor	100	R25
R2	Resistor	100	R25
R3	Resistor	100	R25
R4	Resistor	100	R25
R5	Resistor	1K	R25
R6	Resistor	10K	R25
R7	Resistor	47K	R25
R8	Resistor	47K	R25
R9	Resistor	47K	R25
R10	Resistor	10K	R25
R11	Resistor	100K	R25
R12	Resistor	100K	R25
R13	Resistor	100K	R25
R14	Resistor	1M	R25
R15	Resistor	1M	R25
R16	Resistor	4.7K	R25
R17	Resistor	4.7K	R25
R18	Resistor	10M	R50
R19	Resistor	560	R25
R20	Resistor	220K	R25
R21	Resistor	6.8K	R25
R22	Resistor	10K	ELR25
R23	Resistor	1K	R25
R24	Resistor	10K	R25
R25	Resistor	100K	R25
R26	Resistor	4.7K	R25
R27	Resistor	4.7K	R25
R28	Resistor	1.8M	R25
R29	Resistor	4.7K	R25
R30	Resistor	100K	R25
R31	Resistor	22K	R25
R32	Resistor	10K	R25
R33	Resistor	22K	R25
R34	Resistor	4.7K	R25
R35	Resistor	100K	R25
R36	Resistor	1K	R25
R37	Resistor	10K	R25
R38	Resistor	1K	R25
R39	Resistor	100K	R25
R40	Resistor	100K	R25
R41	Resistor	2.2K	R25
R42	Resistor	2.2	R25
R43	Resistor	10K	R25

[IC-EX107] VOX UNIT (IC-551D)

REF. NO.	DESCRIPTION		PART NO.
R44	Resistor	15K	R25
R45	Resistor	1K	R25
R46	Resistor	47K	R25
R47	Resistor	1M	R25
R48	Resistor	12K	ELR25
R49	Resistor	1M	R25
R50	Resistor	22K	ELR25
R51	Resistor	2.2K	ELR25
C1	Electroly	100	10V
C2	Barrier L.	0.1	12V
C3	Cylinder	0.001	25V
C4	Electroly	1	50V
C5	Barrier L.	0.1	12V
C6	Electroly	4.7	25V
C7	Electroly	1	50V
C8	Electroly	10	16V
C9	Barrier L.	0.047	25V
C10	Barrier L.	0.1	12V
C11	Cylinder	0.001	25V
C12	Electroly	1	50V
C13	Electroly	1	50V
C14	Electroly	10	16V
C15	Barrier L.	0.1	12V
C16	Cylinder	0.001	25V
C17	Electroly	10	16V
C18	Barrier L.	0.1	12V
C19	Cylinder	680P	50V
C20	Electroly	10	16V
C21	Electroly	1	50V
C22	Electroly	10	16V
P1	Connector	3021-12	
J1	Connector	5045-4A	
	P.C. Board	B-309A	
	Jumper	JPW03A-EL01	

[IC-EX108] P.B.T. UNIT (IC-551D)

REF. NO.	DESCRIPTION	PART NO.
Q1	FET	3SK74M
Q2	FET	3SK74M
Q3	FET	3SK74K
Q4	FET	3SK74K
Q5	Transistor	2SA798
Q6	Transistor	2SC945P
Q7	Transistor	2SA1015
Q8	Transistor	2SC945P
Q9	Transistor	2SC945P
Q10	Transistor	2SC945P
Q11	Transistor	2SC945P
Q12	Transistor	2SC945P
Q13	Transistor	2SC945P
Q14	Transistor	2SC945P
Q15	FET	2SK49H2
Q16	FET	2SK30AY
D1	Diode	1SS53
D2	Diode	1SS99
D3	Diode	1SS99
D4	Diode	1SS99
D5	Diode	1SS99
D6	Diode	1SS99
D7	Diode	1SS99
D8	Diode	1SS99
D9	Diode	1SS99
D10	Diode	1N60
D11	Diode	1S953
D12	Diode	1N60
D13	Diode	1SS53
D14	Diode	1SS53
D15	Diode	1SS53
D16	Varicap	FC51M
D17	Diode	1SS53
D18	Diode	1SS53
D19	Diode	1SS53
D20	Diode	1SS53
D21	Diode	1SS53
D22	Diode	1SS53
D23	Diode	1SS53
D24	Diode	1SS53
D25	Diode	1S953
D26	Diode	1S953
D27	Diode	1SS53
L1	Coil	LS-96A
L2	Coil	LS-96A
L3	Coil	LR-18
L4	Coil	LR-18
L5	Coil	LS-129
L6	Coil	LS-129
L7	Coil	LR-18
L8	Coil	LR-18
L9	Coil	LS-96A
L10	Coil	LS-96A
L11	Coil	LS-96A
L12	Coil	LS-140A
L13	Coil	LS-74
L14	Coil	LS-116
L15	Coil	LS-116
L16	Coil	LS-116
L17	Choke	101 (LB4)
L18	Choke	100 (LB4)

[IC-EX108] P.B.T. UNIT (IC-551D)

REF. NO.	DESCRIPTION		PART NO.
R1	Resistor	470	R25
R2	Resistor	2.2K	R25
R4	Resistor	10K	R25
R5	Resistor	2.2K	R25
R6	Resistor	47	R25
R7	Resistor	47	R25
R8	Resistor	100K	R25
R9	Resistor	10K	R25
R10	Resistor	47	R25
R11	Resistor	3.3K	R25
R12	Resistor	100K	R25
R13	Resistor	3.3K	R25
R14	Resistor	220	R25
R15	Resistor	47	R25
R16	Resistor	3.3M	R25
R17	Resistor	470K	R25
R18	Resistor	470K	R25
R19	Resistor	220K	R25
R20	Resistor	1M	R25
R21	Trimmer	300K	RGP102
R22	Resistor	1M	R25
R23	Resistor	470	R25
R24	Resistor	820	R25
R25	Trimmer	300	RGP102
R26	Trimmer	3K	RGP102
R27	Resistor	1K	R25
R28	Trimmer	10K	RGP102
R29	Trimmer	10K	RGP102
R30	Resistor	1K	R25
R31	Trimmer	10K	RGP102
R32	Resistor	100K	R25
R33	Resistor	10K	R25
R34	Resistor	100K	R25
R35	Resistor	4.7K	R25
R36	Resistor	10K	R25
R37	Resistor	1K	R25
R38	Resistor	1K	R25
R39	Resistor	10K	R25
R40	Resistor	220	R25
R41	Resistor	220	R25
R42	Resistor	1K	R25
R43	Resistor	10K	R25
R44	Resistor	220	R25
R45	Resistor	1K	R25
R46	Resistor	10K	R25
R47	Resistor	220	R25
R48	Resistor	47	R25
R49	Resistor	10K	R25
R50	Resistor	2.2K	R25
R51	Resistor	4.7K	R25
R52	Resistor	47	R25
R53	Resistor	2.2K	R25
R54	Resistor	1K	R25
R55	Resistor	47K	R25
R56	Resistor	4.7K	R25
R58	Resistor	1.8M	R25
R59	Resistor	330K	R25
R60	Resistor	47K	R25
R61	Resistor	4.7K	R25
R62	Resistor	22K	R25
R63	Trimmer	10K	RGP102
R64	Resistor	470	R25
R65	Trimmer	1K	RGP102
R66	Resistor	220	R25
R68	Resistor	100K	R25

[IC-EX108] P.B.T. UNIT (IC-551D)

REF. NO.	DESCRIPTION		PART NO.
R69	Resistor	220K	R25
R70	Trimmer	10K	RGP102
R71	Resistor	33K	R25
R72	Resistor	100K	R25
R73	Resistor	150K	R25
R74	Resistor	1M	R25
R75	Resistor	1K	R25
R76	Resistor	3.3K	R25
C1	Cylinder	0.01	25V
C2	Cylinder	0.01	25V
C3	Cylinder	0.0047	50V
C4	Cylinder	0.01	25V
C5	Cylinder	0.0047	50V
C6	Cylinder	0.01	25V
C7	Cylinder	0.001	50V
C8	Cylinder	0.0047	50V
C9	Cylinder	0.01	25V
C10	Cylinder	100P	50V
C11	Cylinder	100P	50V
C12	Cylinder	0.0047	50V
C13	Cylinder	0.01	25V
C14	Cylinder	0.01	25V
C15	Cylinder	0.01	25V
C16	Cylinder	0.001	50V
C17	Cylinder	0.0047	50V
C18	Electroly	2.2	35V
C19	Cylinder	0.01	50V
C20	Dip Mica	51P	50V
C21	Dip Mica	39P	50V
C22	Dip Mica	30P	50V
C23	Cylinder	0.01	25V
C24	Cylinder	10P	50V
C25	Cylinder	0.01	25V
C26	Cylinder	10P	50V
C27	Cylinder	10P	50V
C28	Cylinder	0.01	25V
C29	Cylinder	0.01	25V
C30	Cylinder	0.01	25V
C31	Cylinder	22P	50V
C32	Cylinder	0.001	50V
C34	Cylinder	0.001	50V
C35	Cylinder	0.01	25V
C36	Cylinder	0.01	25V
C37	Cylinder	0.01	25V
C38	Cylinder	0.001	50V
C39	Electroly	10	16V
C40	Cylinder	22P	50V
C42	Barrier L.	0.047	12V
C43	Barrier L.	0.047	12V
C44	Cylinder	15P	50V
C45	Cylinder	15P	50V
FI1	Crystal Filter	10M24D4	
X1	Crystal	19.7615MHz (HC-43/U)	
P1	Connector	3021-12	
J1	Connector	5045-08A	
B1	P.C. Board	B-307A	
	Bead Core	DL-20P-2.6-3-1, 21-1	
	Bead Core	2D1	

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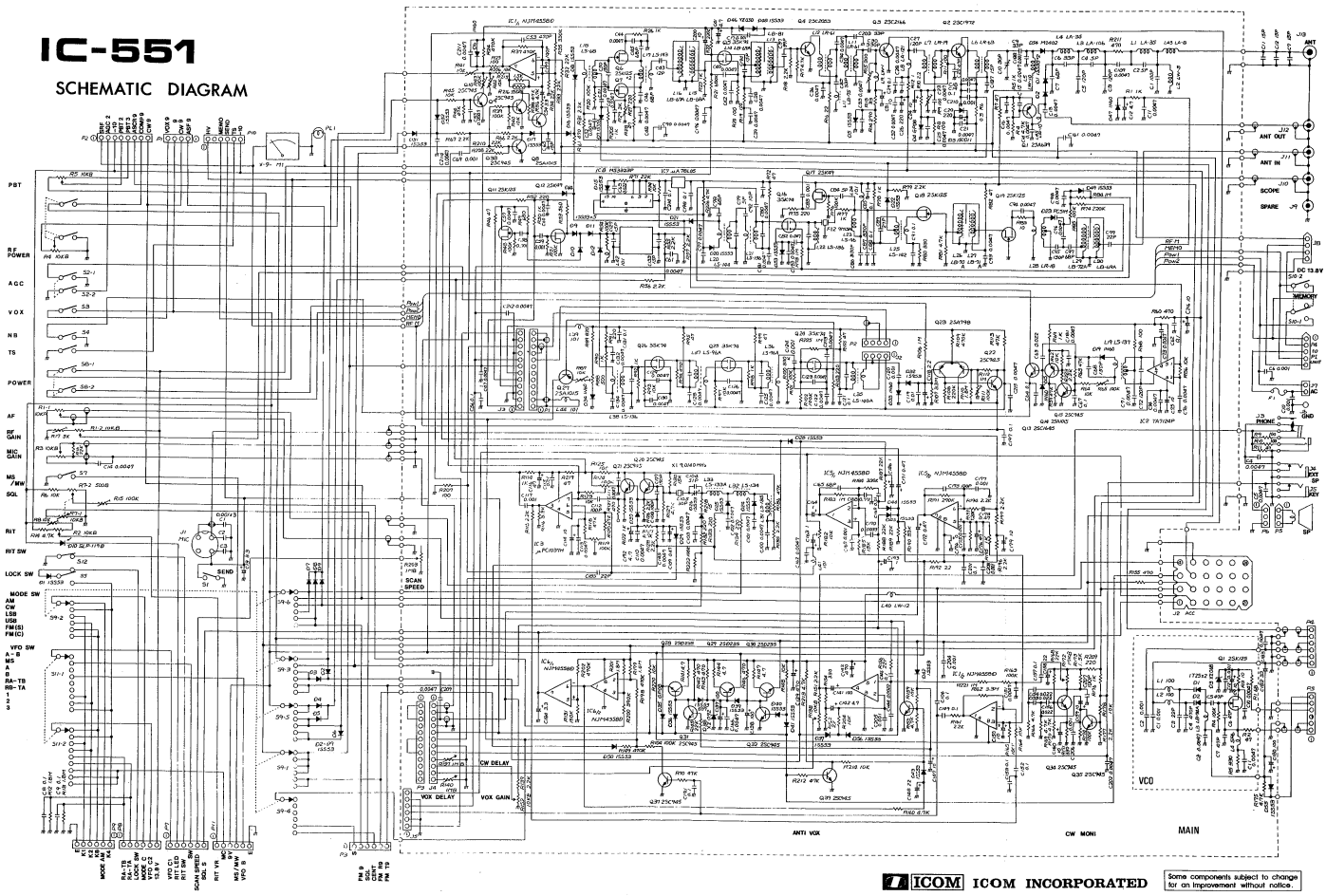
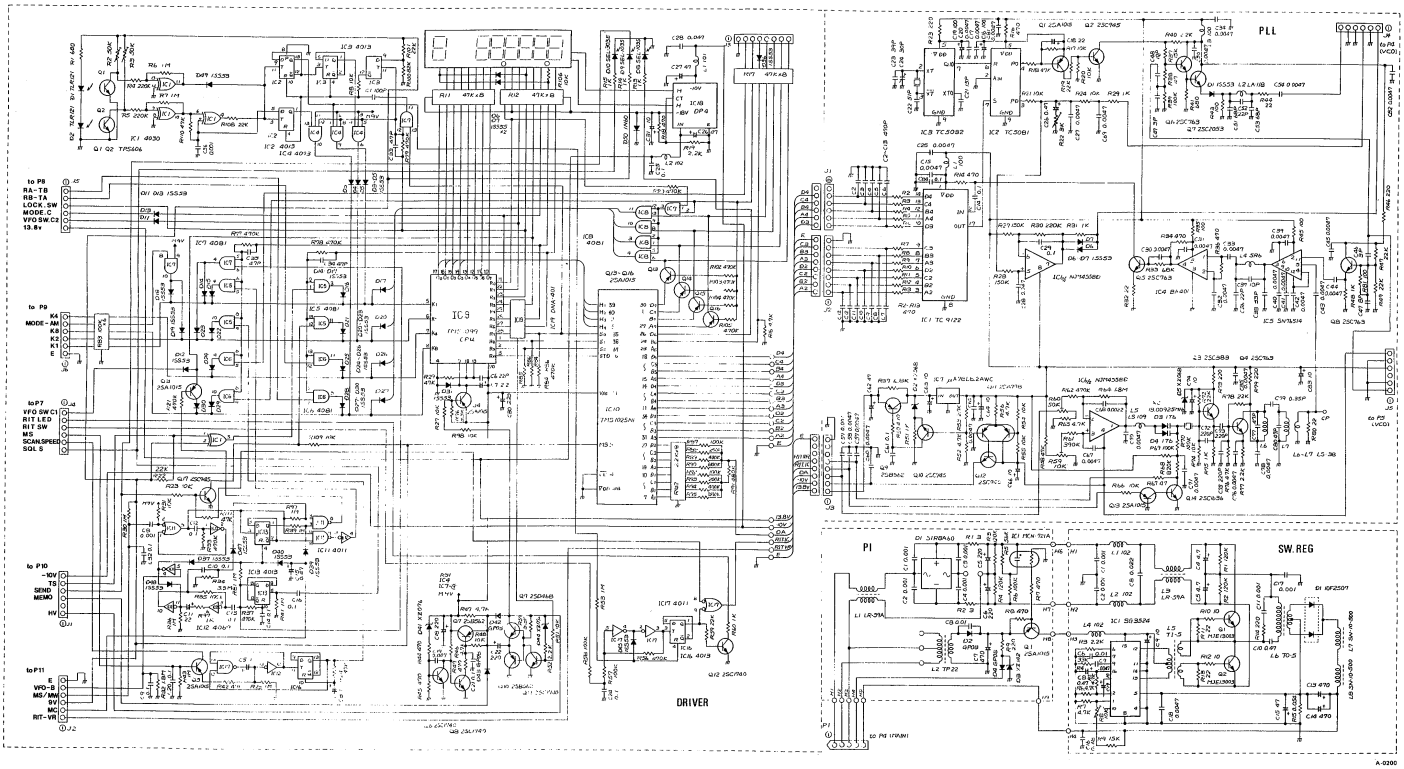
SCHEMATIC DIAGRAM

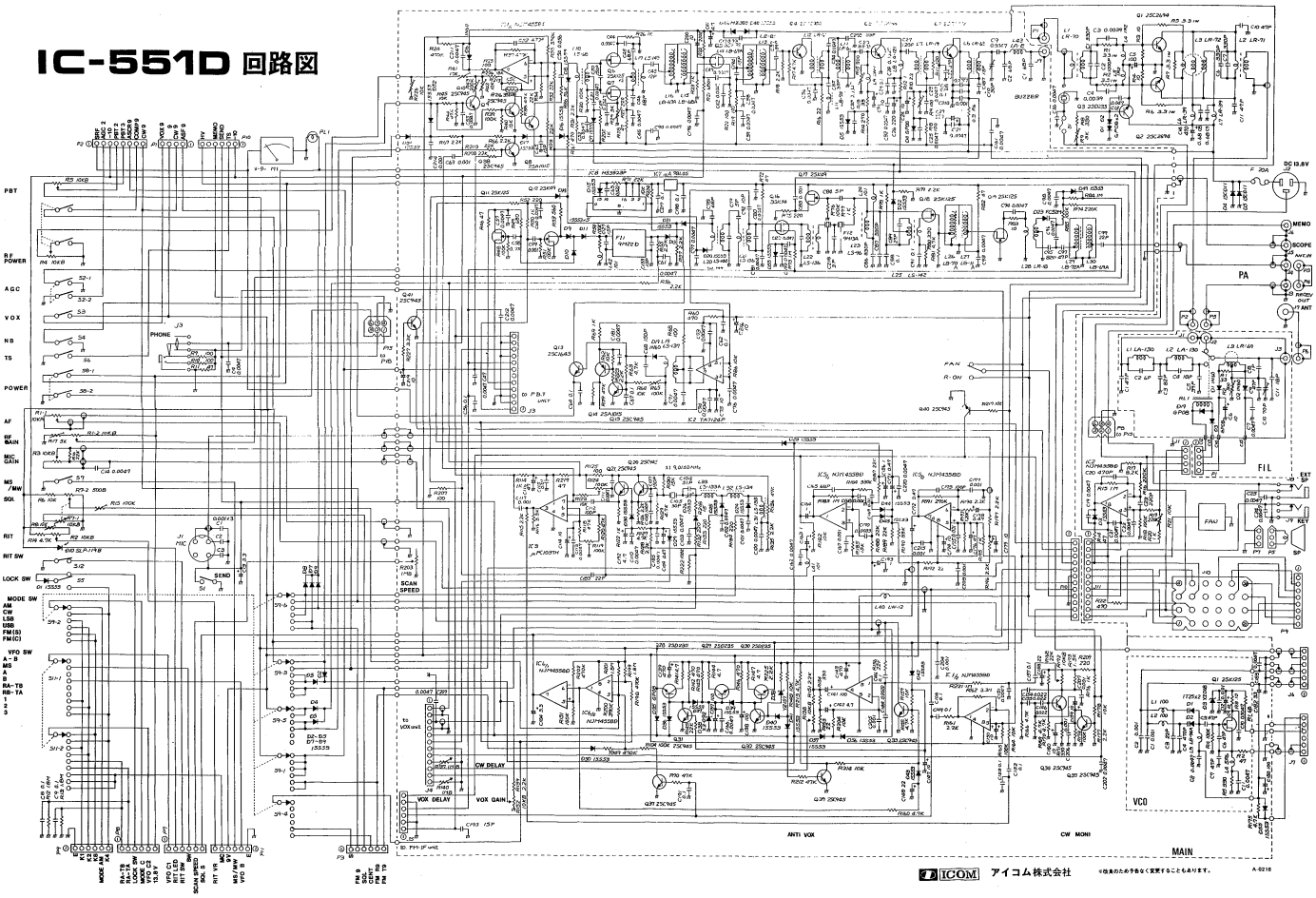


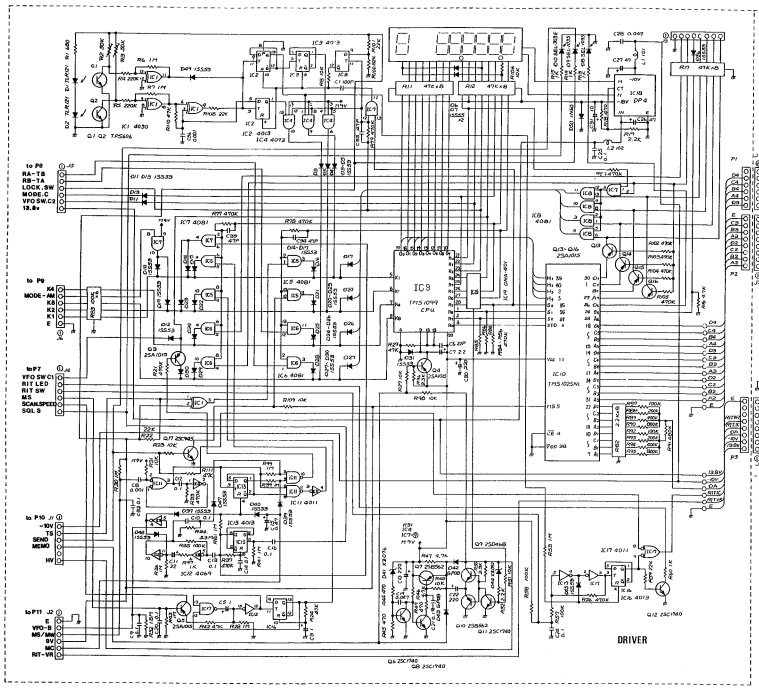
ICOM ICOM INCORPORATED

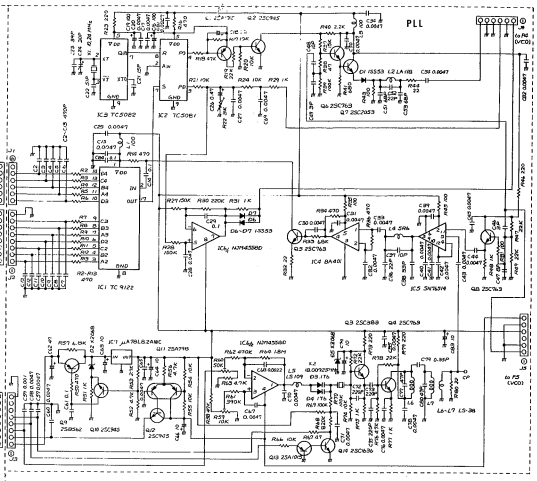
Some components subject to change for an improvement without notice.

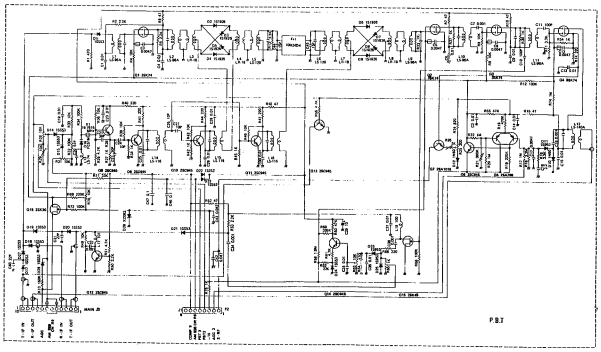

PLL
PI
SW.REG
DRIVER
to P8
RA-TB
RB-TA
LOCK.SW
MODE.C
VFO SW.C2
13.8v
to P9
K6
MODE-AM
K8
K3
K1
E
to P7
VFO SW.C1
RIT LED
RIT SW
MS
SCAN SPEED
SQL S
to P10
-10V
TS
SEND
MEMO
HV
to P11
E
VFO-B
MS/MW
SV
MC
RIT-VR
to P3 (VCO)
to P6 (MAIN)

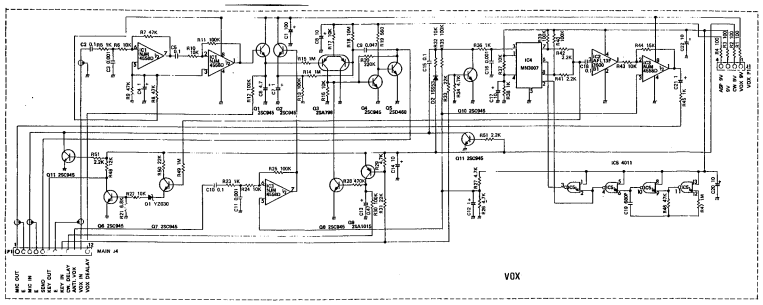
IC-551D 回路図


PBT
RF POWER
AGC
VOX
NB
TS
POWER
AF
RF GAIN
MIC GAIN
MS /MW
SQL
RIT
RIT SW
LOCK SW
MODE SW
AM
CW
LSB
USB
FM(S)
FM(C)
VFO SW
A→B
MS
A
B
RA→TB
RB→TA
1
2
3
PHONE
SEND
SCAN SPEED
CW DELAY
VOX DELAY
VOX GAIN
ANTI VOX
CW MONI
PA
FIL
VCO
MAIN
DC 13.8V
MEMO
SCOPE
EXT SP
KEY
ICOM
アイコム株式会社


DRIVER


PLL


P.B.T


VOX