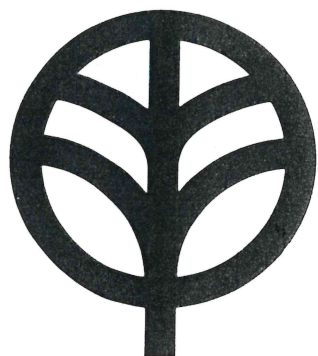




KENWOOD

SERVICE MANUAL

Model TS-770



V-UHF ALL MODE DUO BANDER

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FEATURES

1. 144/430 MHz, all mode (FM, SSB (USB, LSB), CW) transceiver.
 - Microprocessor controlled VFO and full variety of auxiliary functions.
 - FM circuitry based on KENWOOD's advanced technology and outstanding SSB quality.
 - Built-in VOX.
 - Built-in side tone and CW circuitry capable of semi-break-in operation.
 - Easy-to-operate 1 band, 1 MHz VFO stops at 999.98 kHz or is continuously adjustable (endless system).
2. Built-in digital display that indicates operating frequency in all modes.
 - Digital display equipped with easy-to-read green phosphor tubes.
 - 7-digit digital display that directly reads down to 100 Hz.
 - Frequency indicator that reads out carrier positions when mode of operation is changed.
 - Indicates fixed channel (stores any given frequency) and call channel frequencies, besides VFO A and B frequencies.
 - Digital display indicates which VFO (A or B) is in use, fixed channel numbers (1 through 8).
 - The use of display select circuit turns off the 100 Hz digits in FM mode.
3. Dependable electrical and mechanical functions.
 - VFO frequencies are switchable in 2 speeds, SLOW (in 20 Hz steps) and FAST (in 200 Hz steps).
 - VFO knob equipped with variable torque mechanism.
 - Pushbutton band select switches (UP and DOWN) that shift up and shift down frequency between 144 MHz and 440 MHz in 12 bands at 1 MHz intervals.
 - Wide band design for both transmitter and receiver that eliminates the need for tuning the RF circuits.
4. A multitude of auxiliary functions for more enjoyable operation.
 - Panel layout based on human engineering.
 - Full variety of indicating functions to check operating conditions (Pilot lamps: ON AIR, Hi/LOW (FM transmit), F-LOCK, RIT, SLOW/FAST, Back-up power ON/OFF).
 - Amplified type AGC and ALC circuits that maintain receive and transmit outputs at constant level without distortion.
 - The use of RAM memory system microprocessor enables any given frequencies to be stored in or cleared from fixed channels (8 CH).
 - Built-in back-up power circuit to keep data stored at all times.
 - Built-in scan and search circuits.
 - RIT circuit functions on VFO, fixed channels and call channel.
 - Adoption of frequency lock circuit.
 - KENWOOD's unique noise blanker (NB) circuit to eliminate pulse type noise.
 - Equipped with two meters, one is an "S" meter (with RF/ALC selector) and the other is a center meter for use on FM.
 - RF power HIGH/LOW selecting function provides convenience in transmission with local stations.
 - Auxiliary (AUX) socket.
5. Designed for fixed and mobile station services.
 - AC/DC 2-way power operation.
 - Equipped with a grip for carrying convenience.
 - Sufficient AF output power (2.5W/4Ω).
 - Built-in large sized speaker (7.5 cm). External speaker connecting jack.

CIRCUIT DESCRIPTION

GENERAL

This unit is a high class home transceiver having All Mode VHF (2 m) UHF (70 cm) Bands designed for amateur radio stations.

By microcomputer control, it covers the amateur bands of 144 MHz ~ 146 MHz, 430 MHz ~ 440 MHz. The modes of the radio waves are A₁, A_{3j}, and F₃.

FREQUENCY CONFIGURATION

The unit consists of frequency composition shown in Fig. 1. In Table 1, the oscillating frequencies of each oscillating circuit are shown.

Table 1. Oscillator frequency of each oscillator circuit

Unit	Mode/Frequency	Oscillator Frequency
CAR unit	USB, CW — R	8.8315 MHz
	LSB	8.8285 MHz
	FM	8.830 MHz
	CW-T	8.8307 MHz
IF unit	USB, LSB, CW	30.430 MHz
IF unit (MIX unit)	430 MHz band	15.8888 × 18 MHz
		16.1666 × 18 MHz
IF unit	FM TX	21.6 MHz
RF unit	FM RX	22.055 MHz
VCO unit	All mode	122.4 ~ 127.4 MHz

With the exception of FM transmission, all modes adopt the double conversion system.

In SSB or CW transmit mode, the CAR oscillator frequency (8.83 MHz) is modulated by audio signal to obtain 8.83 MHz in the 1st IF. This signal is mixed with 30.43 MHz to obtain 21.6 MHz in the 2nd IF.

In FM transmit mode, the 21.6 MHz crystal oscillator circuit in the IF unit is directly modulated.

The 122.4 MHz band of VCO is mixed with the 21.6 MHz of the 2nd IF to obtain a 144 MHz band heterodyne signal which is fed to the final unit. The 430 MHz band heterodyne signal is mixed with the 286 MHz (or 291 MHz) local oscillator frequency multiplied by 18, and the VCO frequency of 122.4-127.4 MHz to obtain a heterodyne signal of 408.4-418.4 MHz. This signal is mixed with 21.6 MHz to obtain a signal of 430 MHz band which is fed to the final unit.

In receive mode, the signal is RF amplified and mixed with the band heterodyne signal to obtain 21.6 MHz in the 1st IF.

In SSB or CW mode, the signal is mixed with 30.430 MHz to obtain 8.83 MHz in the 2nd IF.

In FM mode, the signal is mixed with 22.055 MHz to obtain 455 kHz in the 2nd IF.

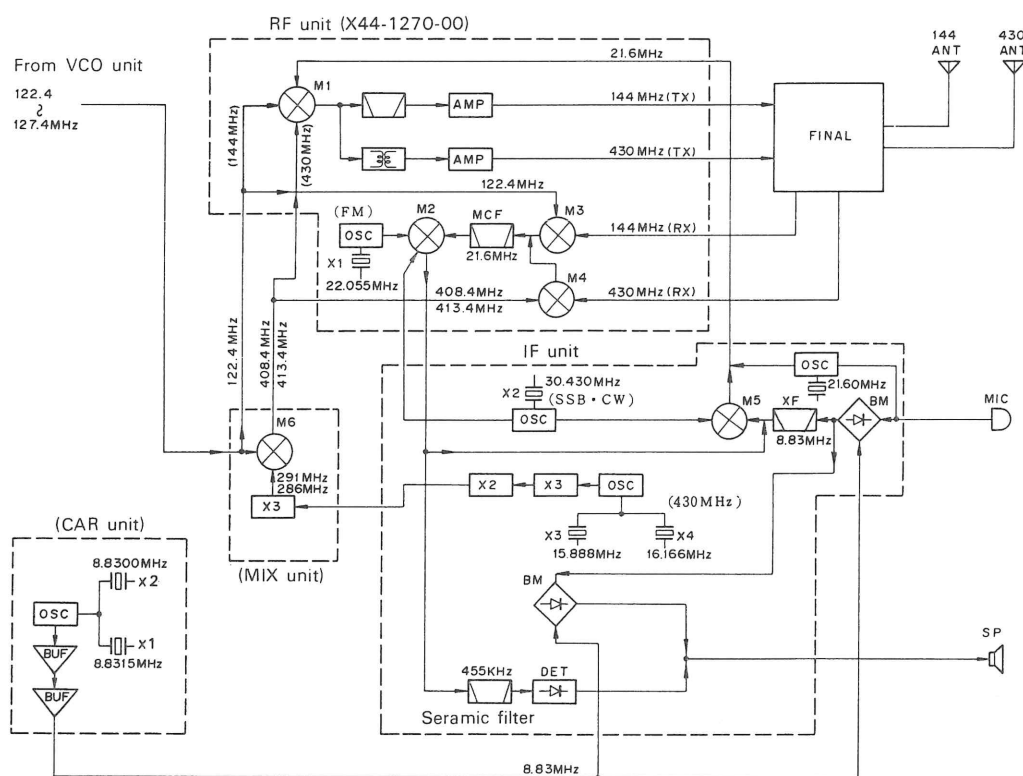


Fig. 1 Frequency configuration

CIRCUIT DESCRIPTION

ENCODER UNIT ASS'Y (X60-1080-61)

This unit includes a pulse generator unit and a light receiving unit. The VFO is operated by one knob. The photo coupler composed of LED and photo transistor generates pulses when the light turns ON and OFF through the slit. Channel pulses are generated by D1 and Q1, and count pulses by D2, D3, Q2 and Q3.

The slit is composed of a fixed slit and a moving slit. The moving slit has 125 holes at the outside. The count slit has 2 sets of photo couplers to produce 250 pulses. The two sets of photo couplers are mounted to provide a 90° phase difference to detect a right turn (UP) and left turn (DOWN) of the dial. These pulses are amplified by IC1, fed to the Schmidt circuit IC2, and outputted as pulses for V1-V4.

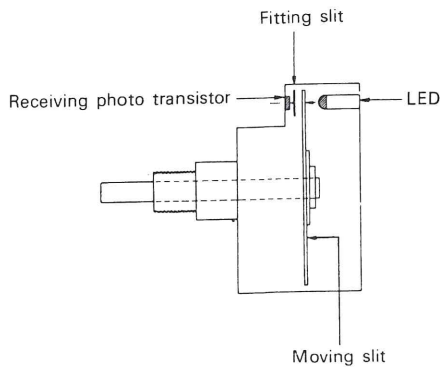


Fig. 2 Moving slit of ENCODER UNIT

The rotational torque of the knob is selected in 2 steps by the tight knob. When the tight knob is switched from NORM to TIGHT, the cam interlocked with the knob releases the braker from the locked position to brake the shaft. The braking liner is provided with a wear resisting felt.

Note: Bending the PG101 and PG102 leads:

When bending the leads, hold them more than 1.5 mm from the end using a tweezers or pliers.

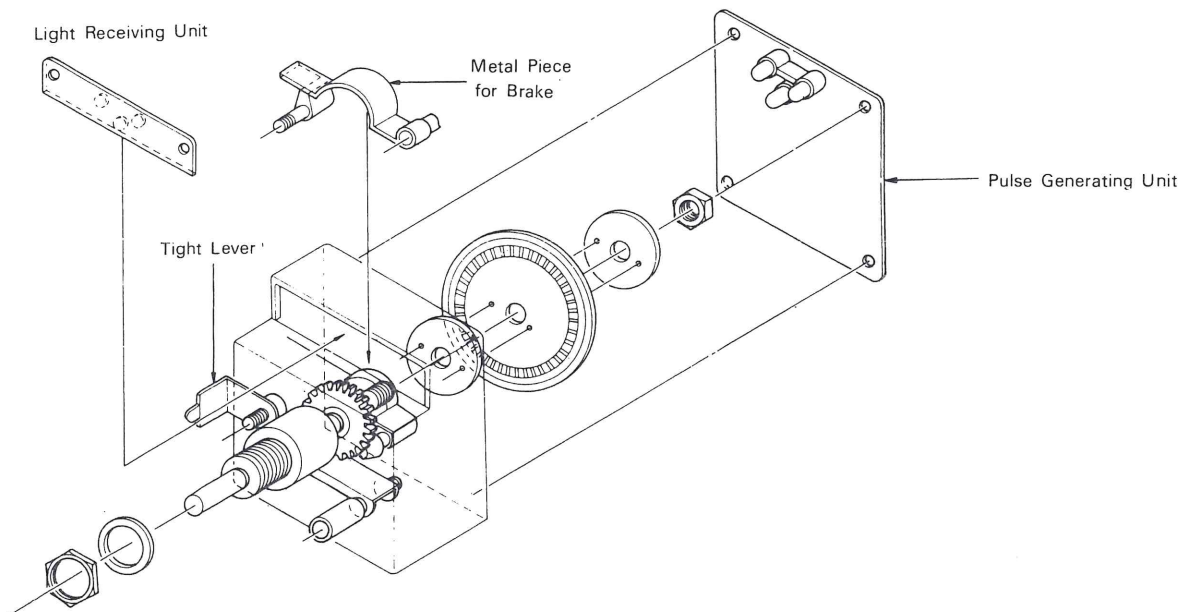


Fig. 4 ENCODER UNIT analysis

CIRCUIT DESCRIPTION

DISPLAY UNIT (X54-1390-00)

1. Digit Driver Circuit

Eight digits scan pulse is generated by SA-SC scan pulse.

2. Data decoder circuit

Data of DA-DD are converted into display data "a-g" by IC3.

3. Word matrix circuit

The 9th digit signal is added by the signals from CA, F1 and F2 terminals and from the digit driver circuit (1) to display characters. The character "A" is displayed by IC1-b and IC2-c, and "b" by IC1-a and IC2-c.

In FIX mode, the signal from IC3 is applied to the fluorescent display tube to indicate "1"~"8" in the 9th digit.

The signal at the 9B terminal becomes "H" when the 9th digit scan pulse is generated.

Table 2.

CA	F1	F2	Letter Display	Function
L	H	X	"1" ~ "8"	FIX CH
L	L	H	"A"	VFO "A"
L	L	L	"b"	VFO "B"

X: Either H or L will do.

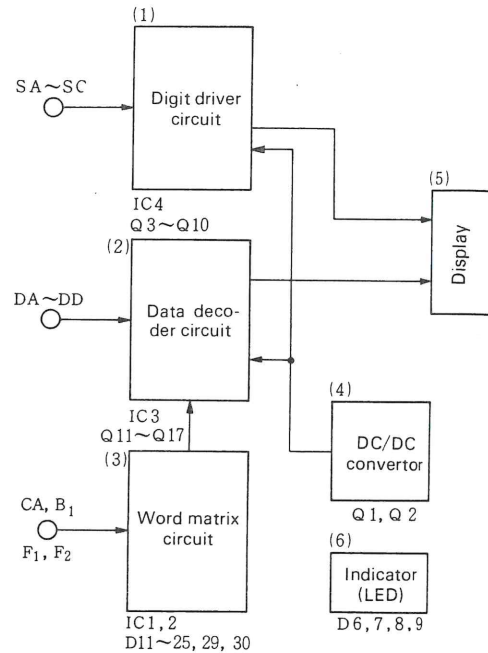


Fig. 5 Display unit block diagram

4. DC/DC converter

This converter oscillates with the feedback from T1 to Q1 and Q2. The output for the filament is 4Vp-p and that for lighting is -25VDC.

5. Display

The display has a 9-digit fluorescent tube. Each digit is as shown in Fig. 6. When no figures are displayed between 100 MHz to 100 Hz in FIX CH mode, it is an indication of empty channels.

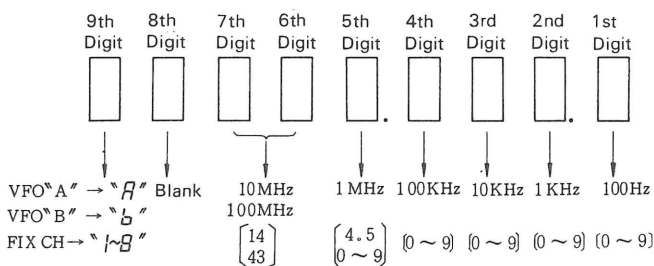


Fig. 6 Display

Table 3. IC3 (SN74LS247N) function

DECIMAL OR FUNCTION	INPUTS					BI/RBO	OUTPUTS						
	LT	RB1	D	C	B	A	a	b	c	d	e	f	g
0	H	H	L	L	L	L	H	ON	ON	ON	ON	ON	OFF
1	H	X	L	L	L	H	H	OFF	ON	ON	OFF	OFF	OFF
2	H	X	L	L	H	L	H	ON	ON	OFF	ON	OFF	ON
3	H	X	L	L	H	H	H	ON	ON	ON	ON	OFF	ON
4	H	X	L	H	L	L	H	OFF	ON	ON	OFF	OFF	ON
5	H	X	L	H	L	H	H	ON	OFF	ON	ON	OFF	ON
6	H	X	L	H	H	L	H	ON	OFF	ON	ON	ON	ON
7	H	X	L	H	H	H	H	ON	ON	ON	ON	OFF	OFF
8	H	X	H	L	L	L	L	ON	ON	ON	ON	ON	ON
9	H	X	H	L	L	H	H	ON	ON	ON	ON	OFF	ON
10	H	X	H	L	H	L	H	OFF	OFF	OFF	ON	ON	ON
11	H	X	H	L	H	H	H	ON	ON	ON	ON	OFF	ON
12	H	X	H	H	L	L	L	OFF	ON	OFF	OFF	OFF	ON
13	H	X	H	H	L	H	H	ON	OFF	OFF	ON	ON	ON
14	H	X	H	H	H	L	H	OFF	OFF	OFF	ON	ON	ON
15	H	X	H	H	H	H	H	OFF	OFF	OFF	OFF	OFF	OFF
BI	X	X	X	X	X	X	L	OFF	OFF	OFF	OFF	OFF	OFF
RB1	H	L	L	L	L	L	L	OFF	OFF	OFF	OFF	OFF	OFF
LT	L	X	X	X	X	X	H	ON	ON	ON	ON	ON	ON

Table 4. Functions of Display Unit IC4 HD74LS42P

NO	BCD Input				DECIMAL Output									
	D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	L	H	H	H	H	H	H	H	H	H
2	L	L	H	L	L	H	H	L	H	H	H	H	H	H
3	L	L	H	H	L	H	H	L	H	H	H	H	H	H
4	L	H	L	L	L	H	H	L	H	H	H	H	H	H
5	L	H	L	H	L	H	H	L	H	H	H	H	H	H
6	L	H	H	L	L	H	H	L	H	H	H	H	H	H
7	L	H	H	H	L	H	H	L	H	H	H	H	H	H
8	H	L	L	L	L	H	H	L	H	H	H	H	L	H
9	H	L	L	H	L	H	H	L	H	H	H	H	L	H
INVALID	H	L	L	L	H	H	H	L	H	H	H	H	H	H
	H	L	L	H	L	H	H	L	H	H	H	H	H	H
	H	L	H	L	L	H	H	L	H	H	H	H	H	H
	H	L	H	H	L	H	H	L	H	H	H	H	H	H
	H	H	L	L	L	H	H	L	H	H	H	H	H	H
	H	H	L	H	L	H	H	L	H	H	H	H	H	H
	H	H	H	L	L	H	H	L	H	H	H	H	H	H
	H	H	H	H	L	H	H	L	H	H	H	H	H	H

H High Level
L Low Level

CIRCUIT DESCRIPTION

6. Indicator

1. D6 ON AIR Indication
2. D7 LOW POWER Indication
3. D8 F LOCK ON Indication
4. D9 RIT ON Indication

7. B1 and B2 terminals

In FM mode, if frequencies of 100 Hz order are not displayed, a voltage is applied to the B1 terminal.

DIGITAL UNIT (X54-1460-61)

1. Pulse shaping, Count Up/Down Judge

→ IC1, 2, 3-c.a.d

Fig. 7 shows the timing of pulses at the terminals V1-V4. The terminals V1 and V2, and V3 and V4 each differ in phase by 180°. In the up-count, V3 lags in phase by 90° with respect to V1. The input pulses from the terminals V1-4 and the pulses passing through the differential circuit are set in AND mode by IC1 and 2 to judge the phase.

In the up-count, pulses appear at "8" or "11" of IC1 and 2, thus the RS flip flop (IC3-a, d) is triggered by OR.

When the pulses are fed to "13" of IC3-d, "11" becomes "H" to hold the up-count state. This signal is fed to IC9-d.c so IC9-"8" holds "H".

2. Pulse select circuit

→ IC3-b, 6-c.d, 7-a

This circuit selects the pulses in item (1) and FM channel pulses. The pulses selected are fed to IC5-a "1".

3. Selection of F. LOCK and scan pulses

→ IC5-a, 11-a, 12-f, Q5

IC5-a turns off the output in F. LOCK. In the normal operation of VFO, IC5-a "2" and "13" are "H". When F. LOCK is ON, IC5-a "13" is set to "L" to prohibit the input from the VFO dial. When the power is ON, Q5 turns on IC8-c to prevent unwanted pulses from entering IC38 during backup time.

4. BAND Up/Down Judge

IC9-a.b.c

The up/down counts are judged by the signal from the BAND switch. The VFO up/down counts are also judged at the same time. The up/down signals are generated during both the band operation and VFO operation.

5. FM click, scan exclusion, ON/OFF judge

→ IC8-d, 4-a.c, 6-b, 9-b, Q2

The up/down counts (band only) are started by the first pulse at the time of scanning of band or FIX channel.

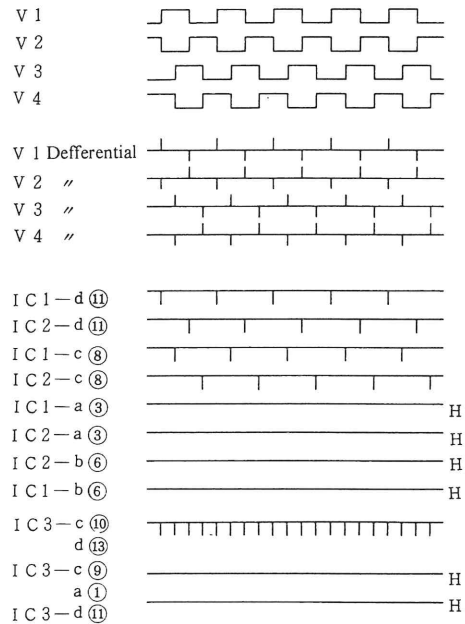


Fig. 7 (A) UP counter timing chart

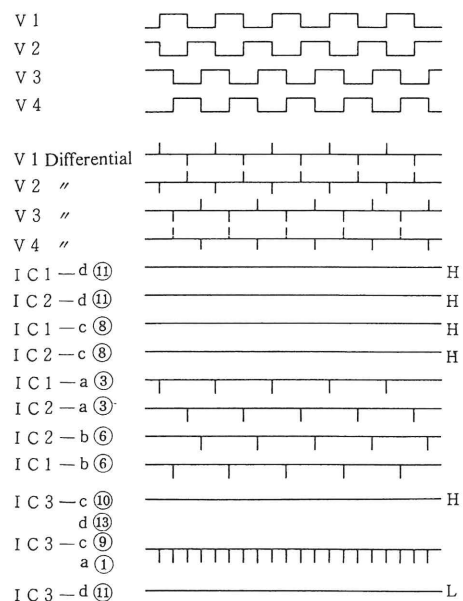


Fig. 7 (B) DOWN counter timing chart

CIRCUIT DESCRIPTION

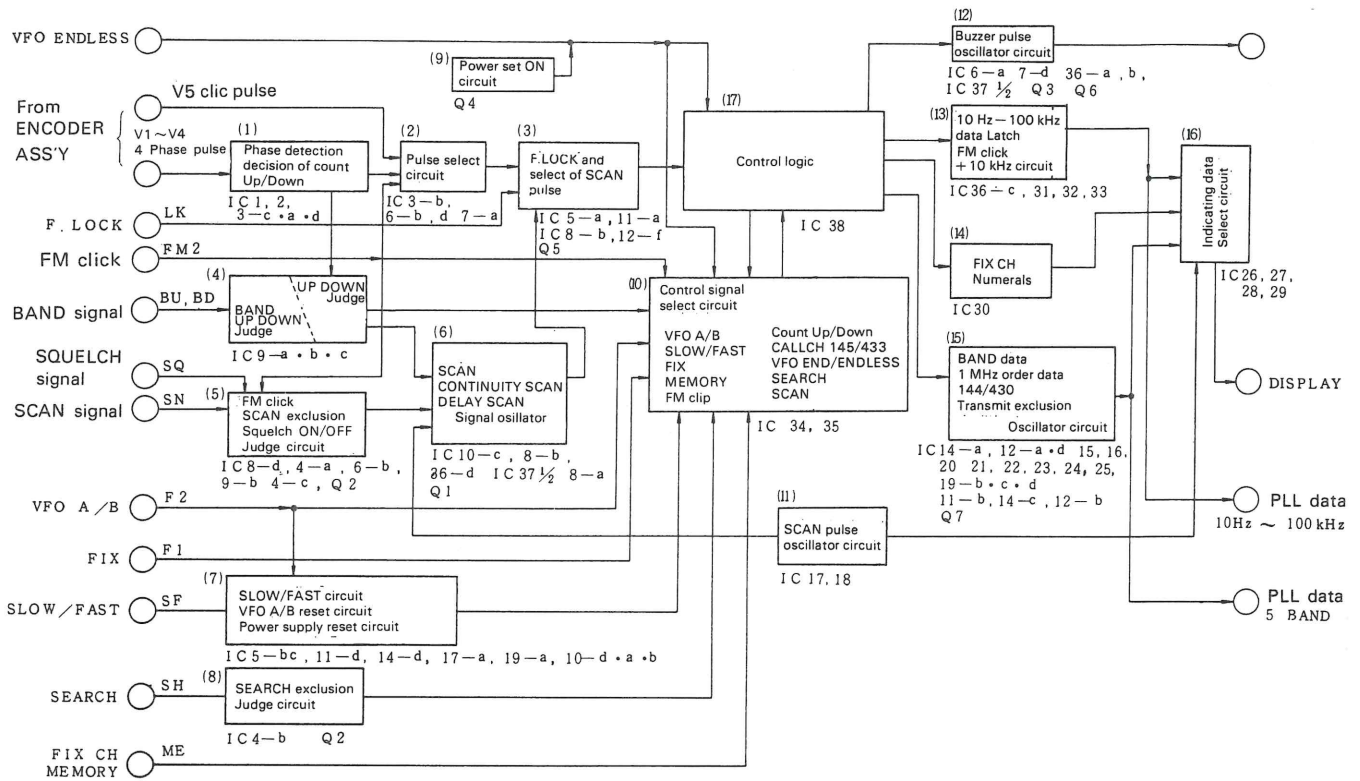


Fig. 8 Block Diagram of Digital Unit

6. Single, continuous, delay scan signal oscillator circuit → IC 10-c, 8-a, b, 36-d, 37-1/2, Q1

When the switch is kept depressed, it is set in auto scan mode.

In Fig. 9, IC10-c "10" is "H" during the band operation, while IC10-c "9" is "H" during the FIX channel operation. When IC10-c "10" or "9" is "H", IC10-c "8" is also "H". Since there is a time lag until IC38 receives the band or FIX data, IC8-b "6" becomes "H" a little later by the delay circuit R13 and C16.

When IC10-c "10" is "L", Q1 is ON because the base current is flowing from R14 to D2, so the collector of Q1 is "H". When IC10-c "8" is "H", D2 is reverse biased so the current flows from R14 to C17. When C17 is charged, the base current stops and the collector opens. As a result, the scan pulse is fed from R16 to Q1 collector and to IC8-b "6". When VFO is being scanned, the pulse is fed from IC8-a to IC36-d so that IC37 is triggered by the band scan or FIX scan.

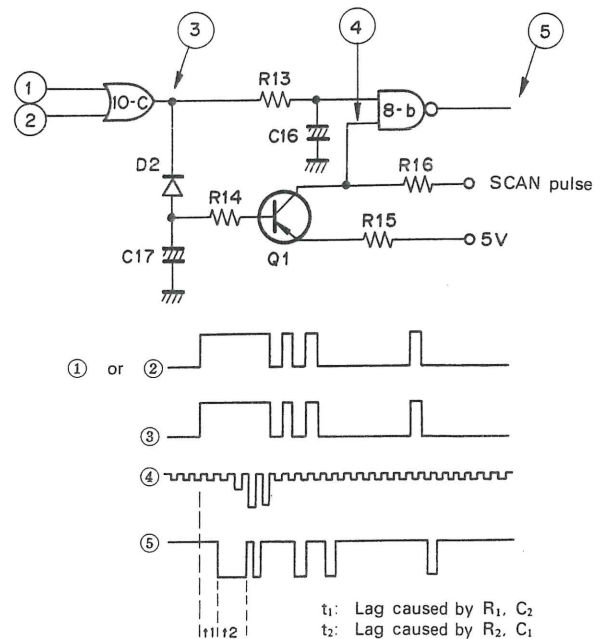


Fig. 9 Scan signal oscillator circuit

CIRCUIT DESCRIPTION

7. SLOW/FAST circuit

→ IC5-b,c, 11-d, 10-a,b,d, 14-d, 17-a, 19-a

IC5-b,c forms a T flip flop which is inverted by a negative trigger pulse from the SLOW/FAST switch. The output is delivered by negative logic from IC5-b "6".

IC19-a functions as a reset circuit for the SLOW/FAST circuit when the power is ON. It is a delay circuit composed of R41 and C3.

IC17-a, 14-b and 10-d function as a reset circuit for the S/F circuit when the mode of function is selected.

8. Search exclusion circuit

→ IC4-b, Q2

In transmit mode, the RL terminal becomes "H", Q2 turns ON and IC4-b "6" becomes "L".

9. Power ON set circuit

→ Q4

When the power turns ON, the first CALL channel is obtained and then other functions. This circuit is used to delay the operation of the latch circuit, since the latch circuit is not set due to the transient of power ON during the backup time.

10. Control signal select switch

→ IC34, 35

IC38 has eight input pins, and the input signals are selected by IC34 and 35 as shown in Fig. 12. IC34-"2" is used to determine the speeds of up/down counts during VFO operation. The slow speed (20 Hz count) is obtained at "L", and the fast speed (20 kHz count) at "H".

Table 5. HD74221P Truth Table

Input			Output	
CLEAR	A	B	Q	$\bar{Q}$
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	L	↑		
H	↓	H		
↑	L	H		

Note: One "H" level pulse.
 One "L" level pulse.

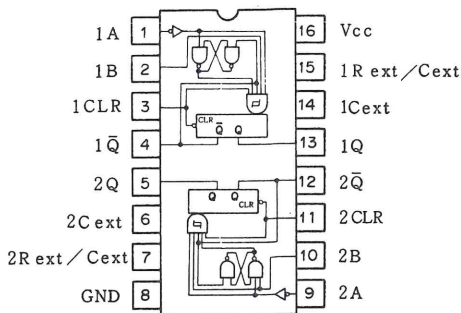


Fig. 10 IC37(HD 74221P)

Function Table of HD74LS157P

Input				Output
STR OBE	SEL ECT	A	B	Y
H	X	X	X	L
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H

L: Low Level
H: High Level
X: Either "H" or "L" will do.

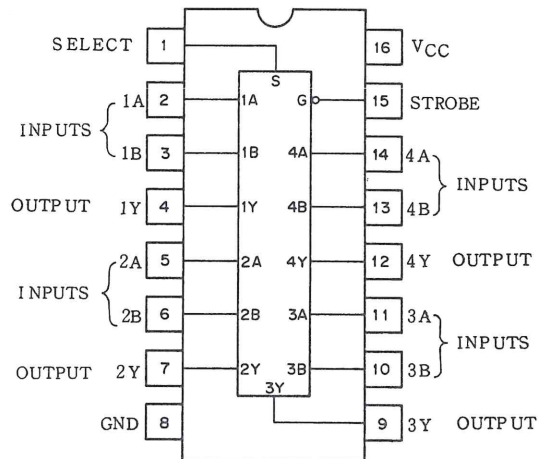


Fig. 11 IC34,35(HD74LS157P)

CIRCUIT DESCRIPTION

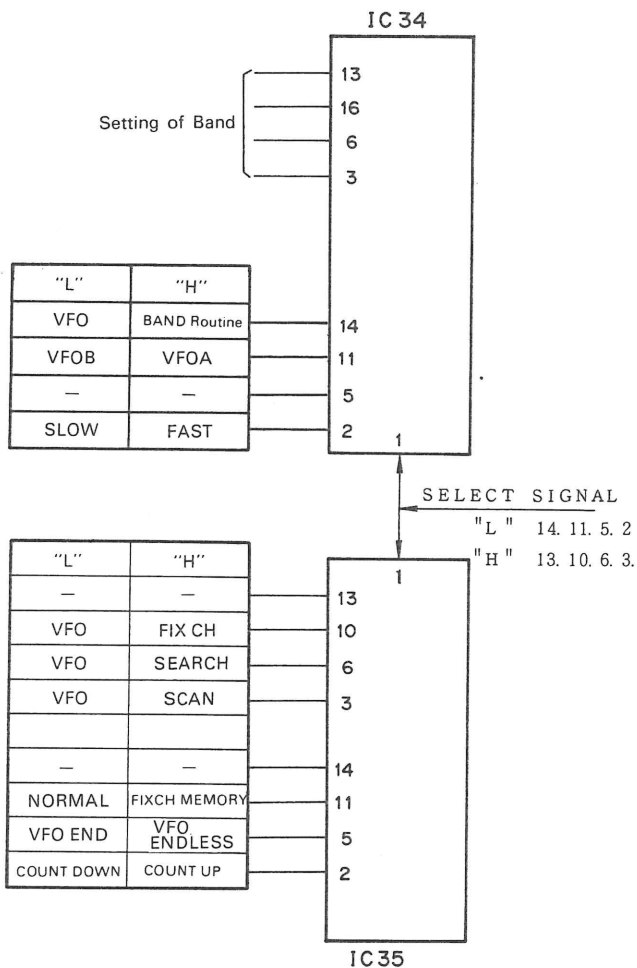


Fig. 12 Operation of HD74LS157P

11. Scan pulse oscillator circuit

→ IC17, 18

IC17-b.c oscillates a signal of about 6 kHz. This frequency is divided by IC18.

Pin "7" → About $6 \text{ kHz} \times 2^{-11}$

= about 3 Hz FM scan pulse
SSB, CW scan pulse

Pin "9" → About $6 \text{ kHz} \times 2^{-12}$

= about 1.5 Hz Band, FIX scan pulse

Pin "13", "14", "15" are for display scan pulse.

Pin "13" → About $6 \text{ kHz} \times 2^{-4}$ = about 375 Hz

Pin "14" → About $6 \text{ kHz} \times 2^{-3}$ = about 750 Hz

Pin "15" → About $6 \text{ kHz} \times 2^{-2}$ = about 1.5 kHz

12. Buzzer pulse oscillator circuit

→ IC6-a, 7-d, 36-a.b, 37-1/2, Q3, 6

The buzzer sounds in the following cases.

- a. Band switch ON
- b. FIX switch ON
- c. VFO endless 000.0 ↔ 999.8

In the above cases "a" through "c", pulses are given by IC38-"5", "6" to trigger IC37-1/2 and turn ON Q6 and 3.

13. 10 Hz ~ 100 kHz data latch

→ IC31, 32, 33

The data from IC38 are latched and are fed to the PLL circuit and the indicating data select circuit.

14. FIX channel display

→ IC30

The signal of FIX channel number is outputted from IC38 and latched by IC30.

15. Band data and MHz data

→ IC11-b, 12-a.b.d, 14-a.c, 15, 16, 20, 21, 22, 23, 24, 25, 19-b.c.d

The data from IC38 is fed through the integrating circuit to IC25 where the binary code is converted into hexadecimal code.

Any of 16 outputs is set to "L" by the input data.

The display data of 1 MHz order are given by IC22, 20-c, 21-a, 23 and 11-b, while PLL band data are given by IC24, 20-a, 16-b, 20-b and 16-a.

Table 9. 1 MHz Data Display

Output Terminal of IC25	Output of IC11-b	Output of IC23	Output of IC21-a	Output of IC22	MHz
1	L	H	L	L	4
2	L	H	L	H	5
3	L	L	L	L	0
4	L	L	L	H	1
5	L	L	H	L	2
6	L	L	H	H	3
7	L	H	L	L	4
8	L	H	L	H	5
9	L	H	H	L	6
10	L	H	H	H	7
11	H	L	L	L	8
13	H	L	L	H	9
14 ~ 16	Not used	Not used	Not used	Not used	
17	L	L	L	L	0

CIRCUIT DESCRIPTION

Table 10. PLL Band Data

Output Terminal of IC25	Output of IC16-a(PC)	Output of IC16-b(PB)	Output of IC24(PA)
1, 3, 8	L	L	H
2, 4, 9	L	H	L
5, 10	L	H	H
6, 11	H	L	L
7, 13	H	L	H
17.	L	L	L

Table 11. Function Table of IC30, 31 (HD74LS75P)

Input		Output	
D	G	Q	$\bar{Q}$
L	H	L	H
H	H	H	L
X	L	Q_0	$\bar{Q}_0$

Note:

H : High Level

L : Low Level

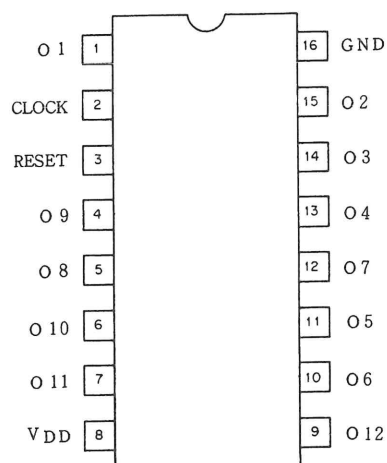
X : Either "H" or "L" will do.

Q_0 : Level of Q prior to the time the indicated input condition is established.

$\bar{Q}_0$: Complement of Q_0

Table 12. IC32, 33 (MIN1201A) Pins

Symbol	Pin	Description
IN1~IN4	Input	4-bit input terminal
AO1~AO4	Output	Output terminal for data latched by clock pulse CKA
BO1~BO4	Output	Output terminal for data latched by clock pulse CKB
CKA	Clock A	Clock signal terminal for latching 4-bit input signal in 4-bit flip flop A. Input signal is latched at the rising of clock signal.
CKB	Clock B	Clock signal terminal for latching 4-bit input signal in 4-bit flip flop B. Input signal is latched at the rising of clock signal.



12 stage Binary Counter

Fig. 13 IC18(MSM5507RS)

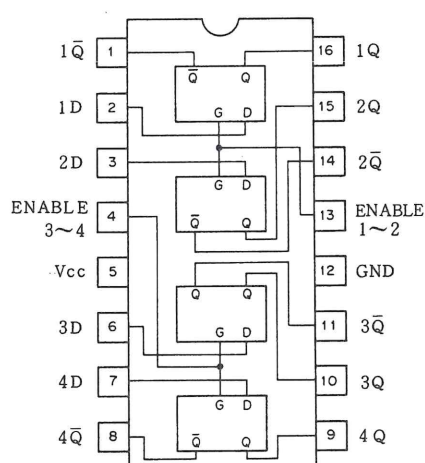


Fig. 14 IC30, 31(HD74LS75P)

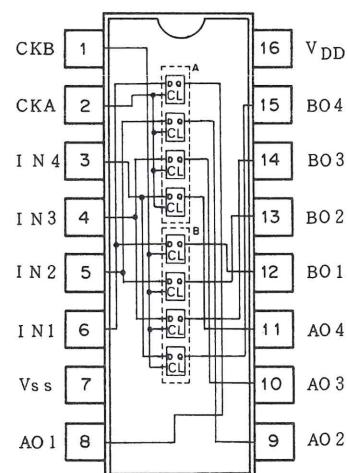


Fig. 15 IC32, 33(MN1201A)

CIRCUIT DESCRIPTION

In addition to 286, 291 and UH, display data of 100 MHz and 10 MHz orders are given by IC15-a, 19-b, d, 15-b, 14-c, and 12-b.

Table 13.

Output terminal of IC25	Output of IC15-a(286)	Output of IC15-b(291)	Output of IC12-b(UH)
1, 2	L	L	L
3, 4, 5, 6, 7	H	L	H
8, 9, 10, 11, 13	L	H	H

* Digital Indication when UH is "L" 100 MHz → 1 10 MHz → 4
Digital Indication when UH is "H" 100 MHz → 4 10 MHz → 3

16. INDICATING DATA SELECT CIRCUIT

→ IC26, 27, 28, 29

The data from (13), (14) and (15) are fed in that order by the pulse (11) to the display unit.

17. CONTROL LOGIC

→ IC38

The functions of IC38 are as follows:

- VFO count (up, down, slow, fast)
- Band count (up, down)
- FIX operation (VFO-FIX selection)

- FIC count(Changeover of FIX 1 ↔ 8)
 - FIX memory
 - SCAN operation
 - Search operation
 - A ↔ B changeover of VFO
- As Output

(Continued on page 13.)

Table 15. Truth Table IC25(HD74154P)

Input						Output															
G ₁	G ₂	D	C	B	A	Q ₀	Q ₁	Q ₂	Q ₃	Q ₄	Q ₅	Q ₆	Q ₇	Q ₈	Q ₉	Q ₁₀	Q ₁₁	Q ₁₂	Q ₁₃	Q ₁₄	Q ₁₅
0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0	1	0	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
0	0	0	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1
0	0	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1
0	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1
0	0	1	0	0	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1
0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
0	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1
0	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1
0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
0	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
0	1	×	×	×	×	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	0	×	×	×	×	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	×	×	×	×	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Note X: Either 1 or 0 will do.

Table 14. Function Table of IC26-29(HD74LS151P)

Input				Output	
SELECT			STR OBE	Y	W
C	B	A	S		
X	X	X	H	L	H
L	L	L	L	D ₀	$\bar{D}_0$
L	L	H	L	D ₁	$\bar{D}_1$
L	H	L	L	D ₂	$\bar{D}_2$
L	H	H	L	D ₃	$\bar{D}_3$
H	L	L	L	D ₄	$\bar{D}_4$
H	L	H	L	D ₅	$\bar{D}_5$
H	H	L	L	D ₆	$\bar{D}_6$
H	H	H	L	D ₇	$\bar{D}_7$

H: High Level

L: Low Level

X: Either H or L will do.

D₀~D₇: Levels of D₀ Input~D₇ Input

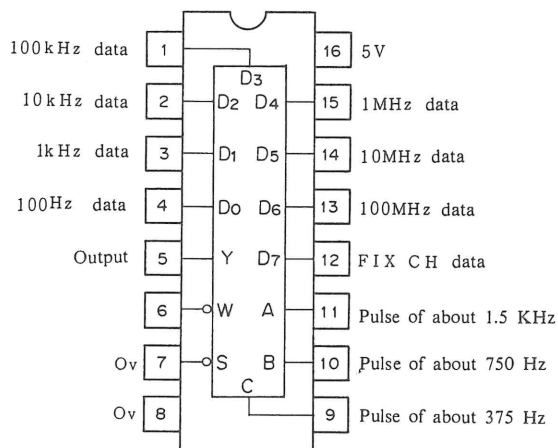


Fig. 16 IC26~29(HD74LS151P)

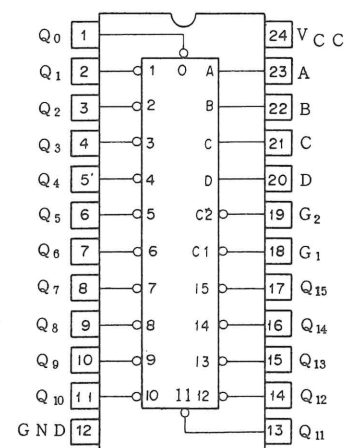


Fig. 17 IC25(HD74154P)

CIRCUIT DESCRIPTION

Table 16. Functions of Digital Unit IC38 MN 9004

Pin No.	Pin	Input signal	Output signal	Description
1	VSS	○		Earth.
2	CO11		○	Count prohibited at FIX channel, scan, band and H.H.
3	CO10		○	H at scan, search, empty FIX channel.
4	CO9		○	H at scan.
5	CO8		○	Buzzer output, FIX channel, figure latch, strobe signal.
6	GO7		○	Buzzer output, FIX channel, figure latch, strobe signal.
7	CO6		○	Delivers output except at 20 μ Sec selector signal
8	CO5		○	
9~13	CO4~0		○	Strobe signals of 100 kHz, 10 kHz, 1 kHz, 100 Hz, 10 Hz.
14~17	AI 3~0	○		A input
18~21	BI 3~0	○		B input
22~25	E00~3		○	Data outputs of 100 kHz, 10 kHz, 1 kHz, 100 Hz, 10 Hz.
26	TST	○		Not used, open.
27	RST	○		H level
28	CSLCT	○		Same as pin 2
29	SNSO	○		
30	SNSI	○		Count input
31~34	DO0~3		○	Band data, binary output.
35~38	DO4~7		○	FIX channel figure, binary output.
39	VDD	○		5V
40	OSC	○		Clock signal, 400 kHz

Table 17. Functions of Digital Unit (X54-1460-00)

Pin	Input signal	Output signal	Description
J2	CA	○	Normally grounded.
	F1	○	Open at FIX, normally grounded.
	9B	○	H at display of 9th digit.
	F2	○	L at FIX, VFO-B, H at VFO-A.
J3	DD	○	Digital display output. Data output by time division.
	DC	○	
	DB	○	
	DA	○	
	B1	○	Frequency disappears at FIX empty.
	SA	○	Digit scan signal.
	SB	○	
	SC	○	
J4	F	○	L at FIX empty.
	PC	○	PLL band data output.
	PB	○	Output of 1~5 at binary code.
	PA	○	
	SN	○	H at scan ON, normally L.
	FM2		
	SD	○	H at FAST + 10 kHz, S/F LED ON.
	SQ	○	L at squelch ON, H at OFF.
	F3	○	L at VFO A, B.
	F1	○	Open at FIX, normally grounded.
	SF	○	L by SLOW, FAST switch.
			Normally open.
	CC	○	Normally grounded.
	LK	○	L at F lock, normally open.
J5	CB	○	VFO end or endless signal.
	SH	○	H at search switch ON.
	ME	○	H at FIX, memory switch ON.
	V5	○	VFO pulse
	V4	○	
	V3	○	
	V2	○	
	V1	○	
J6	ATX	○	H at FIX empty, scan, search.
	ST	○	
	UH	○	
	291	○	100 MHz → 1 and 10 MHz → 4 at L.
	286	○	100 MHz → 4 and 10 MHz → 3 at H.
	BZ	○	H at 435~439. 144 MHz band at L.
	RL	○	H at 430~434. 144 MHz band at L.
			H at buzzer ON.
J7	BP	○	8V input at TX.
			Normally 13.8V. More than 7.5V at backup time.
	Z	○	5V
J8	01~03	○	Frequency data output to PLL.
	10~13	○	
	20~23	○	
	30~33	○	
	40~43	○	
J9	FC	○	L at press of FIX.
	UD	○	Band stops at FIX. Open at FIX.
	BD	○	L at press of band DOWN.
	BU	○	L at press of band UP.

CIRCUIT DESCRIPTION

(From page 11.)

- Selector signal output to IC34 and 35.
- Transmit prohibit signal at scan, search and FIX empty.
- Latch strobe signal.
- 10 Hz ~ 100 kHz data output.
- Band data output.
- FIX channel figure output.
- Buzzer pulse output.

ALL ASS'Y UNIT (X60-1050-00)

The PLL circuit includes VCO, A LOOP and B LOOP units.

1. B LOOP Unit

A signal of 13.215 MHz is oscillated by Q4. The 10 and 100 kHz data from the digital unit are converted into an analog signal as a bias signal to D2 by the resistors R25-37 to control the frequency of 0-980 Hz. The frequency is doubled by Q5 as a HET signal to the B LOOP. Q1 is VCO oscillator for B LOOP. The signal from the oscillator passes through the buffer Q3 and is mixed with CAR 8.83 MHz by IC1, then the frequency difference is mixed with HET signal for B LOOP by IC2. The 1 kHz-100 kHz data from the digital unit is divided by IC3 to produce 1 kHz signal. This signal is compared in phase with the reference signal from A LOOP by IC4. The output passes through the low pass filter Q6-8 to produce VCO control voltage for B LOOP to control Q1. The output from Q1 passes through the buffer Q2 to produce the output to B LOOP.

2. A LOOP

A signal of 14.190 MHz is oscillated by Q1. This signal is doubled by Q2 and tripled by Q3 to produce HET signal for A LOOP. The signal from the VCO unit is mixed with the HET signal by IC1, amplified by IC2 and then mixed with the signal from B LOOP by IC3.

The BAND data from the digital unit is fed to IC4 so that the signal from IC3 is divided into 100 kHz.

A signal of 8 MHz is oscillated by IC5. This signal is divided to obtain 100 kHz signal as reference signals for B LOOP and A LOOP, and is compared in phase by IC6. The output from IC6 is VCV which controls VCO of the VCO unit.

Analog signal from the BAND data is obtained from IC7. This signal is tuned by T1 and T2 to obtain 5 MHz bandwidth.

When the signal is unlocked, D4 or D5 is ON, producing UK signal of H level.

3. VCO Unit (X50-1520-00)

Frequencies are controlled by the VCV voltage of VCO (Q1). The signal passes through the buffer Q2 and is fed to A LOOP.

Q3 and Q4 form the buffer of VCO. When the signal is unlocked, the UK signal turns Q9 to ON and turns Q8 to OFF, so the buffer stops and no output is obtained from the VCO terminal.

Q5 and Q6 form a circuit to short the VCV terminal when the voltage at PL8 drops momentarily.

When the signal is unlocked during adjustments or repairs, turn OFF the power switch and then turn ON. The signal will then be locked.

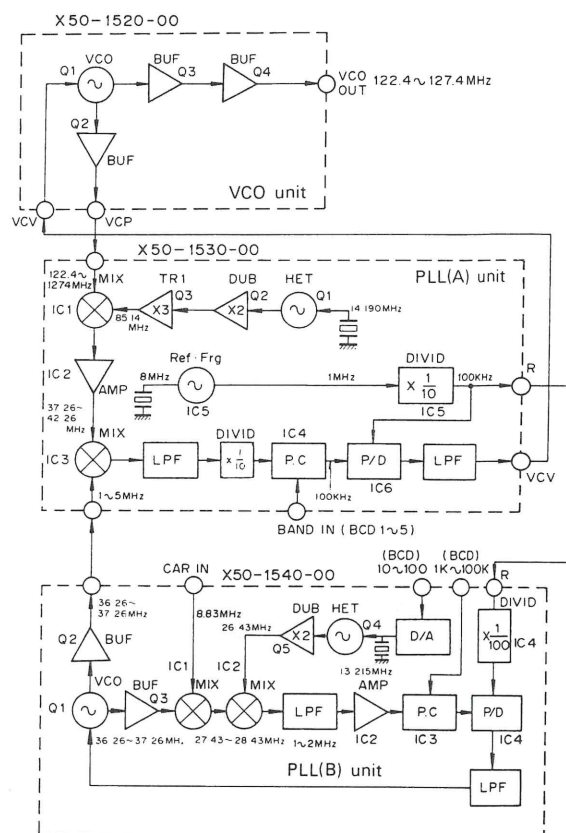


Fig. 18 Block diagram of PLL unite

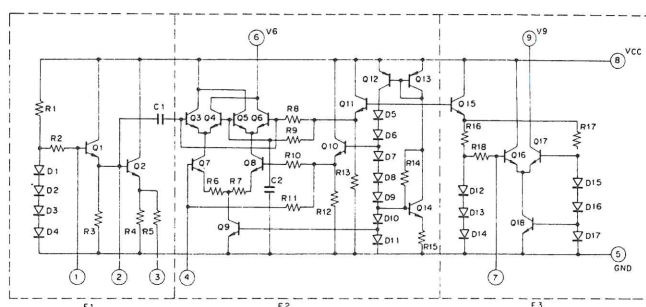


Fig. 19 PLL(A)IC3 PLL(B)IC2(TA7310P)

CIRCUIT DESCRIPTION

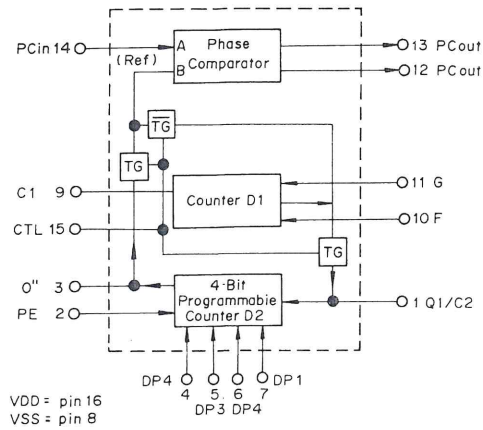
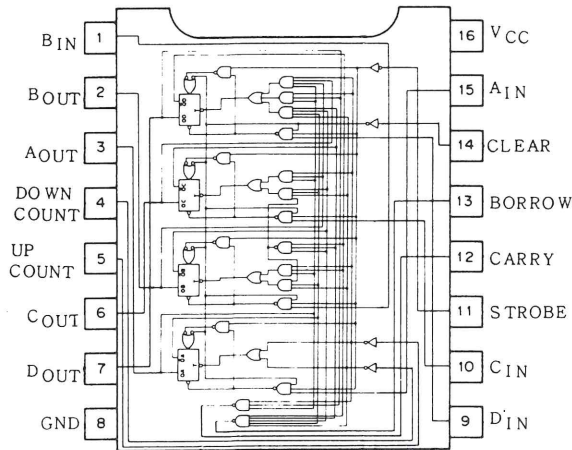
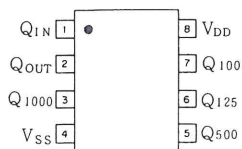


Fig. 20 PLL(B)IC4(MC14568B)



PLL(A)IC4(TD34192BP)



PLL(A)IC5(SM6422A)

Fig. 21

Truth Table TD34192BP

Input t_n								Output t_{n+1}						
Count -up pulse	Count -down pulse	Strobe	Clear	Input				Output				Borrow	Carry	
				A	B	C	D	A	B	C	D			
*	*	0	0	A _{IN}	B _{IN}	C _{IN}	D _{IN}	A _{IN}	B _{IN}	C _{IN}	D _{IN}	Note1	Note1	
*	*	0	0	1	0	0	1	1	0	0	1	Note1	Note1	
*	*	*	1	*	*	*	*	0	0	0	0	Note1	Note1	
1	1	1	0	*	*	*	*	1	0	0	0	1	1	
2	1	1	0	*	*	*	*	0	1	0	0	1	1	
3	1	1	0	*	*	*	*	1	1	0	0	1	1	
4	1	1	0	*	*	*	*	0	0	1	0	1	1	
5	1	1	0	*	*	*	*	1	0	1	0	1	1	
6	1	1	0	*	*	*	*	0	1	1	0	1	1	
7	1	1	0	*	*	*	*	1	1	1	0	1	1	
8	1	1	0	*	*	*	*	0	0	0	1	1	1	
9	1	1	0	*	*	*	*	1	0	0	1	1	0	
0	1	1	0	*	*	*	*	0	0	0	0	1	1	
1	1	1	0	*	*	*	*	1	0	0	0	1	1	
↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
8	1	1	0	*	*	*	*	0	0	0	1	1	1	
9	1	1	0	*	*	*	*	1	0	0	1	1	1	
1	8	1	0	*	*	*	*	0	0	0	1	1	1	
1	7	1	0	*	*	*	*	1	1	1	0	1	1	
1	6	1	0	*	*	*	*	0	1	1	0	1	1	
↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
1	1	1	0	*	*	*	*	1	0	0	0	1	1	
1	0	1	0	*	*	*	*	0	0	0	0	0	1	
1	9	1	0	*	*	*	*	1	0	0	1	1	1	

- Note 1: The state of BORROW Output and CARRY Output will depend on the state of A, B, C, D Output and Down Count/Up Count Inputs.
 2: *: 0 or 1
 3: t_n : Bit time prior to the time the clock input changes from "0" to "1".
 4: t_{n+1} : Bit time after the clock input changed from "0" to "1".

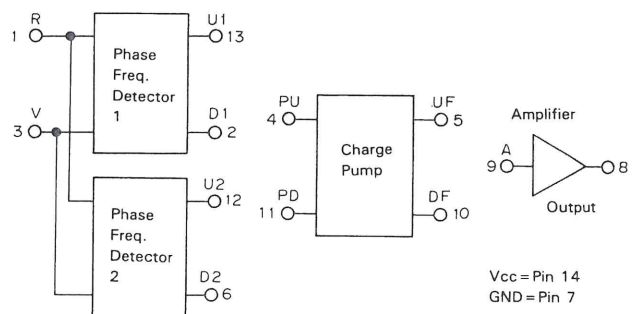


Fig. 22 PLL(A)IC6(MC4044P)

SEMICONDUCTOR/FILTER DATA

* In case of replacing power transistors of the FINAL, always use those based on TRIO Specifications.

Table 18. 2SC2381 Ratings

Name	2SC2381, TRIO									
Application	UHF band power amplifier									
Construction	NPN Epitaxial planar type									
Absolute maximum rating (T _a = 25°C)	V _{CB0}	V _{CE0}	V _{EB0}	I _C	I _E	P _C	T _J	T _{stg}		
	35	17	3.5	6	-6	50	175	-65~175		
	V	V	V	A	A	W	°C	°C		
Test condition	T _a = 25 ± 1.5 °C									
Test specification										
Item	Condition					Code	Max	Min	Unit	
Collector cut-off current	V _{CB} = 15 V, I _E = 0					I _{CBO}	—	1	mA	
Collector-base break down voltage	I _C = 10mA, I _E = 0					V _{(BR)CBO}	35	—	V	
Collector-emitter break down voltage	I _C = 25mA, I _B = 0					V _{(BR)CEO}	17	—	V	
Emitter-base break down voltage	I _E = 1 mA, I _C = 0					V _{(BR)EBO}	35	—	V	
DC amplifier factor	V _{CE} = 5 V, I _C = 3 A					h _{FE}	10	—	—	
Collector output capacity	V _{CB} = 10V, I _E = 0, f = 1MHz					C _{ob}	—	—	PF	
Output power	V _{CC} = 12.6 V, f = 470 MHz P _i = 10 W, η _C ≥ 60%					P _O	25	—	W	

Table 19. 2SC2380 Ratings

Name	2SC2380, TRIO									
Application	UHF band power amplifier									
Construction	NPN Epitaxial planar type									
Absolute maximum rating (T _a = 25°C)	V _{CE0}	V _{CE0}	V _{EB0}	I _C	I _E	P _C	T _J	T _{stg}		
	35	17	3.5	2.8	2.8	30	175	-65~175		
	V	V	V	A	A	W	°C	°C		
Test condition	T _a = 25 ± 1.5 °C									
Test specification										
Item	Condition					Code	Max	Min	Unit	
Collector cut-off current	V _{CB} = 15 V, I _E = 0					I _{CBO}	—	1.5	mA	
Collector-base break down voltage	I _C = 2 mA, I _E = 0					V _{(BR)CBO}	35	—	V	
Collector-emitter break down voltage	I _C = 10mA, I _B = 0					V _{(BR)CEO}	17	—	V	
Emitter-base break down voltage	I _E = 200 μ A, I _C = 0					V _{(BR)EBO}	3.5	—	V	
DC amplifier factor	V _{CE} = 5 V, I _C = 1.5 A					h _{FE}	10	—	—	
Collector output capacity	V _{CB} = 10V, I _E = 0, f = 1MHZ					C _{o b}	—	40	PF	
Output power	V _{CC} = 12.6 V, f = 470MHz P _i = 3 W, η _C ≥ 60%					P _O	11	—	W	

Table 20. 2SC2103A Ratings

Name	2SC2103A, TRIO									
Application	UHF band power amplifier									
Construction	NPN Epitaxial planar type									
Absolute maximum rating (T _a = 25°C)	V _{CE0}	V _{CE0}	V _{EB0}	I _C	I _E	P _C	T _J	T _{stg}		
	40	18	4.0	6.0	-6.0	50	175	-65~175		
	V	V	V	A	A	W	°C	°C		
Test condition	T _a = 25 ± 1.5 °C									
Test specification										
Item	Condition					Code	Max	Min	Unit	
Collector cut-off current	V _{CB} = 15 V, I _E = 0					I _{CBO}	—	1	mA	
Collector-base break down voltage	I _C = 10mA, I _B = 0					V _{(BR)CBO}	40	—	V	
Collector-emitter break down voltage	I _C = 25mA, I _B = 0					V _{(BR)CEO}	18	—	V	
Emitter-base break down voltage	I _E = 1 mA, I _C = 0					V _{(BR)EBO}	4	—	V	
DC amplifier factor	V _{CE} = 5 V, I _C = 3 A					h _{FE}	10	—	—	
Collector output capacity	V _{CB} = 10V, I _E = 0, f = 1 MHz					C _{ob}	—	80	PF	
Output power	V _{CC} = 12.5 V, f = 175 MHz P _i = 4.2W, η _C ≥ 60%					P _O	27	—	W	

Table 21. Filter L72-0312-05(CFL-455F2) Ratings

Item	Specification
Nominal center frequency	455 kHz
3 dB bandwidth	±5 kHz or more
6 dB bandwidth (From 455 kHz)	±7.5 kHz or more
70 dB bandwidth	+16 kHz or less
Guaranteed attenuation	55 dB or more 40 dB or more
Ripple	3 dB or less
Loss	4 dB or less
Impedance	1.5 kΩ

FILTER/OPTION DATA

Table 22. Ratings of Crystal Filter L71-0209-05(21G20A)

Item	Specification
Nominal center frequency	21.6 MHz
Pass bandwidth	± 10 kHz or more at 3 dB
Attenuation bandwidth	± 35 kHz or less at 18 dB
Ripple	0.5 dB or less
Loss	2 dB or less
Guaranteed attenuation	30 dB or more at a range within ± 1 MHz (The spurious output shall be at 18 dB or more.)
Terminal impedance	$2\text{ k}\Omega \pm 10\% // 1\text{ PF} \pm 10\%$

Table 23. Ratings of Crystal Filter L71-0208-05(YK-88S)

Item	Specification
Nominal center frequency	8830 kHz
Center frequency deviation	Within ± 150 Hz at 6 dB
Pass bandwidth	± 1.2 kHz or more at 6 dB
Attenuation bandwidth	± 1.5 kHz or less at 20 dB ± 2.2 kHz or less at 60 dB ± 3 kHz or less at 80 dB
Ripple	2 dB or less
Loss	6 dB or less
Guaranteed attenuation	80 dB or more within ± 1 MHz.
Impedance	$600\Omega \pm 5\% // 15\text{ PF} \pm 5\%$ for both input and output

Option

- BU-1 (Outside Battery Case)

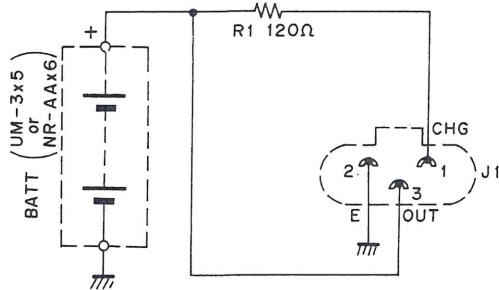


Fig. 26 BU-1 Circuit

Table 25. BU-1 Parts List

Parts Name	Parts No.	Remarks
Resistor (R1)	RC05GF2H121J	$120\Omega \pm 5\%$ 1/2W
Power Jack (J1)	E 08 - 0304 - 05	
Power Plug	E 30 - 1624 - 05	
Battery case	J 19 - 1319 - 03	
Dummy cell	W 09 - 0002 - 05	

In order to operate by DC

Since this unit is not equipped with DC power source cable, in case of DC operation, it is necessary to prepare a DC power source cable like the one shown in Fig. 25.

Since this cable is not equipped with a fuse, in case it is used as that for TS-770, insert an 8A fuse.

DC power source cable and fuses are handled by our business offices or service centers.

DC cable ASSY parts No. X42-1210-00

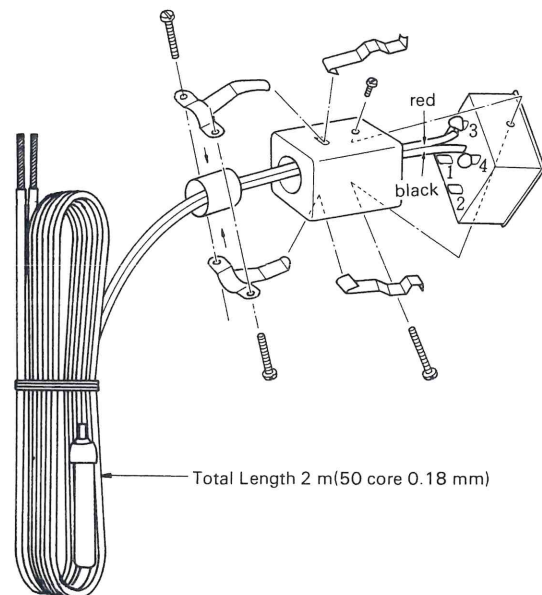
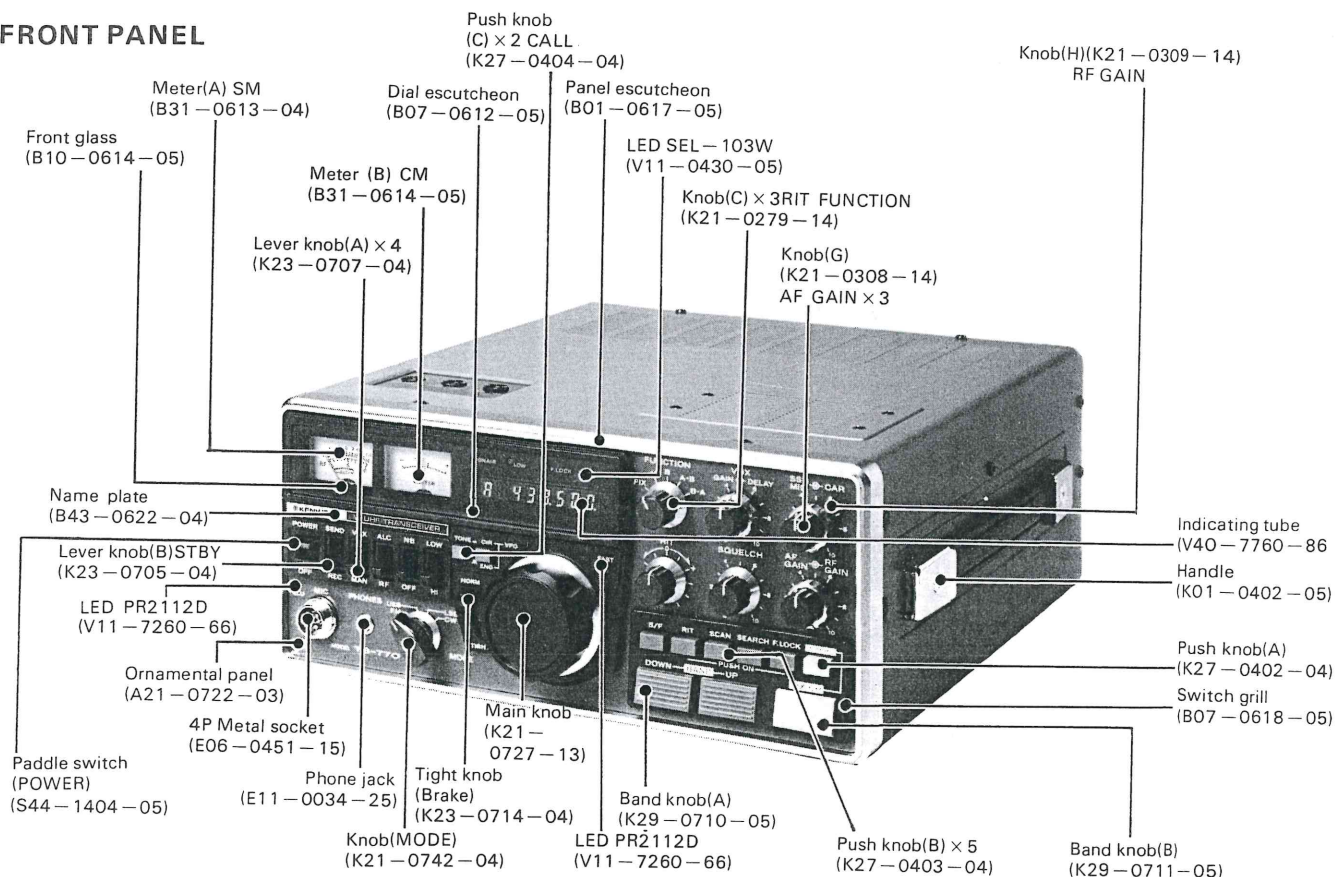


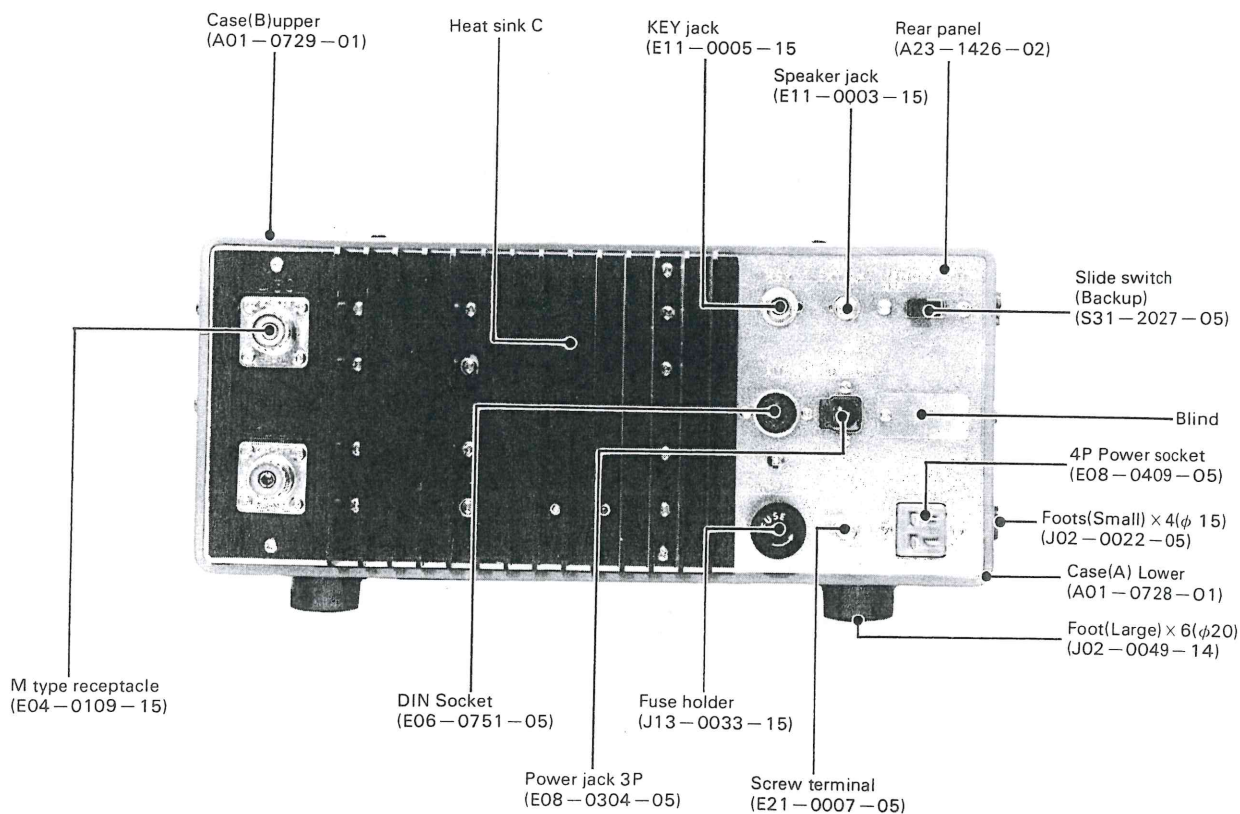
Fig. 25 DC Cable

OUTSIDE VIEWS

FRONT PANEL

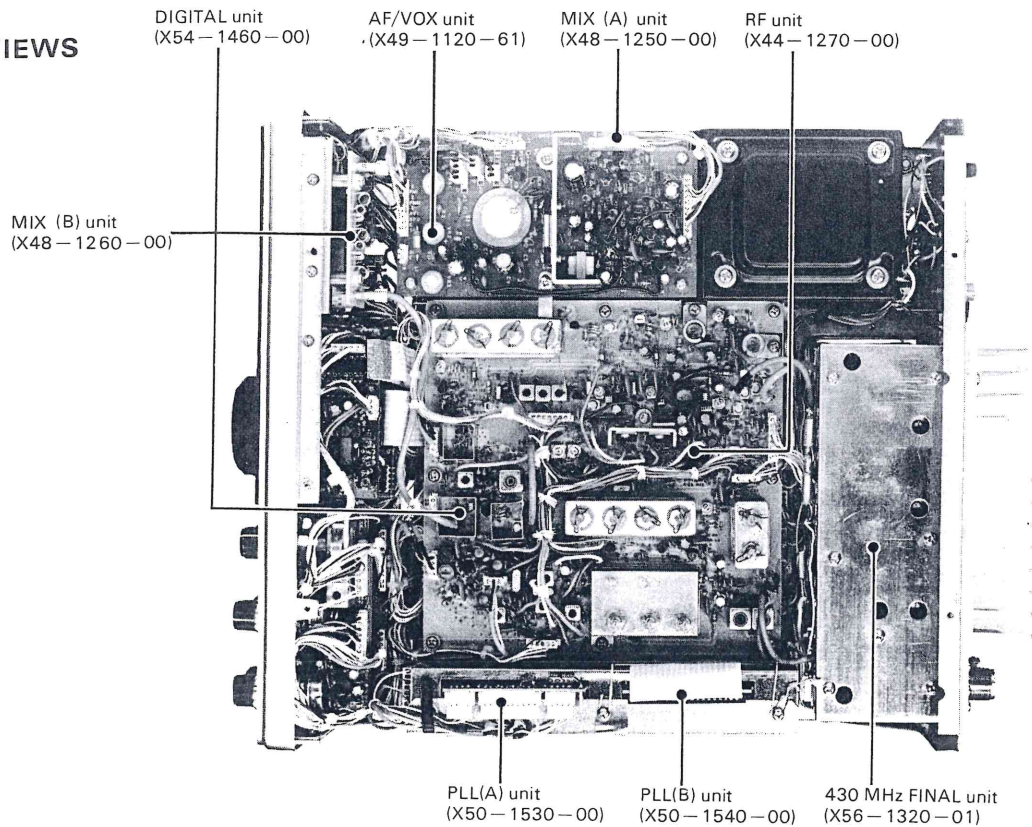


REAR PANEL

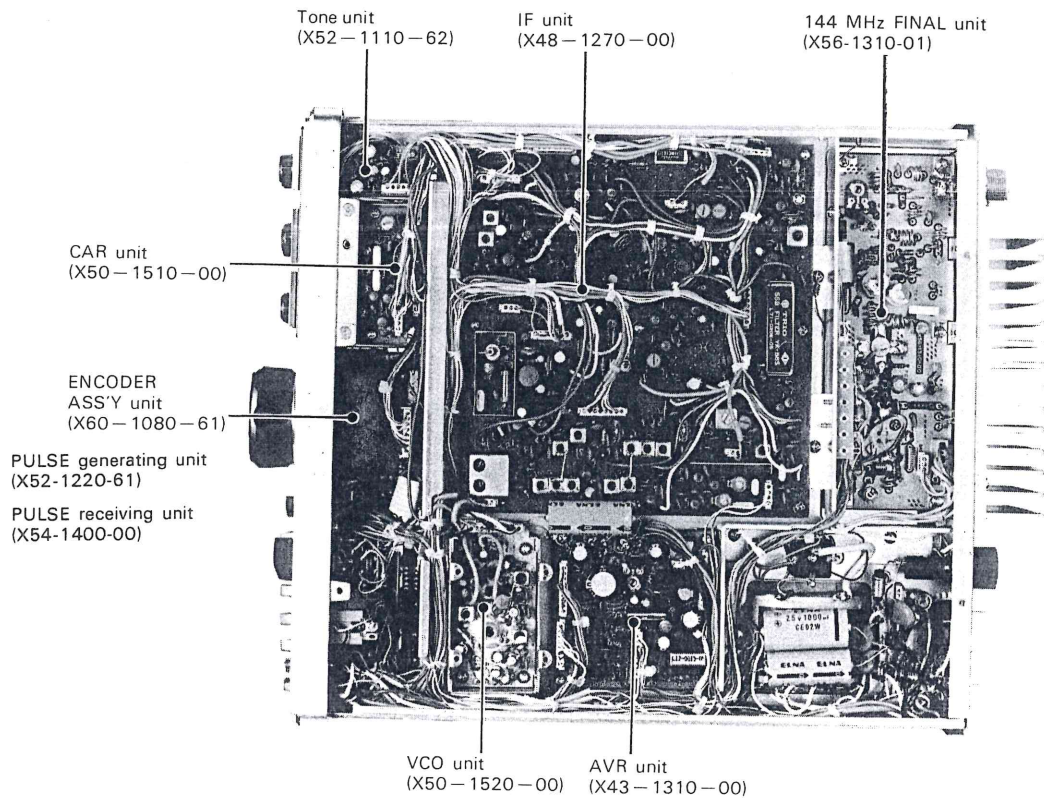


INSIDE VIEWS

TOP VIEWS



BOTTOM VIEWS



PACKING

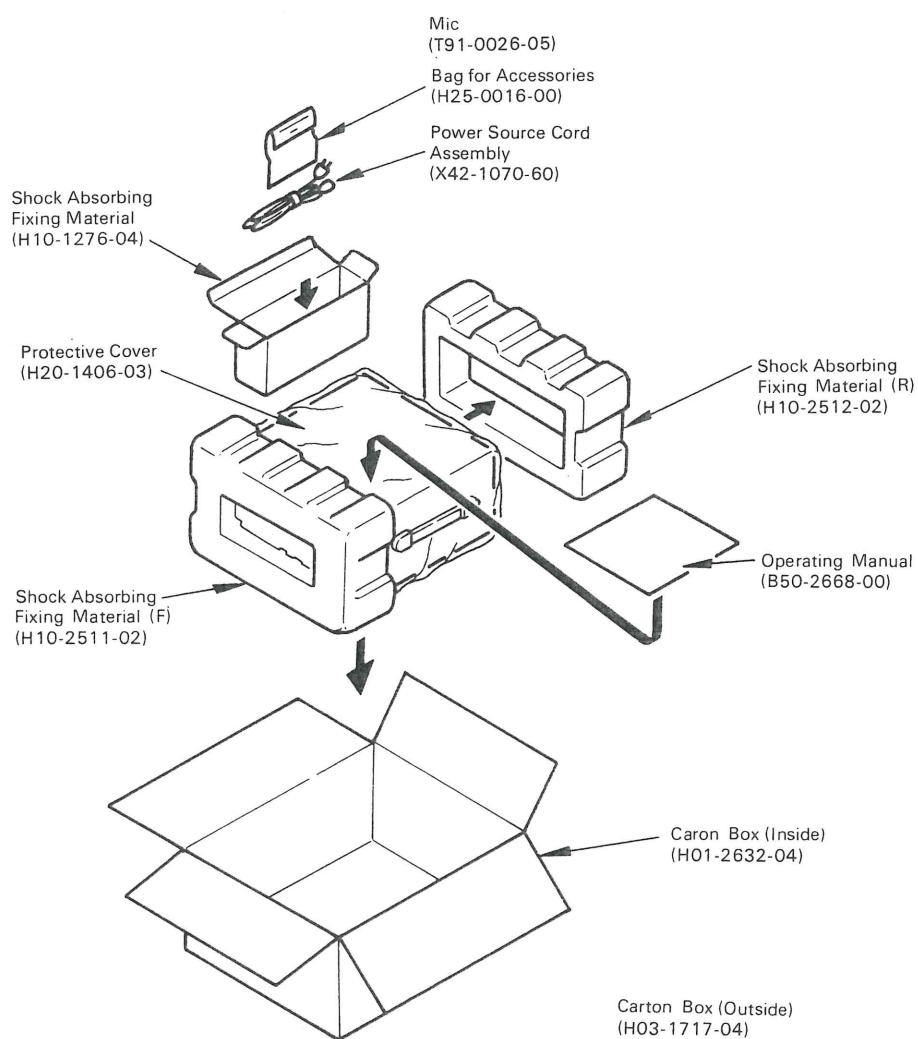


Fig. 23 Packing

Accessories

Name	Parts No.	pcs.
Fuse 2A	F05-2023-05	1
Speaker plug	E12-0001-05	1
Din plug	E07-0751-05	1
Foot	J02-0049-14	2
Screw	N30-4012-41	2

PARTS LIST

Note

Only special type of resistors (example: cement, metal film, etc.) and capacitors (example: electrolytic, tantalum, mylar, temp. coeff. capacitors) are detailed in the PARTS LIST. For the value of all common type components refer to the schematic diagram or the PC board illustration. Resistors not otherwise detailed are carbon type (1/4 of 1/8W).

Order carbon resistors and capacitors according to the following example:

A carbon resistor's part number is RD14BB 2E222J.

A ceramic capacitor's number is CK45F1H103Z, CC45TH1H220J.

1. Type of the carbon resistor

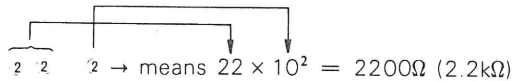
3. Resistance value



RD14BB



RD14CB



Significant figure

Multiplier

2. Wattage

1/4W → 2E

1/8W → 2B

Example: 221 → 220Ω 224 → 220kΩ
222 → 2.2kΩ 225 → 2.2MΩ
223 → 22kΩ

4. Tolerance

J = ±5% (Gold)

K = ±10% (Silver)

CAPACITORS

Type I

CK	45	F	1H	103	Z
1	2	3	4	5	6

Type II

CC	45	TH	1H	220	J
1'	2	3'	4	5	6

1 = Type Ceramic, Electrolytic etc.
2 = Shape Round, Square etc.
3 = Temp range
3' = Temp coeff
4 = Voltage rating
5 = Value
6 = Tolerance

6. Tolerance

Type	C	D	G	J	K	M	X	Z	P	No Type
(%)	±0.25	±0.5	±2	±5	±10	±20	+40 -20	+80 -20	+100 -0	More than 10μF - 10 ~ +50 Less than 4.7μF - 10 ~ +75

Cord	B	C	D	F	G
(pF)	±0.1	±0.25	±0.5	±1	±2

(Value less than 10 pF)

CK45F

Ceramic capacitor (type I) 3

Cord	B	D	E	F
Operating temperature °C	-30 +85	-30 +85	-30 +85	-10 +70

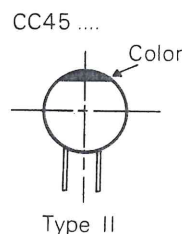
5. Capacitor value

Example: 010 → 1pF
100 → 10pF
101 → 100pF
102 → 1000pF = 0.001μF
103 → 0.01μF

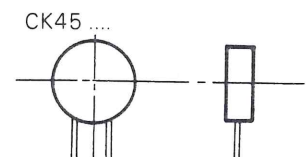
CC4500..

Ceramic capacitor (type II) temperature coeff. capacitor 1' 3'

Color	CH (Black)	LH (Red)	PH (Orange)	RH (Yellow)	SL (Green)	TH (Blue)	UH (Violet)
ppm/°C	0	-80	-150	-220	-330	-470	-750



Type II



Type I

PARTS LIST

☆ New parts

Ref. No.	Parts No.	Description	Re- marks
GENERAL			
—	A01-0728-11	Case(A) TOP	☆
—	A01-0729-31	Case(B) BOTTOM	☆
—	A21-0729-03	Ornamental panel	☆
—	A23-1426-02	Rear panel	☆
—	B01-0617-05	Panel escutcheon	☆
—	B05-0708-04	Speaker grill cloth	☆
—	B07-0615-15	Dial escutcheon Ass'y	☆
—	B07-0617-05	Band SW Ass'y	☆
—	B07-0618-05	Switch grill	☆
—	B10-0614-15	Front glass	☆
—	B11-0413-05	Filter	☆
PL1~3	B30-0804-05	Pilot lamp	☆
M-1	B31-0613-05	Meter(A) S meter	☆
M-2	B31-0614-05	Meter(B) Center meter	☆
—	B42-1648-04	Indicating plate(VOX)	☆
—	B42-1668-04	Indicating plate(A) FUSE	☆
—	B42-1669-04	Indicating plate(B) AC 220V	☆
—	B43-0622-04	Badge	☆
—	B50-2668-00	Operating manual	☆
C1	C90-0805-05	Electrolytic 1000 μ F 25WV	☆
C6~9	CE02W1E102	Electrolytic 1000 μ F 25WV	
C7	CC45SL1H101J	Ceramic 100PF $\pm$ 5%	
C2~5	C91-0402-05	Ceramic 0.001 μ F	
J6	E06-0451-15	4P metal socket MIC	
J5	E06-0751-05	DIN socket	
—	E07-0751-05	DIN plug	
J10	E08-0304-05	Power jack(3P)	
J1	E08-0409-05	4P square socket AC	
J2	E11-0003-15	Speaker jack	
J3	E11-0005-15	Key jack	
J4	E11-0034-25	Phone jack	
—	E12-0001-05	Ear plug	
J9	E21-0007-05	Ground terminal	☆
—	E22-0207-05	Lug plate 1L2P	
—	E22-0222-05	Lug plate 1L2P	
—	E22-0405-05	Lug plate 1L4P	
—	E22-0603-05	Lug plate 1L6P	
—	E23-0015-04	Lug terminal	
—	E31-0433-15	Flat cable 6P	☆
—	E31-0434-15	Flat cable 9P	☆
—	E31-0435-05	Flat cable 19P	☆
—	F05-2023-05	FUSE 2A	
—	F15-0165-14	Switch mask(B) LEVER SW	
—	F15-0612-04	Switch mask(C) LEVER SW	
—	F15-0619-04	Shadow mask(B)	☆
—	F15-0620-04	Switch mask(A) TIGHT KNOB	☆
—	G02-0508-04	Plate spring	☆
—	G09-0409-04	Cable stopper	☆
—	G09-0403-14	Bent spring	☆
—	G10-0606-04	Cushion cloth	☆

Ref. No.	Parts No.	Description	Re- marks
—	H21-0701-04	Protection sheet TOP	
—	H01-2632-04	Carton (inside)	☆
—	H03-1717-04	Carton (outside)	☆
—	H10-2511-02	Front packing fixture	☆
—	H10-2512-02	Rear packing fixture	☆
—	H10-1276-04	Cushion	
—	H20-1406-03	Protective bag	☆
—	H25-0016-04	Accessory bag	
—	H25-0036-04	Accessory bag	
—	J02-0022-05	Foot SMALL ϕ 15	
—	J02-0049-14	Foot LARGE ϕ 20	
—	J13-0033-15	Fuse holder	
—	J21-2578-04	Brake	☆
—	J25-2699-14	PC Board(A) TONE SW	☆
—	J31-0504-04	Collar for brake	☆
—	J32-0727-04	Round boss(A)	☆
—	J32-0728-04	Round boss(B)	☆
—	J32-1030-14	Round boss for front foot	
—	J42-0410-05	Flexible bush 58 mm	☆
—	J42-0411-05	Flexible bush 53 mm	☆
—	K01-0402-15	Handle	☆
—	K21-0279-14	Knob(C) RIT. FUNCTION $\times$ 3	
—	K21-0308-14	Knob(G) AF $\times$ 3	
—	K21-0309-14	Knob(H) RF $\times$ 3	
—	K21-0727-13	Main knob	☆
—	K21-0742-04	Pointer knob MODE	☆
—	K23-0705-04	Lever knob(B) STBY	
—	K23-0707-04	Lever knob(A) $\times$ 4	
—	K23-0712-04	VOX knob $\times$ 3	
—	K23-0714-04	Tight knob	☆
—	K27-0402-04	Push knob(A) MENO	☆
—	K27-0403-04	Push knob(B) S/F $\times$ 5	☆
—	K27-0404-04	Push knob(C) TONE $\times$ 2	☆
—	K29-0710-05	Band knob(A) UP, DOWN	☆
—	K29-0711-05	Band knob(B) FIX	☆
—	K29-0719-05	Band knob(C) $\times$ 3	☆
T1	L01-8046-05	Power transformer	☆
T2	L01-8012-05	Power transformer	☆
L3	L15-0301-05	Low frequency choke	☆
L1,2	L33-0601-05	Choke coil	
—	L92-0110-05	Bead core	☆
—	N09-0256-05	Ground screw	
—	N10-2030-46	Hex nut	
—	N33-3006-45	Round flat screw (speaker) $\times$ 4	
—	N35-3006-45	Bind screw $\times$ 22	
—	N35-3008-45	Case screw above S meter	
R1	RS14AB3D100J	Metal film 10 Ω 2W	
R2,3	RD14BB2E101J	Carbon 100 Ω 1/4W	
R4	RS14AB3F4R7J	Metal film 4.7 Ω 3W	
R5	RD14BB2E471J	Carbon 470 Ω 1/4W	
R6	RD14BB2E103J	Carbon 10 k Ω 1/4W	
R7	RD14BB2E332J	Carbon 3.3k Ω 1/4W	
R8	RD14BB2E153J	Carbon 15k Ω 1/4W	
VR1	R12-3036-05	Potential meter 10k(B)	

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
S1	S44-1404-05	Paddle switch POWER	☆
S2	S31-2027-05	Slide switch BACK UP	
S3	S01-1417-05	Rotary switch MODE	☆
S4	S40-2405-05	Push switch VFO	
S5	S40-2413-05	Push switch TONE	☆
	S50-1402-05	TACT switch	☆
	T03-0031-15	Speaker	
	T91-0026-05	Microphone	
D1	V11-2163-66	Rectifier stack M4C-6	
D2	V11-3161-96	DIODE 6CD13	
D3,4	V11-7260-66	LED PR2112D	
D5	V11-4163-46	ZENER DIODE XZ-080	
D6	V11-1162-06	Diode MA520	☆
IC1	V30-1029-36	IC μ PC14305H	
IC2	V30-1029-66	IC FS-7808M	
Q1		Not used	
Q2	V03-1815-06	Transistor 2SC1815(Y)	
6 KEY SWITCH UNIT (X41-1160-00)			
J1	E40-0973-05	Mini connect wafer 9P	
J2	E40-0373-05	Mini connect wafer 3P	
	S42-6401-05	6 key switch	☆
LEVER SWITCH UNIT (X41-1180-00)			
J1	E40-1372-05	Mini connect wafer 13P	
J2	E40-0473-05	Mini connect wafer 4P	
SW1~5	S33-2401-05	Lever switch	☆
POWER CODE ASSY (X42-1070-60)			
	E03-0301-15	Plug	
	E09-0426-05	4P square plug	
	E33-0672-00	WIRE KIT	
	J61-0402-05	FREE UP BELT	
AVR UNIT (X43-1310-00)			
C1	CE04W1HR47	Electrolytic 0.47 μ F 50WV	
C2	CE04W1C471Q	Electrolytic 470 μ F 16WV	
C3	CE04W1A101Q	Electrolytic 100 μ F 10WV	
C4	CE04W1C101Q	Electrolytic 100 μ F 16WV	
C5	CE04W1H010	Electrolytic 1 μ F 50WV	
C6	CE04W1C100	Electrolytic 10 μ F 16WV	
C7	CE04W1E101Q	Electrolytic 100 μ F 25WV	
C8	CQ92M1H473K	Mylar 0.047 μ F $\pm$ 10%	
C9	CQ92M1H103K	Mylar 0.01 μ F $\pm$ 10%	
C10	CQ92M1H103K	Mylar 0.01 μ F $\pm$ 10%	
C11	CE04W1E101Q	Electrolytic 100 μ F 25WV	
C12	C90-0818-05	Electrolytic 470 μ F 25WV	

Ref. No.	Parts No.	Description	Re- marks
C13	CE04W1C221Q	Electrolytic 220 μ F 16WV	
C14	CE04W1H4R7	Electrolytic 4.7 μ F 50WV	
J1,2	E40-0873-05	Mini connect wafer 8P	
J3	E40-0973-05	Mini connect wafer 9P	
J4	E40-1073-05	Mini connect wafer 10P	
	E23-0047-05	Terminal 2P	
L1	L40-6825-04	Ferri-inductor 6.8 mH	
L2	L40-1021-03	Ferri-inductor 1 mH	
T1	L12-0013-05	Oscillating transformer	
R18	RC05GF2H4R7J	SOLID 4.7 Ω $\pm$ 5%1/2W	
VR1	R12-0039-05	Potential meter 500 Ω	
VR2,3	R12-2017-05	Potential meter 5k Ω	
	R92-0150-05	Short jumper $\times$ 2	
D1	V11-0076-05	Diode 1S1555	
D2	V21-0004-05	Varistor MV-13	
D3	V11-0051-06	Diode 1N60	
D4~7	V11-0076-05	Diode 1S1555	
D8	V11-4162-66	Zener Diode XZ-060	
D9	V11-0240-05	Zener Diode WZ-090	
D10~19	V11-7766-06	Diode 1N4448	
Q1	V01-1015-06	Transistor 2SA1015(Y)	
Q2~7	V03-1815-06	Transistor 2SC1815(Y)	
Q8	V03-0241-05	Transistor 2SC735(Y)	
Q9	V03-1815-06	Transistor 2SC1815(Y)	
Q10	V03-0336-05	Transistor 2SC496(Y)	
Q11	V01-0139-05	Transistor 2SA671 TD(B)	
IC1	V30-1030-66	IC TC4011BP	
IC2	V30-1068-06	IC MB3756M	
RF UNIT (X44-1270-00)			
R42,45	RC05GF2H2R2J	Solid 2.2 Ω $\pm$ 5% 1/2W	
C1~3,8		Not used	
C4	CC45SL1H0R5C	Ceramic 0.5pF $\pm$ 0.25pF	
C11	C90-0804-05	Trough capacitor 0.01 μ F	
C12	CC45SL1H470J	Ceramic 47pF $\pm$ 5%	
C13,14	C90-0804-05	Trough capacitor 0.01 μ F	
C18	C90-0804-05	Trough capacitor 0.01 μ F	
C20	CE04W1H010	Electrolytic 1 μ F 50WV	
C23	CC45CH1H220J	Ceramic 22pF $\pm$ 5%	
C24	CC45CH1H010C	Ceramic 1pF $\pm$ 0.25pF	
C25		Not used	
C27	CE04W1E4R7	Electrolytic 4.7 μ F 25WV	
C30	CE04W1C100	Electrolytic 10 μ F 16WV	
C34	CE04W1E4R7	Electrolytic 4.7 μ F 25WV	
C37	CE04W1C100	Electrolytic 10 μ F 16WV	
C38,41,42	CC45CH1H0R5C	Ceramic 0.5pF 50WV	
C47	CE04W1E4R7	Electrolytic 4.7 μ F 25WV	
C49	CC45CH1H220J	Ceramic 22pF $\pm$ 5%	

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
C50	CC45SL1H010C	Ceramic 1pF $\pm 0.25\text{pF}$	
C53,56	CE04W1E4R7	Electrolytic 4.7 μF 25WV	
C58~60		Not used	
C63,64,66,67		Not used	
C70	CC45SL1H470J	Ceramic 47pF $\pm 5\%$	
C72	CC45RH1H180J	Ceramic 18pF $\pm 5\%$	
C75,77,80		Not used	
C82	CE04W1C100	Electrolytic 10 μF 16V	
C84	CC45SL1H470J	Ceramic 47pF $\pm 5\%$	
C87	CC45SL1H101J	Ceramic 100pF $\pm 5\%$	
C88	CC45SL1H470J	Ceramic 47pF $\pm 5\%$	
C91		Not used	
C92	CC45CH1H030C	Ceramic 3pF $\pm 0.25\text{pF}$	
C95		Not used	
C97	CC45SL1H470J	Ceramic 47pF $\pm 5\%$	
C100,101	C91-0457-05	Ceramic 0.022 μF	
C102,103		Not used	
C104	CC45SL1H470J	Ceramic 47pF $\pm 5\%$	
C105		Not used	
C109	C91-0457-05	Ceramic 0.022 μF	
C110	CC45SL1H100D	Ceramic 10pF $\pm 0.5\text{pF}$	
C112	CC45SL1H151J	Ceramic 150pF $\pm 5\%$	
C113,115	CC45CH1H470J	Ceramic 47pF $\pm 5\%$	
C117	CC45RH1H070D	Ceramic 7pF $\pm 0.5\text{pF}$	
C118	CC45CH1H150J	Ceramic 15pF $\pm 5\%$	
C119	CC45CH1H050C	Ceramic 5pF $\pm 0.25\text{pF}$	
C120	CC45CH1H220J	Ceramic 22pF $\pm 5\%$	
C121	CC45RH1H070D	Ceramic 7pF $\pm 0.5\text{pF}$	
C124		Not used	
C126	CC45SL1H330J	Ceramic 33pF $\pm 5\%$	
C130		Not used	
C132	CC45CH1H050C	Ceramic 5pF $\pm 0.25\text{pF}$	
C133	CE04W1E4R7	Electrolytic 4.7 μF 25WV	
C139	CE04W1C100	Electrolytic 10 μF 16WV	
C140	CE04W1HR47	Electrolytic 0.47 μF 50WV	
C145	CC45SL1H0R5C	Ceramic 0.5pF $\pm 0.25\text{pF}$	
C146	CC45SL1H220J	Ceramic 22pF $\pm 5\%$	
C147	C91-0457-05	Ceramic 0.022 μF	
C158		Not used	
C159	CC45CH1H150J	Ceramic 15pF $\pm 5\%$	
C161		Not used	
C163	CE04W1H010	Electrolytic 1 μF 50WV	
C167	CQ92M1H103K	Mylar 0.01 μF 50WV	
TC1	C05-0030-15	Seramic Trimmer 20pF	
TC2	C05-0031-15	Seramic Trimmer 10pF	
TC3	C05-0062-05	Seramic Trimmer 6pF	
TC4		Not used	
TC5,6	C05-0031-15	Seramic Trimmer 10pF	
TC7	C05-0067-05	Seramic Trimmer 25pF	
TC8	C05-0031-15	Seramic Trimmer 10pF	
TC9,10	C05-0067-05	Seramic Trimmer 25pF	
TC11	C05-0309-05	Seramic Trimmer 40pF	
TC12, 13	C05-0031-15	Seramic Trimmer 10pF	
TC14		Not used	
TC15	C05-0309-05	Seramic Trimmer 40pF	
TC16	C05-0031-15	Seramic Trimmer 10pF	
TC17	C05-0062-05	Seramic Trimmer 6pF	
TC18	C05-0308-05	Seramic Trimmer 4pF	
TC19	C05-0031-15	Seramic Trimmer 10pF	

Ref. No.	Parts No.	Description	Re- marks
J1	E40-0473-05	Mini connect wafer 4P	
J2	E40-0273-05	Mini connect wafer 2P	
J3	E40-0473-05	Mini connect wafer 4P	
J4	E40-0773-05	Mini connect wafer 7P	
J5	E04-0154-05	1P socket	
J6	E40-0473-05	Mini connect wafer 4P	
J7	E40-0373-05	Mini connect wafer 3P	
J8	E40-0573-05	Mini connect wafer 5P	
J9	E40-0873-05	Mini connect wafer 8P	
J10~14	E04-0154-05	1P socket	
—	E23-0046-04	Terminal $\times 9$ (Square)	
—	J31-0502-04	PC board collar $\times 9$	
—	J42-0404-05	PC board bush $\times 9$	
—	J61-0019-05	Vinyl tie $\times 6$	
L1		Not used	
L2	L34-0741-05	Coil 3.5T	☆
L3	L33-0026-05	Choke coil	
L4	L79-0449-05	Helical block 430(B)	☆
L5	L34-0741-05	Coil 3.5T	☆
L6	L33-0026-05	Choke coil	
L7	L34-0740-05	Coil 1.5T	☆
L8	L34-0453-05	Coil 3T	
L9	L33-0026-05	Choke coil	
L10	L34-0739-05	Coil 1.5T	
L11,12		Not used	
L13	L34-0739-05	Coil 1.5T	
L14		Not used	
L15	L33-0026-05	Choke coil	
L16	L34-0739-05	Coil 1.5T	
L17	L33-0222-05	Choke coil	
L18	L33-0222-05	Choke coil	
L19	L34-0499-05	Coil 4T	
L20	L33-0222-05	Choke coil	
L21	L34-0742-05	Coil 5T	
L22	L34-0499-05	Coil 4T	
L23	L33-0026-05	Choke coil	
L24	L34-0452-05	Coil 6T	
L25		Not used	
L26	L34-0099-05	Coil 4T	
L27	L34-0498-05	Coil 2.5T	
L28		Not used	
L29	L33-0002-05	Choke coil	
L30	L79-0448-05	Helical block 430(A)	☆
L31		Not used	
L32	L34-0498-05	Coil	
L33	L79-0449-05	Helical block 430(B)	☆
L34		Not used	
L35	L34-0743-05	Coil	☆
L36	L33-0002-05	Choke coil	
L37	L40-4711-03	Ferri-inductor 470 μH	
L38	L40-4711-03	Ferri-inductor 470 μH	
L39	L40-1011-03	Ferri-inductor 470 μH	
L40	L79-0450-05	Helical block 144	☆
L41	L33-0002-05	Choke coil	
T1		Not used	
T2,3	L19-0309-05	Wide band transformer	☆
T4		Not used	
T5	L34-0747-05	Tuning coil 144 MHz	☆

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
T6	L34-0747-05	Tuning coil 144 MHz	☆
T7	L34-0747-05	Tuning coil 144 MHz	☆
T8	L34-0850-05	Tuning coil 124 MHz	☆
T9	L34-0694-05	Tuning coil 144 MHz	
T10	L34-0749-05	Tuning 144 MHz	☆
T11	L34-0749-05	Tuning 144 MHz	☆
T12	L34-0749-05	Tuning coil 144 MHz	☆
T13		Not used	
T14	L34-0750-05	Tuning coil 455 kHz	☆
T15	L34-0535-05	Tuning coil 8.83 MHz	
T16	L34-0694-05	Tuning coil 144 MHz	
T17	L34-0694-05	Tuning coil 144 MHz	
T18	L34-0850-05	Tuning coil 124 MHz	☆
XF1	L71-0209-05	Monolithic filter 21G20A	☆
X1	L77-0817-05	Quartz crystal 22.055 MHz	☆
VR1.2	R12-1404-05	Potential meter 4.7kΩ	
VR3	R12-3415-05	Potential meter 22kΩ	
VR4	R12-6403-05	Potential meter 470kΩ	
VR5	R12-3415-05	Potential meter 22kΩ	
VR6	R12-6403-05	Potential meter 470kΩ	
	R92-0150-05	Short jumper × 3	
D1	V11-1264-06	Diode 1SS97	☆
D2.3	V11-0414-05	Diode 1S2588	
D4~7	V11-0051-05	Diode 1N60	
D8.9	V11-0414-05	Diode 1S2588	
D10.11		Not used	
D12	V11-0370-05	Diode 1S1587	
D13.14		Not used	
D15	V11-0076-05	Diode 1S1555	
D16	V11-4162-66	Zener diode XZ060	
D17		Not used	
D18	V11-0076-05	Diode 1S1555	
D19	V11-4162-66	Zener diode XZ060	
D20	V11-4162-16	Zener diode XZ132	
D21.22		Not used	
D23.24	V11-0370-05	Diode 1S1587	
D25	V11-0051-05	Diode 1N60	
D26.27	V11-0076-05	Diode 1S1555	
D28	V11-4162-06	Zener diode XZ117	
D29~31	V11-0076-05	Diode 1S1555	
D32	V11-4162-66	Zener diode XZ060	
D33.34		Not used	
D35~37	V11-0370-05	Diode 1S1587	
D38.39		Not used	
D40	V21-0004-05	Varistor MV-13	
D41~42	V11-0076-05	Diode 1S1555	
D43	V11-0004-05	Varistor MV-13	
D44	V11-0076-05	Diode 1S1555	
D45~47	V11-1264-06	Diode 1SS97	
D48		Not used	
D49	V11-0076-05	Diode 1S1555	
Q1	V03-2549-06	Transistor 2SC2549	
Q2	V09-1004-26	FET 2SK125	
Q3	V03-2407-06	Transistor 2SC2407	
Q4.5	V08-1004-16	Transistor MRF629	

Ref. No.	Parts No.	Description	Re- marks
Q6.7	V09-1004-26	FET 2SK125	
Q8	V03-2407-06	Transistor 2SC2407	
Q9	V03-0283-05	Transistor 2SC741	
Q10	V09-1004-26	FET 2SK125	
Q11	V03-0287-05	Transistor 2SC387A	
Q12	V04-0046-05	Transistor 2SD234(Y)	
Q13.14	V03-1815-06	Transistor 2SC1815(Y)	
Q15	V04-0046-05	Transistor 2SD235(Y)	
Q16~18	V03-1815-05	Transistor 2SC1815(Y)	
Q19	V01-0032-05	Transistor 2SA562(Y)	
Q20	V03-2549-06	Transistor 2SC2549	☆
Q21	V09-1004-26	FET 2SK125	☆
Q22	V09-1006-16	FET 3SK92 or	☆
	V09-1012-06	FET 3SK76	☆
Q23	V03-1815-06	Transistor 2SC1815(Y)	
Q24.25	V09-1002-56	FET 3SK74(L)	
Q26	V01-1015-06	Transistor 2SA1015(Y)	
Q27	V03-0079-05	Transistor 2SC460(B)	
Q28.29	V09-0079-05	FET 3SK40(L)	
Q30.31	V03-1815-05	Transistor 2SC1815(Y)	
Q32	V03-0241-05	Transistor 2SC735(Y)	
Q33.34	V03-1815-05	Transistor 2SC1815(Y)	
Q35	V09-0012-05	FET 2SK19(GR)	
Q36	V01-1015-06	Transistor 2SA1015(Y)	
Q37	V09-0012-05	FET 2SK19(GR)	
Q38	V01-1015-06	Transistor 2SA1015(Y)	
Q39.40	V03-1815-06	Transistor 2SC1815(Y)	
Q41	V04-0046-05	Transistor 2SD235(Y)	
Q42	V03-0336-05	Transistor 2SC496(Y)	

IF UNIT (X48-1270-00)

C2	CC45CH1H050C	Ceramic	5pF	±0.25pF
C4	CC45CH1H330J	Ceramic	33 pF	±5%
C7	CC45CH1H0R5C	Ceramic	0.5pF	±0.25pF
C8	CC45CH1H330J	Ceramic	33pF	±5%
C15	CC45CH1H560J	Ceramic	56pF	±5%
C18	CC45CH1H0R5C	Ceramic	0.5pF	±0.25pF
C22	CC45CH1H050C	Ceramic	5pF	±0.25pF
C30	CC45SL1H150J	Ceramic	15pF	±5%
C31	CQ92M1H473K	Mylar	0.047μF	±10%
C35	CC45CH1H220J	Ceramic	22pF	±5%
C37	CC45SL1H470J	Ceramic	47pF	±5%
C38	CC45CH1H100D	Ceramic	10pF	±5pF
C40	CQ92M1H102K	Mylar	0.001μF	16WV
C45	CE04W1C100Q	Electrolytic	10μF	16WV
C47	CC45SL1H120J	Ceramic	12pF	±5%
C52	CC45CH1H050C	Ceramic	5pF	±0.25pF
C54	CQ92M1H102K	Mylar	0.001μF	±10%
C57	CC45CH1H070D	Ceramic	7pF	±0.5pF
C63	CC45CH1H330J	Ceramic	33pF	±5%
C64	CC45CH1H180J	Ceramic	19pF	±5%
C65	CC45CH1H020C	Ceramic	2pF	±0.25pF
C66	CC45CH1H330J	Ceramic	33pF	±5%
C73	CE04W1E4R7Q	Electrolytic	4.7μF	25WV
C76	CC45SL1H151J	Ceramic	150pF	±5%
C77	CC45RH1H270J	Ceramic	27pF	±5%
C79	CC45SL1H101J	Ceramic	100pF	±5%
C80	CC45CH1H100D	Ceramic	10pF	±0.5pF
C81	CC45CH1H030C	Ceramic	3pF	±0.25pF

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
C83 ~ 84	CC45CH1H470J	Ceramic 47pF ±5%	
C86	CE04W1C100Q	Electrolytic 10μF 16WV	
C87	CC45SL1H101J	Ceramic 100pF ±5%	
C89	CE04W1C100Q	Electrolytic 10μF 16WV	
C92	CQ92M1H102K	Mylar 0.001μF ±10%	
C93	CQ92M1H103K	Mylar 0.01μF ±10%	
C95	CQ92M1H103K	Mylar 0.01μF ±10%	
C96	CE04W1H010Q	Electrolytic 1μF 50WV	
C97	CC45CH1H030C	Ceramic 3pF ±0.25pF	
C100	CQ92M1H102K	Mylar 0.001μF ±10%	
C101	CC45SL1H331J	Ceramic 330pF ±5%	
C105	CC45SL1H101J	Ceramic 100pF ±5%	
C106 ~ 107	CQ92M1H103K	Mylar 0.01μF ±10%	
C108 ~ 110	CQ92M1H473K	Mylar 0.04μF ±10%	
C111	CC45CH1H040C	Ceramic 4pF ±0.25pF	
C112	CE04W1H3R3Q	Electrolytic 3.3μF 50WV	
C114	CC45CH1H330J	Ceramic 33pF ±5%	
C116	CC45SL1H101J	Ceramic 100pF ±5%	
C118	CQ92M1H103K	Mylar 0.01μF ±10%	
C119,120	CQ92M1H473K	Mylar 0.047μF ±10%	
C121	CC45CH1H100D	Ceramic 10pF ±0.5pF	
C122	CC45CH1H330J	Ceramic 33pF ±5%	
C123	CC45CH1H220J	Ceramic 22pF ±5%	
C125	CQ92M1H273K	Mylar 0.27μF ±10%	
C126	CE04W1HR47Q	Electrolytic 0.47μF 50WV	
C127,128	CQ92M1H223K	Mylar 0.022μF ±10%	
C129	CC45SL1H470J	Ceramic 47pF ±5%	
C130	CE04W1H3R3Q	Electrolytic 3.3μF 50WV	
C132	CQ92M1H473K	Mylar 0.047μF ±10%	
C133	CE04W1H010Q	Electrolytic 1μF 50WV	
C137 ~ 140	CQ92M1H223K	Mylar 0.022μF ±10%	
C142	CQ02M1H393K	Mylar 0.039μF ±10%	
C143	CE04W1A470Q	Electrolytic 47μF 10WV	
C144	CQ92M1H102K	Mylar 0.001μF ±10%	
C145,146	CQ92M1H393K	Mylar 0.039μF ±10%	
C147	CQ92M1H103K	Mylar 0.01μF ±10%	
C150	CE04W1H010Q	Electrolytic 1μF 50WV	
C151	CQ92M1H393K	Mylar 0.039μF 50WV	
C152	CE04W1A470Q	Electrolytic 47μF 10WV	
C155	CQ92M1H472K	Mylar 0.0047μF ±10%	
C156	CQ92M1H473K	Mylar 0.047μF ±10%	
C159	CQ92M1H222K	Mylar 0.0022μF ±10%	
C160,161	CQ92M1H473K	Mylar 0.047μF ±10%	
C162,163	CE04W1C100Q	Electrolytic 10μF 16WV	
C165,166	CQ92M1H223K	Mylar 0.022μF ±10%	
C167	CQ92M1H473K	Mylar 0.047μF ±10%	
C168	CQ92M1H223K	Mylar 0.022μF ±10%	
C170	CQ92M1H393K	Mylar 0.039μF ±10%	
C174	CQ92M1H103K	Mylar 0.01μF ±10%	
C176	CQ92M1H472K	Mylar 0.0047μF ±10%	
C178	CE04W1A101Q	Electrolytic 100μF 10WV	
C179	CE04W1A470Q	Electrolytic 47μF 10WV	
C180	CE04W1H010Q	Electrolytic 1μF 50WV	
C181	CE04W1C100Q	Electrolytic 10μF 16WV	
C182	CE04W1H010Q	Electrolytic 1μF 50WV	
C183	CQ92M1H223K	Mylar 0.022μF ±10%	
C184	CQ92M1H473K	Mylar 0.047μF ±10%	
C185	CE04W1A470Q	Electrolytic 47μF 10WV	
C186,187	CE04W1H010Q	Electrolytic 1μF 50WV	
C188	CC45CH1H330J	Ceramic 33pF ±5%	
C189	CC45UJ1H050C	Ceramic 5pF ±0.25pF	
C190	CC45CH1H070D	Ceramic 7pF ±0.5pF	
C191 ~ 193	CM93BD2A221J	Mica 220pF ±5%	
C197	CC45CH1H180J	Ceramic 18pF ±5%	
C200	CQ92M1H333K	Mylar 0.033μF ±10%	
C201	CQ92M1H103K	Mylar 0.01μF ±10%	
C202	CC45SL1H101J	Ceramic 100pF ±5%	
C204	CQ92M1H153K	Mylar 0.015μF ±10%	
C205	CQ92M1H223K	Mylar 0.022μF ±10%	
C206,207	CE04W1E4R7Q	Electrolytic 4.7μF 25WV	
C208	CE04W1H010Q	Electrolytic 1μF 50WV	
C209	CQ92M1H333K	Mylar 0.033μF ±10%	
C210	CQ92M1H332K	Mylar 0.0033μF ±10%	
C211	CC45SL1H101J	Ceramic 100pF ±5%	
C212	CE04W1A470Q	Electrolytic 47μF 10WV	
C213	CQ92M1H393K	Mylar 0.039μF ±10%	
C214	CQ92M1H153K	Mylar 0.015μF ±10%	
C215	CQ92M1H473K	Mylar 0.047μF ±10%	
C217,218	CE04W1HR47Q	Electrolytic 0.47μF 50WV	
C219	CE04W1A470Q	Electrolytic 47μF 10WV	
C220	CQ92M1H102K	Mylar 0.001μF ±10%	
C221	CQ92M1H393K	Mylar 0.039μF ±10%	
C222	CQ92M1H103K	Mylar 0.01μF ±10%	
C223	CQ92M1H222K	Mylar 0.0022μF ±10%	
C224	CQ92M1H333K	*Mylar 0.033μF ±10%	
C225	CS15E1V0R1M	Tantalum 0.1μF 35WV	
C226	CQ92M1H182K	Mylar 0.0018μF ±10%	
C227	CE04W1E4R7Q	Electrolytic 4.7μF 25WV	
C228	CE04W1H3R3Q	Electrolytic 3.3μF 50WV	
C229	CQ92M1H223K	Mylar 0.022μF ±10%	
C230	CQ92M1H393K	Mylar 0.039μF ±10%	
C231	CQ92M1H223K	Mylar 0.022μF ±10%	
C233	CC45CH1H0R5C	Ceramic 0.5pF ±0.25pF	
C235	CC45SL1H470J	Ceramic 47pF ±5%	
C236	CC45CH1H030C	Ceramic 3pF ±0.25pF	
C237	CE04W1A101Q	Electrolytic 100μF 10WV	
C238	CC45CH1H330J	Ceramic 33pF ±5%	
C241	CC45CH1H010C	Ceramic 1pF ±0.25pF	
C247,248	CE04W1H010Q	Electrolytic 1μF 50WV	
C250	CC45CH1H010C	Ceramic 1pF ±0.25pF	
C252,253	CC45CH1H010C	Ceramic 1pF ±0.25pF	
C254	CC45CH1H120J	Ceramic 12pF ±5%	
Not used C11,13,23,24,113,115,148,149,164,169, C172,173,239,242,244			
TC1,2	C05-0062-05	Ceramic trimmer 6pF	
TC3	C05-0310-05	Ceramic Trimmer 10pF	
TC4,5		Not used	
TC6	C05-0031-15	Ceramic Trimmer 10pF	
TC7	C05-0030-15	Ceramic Trimmer 20pF	
J1		Not used	
J2	E40-0273-05	Mini connect wafer 2P	
J3	E40-0373-05	Mini connect wafer 3P	
J4	E40-0273-05	Mini connect wafer 2P	
J5 ~ 9	E40-0773-05	Mini connect wafer 7P	
J10	E40-0973-05	Mini connect wafer 9P	
J11	E40-1073-05	Mini connect wafer 10P	
—	E04-0154-05	1P socket	
—	E23-0046-04	Terminal (square)	
—	E23-0401-05	Terminal (round)	
—	G07-0407-14	Earth spring	

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks	Ref. No.	Parts No.	Description	Re- marks
L1	L34-0437-05	Oscillating coil		VR1	R12-0048-05	Potential meter 100Ω	
L2	L34-0753-05	Tuning coil 96 MHz		VR2	R12-0042-05	Potential meter 500Ω	
L3	L40-1021-03	Ferri-inductor 1 mH		VR3	R12-3025-05	Potential meter 10kΩ	
L4	L43-0753-05	Tuning coil 96 MHz		VR4	R12-1020-05	Potential meter 1kΩ	
L5	L40-2211-03	Ferri-inductor 220μH		VR5	R12-4016-05	Potential meter 50kΩ	
L6,7	L34-0753-05	Tuning coil 96 MHz		VR6	R12-2015-05	Potential meter 5kΩ	
L8	L40-2211-03	Ferri-inductor 220μH		VR7	R12-4016-05	Potential meter 50kΩ	
L10,11	L34-0756-05	Coil		VR8	R12-2017-05	Potential meter 5kΩ	
L12	L40-1011-03	Ferri-inductor 100μH			R92-0150-05	Jumper wire	
L13,14	L40-1021-03	Ferri-inductor 1 mH					
L15	L40-1011-03	Ferri-inductor 100μH		D1.2	V11-0414-05	Diode 1S2588	
L16	L34-0567-05	Tuning coil 8 MHz	☆	D3	V11-1262-06	Varistor 1S1212	
L17	L34-0754-05	Tuning coil 8 MHz		D4	V11-0076-05	Diode 1S1555	
L18,19	L40-1021-03	Ferri-inductor 1 mH		D5	V11-0370-05	Diode 1S1587	
L20	L34-0536-05	Tuning coil 8 MHz		D6 ~ 9	V11-0051-05	Diode 1N60	
L21	L34-0534-05	Tuning coil 8 MHz		D10 ~ 17	V11-0370-05	Diode 1S1587	
L22	L34-0755-05	Tuning coil 21.6 MHz	☆	D18,19	V11-0051-05	Diode 1N60	
L23,24	L34-0749-05	Tuning coil 21.6 MHz		D20	V21-0004-05	Varistor MV-13	
L26	L34-0749-05	Tuning coil 21.6 MHz		D21 ~ 26	V11-0051-05	Diode 1N60	
L27	L34-0505-05	Tuning coil 30.43 MHz		D27 ~ 29	V11-0076-05	Diode 1S1555	
L28	L34-0536-05	Tuning coil 8 MHz		D30 ~ 33	V11-0370-05	Diode 1S1587	
L29	L34-0536-05	Tuning coil 8 MHz		D34,35	V11-0076-05	Diode 1S1555	
L30	L34-0537-05	Tuning coil 8 MHz		D36		Not used	
L31	L34-0538-05	Tuning coil 8 MHz		D37 ~ 40	V11-0076-05	Diode 1S1555	
L32	L34-0754-05	Tuning coil 8 MHz	☆	D41 ~ 46	V11-0051-05	Diode 1N60	
L33	L40-1021-03	Ferri-inductor 1 mH		D47	V11-0317-05	Diode 1S2208	
L34	L40-1511-03	Ferri-inductor 150μH		D48 ~ 51	V11-0076-05	Diode 1S1555	
L35	L34-0535-05	Tuning coil 8 MHz		D52,53	V11-0051-05	Diode 1N60	
L36	L34-0536-05	Tuning coil 8 MHz		D54 ~ 59	V11-0076-05	Diode 1S1555	
L37	L40-1511-03	Ferri-inductor 150μH		D60		Not used	
L38	L34-0535-05	Tuning coil 8 MHz		D61,62	V11-0076-05	Diode 1S1555	
L40	L34-0536-05	Tuning coil 8 MHz					
L41	L40-1021-03	Ferri-inductor 1 mH		Q1.2	V03-0079-05	Transistor 2SC460(B)	
L42	L40-1011-03	Ferri-inductor 100μH		Q3	V01-1015-06	Transistor 2SA1015(Y)	
L43	L40-1511-03	Ferri-inductor 150μH		Q4	V03-1815-06	Transistor 2SC1815(Y)	
L44	L40-1021-03	Ferri-inductor 1 mH		Q5	V03-0287-05	Transistor 2SC387(A)	
L46	L40-3311-03	Ferri-inductor 330μH		Q6 ~ 9	V03-1815-06	Transistor 2SC1815(Y)	
L47,48	L40-1021-03	Ferri-inductor 1 mH		Q10	V03-0079-05	Transistor 2SC460(B)	
L50	L40-1021-03	Ferri-inductor 1 mH		Q11 ~ 15	V09-1002-56	FET 3SK74(L)	
L51	L30-0199-05	IFT		Q16	V03-0079-05	Transistor 2SC460(B)	
L53	L30-0285-05	Discr coil		Q17	V01-1015-06	Transistor 2SA1015(Y)	
L54	L30-0286-05	Discr coil		Q18	V09-0012-05	FET 2SK19(GR)	
L56	L40-1545-06	Ferri-inductor 150 mH		Q19 ~ 21	V03-0079-05	Transistor 2SC460(B)	
L57	L33-0264-05	Choke coil		Q22,23	V03-1815-06	Transistor 2SC1815(Y)	
L58	L33-0032-05	Choke coil		Q24	V09-1002-56	FET 3SK74(L)	
L59	L40-1021-03	Ferri-inductor 1 mH		Q25		Not used	
L60	L34-0749-05	Tuning coil 21.6 MHz		Q26	V09-1002-56	FET 3SK74(L)	
L61	L40-6825-04	Ferri-inductor 6.8 mH		Q27,28	V03-1815-06	Transistor 2SC1815(Y)	
L62	L40-1021-03	Ferri-inductor 1 mH		Q29	V09-0056-05	FET 2SK30A(O)	
L63	L40-1511-03	Ferri-inductor 150μH		Q20 ~ 34	V03-0079-05	Transistor 2SC460(B)	
L64	L34-0437-05	Oscillating coil		Q35	V03-1815-06	Transistor 2SC1815(Y)	
L65,66	L34-0753-05	Tuning coil 96 MHz		Q36	V03-0272-05	Transistor 2SC1345(E)	
L67	L40-2211-03	Ferri-inductor 220μH		Q37		Not used	
L68,69	L34-0753-05	Tuning coil 96 MHz		Q38	V30-0039-05	IC TA7061AP	
L70,71	L40-2211-03	Ferri-inductor 220μH		Q39	V03-1815-06	Transistor 2SC1815(Y)	
	Not used L9,25,39,45,49,52,55			Q40,41	V03-0079-05	Transistor 2SC460(B)	
XF1	L71-0208-05	Crystal Filter SSB 8.83 MHz		Q42 ~ 49	V03-1815-06	Transistor 2SC1815(Y)	
CF1	L72-0312-05	Ceramic Filter CFL-455F2	☆	Q50 ~ 52	V03-0079-05	Transistor 2SC460(B)	
X1	L77-0865-05	Crystal 47.66 MHz	☆	Q53	V01-1015-06	Transistor 2SA1015(Y)	
X2	L77-0844-05	Crystal 30.430 MHz	☆	Q54	V03-1815-06	Transistor 2SC1815(Y)	
X3	L77-0845-05	Crystal 21.6 MHz	☆				
X4	L77-0864-05	Crystal 48.5 MHz	☆				

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
MIX(A) UNIT (X48-1250-00)			
C4	CC45SL1H050C	Ceramic 5pF $\pm 0.25\text{pF}$	
C7	CC45CH1H100D	Ceramic 10pF $\pm 0.5\text{pF}$	
TC1	C05-0309-05	Trimmer 40pF	
TC2	C05-0062-05	Trimmer 6pF	
TC3	C05-0309-05	Trimmer 40pF	
J1.2	E04-0154-05	1 P socket	
J3	E40-0373-05	Mini connect wafer 3P	
L1	L34-0888-05	Coil	☆
L2	L34-0751-05	Coil	☆
L3	L33-0026-05	Choke coil	
L4	L33-0605-05	Choke coil	
L5	L33-0025-05	Choke coil	
L6	L79-0456-15	Helical resonator	
T1.2	L19-0309-05	Wide bandwidth trans	
D1~4	V11-1264-06	Diode 1SS97	
Q1	V03-2407-06	Transistor 2SC2407	
Q2	V09-1012-06	FET 3SK76 or	
	V09-1006-16	3SK92	
MIX(B) UNIT (X48-1260-00)			
C1	CC45SL1H470J	Ceramic 47pF $\pm 5\%$	
C4	CC45SL1H470J	Ceramic 47pF $\pm 5\%$	
C7	CC45SL1H470J	Ceramic 47pF $\pm 5\%$	
C10	CC45SL1H470J	Ceramic 47pF $\pm 5\%$	
C12	CE04W1C100Q	Electrolytic 10 μF 16WV	
J1.2	E04-0154-05	1 P socket	
—	J31-0502-04	PC board collar	
—	J42-0404-05	PC board bush	
R4	RS14AB3D470J	Metal film 47 Ω 2W	
L1	L34-0499-05	Choke coil	
L2	L34-0756-05	Coil	
L3	L34-0499-05	Choke coil	
L4	L34-0756-05	Coil	
L5	L34-0499-05	Choke coil	
L6	L34-0756-05	Coil	
L7~9	L33-0026-05	Choke coil	
D1	V11-0263-05	Zener Diode BZ-090	
Q1~3	V09-1004-26	FET 2SK125	

Ref. No.	Parts No.	Description	Re- marks
AF VOX UNIT (X49-1120-61)			
C1	CE04W1C100	Electrolytic 10 μF 16WV	
C2	CE04W1E221Q	Electrolytic 22 μF 25WV	
C4	CE04W1A221Q	Electrolytic 220 μF 10WV	
C5	CQ92M1H104K	Mylar 0.1 μF 50WV	
C6	CE04W1A470	Electrolytic 47 μF 10WV	
C7	CE04W1H010	Electrolytic 1 μF 50WV	
C8	CE04W1A101Q	Electrolytic 100 μF 10WV	
C9	CE04W1E470	Electrolytic 47 μF 25WV	
C10	CQ92M1H332K	Mylar 0.0033 μF 50WV	
C13	CE04W1A470	Electrolytic 47 μF 10WV	
C14	CE04W1H3R3	Electrolytic 3.3 μF 50WV	
C16	CE04W1H010	Electrolytic 1 μF 50WV	
C17	CC45SL1H331J	Ceramic 330pF $\pm 5\%$	
C18	CE04W1C100	Electrolytic 10 μF 16WV	
C19	CQ92M1H472K	Mylar 0.0047 μF 50WV	
C21.24	CE04W1H3R3	Electrolytic 3.3 μF 50WV	
C25	CQ92M1H123K	Mylar 0.012 μF 50WV	
C26	CQ92M1H223K	Mylar 0.022 μF 50WV	
C28	CQ92M1H682K	Mylar 0.068 μF 50WV	
C29	CQ92M1H223K	Mylar 0.022 μF 50WV	
C30	CQ92M1H123K	Mylar 0.012 μF 50WV	
C31	CC45SL1H330J	Ceramic 33pF $\pm 5\%$	
C32	CE04W1A221Q	Electrolytic 220 μF 10WV	
C33	CE04W1C220Q	Electrolytic 22 μF 16WV	
C37	CQ92M1H223K	Mylar 0.022 μF 50WV	
—	E31-0475-05	Short connector	
—	E31-0476-05	Short connector	
J1	E40-0773-05	Mini connect wager 7P	
J2	E40-0973-05	Mini connect wafer 9P	
J3	E40-0773-05	Mini connect wafer 7P	
J4	E40-1073-05	Mini connect wafer 10P	
J5	E40-0473-05	Mini connect wafer 4P	
J6	E40-0473-05	Mini connect wafer 4P	
J7		Not used	
J8		Not used	
J9	E40-0273-05	Mini connect wafer 2P	
J10		Not used	
J11	E40-0311-05	Pin connector 3P	
J13	E40-0611-05	Pin connector 6P	
—	G10-0603-14	Felt	☆
T1	L13-0001-05	Input Transformer	
L1	L33-0025-05	Choke coil	
VR1	R12-3412-05	FM MIC Potentio meter 10k Ω	☆
VR2	R12-3408-05	Side Tone Potentio meter 47k Ω	
VR3	R12-0405-05	ANT VOX Potentio meter 330 Ω	
VR4	R12-0053-05	Potnetio meter 500 Ω	
—	R92-0150-05	Short jumper	

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
BZ1	T95-0051-05	Buzzer	☆
D1~4	V11-0051-05	Diode 1N60	
D5,6	V11-0076-05	Diode 1S1555	
D7	V11-0051-05	Diode 1N60	
D8	V11-0076-05	Diode 1S1555	
D9		Not used	
D10,11	V11-0076-05	Diode 1S1555	
D12		Not used	
D13	V11-0051-05	Diode 1N60	
D14,15	V11-0076-05	Diode 1S1555	
Q1	V30-0192-06	IC HA1366W	
Q2~5	V03-1815-06	Transistor 2SC1815(Y)	
Q6	V01-1015-06	Transistor 2SA1015(Y)	
Q7	V03-1815-06	Transistor 2SC1815(Y)	
Q8	V01-1015-06	Transistor 2SA1015(Y)	
Q9~14	V03-1815-06	Transistor 2SC1815(Y)	

CAR UNIT (X50-1510-00)

C1,3		Not used		
C7	CC45TH1H150J	Ceramic 15pF	±5%	
C8	CC45TH1H180J	Ceramic 18pF	±5%	
C9	CC45TH1H100J	Ceramic 10pF	±5%	
C10		Not used		
C12	CC45SL1H471J	Ceramic 470pF	±5%	
C13	CC45SL1H101J	Ceramic 100pF	±5%	
C14	CC45CH1H020C	Ceramic 2pF	±0.25%	
C15	CC45CH1H330J	Ceramic 33pF	±5%	
C16	CQ92M1H473K	Mylar 0.047μF	50WV	
TC1	C05-0031-05	Seramic Trimmer 10pF		☆
TC2	C05-0309-05	Seramic Trimmer 40pF		
TC3	C05-0031-05	Seramic Trimmer 10pF		☆
TC4	C05-00309-05	Seramic Trimmer 40pF		
—	E23-0046-04	Terminal (square)		
J1	E40-1073-05	Mini connect wafer 10P		
L1~5	L40-1021-03	Ferri-inductor 1 mH		
L6	L32-0201-05	Oscillating coil		
L7,8	L40-1511-03	Ferri-inductor 150μH		
X1	L77-0826-05	Crystal oscillator 8.8315 MHz		☆
X2	L77-0825-05	Crystal oscillator 8.8293 MHz		☆
D1		Not used		
D2~6	V11-0076-05	Diode 1S1555		
Q1,2	V03-0079-05	Transistor 2SC460(B)		

Ref. No.	Parts No.	Description	Re- marks
VCO UNIT (X50-1520-00)			
C1	CC45UJ1H120J	Ceramic 12pF	±5%
C2	CC45CH1H070D	Ceramic 7pF	±0.5pF
C3	CC45RH1H040C	Ceramic 4pF	±0.25pF
C4	CC45RH1H070C	Ceramic 7pF	±0.25pF
C6	CE04W1A220	Electrolytic 22μF	10WV
C7	CC45CH1H030D	Ceramic 3pF	±0.5pF
C11	CC45RH1H070C	Ceramic 7pF	±0.25pF
C12	CC45CH1H030D	Ceramic 3pF	±0.5pF
C16	CC45RH1H070C	Ceramic 7pF	±0.25pF
C17	CC45CH1H330J	Ceramic 33pF	±5%
C19	CC45RH1H070C	Ceramic 7pF	±0.25pF
C22,26	CE04W1A220	Electrolytic 22μF	10WV
C28	CE04W1H3R3	Electrolytic 3.3pF	50WV
C29	CC45CH1H020C	Ceramic 2pF	±0.25pF
C30	CQ92M1H223K	Mylar 0.022μF	50WV
C32	CC45CH1H050C	Ceramic 5pF	±0.25pF
J1	E40-1273-05	Mini connector wafer 12P	
L1	L31-0319-05	Oscillating coil	
L2	L40-3392-02	Ferri-inductor 3.3μH	
L3	L40-4791-02	Ferri-inductor 4.7μH	
L4	L31-0347-05	Tuning coil	
L5	L31-0347-05	Tuning coil	
L6	L31-0347-05	Tuning coil	
L7	L40-1021-03	Ferri-inductor 1 mH	
L8	L40-1021-03	Ferri-inductor 1 mH	
D1	V11-0317-05	Varicap diode 1S2208	
D2	V11-0051-05	Diode 1N60	
D3,4	V11-0414-05	Diode 1S2588	
Q1	V09-0012-05	FET 2SK19(GR)	
Q2,3	V09-0082-05	FET 3SK40(M)	
Q4	V09-0079-05	FET 3SK40(L)	
Q5	V03-1815-06	Transistor 2SC1815(Y)	
Q6	V01-1015-06	Transistor 2SA1015(Y)	
Q7		Not used	
Q8	V03-0241-05	Transistor 2SC735(Y)	
Q9	V03-1815-05	Transistor 2SC1815(Y)	

TONE UNIT (X52-1110-62)

C2	CE04W1C220Q	Electolytic 22μF	16WV
C3~5	C91-0433-04	Layer-built 0.0039μF	±5%
C6	CE04-W1C220Q	Electlytic 22μF	16WV
C7,8	CE04W1H010	Electolytic 1μF	50WV
R2,3	R92-0616-05	Metal film 10kΩ±1%1/4W	
R4	R92-0617-05	Metal film 7.5kΩ±1%1/4W	
R5	RN14BK2E4703F	Metal film 470kΩ±1%1/4W	
VR1	R12-2405-05	Semi-fixed resistor 5kΩ	

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
D1 Q1,2	V11-0076-05 V03-0110-05	Diode 1S1555 Transistor 2SC458(B)	
MIC VR UNIT (X53-1080-00)			
C1,2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14	CC45SL1H101J CE04W1H010 CE04W1A470 CE04W1E4R7 CE04W1H010 CQ92M1H103K CQ92M1H473K CE04W1H010 CE04W1E4R7 CE04W1H3R3 CE04W1H010 CC45SL1H101J CE04W1C220Q	Ceramic 100pF 50WV Electrolytic 1μF 50WV Electrolytic 47μF 10WV Electrolytic 4.7μF 25WV Electrolytic 1μF 50WV Mylar 0.01μF 50WV Mylar 0.047μF 50WV Electrolytic 1μF 50WV Electrolytic 4.7μF 25WV Electrolytic 3.3μF 50WV Electrolytic 1μF 50WV Ceramic 100pF ±5% Electrolytic 22μF 16WV	
J1,2	E40-0973-05	Mini connect wafer 9P	
—	R92-0150-05	Short jumper × 3	
VR1 VR2	R19-3402-05 R19-9402-05	Variable resistor 10kΩ(A), 10kΩ(B) Variable resistor 50kΩ(A), 250kΩ(B)	☆ ☆
SW1	S29-1404-05	Slide rotary switch	☆
Q1 Q2~7	V03-0355-05 V03-1815-06	Transistor 2SC1000(GR) Transistor 2SC1815(GR)	
AF VR UNIT (X53-1090-61)			
C1 C2 C3 C4 C5 C6	CE04W1C100 CE04W1A470 CE04W1C100 CE04W1HR47 CE04W1C100 CQ92M1H223K	Electrolytic 10μF 16WV Electrolytic 47μF 10WV Electrolytic 10μF 16WV Electrolytic 0.47μF 50WV Electrolytic 10μF 16WV Mylar 0.022μF 50WV	
J1 J2	E40-1273-05 E40-0773-05	Mini connect wafer 12P Mini connect wafer 7P	
VR1 VR2 VR3 VR4 VR5 —	R19-3402-05 R01-4404-05 R01-3407-05 R12-3025-04 R12-4020-05 R92-0150-05	Variable resistor 10kΩ(A), 10kΩ(B, AF, RF) Variable resistor 50kΩ(B), SQU Potentio meter 10kΩ(B) Potentio meter 10kΩ(B) Potentio meter 50 kΩ(B) Short jumper × 4	☆ ☆
D1 IC1 Q1~6	V11-0076-05 V30-0232-16 V03-1815-06	Diode 1S1555 IC TC4011BP Transistor 2SC1815(Y)	

Ref. No.	Parts No.	Description	Re- marks
DISPLAY UNIT (X54-1390-00)			
C1 C2 C3 C4 C5 C6 C7 C8,9 C10 C11 C12,13	CQ92M1H103K CE04W1A470Q CQ92M1H223K CE04W1A101Q CS15E1VR33M CE04W1H100Q CQ92M1H223K CE04W1E100Q CE04W1A471Q CE04W1C220Q CE04W1C330Q	Mylar 0.01μF ±10% Electrolytic 47μF 10WV Mylar 0.022μF ±10% Electrolytic 100μF 10WV Tantalum 0.33μF 35WV Electrolytic 10μF 50WV Mylar 0.022μF ±10% Electrolytic 10μF 25WV Electrolytic 470μF 10WV Electrolytic 22μF 16WV Electrolytic 33μF 16WV	
J1 J2 J3 J4	E40-0373-05 E40-0573-05 E10-0651-05 E10-0951-05 E31-0465-05 E31-0466-05	Mini connect wafer 3P Mini connect wafer 5P FFC connector 6P FFC connector 9P Tape cable 5P Tape cable 7P	☆ ☆
	J19-1301-04	Diode holder × 4	
L1 L2	L33-0616-05 L40-4711-03	Choke coil Ferri-inductor 470μH	
T1	L19-0305-05	Converter trans.	
R20 R21 R22 R23	R90-0510-05 R90-0517-05 R90-0511-05 R90-0511-05	Resistor 4.7k × 8 Resistor 4.7k × 7 Resistor 47k × 8 Resistor 47k × 8	☆ ☆ ☆ ☆
D1~4 D5 D6~9 D10~32	V11-0076-05 V11-4160-86 V11-0430-05 V11-0076-05	Diode 1S1555 Zener WZ-071 LED SEL-103W Diode 1S1555	
Q1,2 Q3~17 IC1 IC2 IC3 IC4	V03-1959-06 V01-1015-06 V30-1007-76 V30-0192-16 V30-1030-56 V30-1010-26	Transistor 2SC1959(Y) Transistor 2SA1015(Y) IC HD74LS10P IC HD74LS00P IC SN74LS247N IC HD74LS42P	☆ ☆
V1	V40-7760-86	DISPLAY TUBE 9-BT-12	
DIGITAL UNIT (X54-1460-61)			
C1,2 C3 C4,5 C6 C7	CE04W1C100 CE04W1A470 CS15E1E010M CQ92M1H102K CE04W1HR47	Electrolytic 10μF 16WV Electrolytic 47μF 10WV Tantalum 1μF 25WV Mylar 0.001μF ±10% Electrolytic 0.47μF 50WV	

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
C8	CE04W0J101Q	Electrolytic 100 μ F 6.3WV	
C9		Not used	
C10~13	CQ92M1H223K	Mylar 0.022 μ F $\pm$ 10%	
C14		Not used	
C15	CE04W1A101Q	Electrolytic 100 μ F 10WV	
C16,17	CE04W1C100	Electrolytic 10 μ F 16WV	
C18	CE04W0J101Q	Electrolytic 100 μ F 6.3WV	
C19,20	CS15E1ER15M	Tantalum 0.15 μ F 25WV	
C21	CQ92M1H103K	Mylar 0.01 μ F $\pm$ 10%	
C22,23	CQ92M1H103K	Mylar 0.01 μ F $\pm$ 10%	
C24	CE04W1A470	Electrolytic 47 μ F 10WV	
C25	CE04W1H4R7	Electrolytic 4.7 μ F 50WV	
C26	C91-0446-05	Ceramic 100pF $\pm$ 5%	
C27	CE04W0J101Q	Electrolytic 100 μ F 6.3WV	
C28	CE04W1HR47	Electrolytic 0.47 μ F 50WV	
C29~32	CE04W1H010	Electrolytic 1 μ F 50WV	
C33	CE04W1H4R7	Electrolytic 4.7 μ F 50WV	
C34	C91-0445-05	Ceramic 56pF $\pm$ 5%	
C35~37	CE04W1A470	Electrolytic 47 μ F 10WV	
C38~41	CQ92M1H103K	Mylar 0.01 μ F $\pm$ 10%	
C42	CE04W1A470	Electrolytic 47 μ F 10WV	
C43	CQ92M1H102K	Mylar 0.001 μ F $\pm$ 10%	
C44	CE04W1A470	Electrolytic 47 μ F 10WV	
C45	CQ92M1H472K	Mylar 0.0047 μ F $\pm$ 10%	
C46	CE04W0J471Q	Electrolytic 470 μ F 6.3WV	
C47~49	CE04W1H010	Electrolytic 1 μ F 50WV	
C50	CE04W1A470Q	Electrolytic 47 μ F 10WV	
C51		Not used	
J1	Not used		
J2	E10-0651-05	FFC connector 6P	
J3	E10-0951-05	FFC connector 9P	
J4	E40-1373-05	Mini connect wafer 13P	
J5	E40-0873-05	Mini connect wafer 8P	
J6,7	E40-1073-05	Mini connect wafer 10P	
J8	E10-1951-05	FFC connector 19P	
J9	E40-0573-05	Mini connect wafer 5P	
	J31-0502-04	PC board collar	
	J42-0404-05	PC board bush	
L1	L40-4725-04	Ferri-inductor 4.7 mH	
JP1	R92-0150-05	Short wire	
JP2,3	R92-0150-05	Short wire	
R8	R90-0509-05	22k Ω $\times$ 5	☆
R10	R90-0524-05	1.8k Ω $\times$ 5	☆
R33	R90-0508-05	470 Ω $\times$ 4	☆
	Not used R31,35,40,46,51		☆
D1~3	V11-0076-05	Diode 1S1555	
D4	V11-0051-05	Diode 1N60	
D5	V11-0076-05	Diode 1S1555	
D6	V11-0051-05	Diode 1N60	
D7	V11-0076-05	Diode 1S1555	

Ref. No.	Parts No.	Description	Re- marks
D8~10	Not used		
D11~15	V11-0076-05	Diode 1S1555	
D16	Not used		
D17~24	V11-0076-05	Diode 1S1555	
D25,26	V11-0051-05	Diode 1N60	
Q1	V01-1015-06	Transistor 2SA1015(Y)	
Q2	V03-1815-06	Transistor 2SC1815(Y)	
Q3~5	V01-1015-06	Transistor 2SA1015(Y)	
Q6,7	V03-1815-06	Transistor 2SC1815(Y)	
IC1,2	V30-1007-46	IC HD74LS03P or SN74LS03N	☆
IC3	V30-1042-06	IC HD74LS00P or SN74LS00N	☆
IC4	V30-0192-16	IC HD74LS08P	☆
IC5	V30-1007-66	IC HD74LS01P	☆
IC6	V30-1007-76	IC HD74LS00P or SN74LS00N	☆
IC7	V30-1005-66	IC HD74LS04P	☆
IC8	V30-1007-56	IC HD74LS132P	☆
IC9	V30-1060-06	IC HD74LS00P or SN74LS00N	☆
IC10	V30-0192-16	IC HD74LS32P	
IC11	V30-1008-16	IC HD74LS00P or SN74LS00N	☆
IC12	V30-1007-56	IC HD74LS04P	☆
IC13	Not used		
IC14	V30-1007-36	IC HD74LS02P or SN74LS02N	☆
IC15,16	V30-1041-06	IC HD74LS20P	☆
IC17	V30-1007-96	IC HD7404P	
IC18	V30-1008-46	IC HSM4407RS	
IC19	V30-1058-06	IC HD74LS08P	☆
IC20	V30-1007-66	IC HD74LS11P	☆
IC21	V30-1007-86	IC HD74LS20P	☆
IC22~24	V30-1007-96	IC HD74LS30P	☆
IC25	V30-1008-06	IC HD74154P	
IC26~29	V30-1008-56	IC HD74LS151P	
IC30,31	V30-1008-26	IC HD74LS151P	
IC32,33	V30-1008-96	IC HD74LS75P	
IC34,35	V30-1008-66	IC MN1201A	
IC36	V30-1008-36	IC HD74LS157P	
IC37	V30-0192-16	IC HD74LS00P or SN74LS00N	
IC38	V30-1005-66	IC HD74221P or SN74221N	
IC39	V30-1059-06	IC MN9004	
	V30-1087-06	IC μ PC78L05A	
	V30-1008-76		
	V30-1029-16		
PLL ASS'Y (X60-1050-00)			
Q1	V30-1001-16	IC(5V) FS-7805M	
Q2	V30-1029-66	IC(8V) FS-7808M	☆
PLL(A) UNIT (X50-1530-00)			
C6	CC45CH1H100D	Ceramic 10pF $\pm$ 5%	
C8	CC45RH1H070D	Ceramic 7pF $\pm$ 0.5pF	
C11	CC45RH1H070D	Ceramic 7pF $\pm$ 0.5pF	
C16,17	CC45CH1H270J	Ceramic 27pF $\pm$ 5%	
C21	CC45SL1H221J	Ceramic 220pF $\pm$ 5%	

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
C22	CC45UJ1H151J	Ceramic 150pF ±5%	
C25	CC45CH1H180J	Ceramic 18pF ±5%	
C28	CC45RH1H180J	Ceramic 18pF ±5%	
C29	CC45CH1H030C	Ceramic 3pF ±0.25pF	
C30	CC45RH1H180J	Ceramic 18pF ±5%	
C31	CC45CH1H330J	Ceramic 33pF ±5%	
C34	CC45RH1H180J	Ceramic 18pF ±5%	
C35	CC45CH1H0R5C	Ceramic 0.5pF ±0.25%	
C36	CC45RH1H220J	Ceramic 22pF ±5%	
C38	CC45CH1H101J	Ceramic 100pF ±5%	
C39	CC45CH1H220J	Ceramic 22pF ±5%	
C41	CC45CH1H070D	Ceramic 7pF ±0.5pF	
C46	CE04W1H47Q	Electrolytic 0.47μF 50WV	
C47	CE04W1C101Q	Electrolytic 100μF 16WV	
C50	CE04W1A101Q	Electrolytic 100μF 10WV	
C51	CE04W1C470Q	Electrolytic 47μF 16WV	
C53	CQ92M1H104K	Mylar 0.1μF ±10%	
C55	CE04W1C470Q	Electrolytic 47μF 16WV	
C56,57	CS15E1A010M	Tantalum 1μF 10WV	
C58	CE04W1A101Q	Electrolytic 100μF 10WV	
C62	CC45CH1H220J	Ceramic 22pF ±5%	
C63		Not used	
C64~66	CE04W1A470Q	Electrolytic 47μF 10WV	
TC1	C05-0031-15	Ceramic Trimmer 10pF	
TC2	C05-0030-15	Ceramic Trimmer 20pF	
	E23-0046-04	Terminal (square)	
J1	E40-0473-05	Mini connect wafer 4P	
J2	E40-1073-05	Mini connect wafer 10P	
J3	E40-0473-05	Mini connect wafer 4P	
—	G09-0407-14	Earth Spring	
—	J25-2701-04	PC Board (B)	☆
	J61-0019-05	Vinyl tie	
T1,2	L31-0345-05	Tuning coil	
T3,4	L34-0505-05	Tuning coil	
T5,6	L31-0347-05	Tuning coil	
L1	L40-2201-03	Ferri-inductor 22μH	
L2,3	L40-1021-03	Ferri-inductor 1 mH	
X1	L77-0823-15	Crystal 14.19 MHz	☆
X2	L77-0824-05	Crystal 8 MHz	☆
	R92-0150-05	Short junper	
R34	RS14AB3A220J	Metal film 22Ω 1W	
D1~3	V11-0317-05	Diode 1S2208	
D4,5	V11-0051-05	Diode 1N60	
Q1~3	V03-0079-05	Transistor 2SC460(B)	
Q4,5	V03-0241-05	Transistor 2SC735(Y)	
Q6	V03-0355-05	Transistor 2SC1000(GR)	

Ref. No.	Parts No.	Description	Re- marks
Q7	V03-0241-05	Transistor 2SC735(Y)	
IC1	V30-0196-06	IC SN16913P	
IC2	V30-0087-05	IC TA7060P	
IC3	V30-1031-16	IC TA7310P	☆
IC4	V30-1032-16	IC TD34192BP	☆
IC5	V30-1033-16	IC SM6422A	☆
IC6	V30-0173-05	IC MC4044P	
IC7	V30-1034-16	IC TD3409AP	☆
IC8	V30-0151-05	IC TD3490BP	
PLL(B) UNIT (X50-1540-00)			
C1	CQ92M1H562K	Mylar 0.0056μF ±10%	
C2	CC45RH1H180J	Ceramic 18pF ±5%	
C3	CC45CH1H100D	Ceramic 10pF ±0.5pF	
C4	CC45RH1H150J	Ceramic 15pF ±5%	
C5	CC45RH1H270J	Ceramic 27pF ±5%	
C7	CE04W1A101	Electrolytic	
C8,9	CC45CH1H100D	Ceramic 10pF ±0.5pF	
C18	CE04W1A470	Electrolytic 47μF 10WV	
C19	CC45RH1H390J	Ceramic 39pF ±5%	
C22~24	CC45SL1H470J	Ceramic 47pF ±5%	
C26	CE04W1A470	Electrolytic 47μF 10WV	
C33	CC45UJ1H560J	Ceramic 56pF ±5%	
C34	CC45CH1H100D	Ceramic 10pF ±0.5pF	
C36	CC45RH1H270J	Ceramic 27pF ±5%	
C38	CS15E1C1R5M	Tantalum 1.5μF 16WV	
C39,40	CS15E1A100M	Tantalum 10μF 10WV	
C41	CQ92M1H223K	Mylar 0.022μF ±10%	
C42		Not used	
C43	CE04W1A470	Electrolytic 47μF 10WV	
C47		Not used	
C48	CC45UJ1H680J	Ceramic 68pF ±5%	
C50		Not used	
TC1	C05-0031-15	Ceramic Trimmer 10pF	
J1	E19-1951-05	FFC connector 19P	☆
J2	E40-0473-05	Mini connect wafer 4P	
J3	E40-0373-05	Mini connect wafer 3P	
J4	E40-0273-05	Mini connect wafer 2P	
—	E23-0046-04	Terminal (square)	
L1	L40-1511-25	Ferri-inductor 150μH	
L2	L40-1511-03	Ferri-inductor 150μH	
L3		Not used	
L4,5	L40-1021-03	Ferri-inductor 1 mH	
L6,7	L40-3301-03	Ferri-inductor 33μH	
L8,9	L31-0345-05	Tuning coil	
L10	L32-0610-15	Oscillating coil	☆
X1	L77-0822-25	Crystal 13.215 MHz	☆
VR1	R12-2406-05	Potential meter 5kΩ(B)	☆
VR2	R12-3418-05	Potential meter 30kΩ(B)	
	Not used R35		

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
—	R92-0150-05	Short jumper	
D1	V11-1048-06	Diode 1S1658-2	
D2	V11-0317-05	Diode 1S2208	
D3,4	V11-0051-05	Diode 1N60	
D5		Not used	
D6,7	V11-0051-05	Diode 1N60	
TH1	V11-3161-86	Thermistor D33A	☆
Q1~3	V09-0012-05	FET 2SK19(GR)	
Q4,5	V03-0079-05	Transistor 2SC460(B)	
Q6,7	V03-0355-05	Transistor 2SC1000(GR)	
Q8	V09-0060-05	FET 2SK30A(GR)	
Q9	Not used		
IC1	V30-0196-05	IC SN16913P	
IC2	V30-1031-16	IC TA7310P	☆
IC3	V30-1036-16	IC TC9122P	☆
IC4	V30-1035-16	IC MC14568B	☆

FINAL UNIT ASS'Y (X60-1060-01)

—	E04-0109-15	M type receptacle (ANT) × 2	
	E31-2044-05	Plug with leads	
Q1	V04-0588-06	Transistor 2SD588	

144 FINAL UNIT (X56-1310-01)

C1	C91-0439-05	Ceramic 10pF ±0.5pF	
C2,3	C91-0441-05	Ceramic 22pF ±5%	
C4	C91-0439-05	Ceramic 10pF ±0.5pF	
C5	C91-0434-05	Ceramic 0.01μF +100%—0%	
C6	C91-0444-05	Ceramic 47μF ±5%	
C7,8	C91-0441-05	Ceramic 22pF ±5%	
C9	C91-0440-05	Ceramic 15pF ±5%	
C10	CE04W1C100	Electrolytic 10μF 16WV	
C11	C91-0435-05	Ceramic 0.01μF +80%—20%	
C12	CE04W1E100	Electrolytic 10μF 25WV	
C13	C91-0435-05	Ceramic 0.01μF +80%—20%	
C14	CE04W1C100	Electrolytic 10μF 16WV	
C15	C91-0435-05	Ceramic 0.01μF +80%—20%	
C16	CE04W1E100	Electrolytic 10μF 25WV	
C17,18	C91-0435-05	Ceramic 0.01μF +80%—20%	
C19	C91-0443-05	Ceramic 33pF ±5%	
C20~23	C91-0435-05	Ceramic 0.01μF +80%—20%	
C24,25	C91-0442-05	Ceramic 27pF ±5%	
C26	C91-0441-05	Ceramic 22pF ±5%	
C27	C91-0440-05	Ceramic 15pF ±5%	
C28	C91-0435-05	Ceramic 0.01μF +80%—20%	
C29~31	C91-0435-05	Ceramic 0.01μF +80%—20%	
C32	CE04W1E220	Electrolytic 22μF 25WV	
TC1	C05-0056-05	Ceramic Trimmer 30pF	☆
TC2	C05-0306-05	Ceramic Trimmer 20pF	☆
TC3,4	C02-0011-05	Variable capacitor 21pF	☆
J1,2	E40-0373-05	Mini connect wafer 3P	
J4	E40-0673-05	Mini connect wafer 6P	

Ref. No.	Parts No.	Description	Re- marks
	E23-0046-04	Terminal (square)	
	E23-0047-04	Terminal (square)	
L1	L34-0733-05	Coil 5φ2T	☆
L2	L34-0452-05	Coil 3φ6T	
L3	L34-0732-05	Coil 5φ1T	☆
L4	L34-0733-05	Coil 5φ2T	☆
L5	L34-0452-05	Coil 3φ6T	
L6	L34-0734-05	Coil 5φ3T	☆
L7	L34-0735-05	Coil 5φ4T	☆
L8	L34-0733-05	Coil 5φ2T	☆
L9	L33-0025-05	Choke coil 1μH	
L10	L34-0387-05	Coil 6φ4T	
L11,12	L34-0352-05	Coil 6φ3T	
L13	L34-0848-15	Coil 1/2T	
L14,15	L33-0618-05	Choke coil 3φ12T	☆
L16	L34-0387-05	Coil 6φ4T	
L17	L34-0352-05	Coil 6φ3T	
R5	RC05GF2H181J	Solid 180Ω 1/2W	
R6	RC05GF2H2R2J	Solid 2.2Ω 1/2W	
R8	RC05GF2H221J	Solid 220Ω 1/2W	
R9	R92-0601-05	Cement 0.22Ω	
VR1	R12-4015-05	Potential meter 50kΩ	
VR2	R12-0053-05	Potential meter 500Ω	
D1,2	V11-0076-05	Diode 1S1555	
D3	V11-5260-16	Diode MI402	
D4	V11-0414-05	Diode 1S2588	
D5	V11-0051-05	Diode 1N60	
D6,7	V11-0076-05	Diode 1S1555	
Q1	V03-2118-06	Transistor 2SC2118	
Q2	V03-2103-06	Transistor 2SC2103(A)	

430 FINAL UNIT (X56-1320-01)

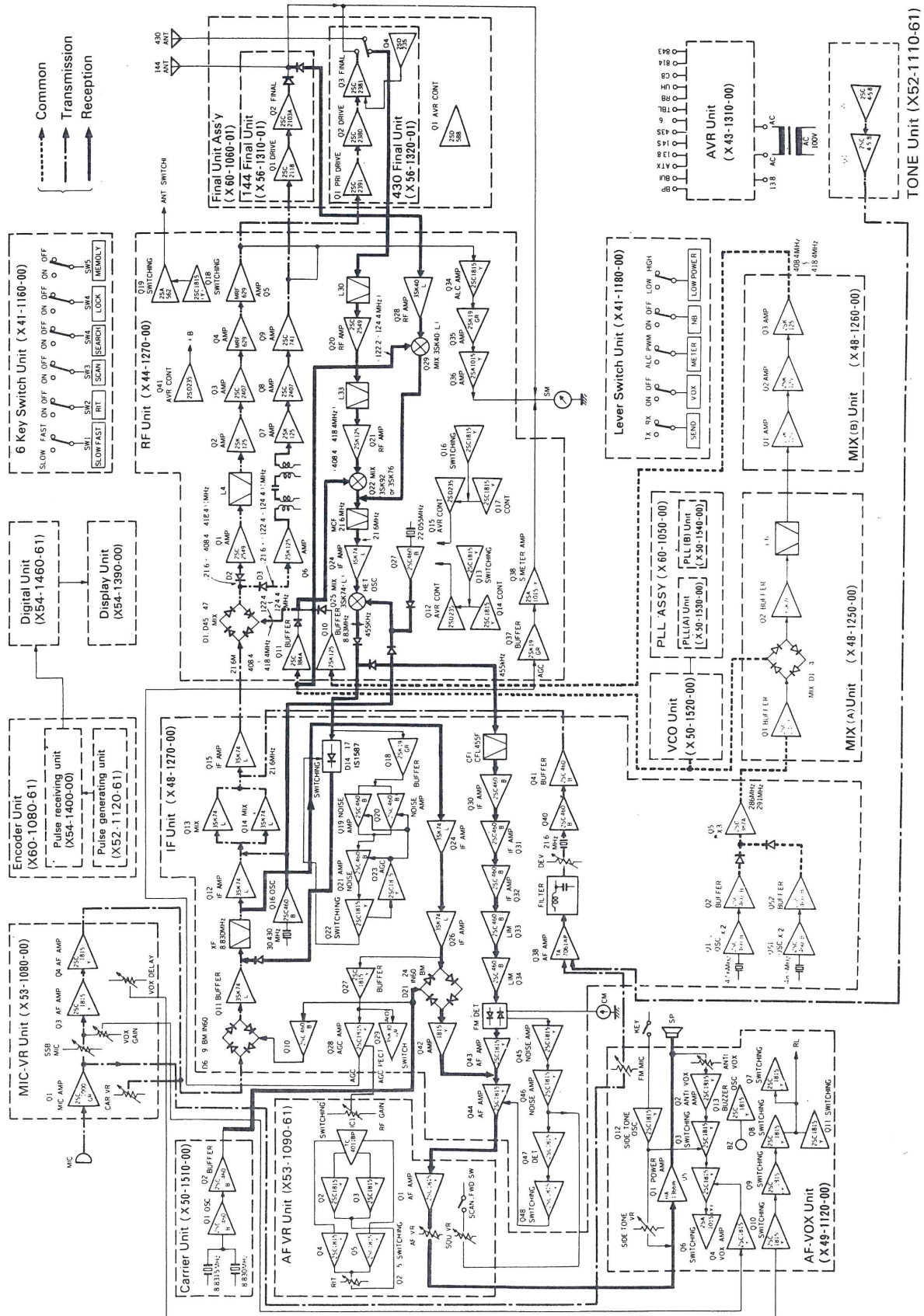
C1	C91-0437-05	Ceramic 5pF ±0.25pF	☆
C2~7	C91-0438-05	Ceramic 7pF ±0.5pF	☆
C8,9	C91-0437-05	Ceramic 5pF ±0.25pF	☆
C10	CE04W1C100	Electrolytic 10μF 16WV	
C11	C91-0435-05	Ceramic 0.01μF +80%—20%	
C12	CE04W1E100	Electrolytic 10μF 25WV	
C13	C91-0435-05	Ceramic 0.01μF +80%—20%	
C14	CE04W1C100	Electrolytic 10μF 16WV	
C15	C91-0435-05	Ceramic 0.01μF +80%—20%	
C16	CE04W1E100	Electrolytic 10μF 25WV	
C17	C91-0435-05	Ceramic 0.01μF +80%—20%	
C18	CE04W1C100	Electrolytic 10μF 16WV	
C19	C91-0435-05	Ceramic 0.01μF +80%—20%	
C20	CE04W1E100	Electrolytic 10μF 25WV	
C21~24	C91-0435-05	Ceramic 0.01μF +80%—20%	
C25	C91-0434-05	Ceramic 0.001μF +100%—0%	
C26~29	C91-0438-05	Ceramic 7pF ±0.5pF	☆
C30	C91-0447-05	Ceramic 1pF ±0.25pF	☆
C31	C91-0435-05	Ceramic 0.01μF +80%—20%	☆
C32	C91-0436-05	Ceramic 3pF ±0.25pF	☆

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
C33	C91-0437-05	Ceramic 5pF $\pm 0.25\text{pF}$	☆
C34~38	C91-0435-05	Ceramic $0.01\mu\text{F} + 80\% - 20\%$	☆
TC1	C05-0010-15	Trimmer 10pF	
TC2	C05-0305-05	Trimmer 12pF	
TC3	C05-0305-05	Trimmer 12pF	
TC4	C05-0305-05	Trimmer 12pF	
TC5	C02-0012-05	Variable capacitor 6pF	
—	C91-0405-05	Ceramic $\times 8$	
—	E23-0047-04	Terminal (square)	
L1	L34-0736-05	Coil $5\phi 0.5\text{T}$	☆
L2	L33-0618-05	Choke coil	
L3	L34-0736-15	Coil $5\phi 0.5\text{T}$	☆
L4	L33-0618-05	Choke coil	
L5	L34-0736-15	Coil $5\phi 0.5\text{T}$	☆
L6	L33-0630-05	Choke coil	☆
L7	L34-0736-15	Coil $5\phi 0.5\text{T}$	☆
L8,9	L33-0074-05	Choke coil	
L10	L34-0732-05	Coil $5\phi 1\text{T}$	
L11,12	L34-0733-05	Coil $5\phi 2\text{T}$	
L13	L34-0848-15	Coil 0.5	☆
L14	L33-0074-05	Choke coil	
L15	L33-0025-05	Choke coil	
L16,17	L33-0633-05	Choke coil	
L18,19	L33-0074-05	Choke coil	
R3	RC05GF2H121J	Solid 120Ω 1/2W	
R5	RC05GF2H121J	Solid 120Ω 1/2W	
R6	R92-0602-05	Cement 0.33Ω	
R7	RC05GF2H181J	Solid 180Ω 1/2W	
R8	R92-0601-05	Cement 0.22Ω	
R10	RC05GF2H122J	Solid $1.2\text{k}\Omega$ 1/2W	
R11	R92-0601-05	Cement 0.22Ω	
—	R92-0150-05	Short jumper	☆
VR1	R12-0048-05	Potential meter 100 Ω	
VR2	R12-4015-05	Potential meter 50k Ω	
VR3	R12-1024-05	Potential meter 1k Ω	
VR4	R12-0053-05	Potential meter 500 Ω	
RL1	S51-1502-05	Relay	
D1~3	V11-0076-05	Diode 1S1555	
D4	V11-0051-05	Diode 1N60	
D5	V11-0076-05	Diode 1S1555	
Q1	V03-2391-06	Transistor 2SC2391	
Q2	V03-2380-06	Transistor 2SC2380	
Q3	V03-2381-06	Transistor 2SC2381	
Q4	V04-0046-05	Transistor 2SD235(Y)	

Ref. No.	Parts No.	Description	Re- marks
ENCODER ASSY (X60-1080-61)			
—	D09-0301-04	Slit plate (A)	☆
—	D09-0302-14	Slit plate (B)	☆
—	D40-0609-05	Detector mech. Ass'y	☆
PULSE GENERATING UNIT (X52-1120-61)			
C2	CE04W1A471Q	Electrolytic $470\mu\text{F}$ 10WV	
C4	CE04W1A470	Electrolytic $47\mu\text{F}$ 10WV	
J1	E40-0414-05	Mini connect wafer, 4P	
J2	E40-0875-05	Mini connect wafer, 8P	
—	J19-1314-04	Diode holder	
—	R92-0150-05	Short jumper	
—	Not used R1, 10		
VR1	Not used		
VR2,3	R12-1024-05	Potential meter, 1k Ω (B)	
D1	Not used		
D2,3	V11-5172-86	Diode SEL 101R (B or C)	☆
IC1	V30-1024-56	IC LM358P	☆
IC2	V30-1069-06	IC MC14099UBCP	☆
PULSE RECEIVING UNIT (X54-1400-00)			
C1~3	CC45SL1H101J	Ceramic 100pF $\pm 5\%$	
—	J61-0019-05	Vinyle tie	
Q1	V08-1009-16	Photo transistor PH-101(R)	☆
Q2,3	V08-1010-16	Photo transistor PH-102(L)	☆

BLOCK DIAGRAM

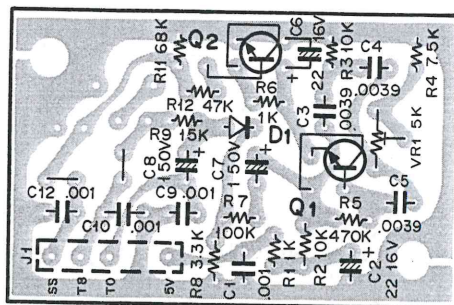


PC BOARD VIEWS

TONE UNIT (X52-1110-62)	35	MIC VR Unit (X53-1080-00)	42
VCO Unit (X50-1520-00).....	35	CAR Unit (X50-1510-00).....	43
RF Unit (X44-1270-00)	36	Pulse Generating Unit (X52-1120-61).....	43
IF Unit (X48-1270-00)	37	Pulse Receiving Unit (X54-1400-00)	43
PLL(A) Unit (X50-1530-00)	38	MIX(A) Unit (X48-1250-00).....	44
PLL(B) Unit (X50-1540-00)	39	MIX(B) Unit (X48-1260-00).....	44
6 Key Unit (X41-1160-00)	40	Printed Circuit (A) (J25-2699-14)	44
Lever Switch Unit (X41-1180-00).....	40	Digital Unit (X54-1460-61).....	45
Display Unit (X54-1390-00).....	40	144 Final Unit (X56-1310-01)	46
AVR Unit (X43-1310-00).....	41	430 Final Unit (X56-1320-01).....	46
AF VR Unit (X53-1090-61)	41	IF Unit (X48-1220-00)	47
AF VOX Unit (X49-1120-61)	42	MIX Unit (X48-1230-00)	48

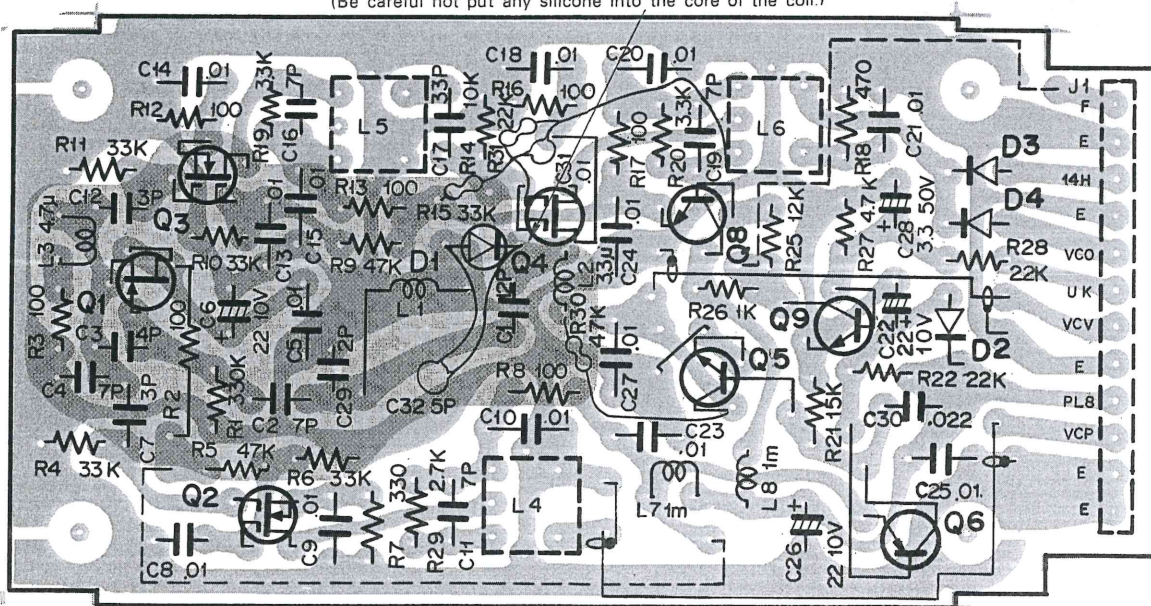
► **TONE unit**
(X52-1110-62)

Q1,2: 2SC458(B)
D1: 1S1555



▼ VCO unit (X50-15200-00)

Fix this portion in place with silicone. (Be careful not put any silicone into the core of the coil.)



Q1:2SK19(GR) Q2、3:3SK40M Q4:3SK40(L) Q5、9:2SC1815(Y) Q6:2SA1015(Y) Q8:2SC735(Y) D1:1S2208 D2:1N60 D3、4:1S2588

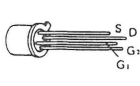
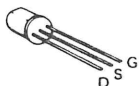
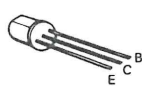
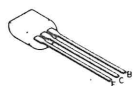
2SA1015(Y)
2SC1815(Y)

2SC735(Y)

2SK19(GR)

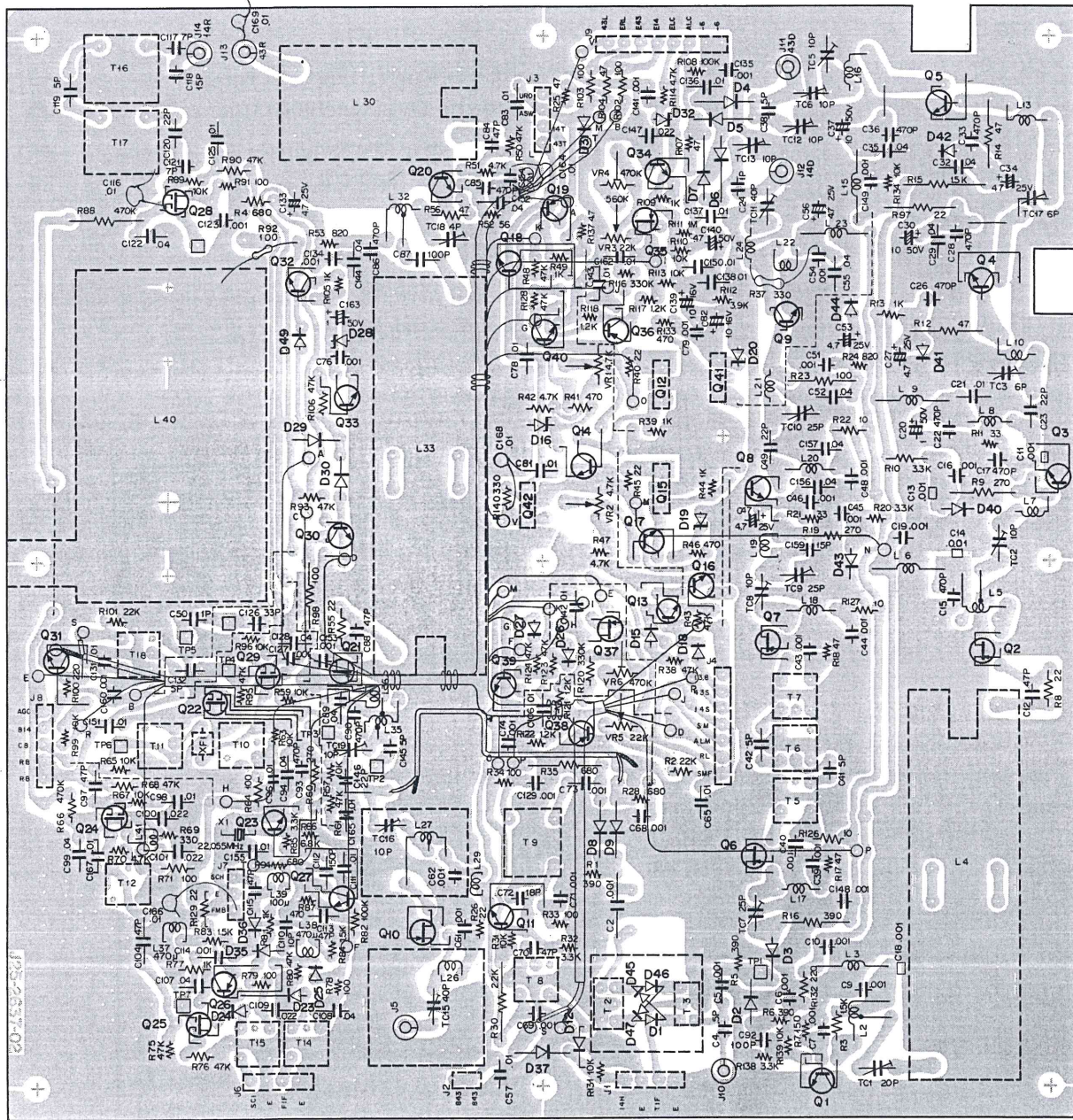
3SK40(L)
3SK40(M)

< Attachment direction of L1 >



PC BOARD VIEWS

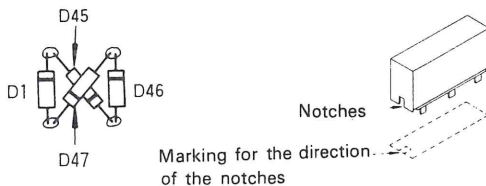
▼ RF unit (X44-1270-00)



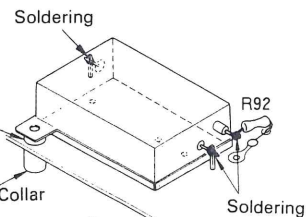
U1:20:2SC2549 Q2:6,7,10,21:2SK125 Q3:8:2SC2407 Q4:5:MRF629 Q9:2SC741 Q11:2SC387A Q12:15,41:2SD235(Y)
 Q13,14,16~18 Q23,30,31,33,34,39,40:2SC1815(Y) Q19:2SA562(Y) Q22:3SK92or3SK76 Q24,25,36,38:2SA1015(Y)
 Q27:2SC460(B) Q28,29,35:3SK40(L) Q32:2SC735(Y) Q35,37,2SK19(GR) Q42:2SC496(Y) D1,45~47:1SS97 D2,3,8,9:1S2588
 D4~7,25:1N60 D12,23,24,35~37:1S1587 D15,18,26,27,29~31,41,42,44,49:1S1555 D16,19,32:XZ-060 D20:XZ-132
 D28:XZ117 D40,43:MV-13

< Attachment direction of diodes > < Attachment method of L4, 30, 33 >

< Attachment method of L40 >

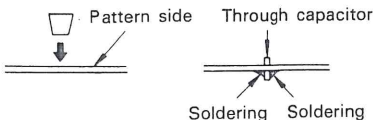


< Attachment direction of T2,3 >



< Attachment method of a through capacitor >

Green or red — Red or green



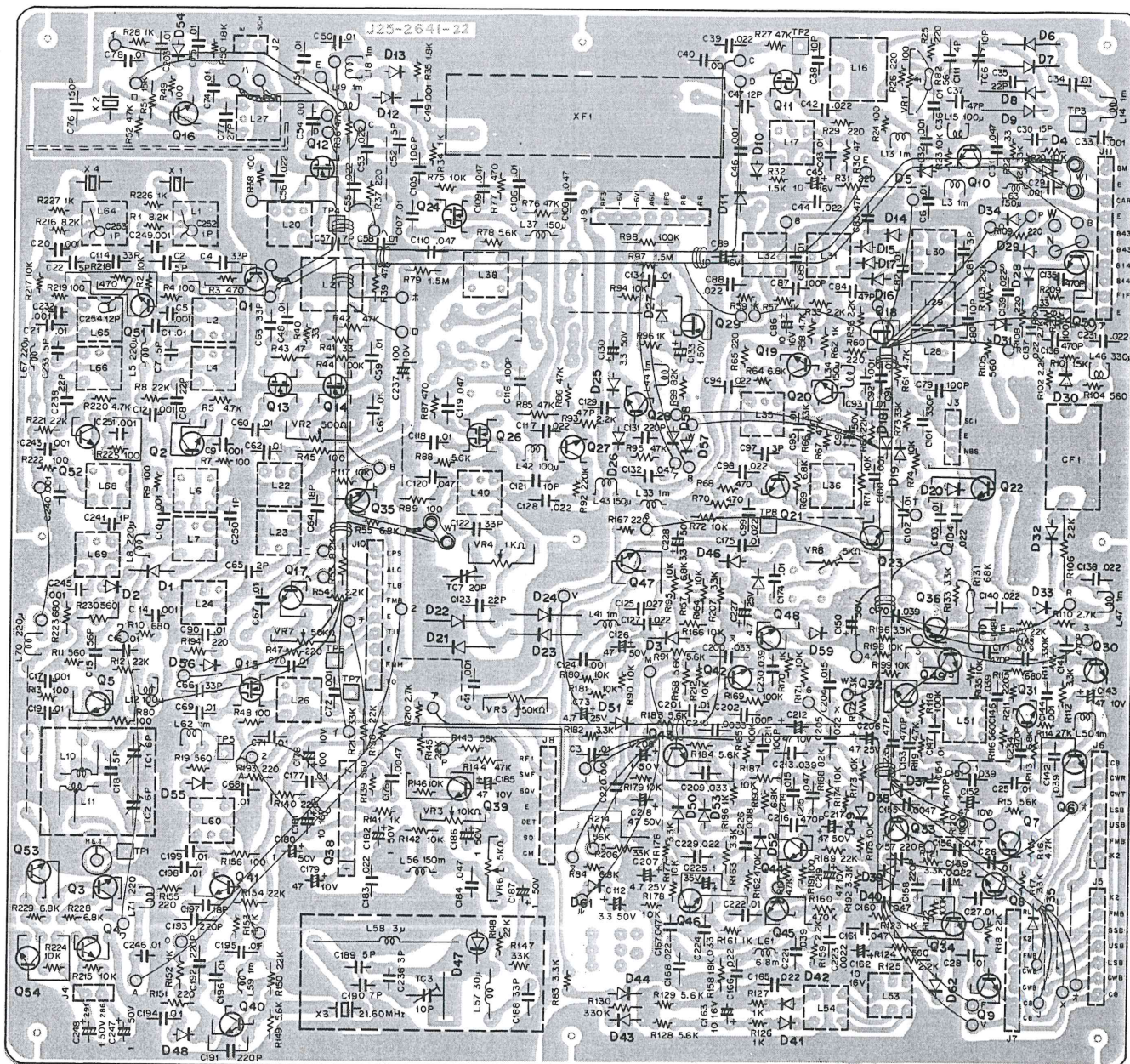
Twisted wires of red and green

Install parallel to the side surface of the shield case.

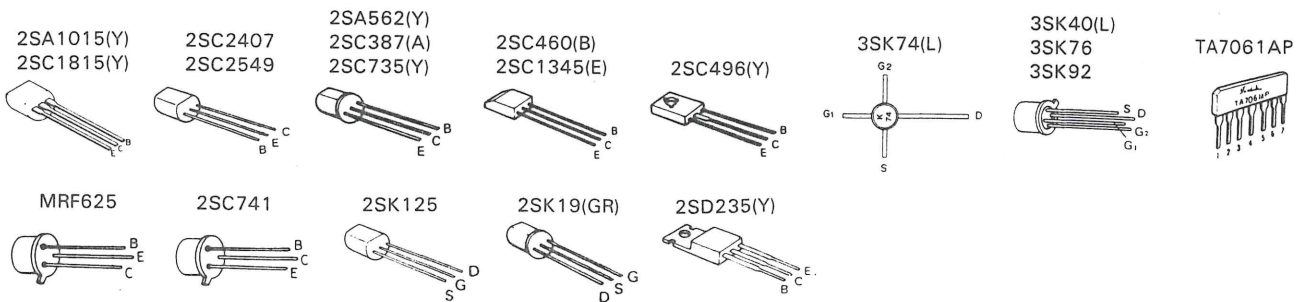
PC BOARD VIEWS

▼ IF unit (X48-1270-00)

From S/N 004 ~



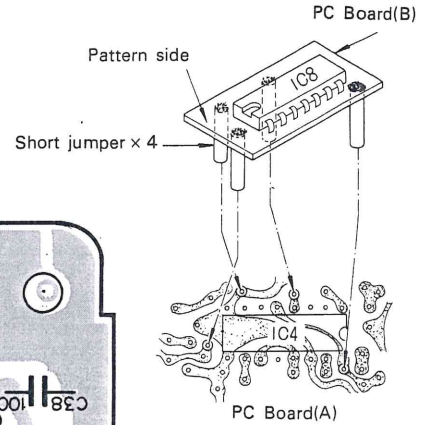
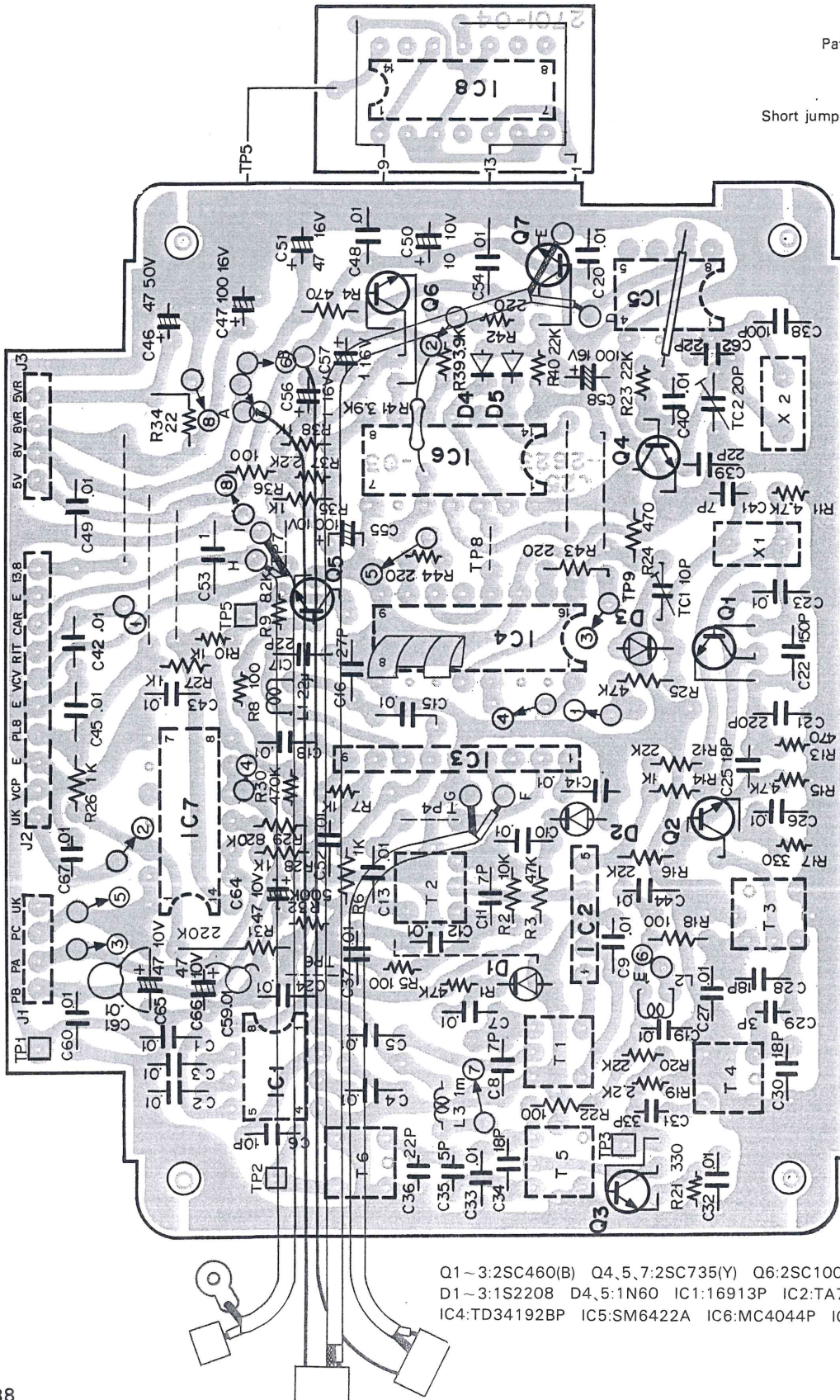
Q1,2,10,16,19~21,30~34,40,41,50~52:2SC460(B) Q3,17,53:2SA1015(Y) Q4,6~9,22,23,27,28,35,39,42~49,54:2SC1815(Y)
Q5:2SC387A Q11~15,24,26:3SK74(L) Q18:2SK19(GR) Q29:2SK30A(O) Q36:2SC1345(E) Q38:TA7061AP D1,2:1S2588
D3:1S1212 D4,27~29,34,35,37~40,48~51,54~59,61,62:1S1555 D5,10~17,10~17,30~33:1S1587
D6~9,18,19,21~26,41~46,52,53:1N60 D20:MV-13 D47:1S2208



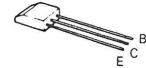
PC BOARD VIEWS

▼ PLL(A) unit (X50-1530-00)

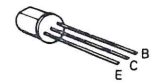
< Attachment method of the PC Board(B) >



2SC460(B)



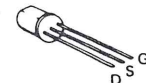
2SC735(Y)
2SC1000(GR)



2SK30A(GR)



2SK19(GR)



TA7060P



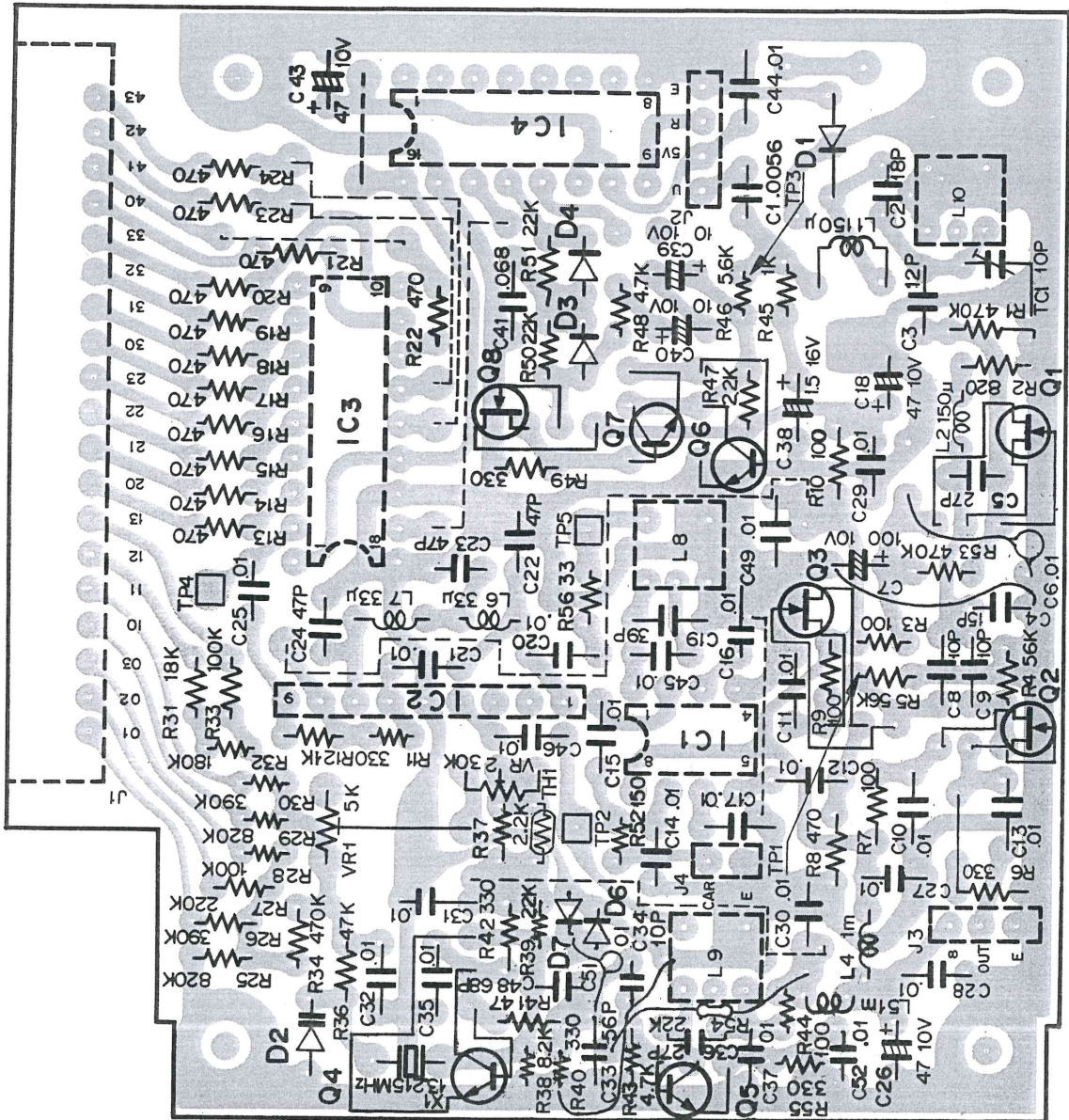
SN16913P
SM6422A



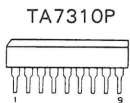
Q1~3:2SC460(B) Q4,5,7:2SC735(Y) Q6:2SC1000(GR)
D1~3:1S2208 D4,5:1N60 IC1:16913P IC2:TA7060P IC3:TA7310P
IC4:TD34192BP IC5:SM6422A IC6:MC4044P IC7:TD3409AP IC8:TD3490BP

PC BOARD VIEWS

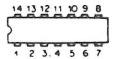
▼ PLL(B)unit (X50-1540-00)



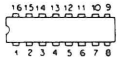
Q1~3:2SK19(GR) Q4,5:2SC460(B) Q6,7:2SC1000(GR) Q8:2SK30A(GR)
D1:1S1658-2 D2:1S2208 D3,4,6,7:1N60
IC1:SN16913P IC2:TA7310P IC3:TC9122P IC4:MC14568B



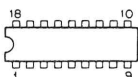
MC4044P
TD3490AP
TD3490BP



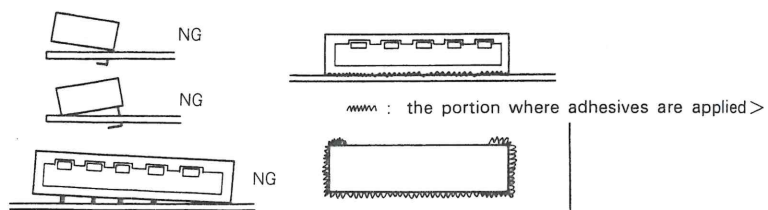
TD34192BP
MC14568B



TC9122P



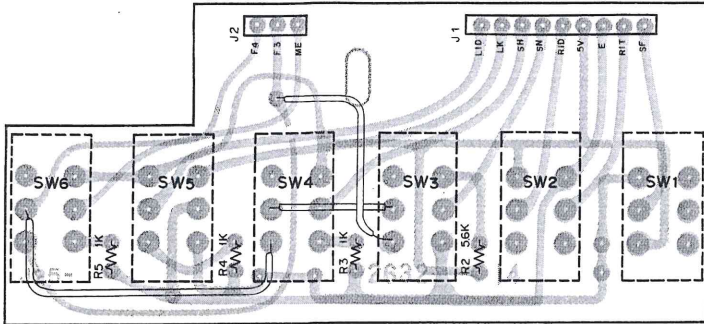
< Attachment method of the J1 >



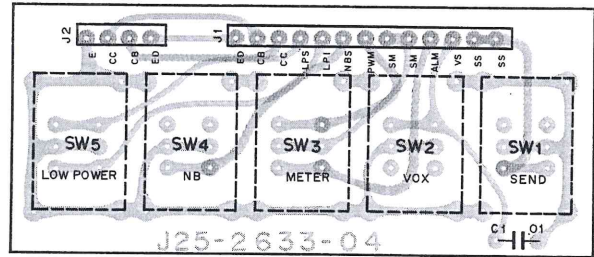
After soldering the J1, apply adhesives around the connector portion and fix it.

PC BOARD VIEWS

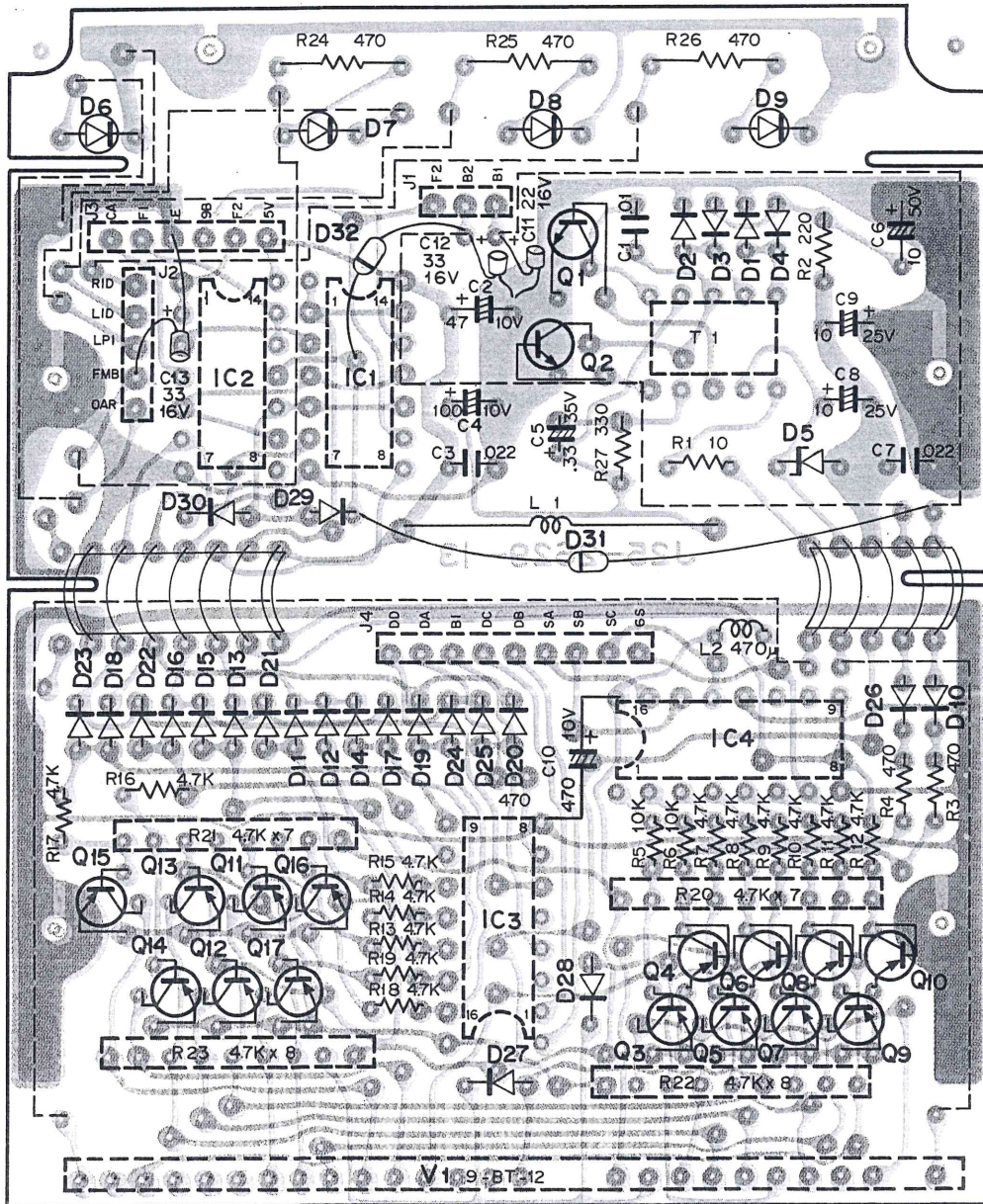
▼ 6 key unit (X41-1160-00)



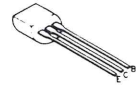
▼ Lever switch unit (X41-1180-00)



▼ Display unit (X54-1390-00) (View from the parts installed)



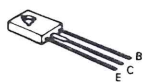
2SA1015(Y)
2SC1815(Y)
2SC1959(Y)



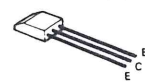
2SC735(Y)



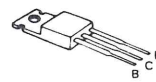
2SC496(Y)



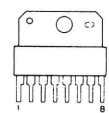
2SC460(B)



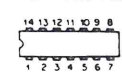
2SA671TD(B)



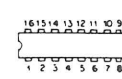
MB3756



TC4011BP
HD74LS00P
HD74LS10P



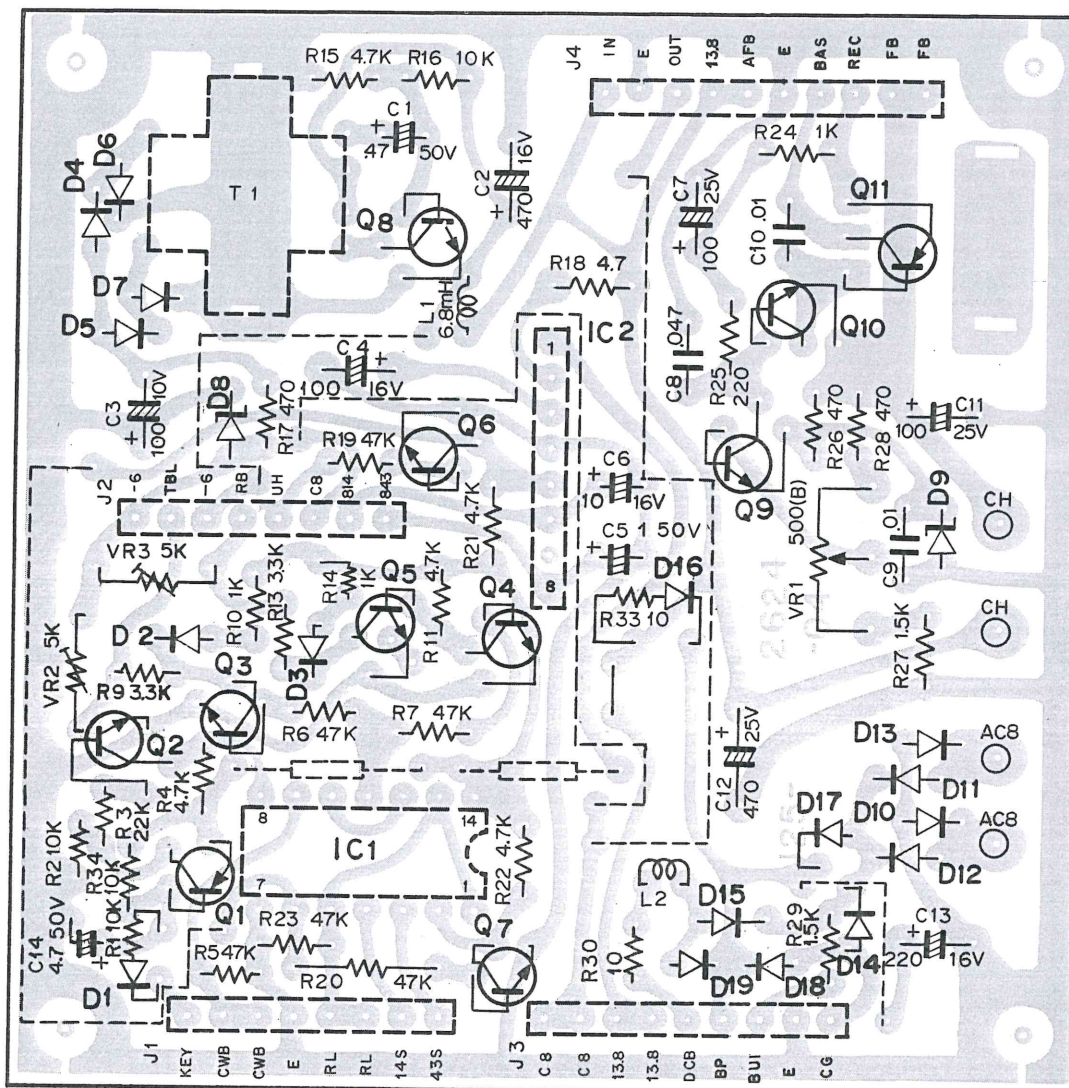
HD74LS42P
SN74LS247N



Q1,2:2SC1959(Y) Q3~17:2SC1815(Y) D1~4,10~32:1S1555 D5:WZ-071 D6~9:SEL103W
IC1:HD74LS10P IC2:HD74LS00P IC3:SN74LS247N IC4:HD74LS42P

PC BOARD VIEWS

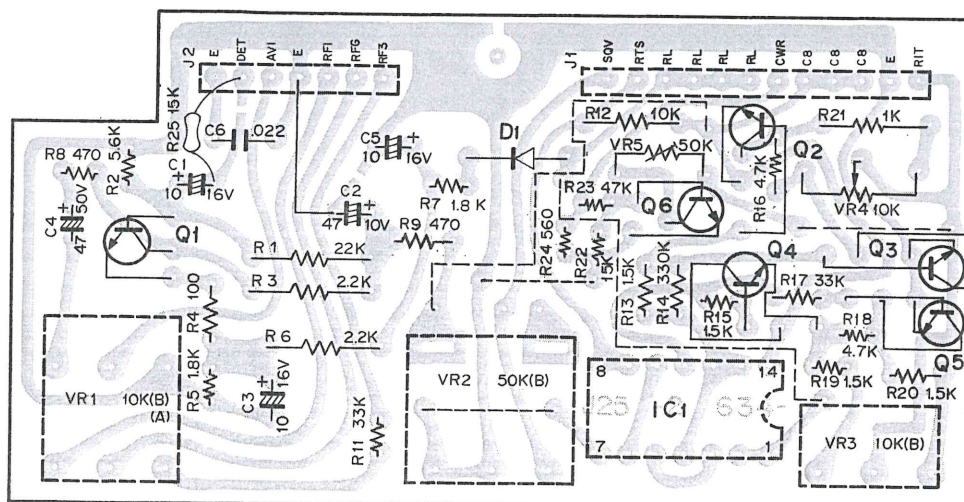
▼ AVR unit (X43-1310-00)



Q1:2SA1015(Y) Q2~7:9:2SC1815(Y) Q8:2SC735(Y) Q10:2SC496(Y) Q11:2SA671TD(B) D1,4~7:1S1555
D2:1N4133 D3:1N60 D8:XZ-060 D9:WZ-090 D10~19:1N4448 IC1:TC4011BP IC2:MB3756M

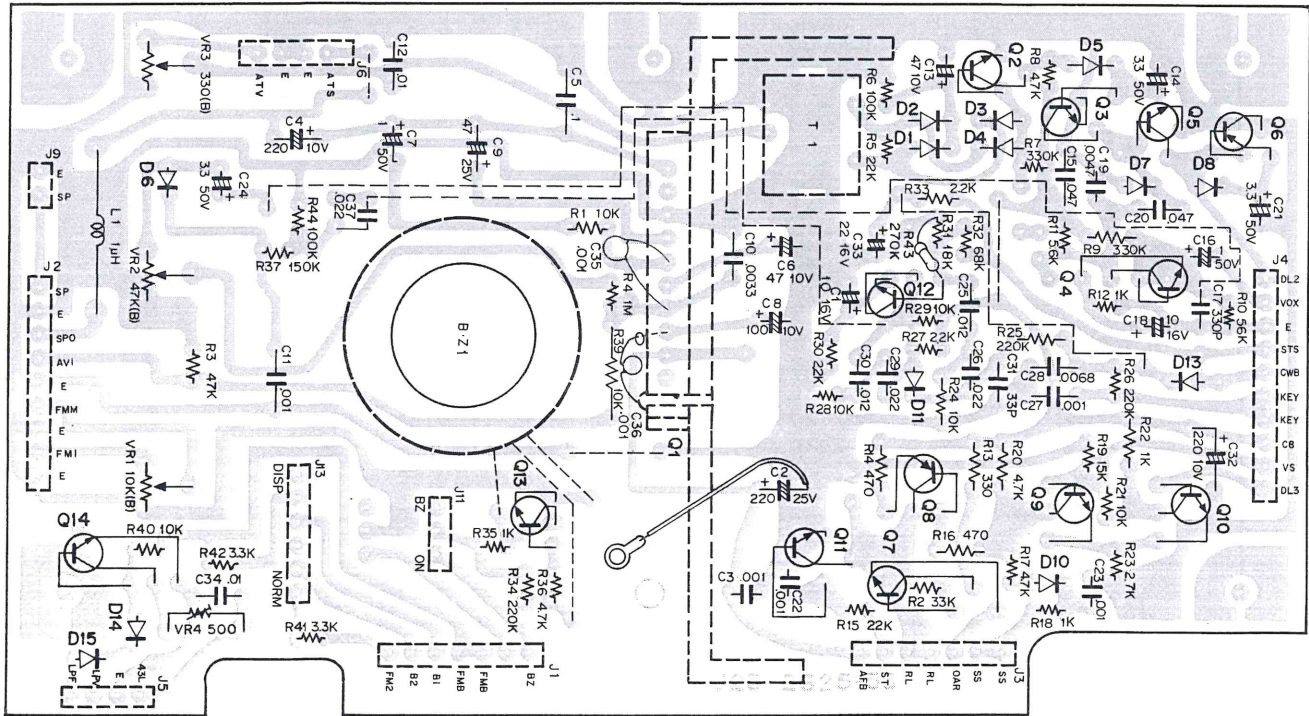
▼ AF·VR unit (X53-1090-61)

Q1~6:2SC1815(Y) D1:1S1555 IC1:TC4011BP



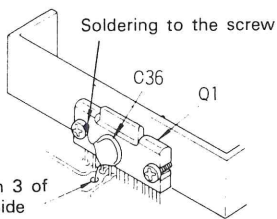
PC BOARD VIEWS

▼ AF·VOX unit (X49-1120-61)



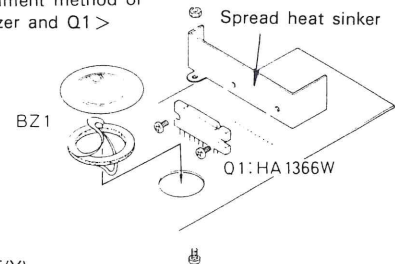
Q1:HA1366W Q2~5,7,9~14:2SC1815(Y) Q6,8:2SA1015(Y) D1~4,7,13:1N60 D5,8,10,11,14,15:1S1555 D6:1S2588

< Attachment method of the C36 >



Soldering to the pin 3 of Q1 at the pattern side

< Attachment method of the buzzer and Q1 >

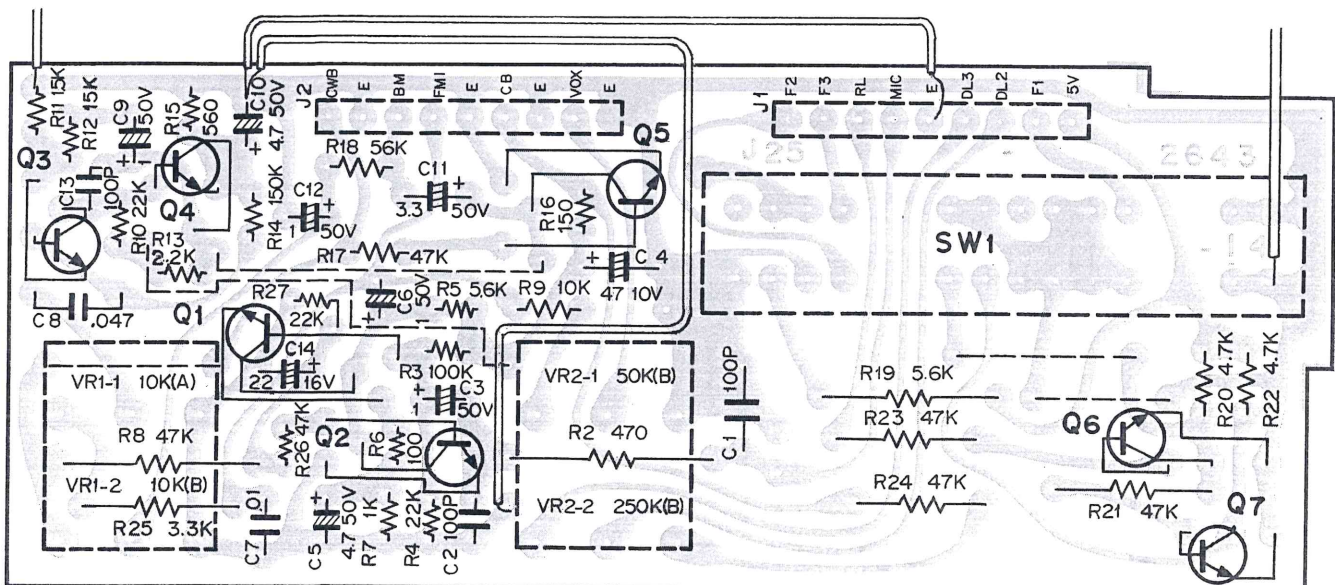


Spread heat sink

Q1:HA1366W

▼ MIC·VR unit (X53-1080-00)

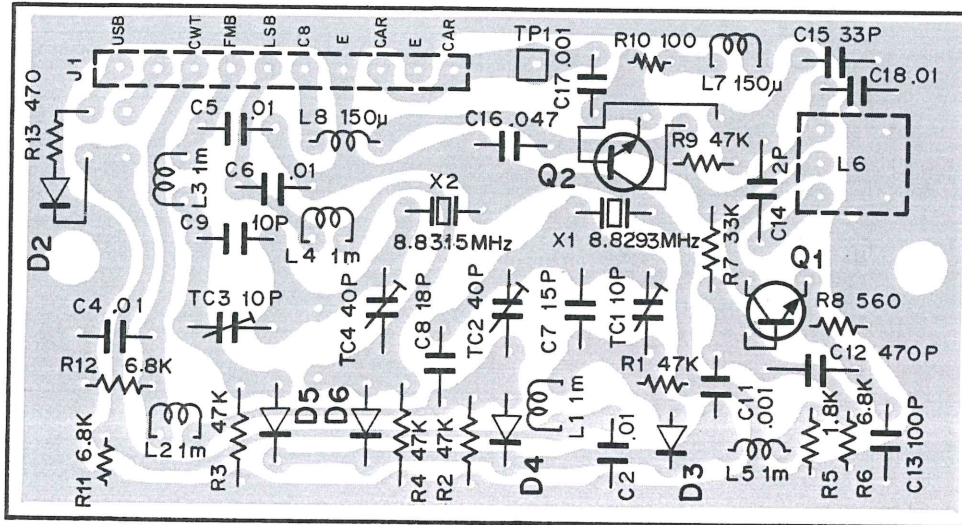
Q1:2SC1000(GR) Q2~7:2SC1815(Y)



PC BOARD VIEWS

▼ CAR unit (X50-1510-00)

Q1,2: 2SC460(B) D2~6: 1S1555



< Polarity of Q1~3 >

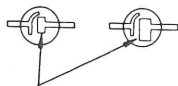


< Attachment method of Q1~3 >



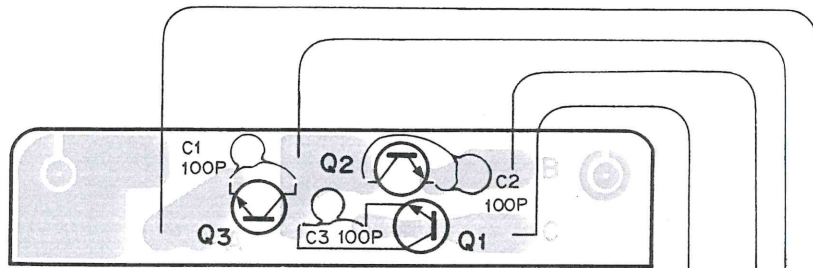
Make it come into close contact with the PC board.

< Differences between Q1 and Q2, 3 >

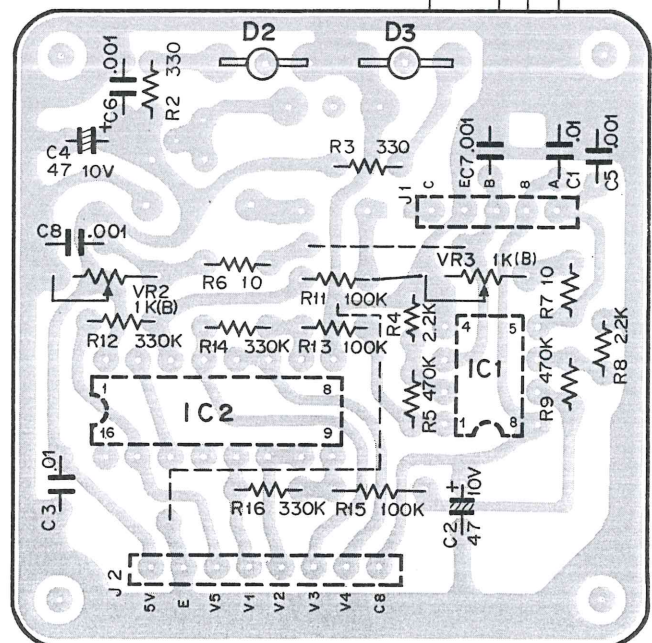


This portion of Q1 is bigger than Q2,3.

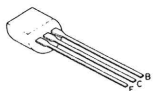
▲ Pulse receiving unit (X54-1400-00)



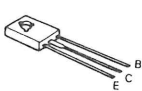
▼ Pulse generating unit (X52-1120-61)



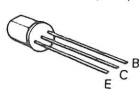
2SA1015(Y)
2SC1815(Y)



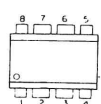
2SC496



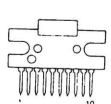
2SC1000(GR)



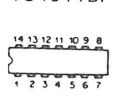
LM358P



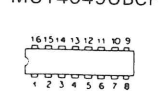
HA1366W



TC4011BP



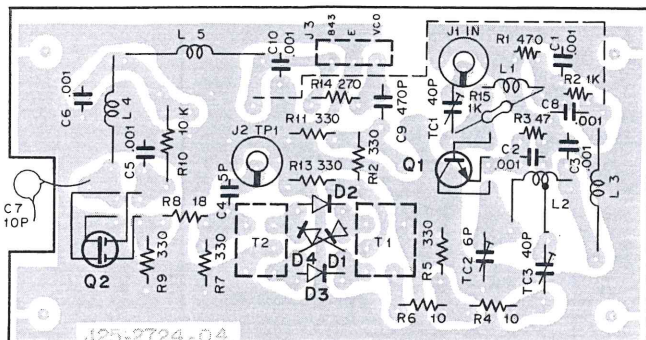
MC14049UBCP



D1~3:SEL101R(BorC) IC1:LM358P IC2:MC14049UBCP

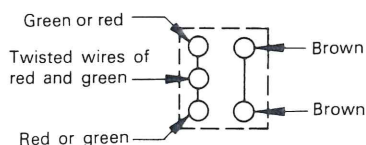
PC BOARD VIEWS

▼ MIX(A) unit (X48-1250-00)

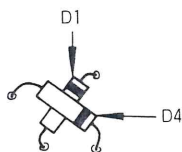


Q1:2SC2407 Q2:3SK76or3SK92 D1~4:1SS97

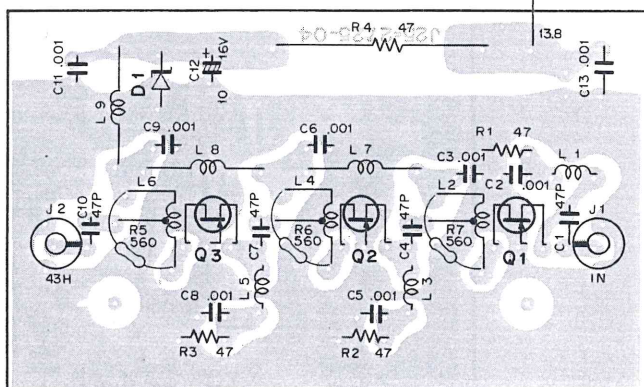
< Attachment direction of T1,2 >



< Attachment direction of D1,4 >



▼ MIX(B) unit (X48-1260-00)

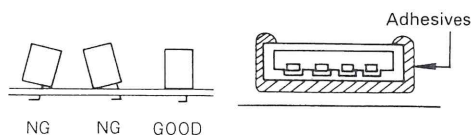


Q1~3:2SK125 D1:BZ-090

< Attachment direction of the composite resistors. >



< Attachment method of the J2,3,8 >



In case of J2, 3, 8, after inserting them into the printed circuit plate, bend the pins at the back side and make them come into close contact with the printed circuit plate.

Furthermore, after dipping, apply sufficient amount of adhesives (Rubber type adhesives such as "Sony Bond" or "Cemedine Hi-Contact") around the connector portion, and fix it in place.

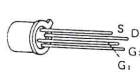
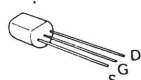
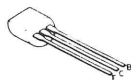
HD74LS00P HD74LS11P
HD74LS03P HD74LS20P
HD74LS04P HD74LS30P
HD74LS08P HD74LS32P
HD74LS10P HD74LS132P
HD7404P

HD74LS75P HD74221P
HD74LS151P MN1201A
HD74LS157P MSM5507RS

2SA1015(Y)
2SC1815(Y)

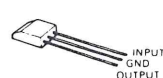
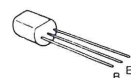
2SK125

3SK76
3SK92

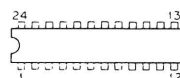


2SC2407

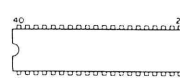
μPC78L05A



HD74154P



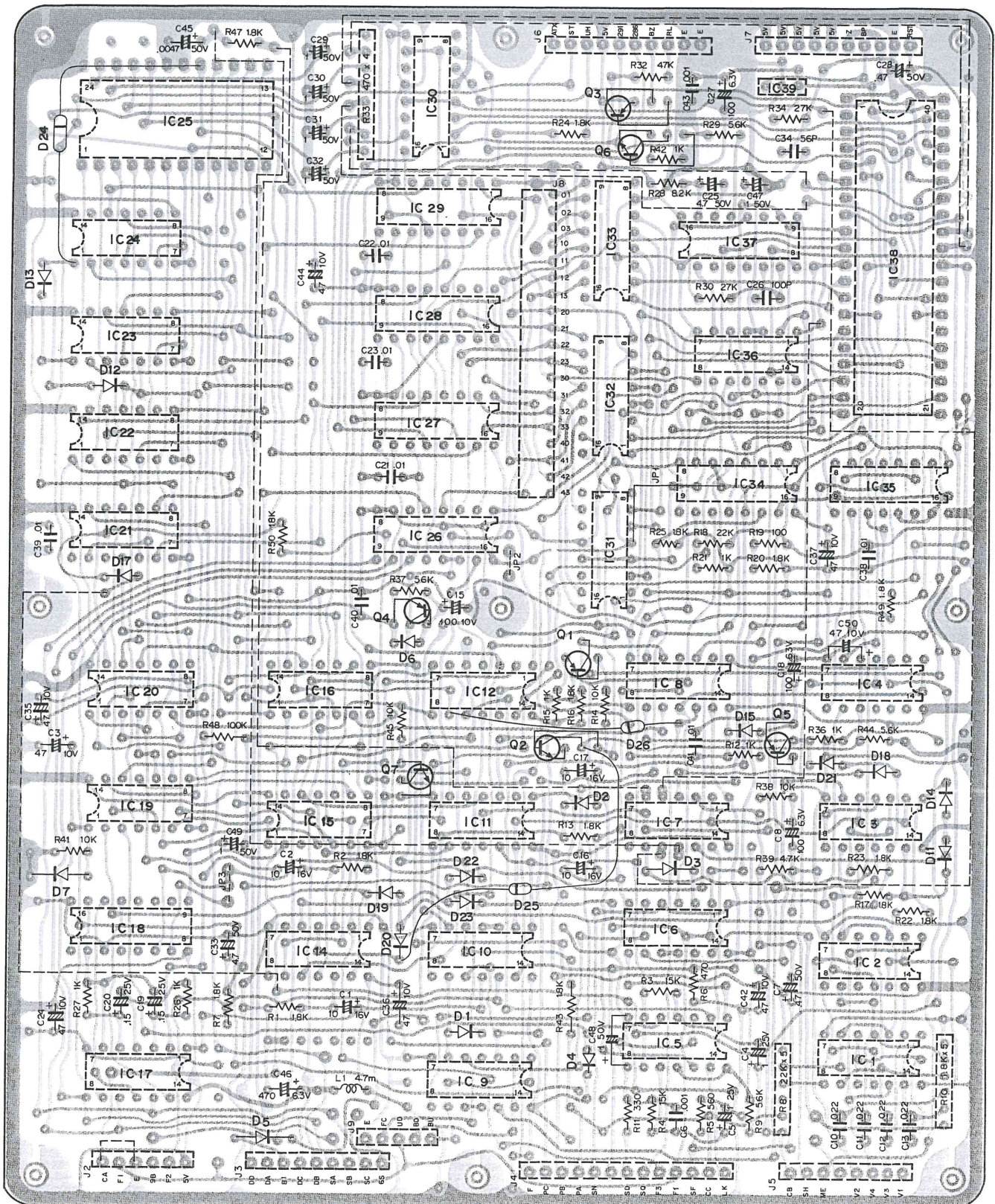
MN9004



Q1,3~5:2SA1015(Y) Q2,6,7:2SC1815(Y) D1~3,5,7,8,11~15,17~24:1S1555 D4,6,25,26:1N60 IC1,2:HD74LS03P
IC3,6,9,11,36:HD74LS00P IC4,19:HD74LS08P IC5:HD74LS10P IC7,12:HD74LS04P IC8:HD74LS132P IC10:HD74LS32P
IC14:HD74LS02P IC15,16,21:HD74LS20P IC17:HD7404P IC18:MSM5507RS IC20:HD74LS11P IC22~24:HD74LS30P
IC25:HD74154P IC26~29:HD74LS151P IC30,31:HD74LS75P IC32,33:MN1201A IC34,35:HD74LS157P IC37:HD74221P
IC38:MN9004 IC39:μPC78L05A

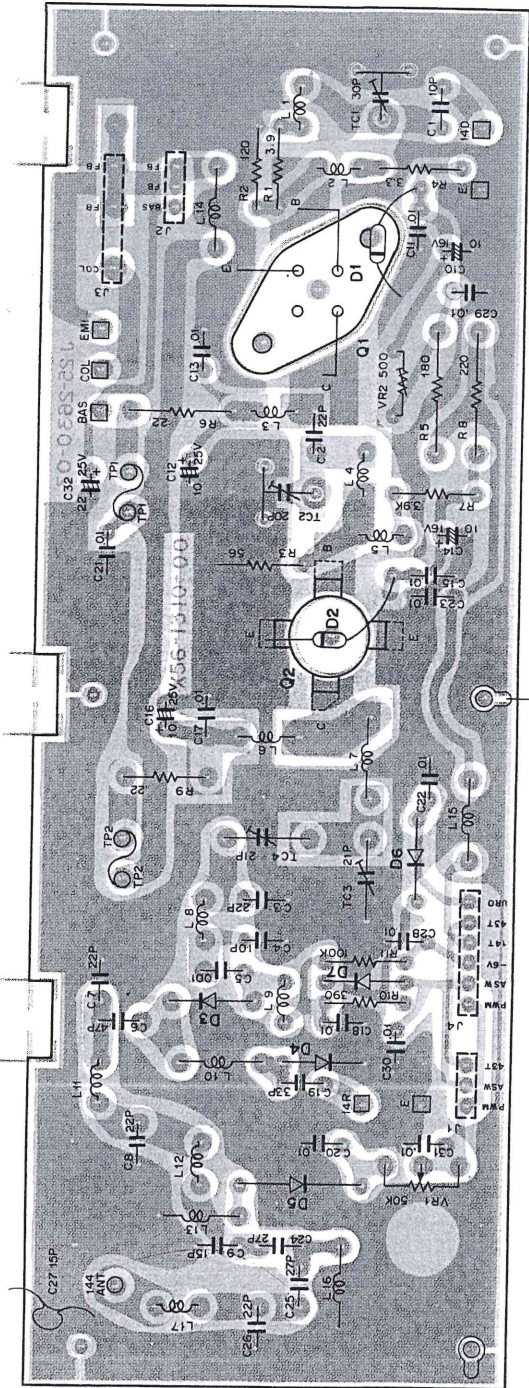
PC BOARD VIEWS

▼ Digital Unit (X54-1460-61) (View from the parts installed)

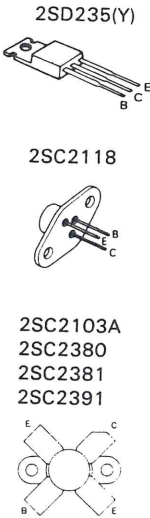


PC BOARD VIEWS

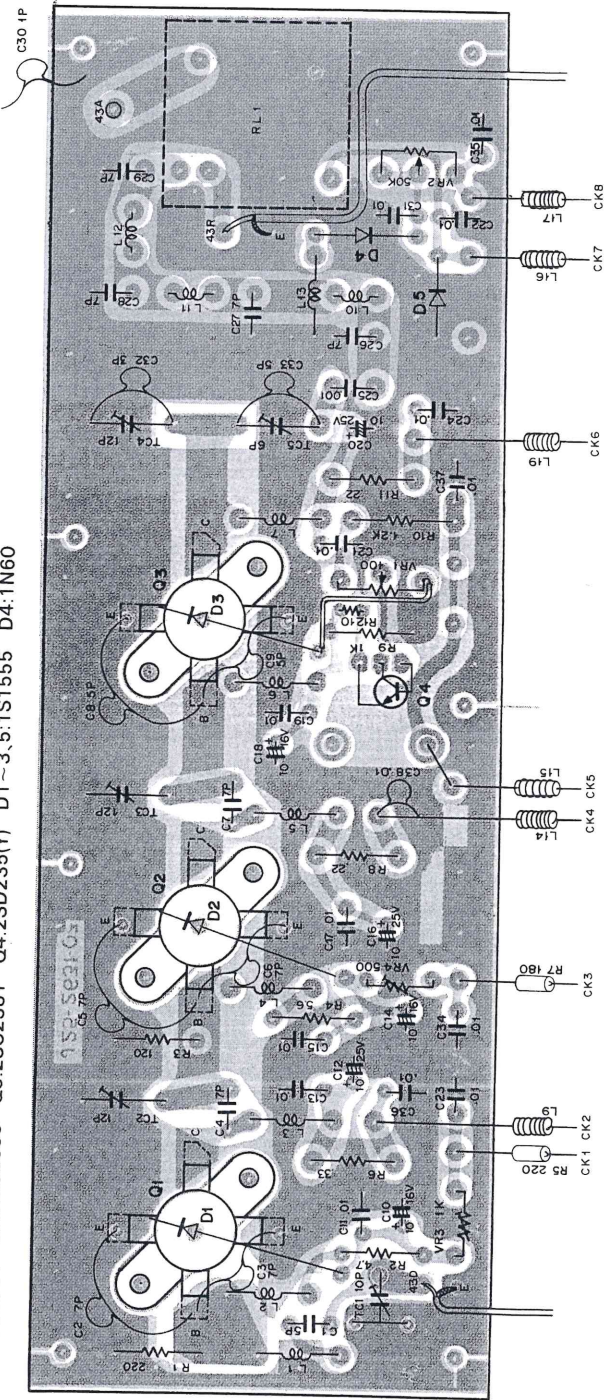
▼ 144 Final Unit (X56-1310-01)



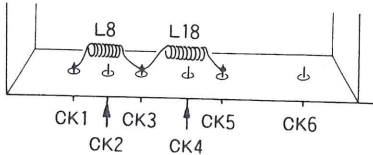
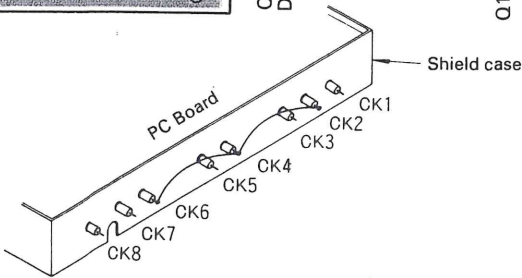
Q1:2SC2118 Q2:2SC2103A D1,2,6,7:1S1555 D3:M1402
D4:1S2588 D5:1N60



▼ 430 Final Unit (X56-1320-01)

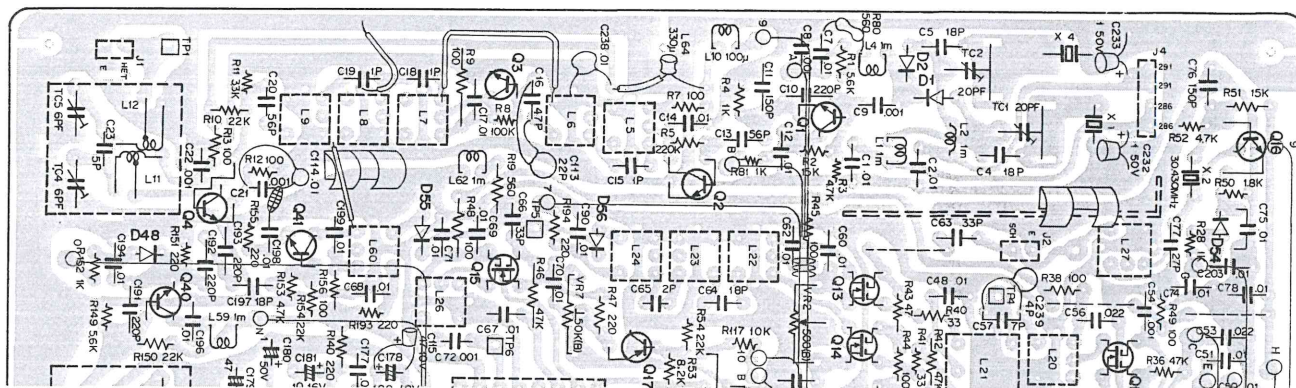
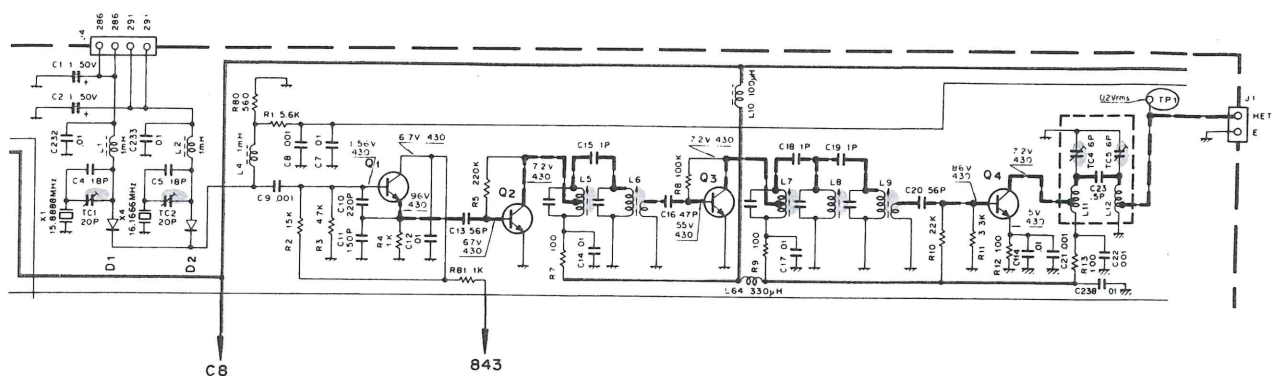


Q1:2SC2391 Q2:2SC2380 Q3:2SC2381 Q4:2SD235(Y) D1~3,5:1S1555 D4:1N60



PC BOARD VIEWS

▼ IF Unit (X48-1220-00) ONLY S/N 94○○○○

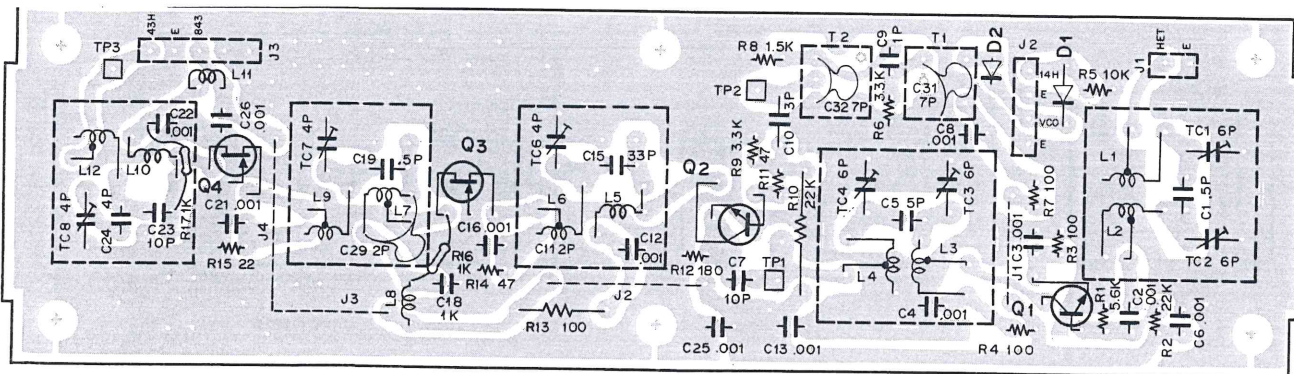


Ref. No.	Parts No.	Description	Re- marks
C1.2	CK45F1H103Z	Ceramic 0.01 μ F + 80% - 20%	
C4.5	CC45CH1H180J	Ceramic 18pF $\pm$ 5%	
C7	CK45F1H103Z	Ceramic 0.01 μ F + 80% - 20%	
C10	CM93BD2A221J	Mica 220pF $\pm$ 5%	
C11	CC45SL1H151J	Ceramic 150pF $\pm$ 5%	
C12	CK45F1H103Z	Ceramic 0.01 μ F + 80% - 20%	
C13	CC45CH1H560J	Ceramic 56pF $\pm$ 5%	
C14	CK45F1H103Z	Ceramic 0.01 μ F + 80% - 20%	
C15	CC45CH1H010C	Ceramic 1pF $\pm$ 0.25pF	
C16	CC45CH1H470J	Ceramic 47pF $\pm$ 5%	
C17	CK45F1H103Z	Ceramic 0.01 μ F + 80% - 20%	
C18,19	CC45CH1H010C	Ceramic 1pF $\pm$ 0.25pF	
C20	CC45CH1H560J	Ceramic 56pF $\pm$ 5%	
C21,22	CK45D1H102M	Ceramic 0.001 μ F $\pm$ 20%	
C232,233	CE04W1H010	Electrolytic 1 μ F 50WV	
C114	CK45F1H103Z	Ceramic 0.01 μ F + 80% - 20%	
C238	CK45F1H103Z	Ceramic 0.01 μ F + 80% - 20%	
	Not used C148,149, 164,169,172,173		
D1.2 D36.60	V11-0414-05	Diode 1S2588 Not used	

Ref. No.	Parts No.	Description	Re- marks
L1.2	L40-1021-25	Ferri-inductor 1 mH	
L4	L40-1021-03	Ferri-inductor 1 mH	
L5.6	L34-0752-05	Tuning coil	
L7~9	L34-0753-05	Tuning coil	
L10	L40-1011-03	Ferri-inductor 100 μ H	
L11,12	L34-0756-05	Tuning coil	
	Not used L25,39, 45,49,52,55		
Q1~3	V03-0079-05	Transistor 2SC460B	
Q4	V03-0287-05	Transistor 2SC387A	
	Not used Q25,37		
	Not used R6,14, 165,200,210		
TC1.2	C05-0306-05	Ceramic Trimmer 20pF	
TC4.5	C05-0062-05	Ceramic Trimmer 6pF	
J1	E40-0273-05	Mini connect wafer, 2P	
J4	E40-0473-05	Mini connect wafer, 4P	
X1	L77-0843-05	Crystal 15.888 MHz	
X4	L77-0842-05	Crystal 16.1666 MHz	

PC BOARD VIEWS

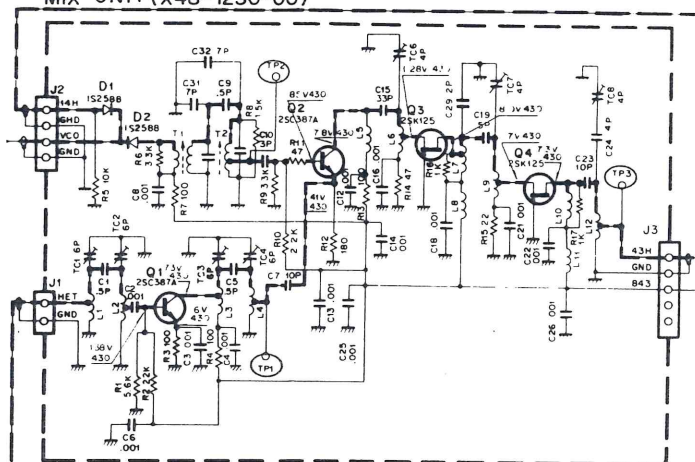
▼ MIX Unit (X48-1230-00) ONLY S/N 94 ○ ○ ○ ○



Q 1,2 : 2SC387A , Q 3,4 : 2SK125 , D 1,2 : 1S2588

Note: Insert Q2,3,4 as far as they will go, and make the pins short.

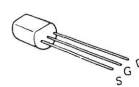
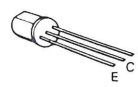
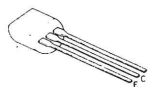
MIX UNIT (X48-1230-00)



2SC1815 (Y)

2SC387A
2SC1000 (GR)

2SK125



Ref. No.	Parts No.	Description	Re- marks
C1,5	CC45CH1H0R5C	Ceramic 0.5pF ±0.25pF	
C7	CC45CH1H100D	Ceramic 10pF ±0.5pF	
C9	CC45CH1H0R5C	Ceramic 0.5pF ±0.25pF	
C10	CC45CH1H030C	Ceramic 3pF ±0.25pF	
C15	CC45CH1H330J	Ceramic 33pF ±5%	
C19	CC45CH1H0R5C	Ceramic 0.5pF ±0.25pF	
C23	CC45CH1H100D	Ceramic 10pF ±0.5pF	
C24	CC45CH1H040C	Ceramic 4pF ±0.25pF	
C29	CC45CH1H020C	Ceramic 2pF ±0.25pF	
C31,32	CC45SL1H070C	Ceramic 7pF ±0.25pF	
	Not used C11,14, 17,20,27,28,30		
D1,2	V11-0414-05	Diode 1S2588	
L1	L34-0751-05	Coil	☆
L2	L34-0756-05	Coil	☆
L3,4	L34-0751-05	Coil	☆

Ref. No.	Parts No.	Description	Re- marks
L5	L33-0605-05	Choke coil	
L6,7	L34-0824-05	Coil	☆
L8	L33-0002-05	Choke coil 1μH	
L9	L34-0824-05	Coil	☆
L10	L33-0605-05	Choke coil	
L11	L33-0002-05	Choke coil	
L12	L34-0825-05	Coil	☆
Q1,2	V03-0287-05	Transistor 2SC387A	
Q3,4	V09-1004-26	FET 2SK125	
T1,2	L34-0748-05	Tuning coil	
TC1~4	C05-0062-05	Ceramic Trimmer, 6P	
TC5		Not used	
TC6~8	C05-0308-05	Ceramic Trimmer, 4P	

DISASSEMBLY

1. How to remove the cases

A. How to remove the top case

- 1) Remove the four screws above the top case, and remove the six screws on both sides.
- 2) Lift up the upper case located towards the back side of the set. At this time, since the speaker cord is in a connected state, pay special attention to the speaker cord when the case is lifted.
- 3) Remove the protective sheet attached to the volume knob on top of the AF/VOX unit.
- 4) Remove the speaker cord from the connector of the AF/VOX unit.

B. How to remove the lower case

- 1) Remove the upper case in accordance with the procedure outlined in A.
- 2) Remove the 4 screws located on both sides and the 4 screws located at the bottom.
- 3) Lift up the case and make the removal.

C. Precautions for mounting the upper case

- 1) Firmly insert the speaker cord into the designated terminal of the AF/VOX unit.
- 2) Attach the upper case while paying attention to the 3 volume knobs located at the top of the set.

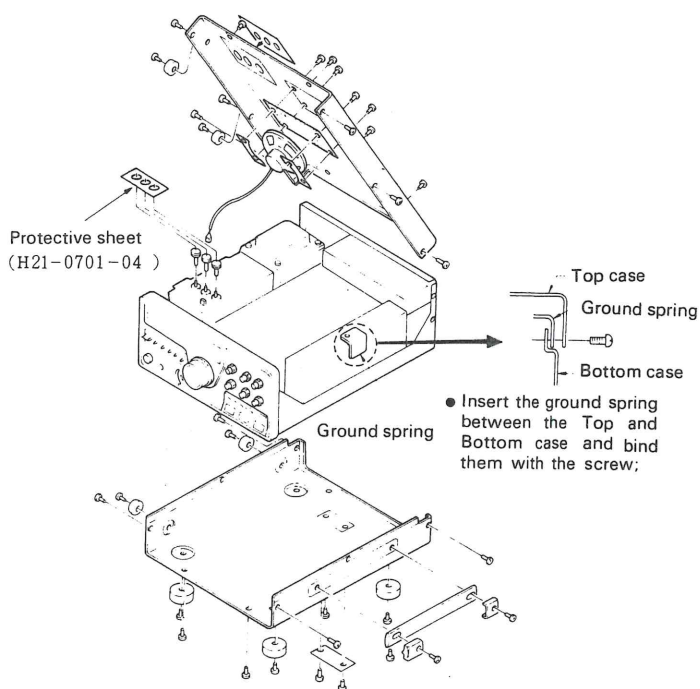


Fig. 1

2. How to incline the front panel

- 1) Remove the top and bottom cases.
- 2) Remove the screws of the RF Unit side, and remove the earth wire located between the RF Unit and the MIC VR Unit.
- 3) Remove the 4 screws located on both sides, then incline the front panel forward (In case the front panel is erected and the screws are tightened, pay special attention so that the wires will not be pinched in between.)
- 4) Pull out the IN of MIX (B) Unit and the connector of 43 H.
- 5) Remove the flat cable located between the display unit and the digital unit from the digital unit side.

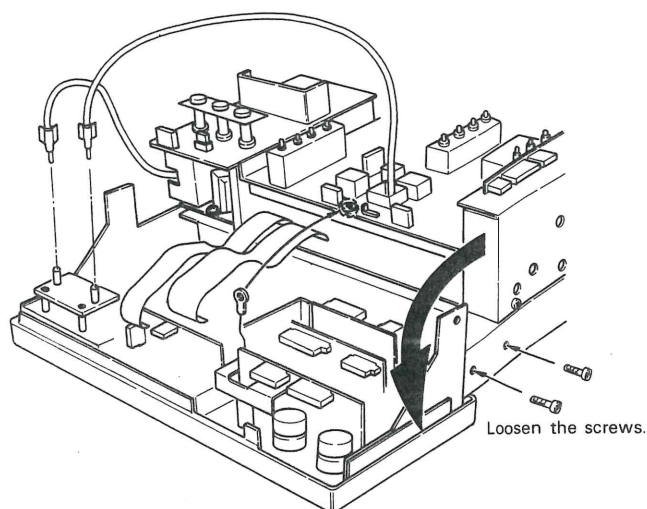


Fig. 2

DISASSEMBLY

3. Inspection and repairing of MIC VR Unit/AF VR Unit

- 1) Remove each knob/nut of MIC VR Unit or AF VR Unit.
- 2) Incline the front panel.
- 3) It can be removed from the front panel with the connectors still attached to it.

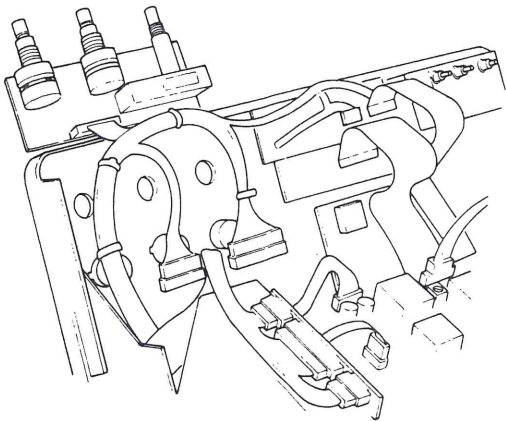


Fig. 3

4. How to remove the 6 key switch unit/band switch

- 1) Incline the front panel.
- 2) Remove the connector of the 6 Key Switch ASSY.
- 3) Remove the 3 screws shown in Fig. 4, then remove the 6 Key Switch Unit.
- 4) Remove the nut which holds the Band Switch ASSY in place as shown in Fig. 4.
- 5) Remove the Band Switch ASSY by sliding it slightly sidewise.

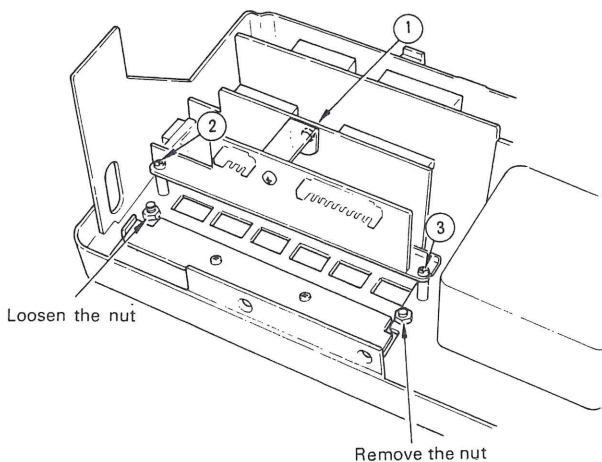


Fig. 4

5. How to remove the encoder unit

- 1) After removing the top and bottom cases, incline the front panel.
- 2) Remove the VFO knob with a 2.0 mm hexagonal spanner.
- 3) Remove the attachment nut of the Encoder Unit.
- 4) Remove the J2 Connector (55) of the Pulse Generating Unit.

6. Confirmation of the Tact Switch Stroke

- 1) Make certain that there is no play when the knob is touched.
- 2) Make certain that the stroke adjustment screw is in contact with the tact switch, but not pushing it.
- 3) Make certain the operation advances precisely one step each when the band knob is pressed.

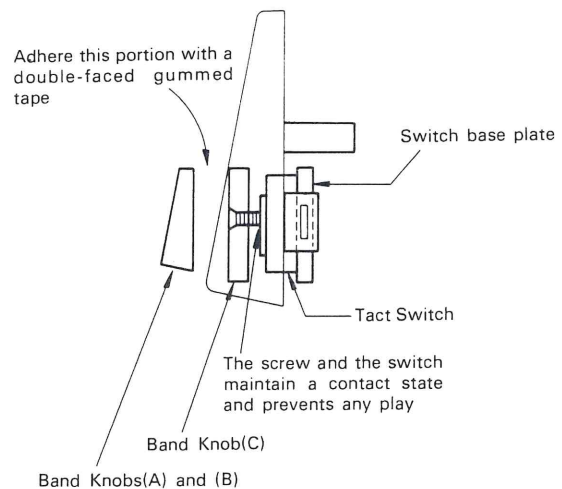


Fig. 5

7. Removing the RF unit

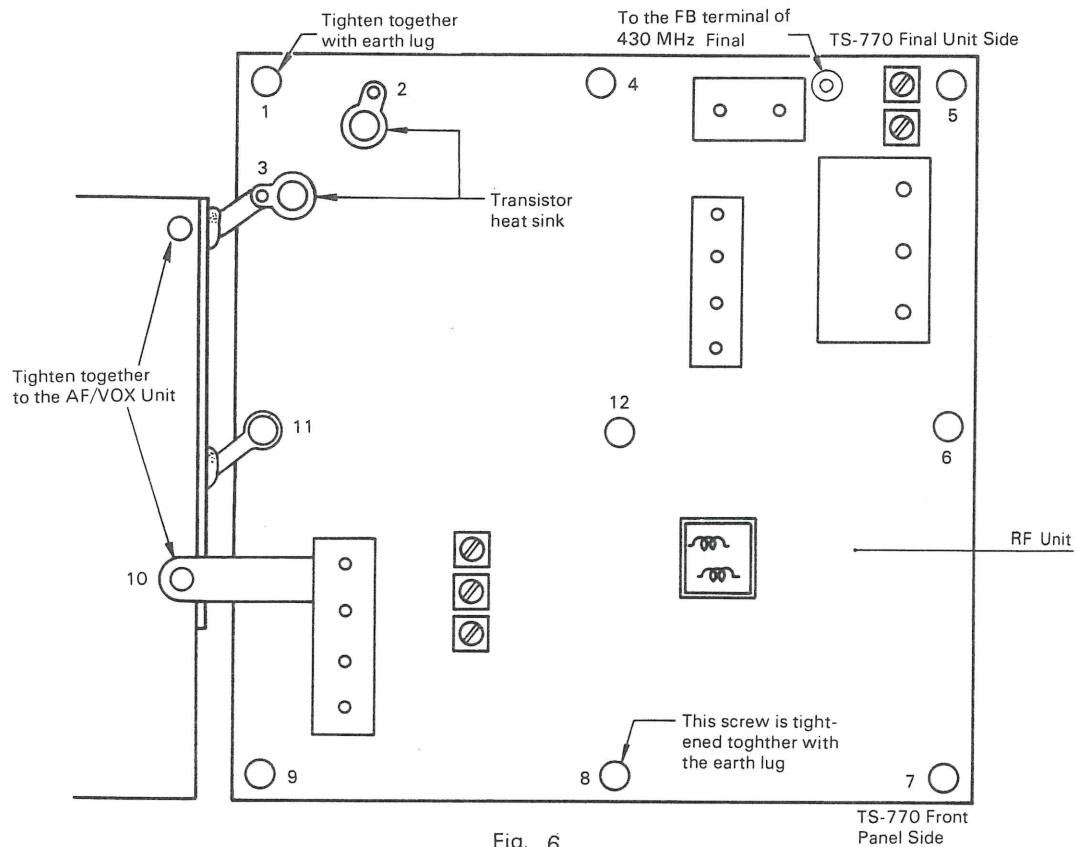
A. Removing the RF PC Board

- 1) Remove the all connector from RF unit.
- 2) Remove the condenser soldered to the FB terminal of the 430 MHz Final.
- 3) Remove the twelve screws (1 ~ 12) (as shown in Fig. 6)

B. Remove the RF PC Board with mounting bracket

- 1) Remove the all connector from RF unit
- 2) Remove the condenser soldered to the FB terminal of the 430 MHz Final.
- 3) Remove the screw (1, 5 ~ 11) (as shown in Fig. 6)

DISASSEMBLY

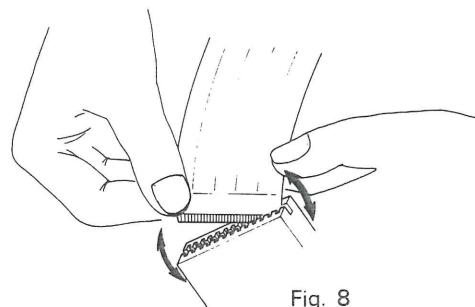
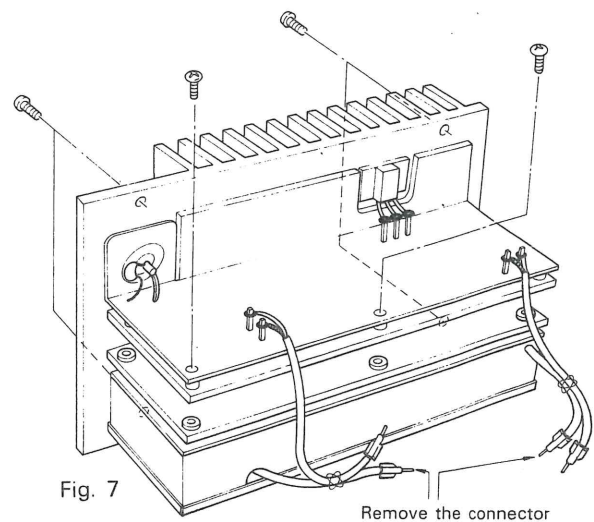


8. How to remove the Final Unit

- 1) Remove the earth wire between the 430 unit and the PLL unit by removing the screw on the 430 unit side.
- 2) Disconnect the wire of FB terminal on the 430 unit.
- 3) Pull out the connector of the 144 unit.
- 4) Pull out the 14D, 43D, 14R, 43R connectors of the RF unit.
- 5) Remove the screw which holds the heat sink in place.
- 6) Remove the final unit from the back panel.

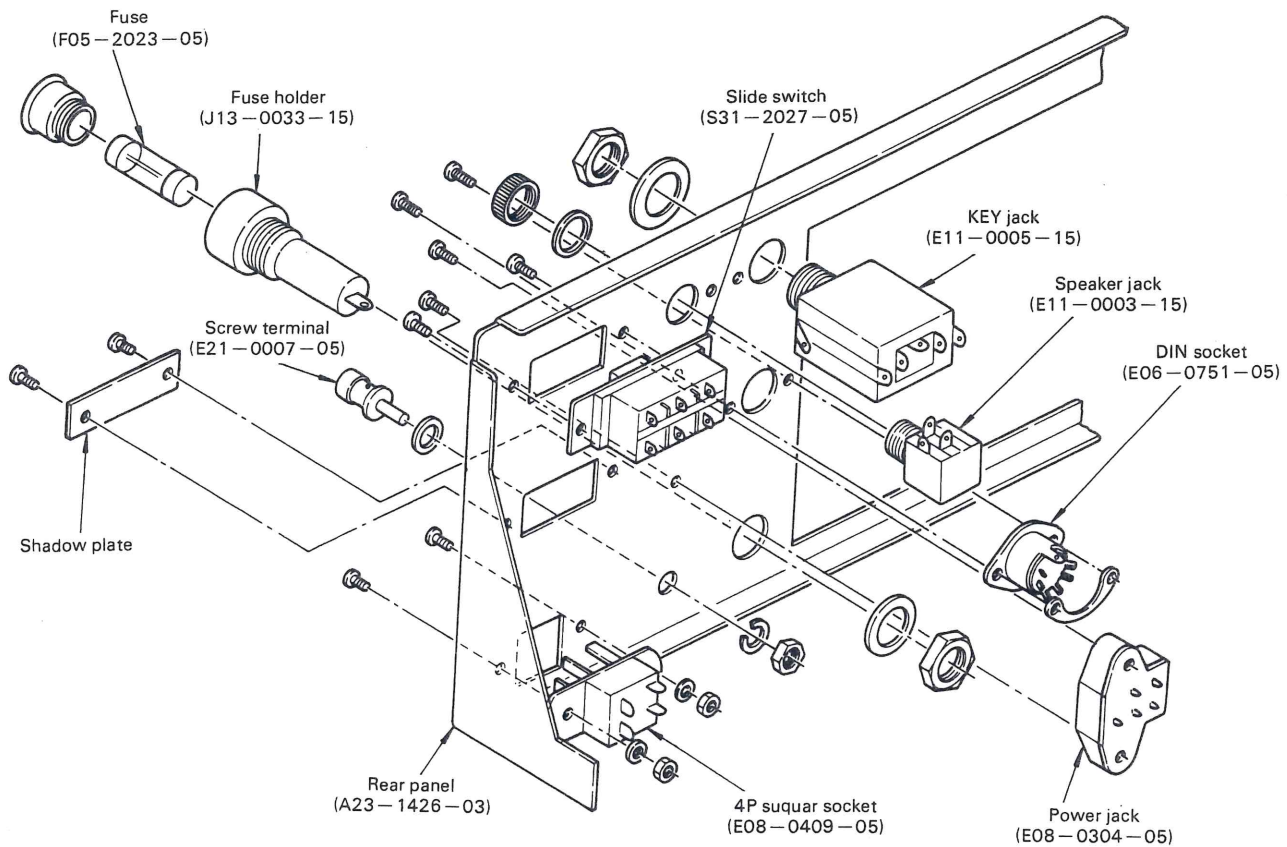
9. How to remove the Flat Cable

- 1) The flat cable is removed by pulling slightly on the left side and right side alternately, as shown in Fig. 8.

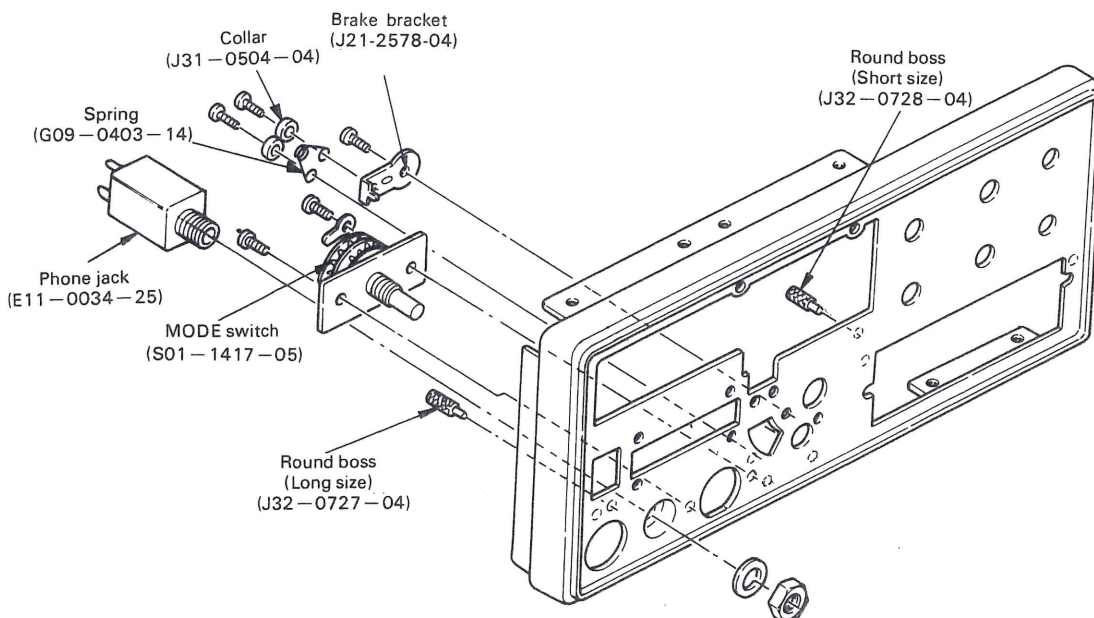


DISASSEMBLY

Rear panel disassembly

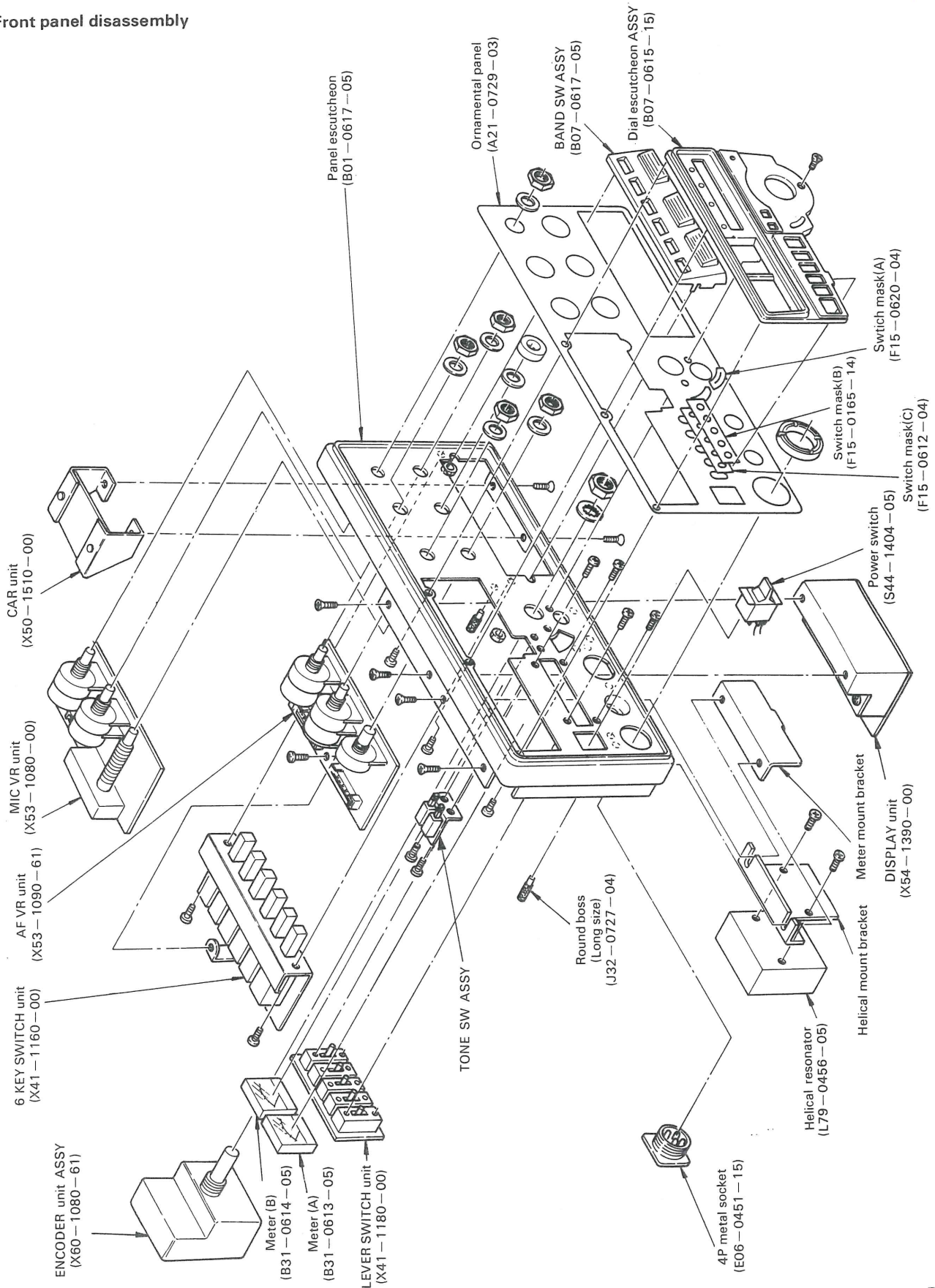


Front panel disassembly

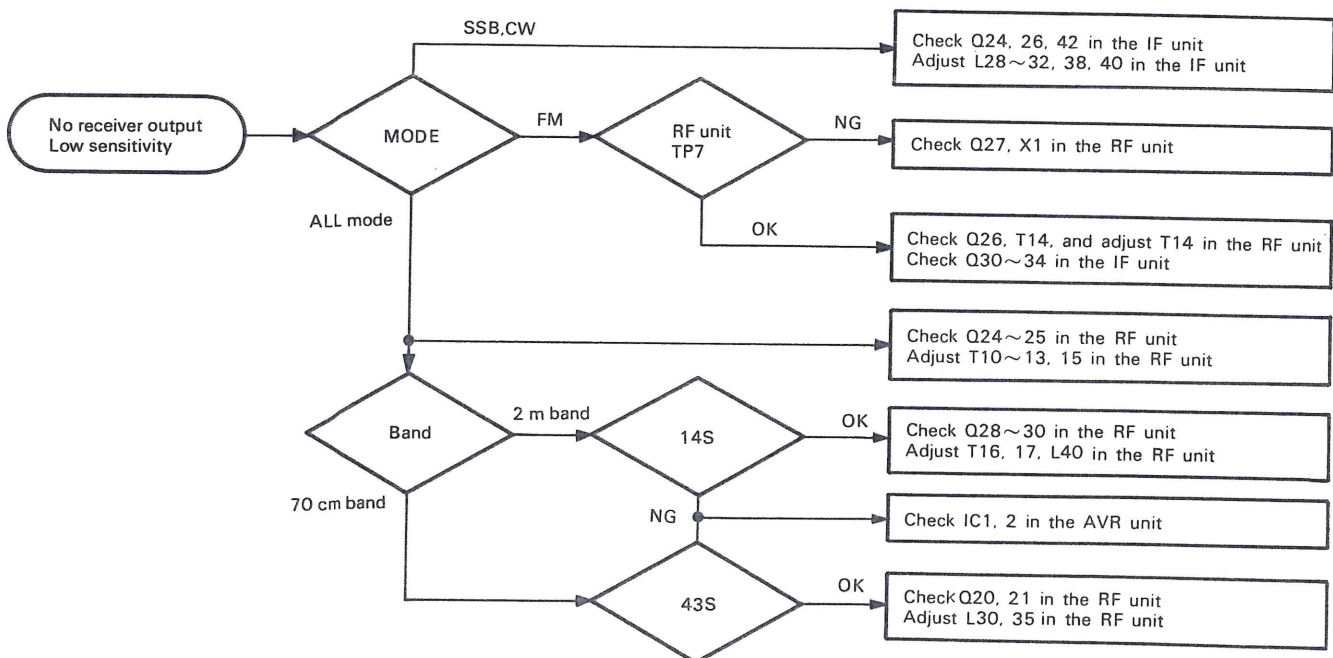
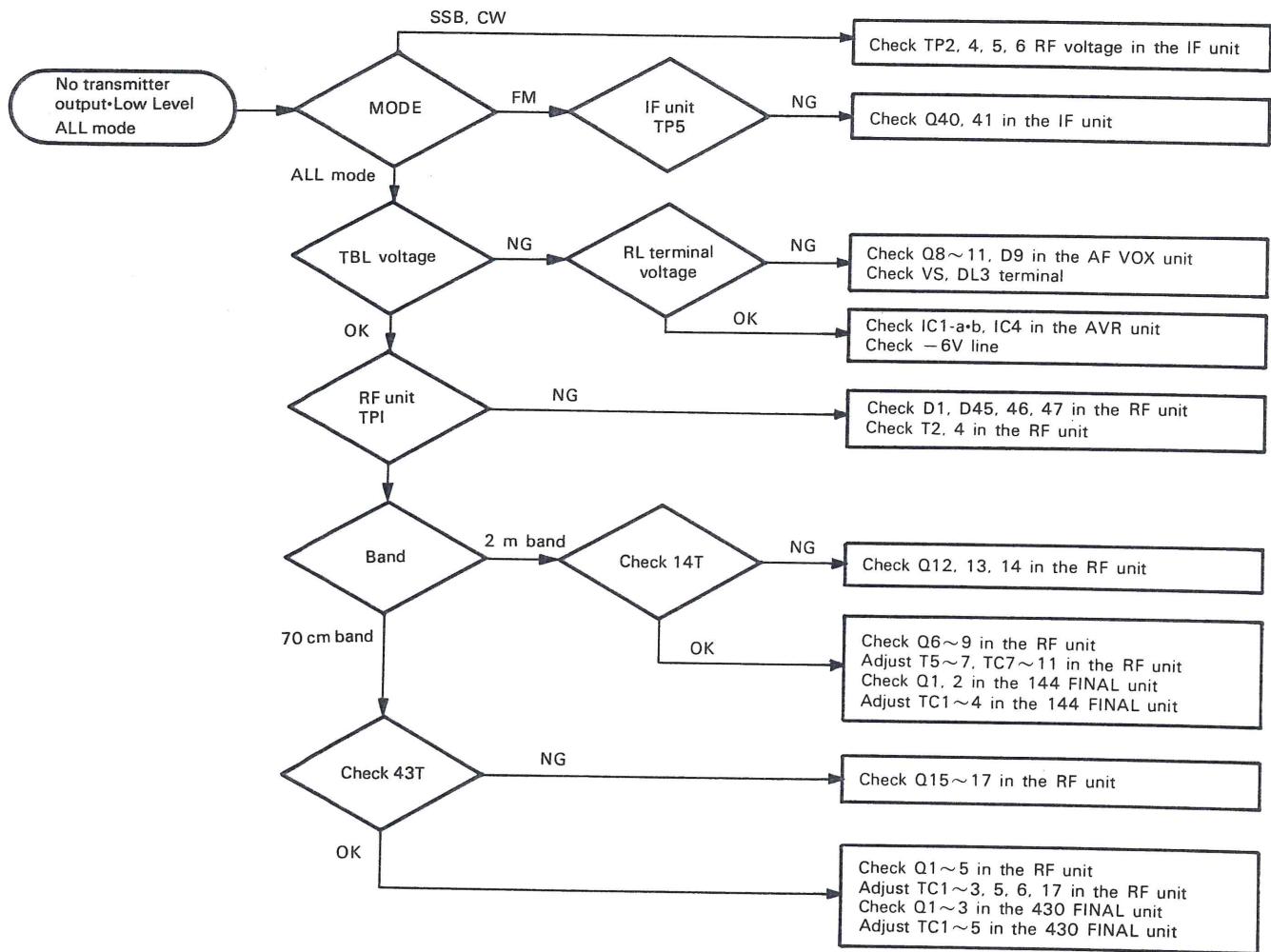


DISASSEMBLY

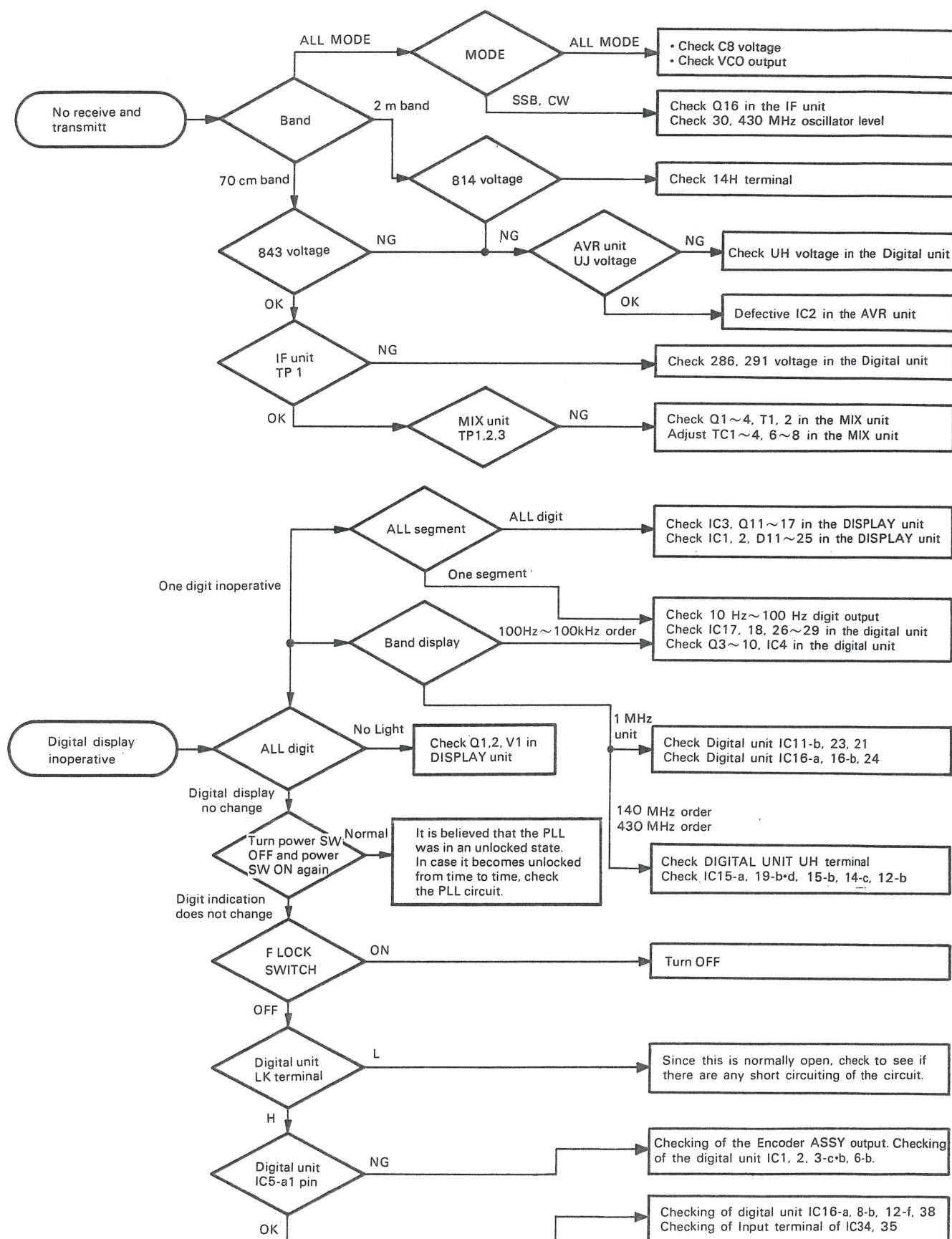
Front panel disassembly



TROUBLE SHOOTING



TROUBLE SHOOTING



ADJUSTMENTS

Testing Instruments

1. **Tester**
 - High input impedance
2. **RF VTVM (RF V.M)**
 - Input impedance: 1M Ω min., 2pF max
 - Voltage range: F.S = 10 mV ~ 300V
 - Frequency range: Up to 450 MHz
3. **Frequency Counter (F count)**
 - Input sensitivity: Approx. 50 mV
 - Frequency range: Up to 450 MHz
4. **DC Power**
 - Voltage: 10V ~ 17V, variable
 - Current: 6A min.
5. **Power Meter**
 - Measurement range Approx. 20W
 - Input impedance: 50 Ω
 - Frequency range: 450 MHz
6. **AF VTVM (AF V.M)**
 - Input impedance: 1M Ω min.
 - Voltage range: F.S = 1 mV ~ 30V
 - Frequency range: 50 Hz ~ 10 kHz
7. **AF Generator (AG)**
 - Output frequency: 100 Hz ~ 10 kHz
 - Output voltage: 0.5 mV ~ 1V
8. **Linear Detector**
 - Frequency range: 450 MHz
9. **Field Strength Meter**
 - Frequency range: 450 MHz
10. **Directional Coupler**
11. **Oscilloscope**
 - High sensitivity oscilloscope with horizontal input terminal
12. **SSG**
 - Frequency range: 144 MHz and 430 MHz band.
 - Modulation: AM and FM MOD.
 - Output level: -10 dB to 120 dB
13. **Dummy Load**
 - 8 Ω , 5W (approx.)
14. **Noise Generator**
 - Must generate ignition-like noise containing harmonics beyond 430 MHz.
15. **Sweep Generator**
 - Sweep range: 144 MHz and 430 MHz bands

Preparation

- 1) Unless otherwise specified, knobs and switches should be set as follows:

POWER SW	ON
SEND/REC SW	REC
VOX/MAN SW	MAN
ALC/RF SW	RF
LOW/HI SW	HI
TONE SW	OFF
VFO SW	CIR
MODE SW	CW
FUNCTION SW	A
RF GAIN VR	MAX(FULL COUNTER CLOCKWISE)
SQUELCH VR	MIN
S/F SW	OFF(SLOW)
SCAN SW	OFF
SEARCH SW	OFF
F.LOCK SW	OFF

- 2) Adjustments (trimmers, coils, etc.) should be made using an insulated rod such as a bakelite rod.
- 3) During adjustments of the receiver section, do not set the stand-by switch to SEND as this will damage the SSG.
- 4) Before connecting the power cord, be sure to set the power switch and VOX switch to OFF.

Note: When the power switch is turned ON in the ON position of the VOX switch, the transceiver is momentarily set in transmit mode. Special care should be taken when adjusting the receiver section.
- 5) The output level of SSG is indicated as SSG's open circuit.

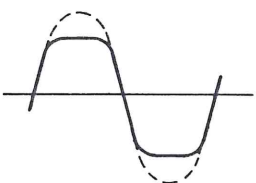
ADJUSTMENTS

A. TX/RX SECTION (COMMON)

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
1. Resistance measurement	1) MEMORY B.U SW on rear panel: ON	Ohm-meter	FINAL (144)	COL FB				More than 30Ω More than 10Ω	Check
			AVR	C8 814 843				More than 10Ω More than 30Ω More than 10Ω	
			RF	ASW 14T 43T L16 L35				Not earthed	
			PLL (A)	8V 5V				Not earthed	
			MIC VR	5V				Not earthed	
2. AVR	1) POWER SW: OFF POWER terminal: AC P.S. (220V) SEND/RED SW: REC	DC V.M	AVR	BP				More than 7.0V	Check
		B.U lamp						ON	Check
	2) MEMORY B.U SW on rear panel: OFF	B.U lamp						OFF	Check
	3) POWER SW: ON TONE SW: OFF VFO SW: CIR FUNCTION SW: A SCAN SW: OFF SEARCH SW: OFF F.LOCK SW: OFF	DC V.M	AVR	13.8 RB	AVR	VR1 VR2	Set to 13.8V Set to 0.6V	±0.1V ±0.1V	Check
				TBL -6 C8 RL 14S 43S				Less than -0.24V -6V ±0.5V 8V ±0.4V Less than 0.3V More than 4V More than 4V	
	4) BAND SW: 144	DC V.M	AVR	814 843				8V ± 0.3V Less than 0.3V	Check
	5) BAND SW: 430	DC V.M	AVR	814 843				Less than 0.3V 8V ± 0.3V	Check
	6) MODE SW: USB RF GAIN VR: MAX	DC V.M	IF	RFI	IF	VR5	Set to 1.7V		
	7) SSB MIC VR: MIN SEND/REC SW: SEND	DC V.M	AVR	TBL	AVR	VR3	Set to 0.3V	±0.03V	
				RB				Less than -0.24V	Check
	8) MODE SW: USB SSB MIC VR: MIN BAND SW: 145								
	• SEND/REC SW: SEND	DC V.M	RF	14T	RF	VR1	Set to 9.0V		
	• SEND/REC SW: REC	DC V.M	RF	14T				Less than 0.3V	Check

ADJUSTMENTS

TX/RX SECTION (COMMON)

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
AVR	9) BAND SW: 430								
	• SEND/RED SW: SEND	DC V.M	RF	TP8	RF	VR2	Set to 9.0V		
	• SEND/REC SW: REC	DC V.M	RF	TP8				Less than 0.3V	Check
	10) SEND/REC SW: REC	DC V.M	PLL (A)	8V 5V				8V ± 0.3V 5V ± 0.25V	Check
3. LAMP	1) Continued from previous item	Meter lamp						All 3 lamps are ON.	Check
		DISPLAY						All 8 digits are ON.	
		ON AIR lamp						OFF	
	2) HI/LOW SW: HI MODE SW: FM, USB, LSB CW	LOW lamp						OFF	Check
	3) HI/LOW SW: LOW • MODE SW: CW, LSB, USB	LOW lamp						OFF	Check
		• MODE SW: FM	LOW lamp					ON	
	4) F. LOCK SW: ON	F. LOCK lamp						ON	Check
	OFF	F. LOCK lamp						OFF	
	5) RIT SW: ON	RIT lamp						ON	Check
	OFF	RIT lamp						OFF	
	6) S/F SW: ON (FAST)	FAST lamp						ON	Check
	OFF (SLOW)	FAST lamp						OFF	
4. VCV	1) MODE SW: USB FUNCTION SW: A SCAN SW: OFF SEARCH SW: OFF F. LOCK SW: OFF BAND SW: 144 VFO dial: 500	Synchroscope	PLL (B)	TP4	PLL (B)	L9, 8	Adjust L9 and L8 to obtain maximum output. Adjust L8 for the clipped wave form (see figure at right).		
	2) VFO dial: 000	DC V.M	PLL (B)	TP3 (R46) TP1	PLL (B)	TC1	Set to 2.0V		
		RF V.M	PLL (A)	TP2	PLL (A)	T3.4 T5.6	MAX (repeat)	(More than 0.12V)	Fig. in () is a value for reference.
	3) VFO dial: 500	RF V.M	PLL (A)	TP4	PLL (A) VCO	T1.2 L4	MAX (repeat)	(More than 0.3V)	
	4) VFO dial: 000	DC V.M	PLL (A)	TP7	VCO	L1	Set to 1.2V		
	5) BAND SW: 434 VFO dial: 000	RF V.M	PLL (A)	TP4	VCO	L4	MAX		
				TP1				More than 0.25V	Check

ADJUSTMENTS

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
5. CAR	1) SEND/REC SW: REC MODE SW: CW	RF V.M	CAR	TP1	CAR	L6	MAX	More than 0.4V	
	2) MODE SW: LSB,USB,FM	RF V.M	CAR	TP1				More than 0.4V	Check
	3) MODE SW: FM	F. Count	CAR	TP1	CAR	TC3	8.8300 MHz	±500 Hz *Coarse adjustment.	
	USB					TC1	8.8315 MHz		
	LSB					TC4	8.8285 MHz		
	4) MODE SW: CW CAR VR: MIN SEND/RED SW: SEND	F. Count	CAR	TP1	CAR	TC2	8.83070 MHz	±100 Hz	
6. OSC	1) MODE SW: FM SEND/REC SW: SEND	F. Count	IF	TP6	IF	TC3	21.6000 MHz		
	2) MODE SW: USB	F. Count	IF	TP9	IF	L27	30.4300 MHz	±20 Hz	
7. VCO	1) VFO SW: CIR BAND SW: 145 • VFO dial: 000.0 ----- • BAND SW: 144 VFO dial: 999.9	F. Count	RF	TP4	PLL (B)	VR1	Set the VR1 for frequency difference within 20 Hz between VFO dial 000.0 and 999.9.	20 Hz	VR2: Coarse adjustment. VR1: Fine adjustment.
	2) VFO dial: 000 MODE SW: USB	RF V.M	RF	TP4	RF	T18	MAX		
8. RIT	1) RIT SW: ON RIT VR: 12 o'clock position	F. Count	RF	TP4			Check counter frequency.		
	2) RIT SW: OFF	F. Count	RF	TP4	AF VR	VR4	Set to the frequency in Item 1).	±20 Hz	
	3) RIT SW: ON • RIT VR: MIN • RIT VR: MAX	F. Count	RF	TP4				Check the frequency varies more than ±2 kHz from the frequency in Item 1).	Check
	4) SEND/REC SW: SEND RIT VR: Turn to left and right.	F. Count	RF	TP4				Frequency should remain unchanged.	Check
9. VCO	1) MODE SW: USB SEND/REC SW: SEND BAND SW: 145	RF V.M	RF	D8 cathode	RF	T9. 8	MAX * If the core of T9 comes off the bobbin, set it on top of the bobbin.	(1V)	
10. ALC. M	1) ALC/RF SW: ALC ALC terminal on the RF unit: Connect 10 MΩ resistor between the terminal and the chassis.	ALC.M			RF	VR3	Set to "0" point on ALC meter.		
	2) ALC terminal on the RF unit: Remove the resistor.								

ADJUSTMENTS

B. TX SECTION (144M BAND)

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
1. Setting	1) Rear panel 144 ANT terminal: POWER M POWER terminal: DC P.S (13.8V)								
	2) RF. U 43D terminal: Remove coax-cable TC9: MIN TC10,12,13: MAX								
2. Bias adjustment	1) BAND SW: 145	DC A.M	FINAL (144)	TP1	FINAL (144)	VR2		25 mA	Remove the jumper wire and connect the ampere meter in series.
3. Power setting	1) MODE SW: CW POWER SW: ON BAND SW: 145 VFO dial: 000 SEND/REC SW: SEND	RF V.M	IF	TP4	IF	L16,17	MAX (repeat)	(0.03V)	
				TP6	IF	L20,21 L22,23 L24,26	MAX (repeat)	(0.3V)	
	2) RF.U 14D terminal: Connect coaxial cable.	POWER.M (DC A.M)			RF	TC7 T5,6,7 TC8,9 TC10, TC11	MAX (repeat) * Precisely adjust the final TC1 ~ 4.	More than 18W	[Note for adjustments of TC8 and 9] Set the capacity of TC9 to minimum and adjust TC8 and TC9 in that order.
					FINAL (144)	TC1,2 TC3,4			
4. ALC	1) Continued from previous item.	POWER.M			RF	TC13	Set to 12W		
	2) ALC/RF SW: ALC CAR VR: Adjust so that the ALC meter pointer indicates the ALC zone.	ALC.M			IF	L16,17 L20,21 L22,23 L24,26	Adjust each coil and trimmer until the ALC meter reads max. Repeat this procedure.		If ALC meter deflects excessively, adjust CAR VR.
					RF	TC7 T5,6,7 TC8,9 TC10,11			[Note for adjustments of TC8 and 9] Set the capacity of TC9 to minimum and adjust TC8 and TC9 in that order.
	3) CAR VR: MAX	POWER.M DC A.M						Power: 12W DC.A: Less than 6A	Check
		ALC.M			RF	VR4	Set to "10" on RF scale.		
5. RF M	1) ALC/RF SW: RF	RF.M			FINAL (144)	VR1	Set to "8" on RF scale.	±2	
6. Band edge	1) BAND SW: 144 ALC/RF SW: ALC	POWER.M DC A.M ALC.M						POWER: 10W DC.A: Less than 6A ALC.M: More than "9" on RF scale	Check
	2) BAND SW: 145 VFO dial: 999	POWER.M DC A.M ALC.M						POWER: 10W DC.A: Less than 6A ALC.M: More than "9" on RF scale	Check
7. Low power	1) VFO dial: 000 MODE SW: FM LOW/HI SW: LOW	POWER.M						Output is reduced.	Check

ADJUSTMENTS

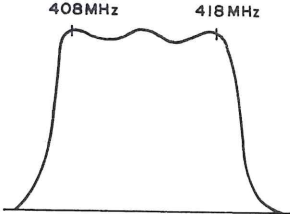
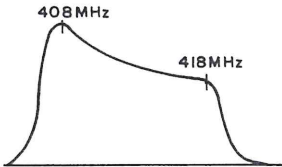
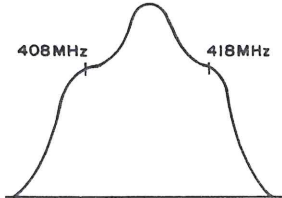
Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
	2) SEND/REC SW: REC 144 ANT terminal on rear panel: POWER M(3W)								
	3) SEND/REC SW: SEND	POWER.M			IF	VR7	Set to 1.2W		
	4) BAND SW: 144	POWER.M						0.5W ~ 3W	
	5) BAND SW: 145 VFO dial: 999	POWER.M						0.5W ~ 3W	

C. TX SECTION (430M BAND)

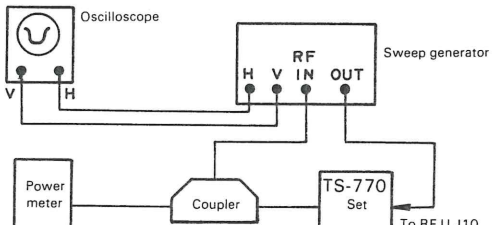
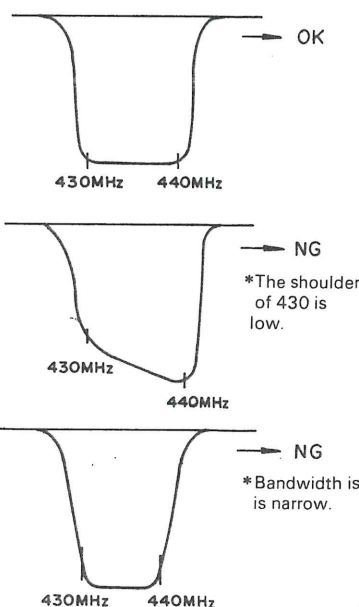
Item	Conditions	Check point			Adjusting point			Standard	Remarks						
		Testing Instruments	Unit	Terminal	Unit	Parts	Method								
1. Setting	1) Rear panel POWER terminal: DC P.S (13.8V)														
	2) RF.unit 43D terminal: Remove coaxial cable.														
2. MIX	1) IF.U J4 connector: Remove POWER SW: ON BAND SW: 432 VFO dial: 500	RF V.M	MIX (A)	TP2	VCO	L5.6	MAX (repeat)	More than 0.09V							
	2) IF.U J4 connector: Connect														
	3) BAND SW: 434	RF V.M	MIX (A)	TP3	IF	L2.4, L6.7	MAX (repeat)								
	4) BAND SW: 435	RF V.M	MIX (A)	TP3	IF	L65.66 L68.69	MAX (repeat)								
	5) BAND SW: 434	RF V.M	MIX (A)	TP3	IF	TC1.2	MAX (repeat)								
	6) BAND SW: Set the level of MIX (A) to lower band with 434 or 435.	RF V.M	MIX (A)	TP3	MIX (A)	TC1.2 TC3	MAX (repeat)	More than 0.25V							
3. BPF (1)	1) MODE SW: LSB SEND/REC SW: REC IF.U J4 connector: Remove MIX (A).U TP1 terminal: Connect the Sweep generator	Detector MIX (B) 43H MIX (A) L6 Oscilloscope Sweep generator 43 H of MIX(B) Set TP1 of MIX(A) IS516x2 100P 47K Detector 408MHz 418MHz (Remove PT1) 408MHz 418MHz (Insert PT1) Fig A													
			MIX (A)	PT1	Turn the trimmer and the helical wave deflects as shown in Fig. A. Adjust so that the wave enters the 408 ~ 418 MHz band.										

ADJUSTMENTS

TX SECTION (430M BAND)

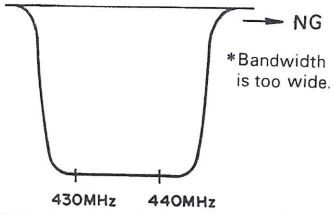
Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
BPF(1)					MIX (A)	PT2,3	These two trimmers adjust gain and bandwidth. Adjust them so that the markers of 408 MHz and 418 MHz are on the shoulder of the helical wave at maximum gain.*		
							* While adjusting PT 2,3, adjust PT1 ~3 alternately until the wave is stabilized. Bandwidth is good but the peak on one side is too low. Waveform is good but marker is deviated to left. Waveform is good but bandwidth is too wide. The center of wave is too high. It should be flat. Bandwidth is good but the center of wave is too low.	(1) the wave should have sufficient height (gain). (2) Top of wave should be as flat as possible. (3) Marker should be on the shoulder of wave.     	

ADJUSTMENTS

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
	2) IF.U J4 connector: Insert MIX (A) TP1 terminal: Remove Sweep MIX (B) 43H terminal: Remove detector BAND SW: 437 VFO dial: 000	RF V.M	RF	TP3	RF	TC15, TC16	MAX		
	3) BAND SW: 430~439 (all bands)	RF V.M	RF	TP3 TP9				More than 0.4V More than 0.25V	Check
4. Bias adjustment	1) BAND SW: 433	DC A.M	FINAL (430)	*1 CK6 CK4 CK2	FINAL (430)	VR1 VR4 VR3		50 mA 40 mA 25 mA	*Remove the pass-through capacitor lead and connect ampare meter in series.
5. Power setting	1) RF.U 43D terminal: Connect coaxial cable BAND SW: 433 VFO dial: 500 MODE SW: CW CAR VR: MAX SEND/REC SW: SEND	POWER.M (DC A.M)			RF FINAL (430)	TC1.2 TC3.17 TC5.6 TC1.2,3 TC4.5	MAX (repeat) * Precisely adjust the final trimmer.	More than 15W	
6. BPF (2)	1) SEND/REC SW: REC RF.U J2 connector: Remove MODE SW: LSB RF.U J10 connector: Connect the Sweep generator								
	2) SEND/REC SW: SEND Sweep output: Level which does not saturate BPF wave. * *Reference ... Proper Sweep generator output derives about 2W output from TS-770.				RF	TC1.2,3 L4,TC17 TC5.6	Adjust these trimmers so that the markers of 430 MHz and 440 MHz are on the shoulder of the wave and that the height is maximum and uniform as shown at right.		

ADJUSTMENTS

TX SECTION (430M BAND)

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
BPF(2)									
	3) SEND/REC SW: REC RF. U J2 connector: Insert RF.U J10 connector: Remove Sweep generator								
	4) SEND/REC SW: SEND BAND SW: 430~439 (all bands)	POWER.M						More than 15W	Check
7. ALC	1) BAND SW: 433 VFO dial: 500	POWER.M			RF	TC12	Set to 12W		
	2) BAND SW: 430~439 (all bands) VFO dial: 000 ALC/RF SW: ALC	POWER.M ALC.M						More than 10W More than "7" on RF scale.	Check
	3) BAND SW: 439 VFO dial: 999	POWER.M ALC.M						10W More than "7" on RF scale	Check
8. RF.M	1) BAND SW: 433 VFO dial: 500 ALC/RF SW: RF	RF.M			FINAL (430)	VR2	Set to "8" on RF scale.	±2	
9. Low power	1) MODE SW: FM LOW/Hi SW: LOW	POWER.M						Output is reduced	Check
	2) SEND/REC SW: REC 430 ANT terminal on rear panel: POWER.M (3W)								
	3) SEND/REC SW: SEND	POWER.M			AF/VOX	VR4	Set to 1.5W		
	4) VFO dial: 000 BAND SW: 430~439 (all bands)	POWER.M						0.3W ~ 5W	Check

ADJUSTMENTS

D. TX SECTION (144/430M BAND)

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
1. Setting	1) Rear panel POWER terminal: AC P.S (220V) 144 ANT terminal: POWER.M (20W)								
2. Spurious	1) CAR VR: MAX MODE SW: CW BAND SW: 144 VFO dial: 000 SEND/REC SW: SEND	Spectrum analyzer			IF	VR2	Set 144.76 MHz adjacent spurious to minimum.	Less than - 60 dB.	
3. Carrier suppression	1) BAND SW: 145 CAR VR: MIN VFO dial: 000	Spectrum analyzer			IF	VR1 TC6	Adjust alternately to set the indication of analyzer to less than - 40 dB.	Less than - 40 dB	
	2) SSB MIC VR: MIN MODE SW: LSB,USB	Spectrum analyzer						Less than - 40 dB	Check
4. SSB frequency response	1) MODE SW: USB MIC terminal: AG (2 mV/1500 Hz) SSB MIC VR: Set transmit output to 8W.								
	2) MIC terminal: AG (2 mV/400 Hz and 2600 Hz) MODE SW: USB	POWER.M			CAR	TC1	Change alternately the frequency of AG to 400Hz and 2600 Hz to obtain the same output.	More than 1W	
	3) MODE SW: LSB MIC terminal: AG (2 mV/400 Hz and 2600 Hz)	POWER.M			CAR	TC4	Change alternately the frequency of AG to 400Hz and 2600 Hz to obtain the same output.	More than 1W	
5. ALC.M	1) MODE SW: USB SSB MIC VR: MAX ALC/RF SW: ALC MIC terminal: AG (2 mV/1500 Hz)	ALC.M POWER.M			RF	VR4	Set to "10" on RF scale.	More than 10W	Check
	2) MODE SW: LSB	POWER. M						More than 10W	Check
	3) MODE SW: USB SSB MIC VR: 3 o'clock position BAND SW: 144 VFO dial: 000	ALC.M						ALC meter should deflect beyond ALC zone.	Check
6. Frequency setting	1) BAND SW: 145 MODE SW: CW VFO dial: 000.0	F. Count			PLL (A)	TC1	145.000.00 MHz	±30 Hz	
	2) MODE SW: FM	F. Count			CAR	TC3	145.000.00 MHz	±100 Hz	
	3) MODE SW: CW	F. Count	PLL (A)	TP1			Check frequency obtained.		Check
	4) SEND/REC SW: REC	F. Count	PLL (A)	TP1	AF VR	VR5	Set to frequency 800 Hz lower than "f" in Item 3).		

ADJUSTMENTS

TX SECTION (144/430M BAND)

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
7 DEV (145 MHz)	1) MIC terminal: AG (20 mV/1000 Hz) FM MIC VR: MAX SEND/REC SW: SEND	Linear detector			IF	VR6	Set to ± 5.0 kHz		
	2) MIC terminal: AG (2 mV/1000 Hz)	Linear detector						Setting to ± 3.5 kHz with FM MIC VR should be possible	Check
	3) MIC terminal: Remove AG SEND/REC SW: REC TONE SW: ON	Connect freq. counter to output terminal of linear detector			TONE	VR1	Set to 1750 Hz	± 5 Hz	
		Linear detector						(1) More than 2.5 kHz (2) Transceiver should be set in transmit mode only when TONE SW is pressed	Check
8 DEV (433 MHz)	1) SEND/REC SW: REC MIC terminal: AG (20 mV/1000 Hz) 430 ANT terminal on rear panel: POWER M								
	2) BAND SW: 433 VFO dial: 000 FM MIC VR: MAX SEND/REC SW: SEND	Linear detector						± 4.0 kHz $\sim$ ± 6.0 kHz	Check
	3) IF U jumper connector: Change from "N" to "W"	Linear detector			IF	VR3	Set to ± 7.5 kHz		
	4) IF U jumper connector: Change from "W" to "N"								
9 SSB	1) MODE SW: USB SSB MIC VR: MAX BAND SW: 430 VFO dial: 000 MIC terminal: AG (2 mV/1500 Hz)	POWER.M						More than 10W	Check
	2) ALC/RF SW: ALC SSB MIC VR: 15 o'clock position.	ALC.M						ALC meter should deflect beyond ALC zone.	
10 Frequency setting	1) MODE SW: CW CAR VR: MAX BAND SW: 433 VFO dial: 000.0	F. Count			IF	L1	433.000.00 MHz	± 100 Hz	
	2) BAND SW: 435	F. Count			IF	L64	435.000.00 MHz	± 100 Hz	
11 Side tone	1) SEND/REC SW: REC AF GAIN VR: MIN SIDE TONE VR: MAX EXP. SP terminal on rear panel: Connect speaker KEY terminal on rear panel: Connect key	AF V.M						Side tone output of 0.7V is obtained by pressing key.	Check

ADJUSTMENTS

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
	2) SEND-REC SW: SEND	POWER.M						Side tone output and transmit output are obtained by pressing key.	Check
	3) SEND-REC SW: REC VOX MAN SW: VOX DELAY VR. MIN	POWER.M						Side tone output and transmit output are obtained by pressing key. Transceiver is set in receive mode by releasing key	Check

E. RX SECTION (144M BAND)

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
1 Setting	1) Rear panel POWER terminal: AC P.S (220V) EXT. SP terminal: Connect speaker								
2 S meter zero point	1) RF GAIN VR: MAX BAND SW. 145 VFO dial: 050	S.M			RF	VR5	Set VR5 for S meter zero.		
	2) RF GAIN VR: MIN	S.M						S meter deflects off scale	Check
3 BPF	1) 144 ANT terminal on rear panel: Connect Sweep gen. MODE SW: FM RF GAIN VR: MAX PLL (A) U J3 connector: Remove RF U TP5 terminal: Connect detector	Oscillo-scope			RF	T16,17 L40	Adjust coil and trimmer for maximum gain and bandwidth	144 MHz 146 MHz 	
4 Sensitivity adjustment	1) 144 ANT terminal on rear panel: SSG PLL (A) U J3 connector: Insert MODE SW: FM VFO dial: With 145.05 MHz signal applied from SSG, turn dial to receive signal and set S meter for maximum deflection.	DEV ± 5 kHz MOD 1 kHz OUTPUT 10~20 dB							
	2) SSG OUTPUT: After receiving signal, reduce output as small as possible within the range of S meter deflection.	S.M			RF	T10,11 T12,13 T14	MAX (repeat)		
	3) SSG OUTPUT: 20 dB (without modulation)	S.M			IF	VR8	Set to "9" on S meter scale.		

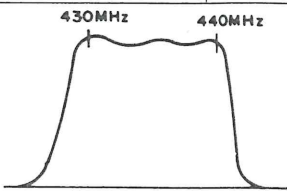
ADJUSTMENTS

RX SECTION (144M BAND)

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
5. C.M	1) SSG OUTPUT: 0 dB (with modulation) VFO dial: Set to optimum receive waveform.	AF V.M			IF	L53	MAX	Repeat Items 1) and 2).	
	2) SSG OUTPUT: OFF (no signal)	C.M			IF	L54	Set to "0".		
	3) SSG OUTPUT: 20 dB (without modulation) VFO dial: Shift freq. in plus direction.	C.M						Center meter deflects beyond "E" of the second letter in "CENTER".	Check
	4) VFO dial: Shift freq. in minus direction.	C.M						Center meter deflects beyond "E" of the fifth letter in "CENTER".	Check
6. Squelch	1) SSG OUTPUT: - 6 dB (with modulation) VFO dial: Receive signal and set AF VTVM for maximum reading.								
	2) BAND SW: 144 SQUELCH VR: Adjust until squelch is closed.							Squelch VR is in 9~12 o'clock position when squelch is closed.	Check
	3) BAND SW: 145							Receive signal again.	Check
7. FM sensitivity	1) SSG OUTPUT: 0 dB							Receive signals at each point at left and measure sensitivity.	More than 26 dB Check
	BAND SW	VFO dial							
	145	050							
	144	050							
	145	950							
8. SSB sensitivity adjustment	1) MODE SW: USB BAND SW: 145 VFO dial: 050 Apply 145.05 MHz, 10 dB signal from SSG and	S.M			RF	T15	MAX (repeat)		
					IF	L28,29 L30,31 L32,38 L40			
9. S.M	1) SSG OUTPUT: -3 dB VFO dial: Set S meter for maximum reading.	S.M			IF	L38	Set the S meter for one division of the scale by turning the core counterclockwise direction		
	2) SSG OUTPUT: 20 dB	S.M			RF	VR6	Set S meter for "9".		
10. NB	1) Continued from the previous Item	DCV.M	IF	TP8	IF	L35,36	MIN (repeat)		

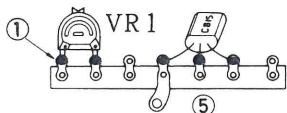
ADJUSTMENTS

F. RX SECTION (430M BAND)

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
1. Setting	1) Rear panel POWER Terminal: AC P.S (220V) 430 ANT terminal: Connect Sweep gen. EXT. SP terminal: Connect speaker								
2. BPF	1) MODE SW: FM BAND SW: 430 PLL (A).U J3 Connector: Remove RF.U TP2 terminal: Connect detector	Oscilloscope			RF	L30,33	Adjust coil and trimmer for maximum gain and bandwidth.		
3. FM sensitivity	1) MODE SW: FM 430 ANT terminal on rear panel: SSG	[DEV ± 5 kHz MOD 1 kHz OUTPUT.. 0 dB							
	2) BAND SW	VFO dial							
	433	050					Receive signals at each point at left and measure sensitivity.	More than 26 dB	Check
	430	050							
	439	950							
4. SSB sensitivity	1) SSG OUTPUT: 20 dB (without modulation) MODE SW: USB BAND SW: 433 VFO dial: 050	S.M					Receive signal and set S meter for maximum reading. Adjust SSG output so that S meter reads S "9"	SSG output for S "9" 20 dB + 8 dB - 10 dB (10 dB ~ 28 dB)	Check
	2) SSG OUTPUT: - 6 dB								
	BAND SW	VFO dial							
	433	050					Receive signals at each point at left and measure sensitivity.	More than 10 dB	Check
	430	050							
	439	950							

ADJUSTMENTS/CHECK

G. OPERATION CHECK OF MICRO COMPUTER SECTION

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
1. Reset	1) Rear panel POWER terminal: DC P.S (13.8V) MEMORY B.U SW: OFF								
	2) AF/VOX.U BZ connector: ON DISP connector: All indicate								
	3) Reset lug terminal (see figure at right) ① terminal: Connect digital voltmeter. ⑤ terminal: Connect oscilloscope.						 VR1: Turn to full clockwise direction		Input selector on oscilloscope: DC
	4) POWER SW: ON Adjust DC power voltage to obtain 3.70 V reading on digital volt- meter.	Oscilloscope	Reset lug ter- minal	⑤ termi- nal	Reset lug ter- minal	VR1	Set VR1 to obtain 0V on oscilloscope.		
	5) Adjust DC power voltage to increase oscillo- scope voltage.	Oscilloscope	Reset lug ter- minal	⑤ termi- nal					
	6) Adjust DC power voltage for 0V on oscilloscope and check the reading of digital voltmeter.	Oscilloscope	Reset lug ter- minal	⑤ termi- nal				Reading of digital voltmeter at 0V of oscilloscope voltage: $3.70V \pm 0.01V$	Check
	7) POWER SW: OFF ① terminal: Remove digital voltmeter. ⑤ terminal: Remove oscillo- scope.								
	8) Set DC power voltage to 13.8V								
2. DISP SW	1) POWER SW: ON MODE SW: FM,LSB,USB, CW	DISPLAY						(A 144.000.0) is displayed in all mode	
	2) AF/VOX.U DISP SW: NORM MODE SW: CW, LSB, USB	DISPLAY						(A 144.000.0) is displayed.	
	3) MODE SW: FM	DISPLAY						(A 144.000.0) is displayed.	
3. VFOSW	1) MODE SW: USB VFO dial: Counterclockwise	DISPLAY						(A 144.000.0) remains unchanged	
	2) VFO SW: CIR VFO dial: Turn to counter- clockwise direction	DISPLAY						(A 144.999.9) is displayed.	

ADJUSTMENTS/CHECK

Item	Conditions	Check point				Adjusting point		Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
4. Digit UP	1) VFO dial: Slowly turn clockwise.	DISPLAY						(1) Each digit changes normally: 0→1→2→3→4→5→6→7→8→9. (2) Frequency changes by 10 kHz at each turn of VFO dial.	
5. F. LOCK	1) F. LOCK SW: ON VFO dial: Turn clockwise and counterclockwise.	DISPLAY						Display remains unchanged.	
	2) F. LOCK SW: OFF								
6. S/F SW	1) VFO dial: 00 S/F SW: ON (FAST)	DISPLAY						(A 144.01) is displayed.	
	2) MODE SW: USB VFO dial: Slowly turn clockwise.	DISPLAY						(1) Digits of 100 kHz changes as follows: 0→2→4→6→8→0. (2) Frequency changes by 100 kHz at each turn of VFO dial.	
	3) S/F SW: OFF (SLOW)								
7. BAND SW	1) BAND SW (UP): Press intermittently.	DISPLAY						(1) Digits of MHz counts up as follows: 144→145→430 431→432→433 434→435→436 437→438→439 (2) Buzzer sounds each time freq. is changed.	
	2) BAND SW (DOWN): Press intermittently.	DISPLAY						Digits of MHz counts down in 1 MHz steps reversing the preceding Item 1)	
	3) BAND SW (UP): Press and hold	DISPLAY						Digits of MHz counts up in 1 MHz steps automatically each time buzzer sounds	
	4) BAND SW (DOWN): Press and hold	DISPLAY						Digits of MHz counts down in 1 MHz steps automatically each time buzzer sounds	
	5) BAND SW: Press UP and DOWN at the same time	DISPLAY						Same as when UP is pressed.	UP takes precedence
8. BZ SW	1) AF/VOX.U BZ SW: OFF BAND SW (UP): Press and hold							Digits of MHz change but buzzer will not sound.	
	2) AF/VOX.U BZ SW: ON								
9. SCAN	1) MODE SW: FM SCAN SW: ON	DISPLAY						Frequency counts up in 5 kHz steps.	
	2) S/F SW: ON (FAST)	DISPLAY						Frequency counts up in 20 kHz steps. not in 5 kHz steps.	

ADJUSTMENTS/CHECK

OPERATION CHECK OF MICRO COMPUTER SECTION

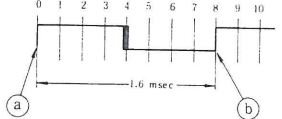
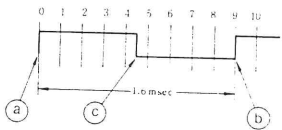
Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
	3) S/F SW: OFF (SLOW)								
	4) SCAN SW: OFF								
10. MEMORY	1) BAND SW: 145 VFO dial: 000.0 (FUNCTION SW: A)	DISPLAY						(A 145.000.0) is displayed.	
	2) FUNCTION SW: B	DISPLAY						(b 144.000.0) is displayed	
	3) FUNCTION SW: FIX	DISPALY						(1) is displayed.	
	4) FUNCTION SW: A MEMORY SW: ON								
	5) FUNCTION SW: FIX	DISPLAY						(1 145.000.0) is displayed	
	6) BAND SW: Press UP and DOWN	DISPLAY						Display in Item 5) remains unchanged	
11. FIX CH	1) FIX CH SW: Press inter- mittently.	DISPLAY						(1) Display changes as follows: 1 145.000.0 ↓ 2 ↓ 3 ↓ 4 ↓ 5 ↓ 6 ↓ 7 ↓ 8 ↓ 1 145.000.0 (2) Buzzer sounds at change of channel	
	2) FIX CH SW: Press and hold	DISPLAY						Channel changes automatically each time buzzer sounds.	
	3) MODE SW: FM SCAN SW: ON	DISPLAY						Same as Item 2), but buzzer will not sound.	
	4) SCAN SW: OFF								
12. MEMORY B.U	1) MODE SW: USB FUNCTION SW: A POWER SW: OFF								
	2) POWER SW: ON (MEMORY B.U SW: OFF)	DISPLAY						(A 144.000.0) is displayed.	
	3) MEMORY B.U SW: ON BAND SW: 145								

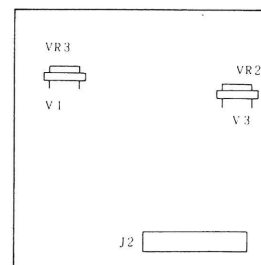
ADJUSTMENTS/CHECK

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
	4) POWER SW: OFF 5) POWER SW: ON	DISPLAY						(A 145.000.0) is displayed.	
13. FUNCTION	1) FUNCTION SW: A-B	DISPLAY						(A 145.000.0) is displayed	
	2) SEND/REC SW: SEND	DISPLAY						(b 144.000.0) is displayed.	
	3) SEND/REC SW: REC FUNCTION SW: B-A	DISPLAY						(b 144.000.0) is displayed	
	4) SEND/REC SW: SEND	DISPLAY						(A 145.000.0) is displayed	
	5) SEND/REC SW: REC								
14 SEARCH	1) SEARCH SW: ON	DISPLAY						Display counts up repeatedly from 144.000.0 to 144.100.0	
	2) SCAN SW: ON	DISPLAY						Operation in Item 1) is repeated.	SEARCH takes precedence.
	3) F. LOCK SW: ON	DISPLAY						Operation in Item 1) is repeated.	SEARCH takes precedence.
	4) SEARCH SW: OFF	DISPLAY						Scanning (UP scan in 5 kHz steps).	SCAN takes precedence.
	5) SCAN SW: OFF POWER SW: OFF								

ADJUSTMENTS/CHECK

H. OPERATION CHECK OF ENCODER ASSEMBLY

Item	Conditions	Check point			Adjusting point			Standard	Remarks
		Testing Instruments	Unit	Terminal	Unit	Parts	Method		
1. Setting	1) POWER terminal on rear panel: AC 220V Use motor instead of VFO knob.	Oscilloscope	Digital	J5-V1			Set the sweep knob of oscilloscope to 0.2 msec/DIV. Set motor speed for 8 div. between "a" and "b".	Motor speed- 300 rpm	 When checking the duty ratio without using the motor, turn the VFO knob by hand.
2. V1 duty ratio	1) Set sweep knob of oscilloscope to 0.1 msec/DIV 2)	Oscilloscope	Digital	J5-V1			Set the variable knob of oscilloscope to 9 div. Set the position "c" to 4.5 div.	4.5 div $\pm$ 0.5 div.	
3. V3 duty ratio	1) Continued from Item 1)	Oscilloscope	Digital	J5-V3	Encoder	VR2	Set the position "c" to 4.5 div.	4.5 div. $\pm$ 1.5 div	
4. V1 - V3 phase difference	1) Set the sweep knob of oscilloscope to 50 μ sec/DIV. Do not touch variable knob.	Oscilloscope	Digital	J5-V1 J5-V3				V1 - V3 phase difference: 4.5 div. $\pm$ 1 div.	



Pulse generator unit

ADJUSTMENTS

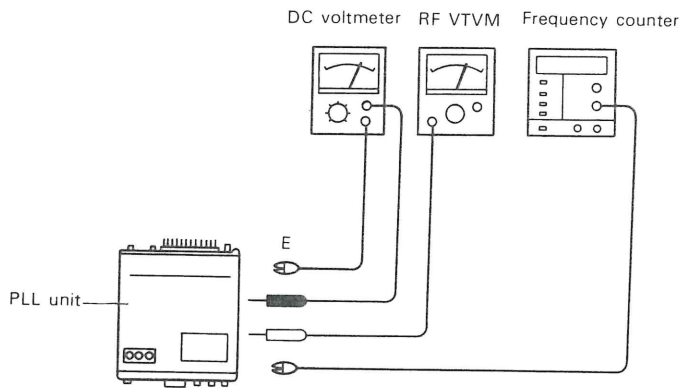


Fig. 1 Adjustment of PLL unit

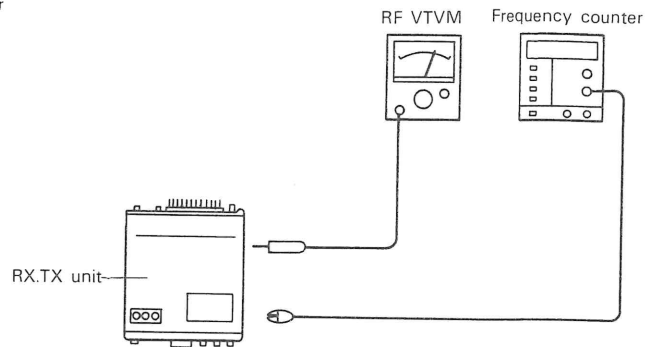


Fig. 4 Adjustment of 10.7 MHz and drive

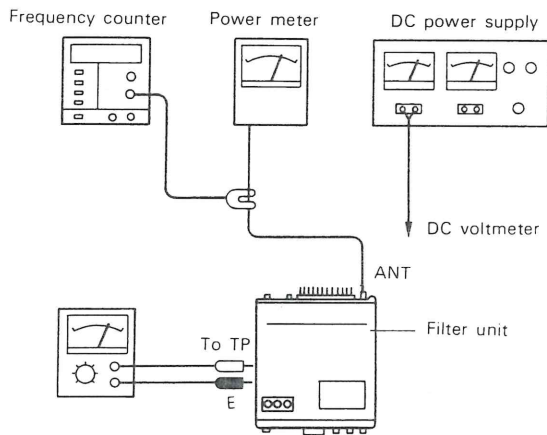


Fig. 2 Adjustment of PA unit and check of TX frequency

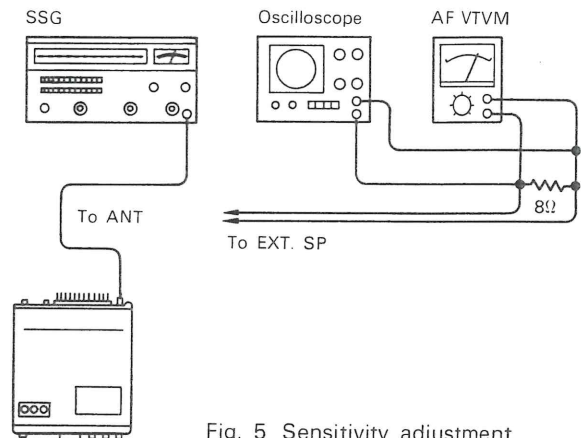


Fig. 5 Sensitivity adjustment

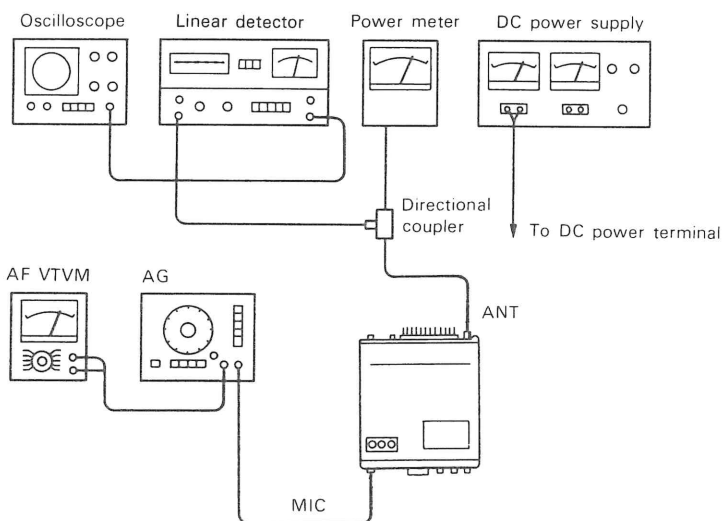


Fig. 3 Deviation adjustment

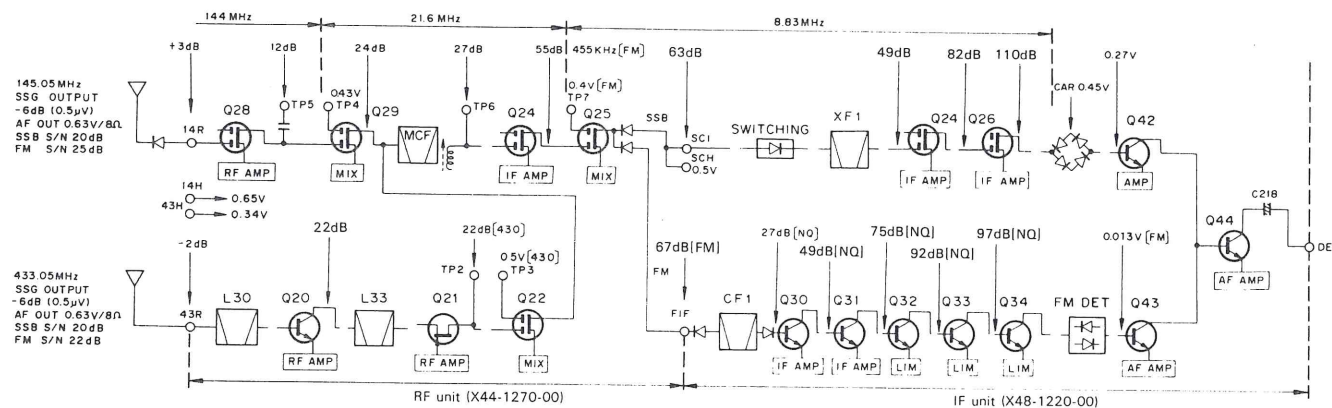
[Receiver Section]

The figures shown are signal generator output required for a constant audio output with a constant AF gain control setting. Set the AF gain control for 0.63V/8 Ω (50 mW) audio output at -6 dB (0.5 μ V) signal generator input at 145.05 MHz. (USB Mode)

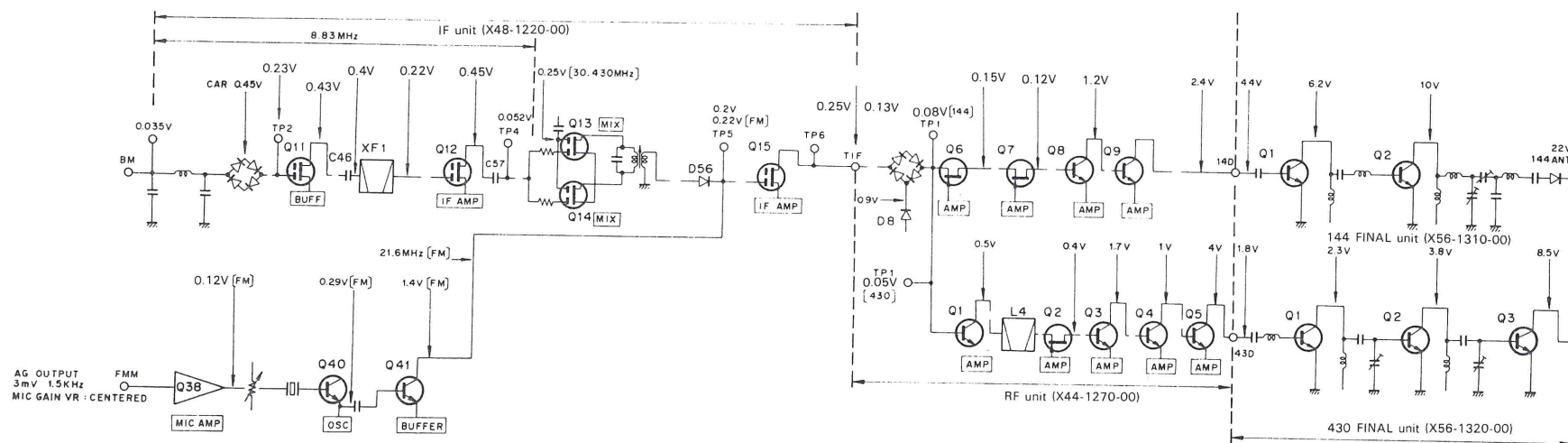
[Transmitting Portion]

- The portion which is not designated is 145.05 MHz, Mode USB
MIC terminal input: 3 mV, 1.5 kHz
MIC gain: CENTERED

RECEIVER SECTION



TRANSMITTED SECTION



LEVEL DIAGRAM

WIREHARNESS

Con- nector No.	Ter- minal No.	Color	Destination		Re- marks	Con- nector No.	Ter- minal No.	Color	Destination		Re- marks	Con- nector No.	Ter- minal No.	Color	Destination		Re- marks				
			Con- nector and Parts	Ter- minal					Con- nector and Parts	Ter- minal					Con- nector and Parts	Ter- minal					
1	1	UL1061 #28 RED/WHT	31	5	OAR	13	1	0.8DXV	48	1	SC1	27	1	UL1061 #28 YLW	25	4	BAS				
	2	UL1061 #28 ORA	30	4	FMB		2	0.8DXV	48	2	E		2	UL1061 #28 RED/WHT	25	2	FB				
	3	UL1061 #28 GRN	10	5	LPI		3	UL1061 #28 VLT/WHT	10	6	NBS		3	UL1061 #28 RED/WHT	25	1	FB				
	4	UL1061 #28 GRN/WHT	9	1	LID																
2	1	UL1061 #28 YLW/WHT	4	9	F2	14	1	0.8DXV	48	4	E	28*	1	UL1061 #28 YLW/WHT	25	8	OUT				
	2	UL1061 #28 YLW	30	2	B2		2	0.8DXV	48	3	FIF		2	UL1061 #28 BLK	25	9	IN				
	3	UL1061 #28 VLT	30	3	B1		3	UL1061 #28 GRN/WHT	45	2	814		3	UL1061 #28 BLU/WHT	25	10					
3*	1	UL1061 #28 RED/WHT	42	7	SD	15	4	UL1061 #28 VLT/WHT	24	2	814	29	1	UL1061 #28 YLW	59	3	SP				
	2	UL1061 #28 BLK * Universal LED socket	44	9	E		5	UL1061 #28 VLT/WHT	24	1	843		2	UL1061 #28 GRN	58	1	SPO				
4	1	UL1061 #28 GRN	43	1	SV	16	7	0.8DXV	48	4	E	30	1	UL1061 #28 YLW	59	3	SP				
	2	UL1061 #28 BLU	42	4	F1		8	0.8DXV	48	3	CAR		2	UL1061 #28 GRN	58	1	SPO				
	3	UL1061 #28 BRN	32	10	DL2		9	UL1061 #28 GRN	5	8	E		3	UL1061 #28 GRN	7	5	AVI				
	4	UL1061 #28 RED	32	1	DL3		10	UL1061 #28 GRN	5	7	BM		4	UL1061 #28 GRN	7	4	E-				
	5	UL1691 #28 WHT	58	3	E		1	UL1061 #28 YLW	7	3	RFI		5	UL1691 #28 GRN	16	8	FMM				
	6	UL1691 #28 WHT	58	4	MIC		2	UL1061 #28 GRN/WHT	50	1	SMF		6	UL1691 #28 GRN	16	7	E				
	7	UL1061 #28 ORA/WHT	6	7	RL		3	UL1061 #28 RED	6	12	SQV		7	UL1691 #28 VLT	16	7	E				
	8	UL1061 #28 GRY	38	1	F3		4	UL1691 #28 WHT	7	7	E		8	UL1691 #28 VLT	16	7	E				
	9	UL1061 #28 YLW/WHT	2	1	F8		5	UL1691 #28 WHT	7	6	DET		9	UL1691 #28 ORA	5	5	FMI				
5	1	UL1691 #28 RED	32	8	E	17	6	UL1061 #28 GRN	42	6	SQ	31	1	UL1061 #28 YLW	2	2	FM2				
	2	UL1691 #28 RED	32	9	VOX		7	UL1061 #28 WHT	57	1	CM		2	UL1061 #28 VLT	2	3	B1				
	3	UL1061 #28 BLK	6	2	E		8	UL1061 #28 RED	33	1	LPS		3	UL1061 #28 ORA	1	2	FMB				
	4	UL1061 #28 GRY	6	5	C8		9	UL1061 #28 VLT	29	7	E		4	UL1061 #28 ORA	11	3	FMB				
	5	UL1691 #28 ORA	29	9	E		10	UL1061 #28 WHT	57	1	SCH		5	UL1061 #28 ORA	44	7	BZ				
	6	UL1691 #28 ORA	29	9	FMI		1	0.8DXV	47	2	E		6	UL1061 #28 ORA	44	7	BZ				
	7	UL1691 #28 GRN	14	10	BM		2	0.8DXV (Ferrite beads)	47	1	E		7	UL1061 #28 ORA	44	7	BZ				
	8	UL1691 #28 GRN	14	10	CWB		3	UL1061 #28 RED	7	1	RF3		8	UL1061 #28 ORA	44	7	BZ				
	9	UL1061 #28 BRN/WHT	11	4			4	UL1061 #28 BLU/WHT	24	8	-6V		9	UL1061 #28 ORA	44	7	BZ				
6	1	UL1061 #28 YLW	39	4	RIT	18	5	0.8DXV	51	4	E	32	1	UL1061 #28 RED	4	4	DL3				
	2	UL1061 #28 BLK	5	3	C8		6	0.8DXV	51	3	TIF		2	UL1061 #28 BLU/WHT	10	11	VS				
	3	UL1061 #28 GRY	11	6	C8		7	UL1691 #28 VLT	29	7	E		3	UL1061 #28 GRY	23	2	C8				
	4	UL1061 #28 GRY	45	3	C8		8	UL1691 #28 VLT	29	6	FMM		4	UL1061 #28 YLW/WHT	22	1	KEY				
	5	UL1061 #28 GRY	5	4	C8		9	UL1691 #28 VLT	29	7	E		5	UL1061 #28 YLW/WHT	59	2	KEY				
	6	UL1061 #28 YLW	12	6	CWR		10	UL1691 #28 VLT	29	7	E		6	UL1061 #28 BRN/WHT	22	2	CWB				
	7	UL1061 #28 ORA/WHT	4	7	RL		11	UL1691 #28 VLT	29	7	E		7	UL1061 #28 WHT	59	1	STS				
	8	UL1061 #28 ORA/WHT	50	2	RL		12	UL1061 #28 BLU	45	4	RB		8	UL1691 #28 WHT	59	1	STS				
	9	UL1061 #28 ORA/WHT	31	3	RL		1	UL1061 #28 RED	33	1	LPS		9	UL1691 #28 WHT	59	1	STS				
	10	UL1061 #28 ORA/WHT	44	8	RL		2	UL1061 #28 RED	33	1	LPS		10	UL1691 #28 WHT	59	1	STS				
	11	UL1061 #28 RED/WHT	9	8	RTS		3	UL1061 #28 RED	33	1	LPS		11	UL1691 #28 WHT	59	1	STS				
	12	UL1061 #28 RED	15	3	SQV		4	UL1061 #28 RED	33	1	LPS		12	UL1691 #28 WHT	59	1	STS				
7	1	UL1061 #28 RED	18	1	RF3	20	1	UL1061 #28 GRN/WHT	44	5	291	33	1	UL1061 #28 RED	16	1	LPF				
	2	UL1061 #28 ORA	18	5	RF3		2	UL1061 #28 BLU/WHT	44	6	286		2	UL1061 #28 RED	16	1	LPF				
	3	UL1061 #28 YLW	15	1	RF1		3	UL1061 #28 BLU/WHT	44	6	286		3	UL1061 #28 BLK	58	5	E				
	4	UL1691 #28 GRN	29	5	E		4	UL1061 #28 BLU/WHT	44	6	286		4	UL1061 #28 YLW	52	8	43L				
	5	UL1691 #28 GRN	29	4	AVI		5	0.8DXV	39	8	E		34	1	UL1061 #28 GRY	10	3	SS			
	6	UL1691 #28 WHT	15	5	DET		6	0.8DXV	39	9	VCP			2	UL1061 #28 BRN	60	5	T8			
	7	UL1691 #28 WHT	15	4	E		7	0.8DXV	39	6	E			3	UL1061 #28 RED	16	9	TO			
8	1	0.8DXV	39	3	CAR	21	8	0.8DXV	39	5	VCV	35	1	UL1061 #28 BLU	60	6	5V				
	2	0.8DXV	39	2	E		9	UL1061 #28 WHT	39	10	UK		36	1	0.8DXV	21	8	VCO			
	3	0.8DXV	14	8	CAR		10	UL1061 #28 WHT	39	10	UK			2	0.8DXV	21	9	E			
	4	0.8DXV	14	7	E		11	UL1061 #28 WHT	39	10	UK			3	UL1061 #28 GRY/WHT	49	2	843			
	5	UL1061 #28 GRY	12	7	C8		12	UL1061 #28 WHT	39	10	UK			37	1	Not used					
	6	UL1061 #28 VLT/WHT	12	4	LSB		1	0.8DXV	51	1	14H				38	1	UL1061 #28 GRY	4	8	F4	
	7	UL1061 #28 ORA/WHT	12	2	FMB		2	0.8DXV	51	2	E					2	UL1061 #28 ORA	42	5	F3	
	8	UL1061 #28 BLU/WHT	12	5	CWT		3	0.8DXV	51	2	E					3	UL1061 #28 RED	41	6	ME	
	9	UL1061 #28 BLU/WHT	12	5	CWT		4	0.8DXV	51	2	E					39	1	UL1061 #28 RED	23	3	13.8
	10	UL1061 #28 GRY/WHT	12	3	USB		5	0.8DXV	51	2	E						2	0.8DXV	8	2	E
					6	0.8DXV	51	2	E	3	0.8DXV	6					1	RIT			
					7	0.8DXV	51	2	E	4	0.8DXV	21	6				VCV				
9	1	UL1061 #28 GRN/WHT	1	4	LID	22	8	0.8DXV	51	2	E	40	1	UL1061 #28 GRY		21	4	PL8			
	2	UL1061 #28 BLU/WHT	42	1	LK		9	UL1061 #28 WHT	39	10	UK		2	UL1061 #28 GRY	21	2	E				
	3	UL1061 #28 BRN	41	7	SH		10	UL1061 #28 WHT	39	10	UK		3	UL1061 #28 GRY	21	2	E				
	4	UL1061 #28 VLT	42	9	SM		11	UL1061 #28 WHT	39	10	UK		4	UL1061 #28 GRY	21	2	E				
	5	UL1061 #28 YLW/WHT	1	5	RID		12	UL1061 #28 WHT	39	10	UK		5	UL1061 #28 GRY	21	2	E				
	6	UL1061 #28 GRN	43	2	SV		1	UL1061 #28 YLW/WHT	32	4	KEY		6	UL1061 #28 GRY	21	2	E				
	7	UL1061 #28 BLK	22	4	E		2	UL1061 #28 BRN/WHT	32	6	CWB		7	UL1061 #28 GRY	21	2	E				
	8	UL1061 #28 RED/WHT	6	11	RF		3	UL1061 #28 BRN/WHT	11	5	E		8	UL1061 #28 GRY	21	2	E				
	9	UL1061 #28 YLW	42	3	SF		4	UL1061 #28 BRN/WHT	11	5	E		9	UL1061 #28 GRY	21	2	E				
							5	UL1061 #28 BRN/WHT	11	5	E		10	UL1061 #28 GRY	21	2	E				
							6	UL1061 #28 BRN/WHT	11	5	E		41	1	UL1061 #28 RED	23	3	13.8			
							7	UL1061 #28 BRN/WHT	11	5	E			2	0.8DXV	8	2	E			
							8	UL1061 #28 BRN/WHT	11	5	E			3	0.8DXV	8	2	E			
10	1	UL1061 #28 GRY	41	8	ED	23	1	UL1061 #28 YLW/WHT	32	4	KEY	42	1	UL1061 #28 RED	23	3	13.8				
	2	UL1061 #28 GRY/WHT	60	4	C8		2	UL1061 #28 YLW/WHT	32	4	KEY		2	0.8DXV	8	2	E				
	3	UL1061 #28 GRY	34	1	CC		3	UL1061 #28 YLW/WHT	32	4	KEY		3	0.8DXV	8	2	E				
	4	UL1061 #28 ORA	33	2	LPS		4	UL1061 #28 YLW/WHT	32	4	KEY		4	0.8DXV	8	2	E				
	5	UL1061 #28 GRN	1	3	LPI		5	UL1061 #28 YLW/WHT	32	4	KEY		5	0.8DXV	8	2	E				
	6	UL1061 #28 VLT/WHT	13	3	NBS		6	UL1061 #28 YLW/WHT	32	4	KEY		6	0.8DXV	8	2	E				
	7	UL1061 #28 BLU	54	6	PWM		7	UL1061 #28 YLW/WHT	32	4	KEY		7	0.8DXV	8	2	E				
	8	UL1061 #28 GRN/WHT	50	4	SM		8	UL1061 #28 YLW/WHT	32	4	KEY		8	0.8DXV	8	2	E				
	9	UL1061 #28 GRN/WHT	57	2	SM		9	UL1061 #28 YLW/WHT	32	4	KEY		9	0.8DXV	8	2	E				
	10	UL1061 #28 YLW/WHT	50	3	ALM		10	UL1061 #28 YLW/WHT	32	4	KEY		10	0.8DXV	8	2	E				
	11	UL1061 #28 BLU/WHT	32	2	VS		11	UL1061 #28 YLW/WHT	32	4	KEY		11	0.8DXV	8	2	E				
	12	UL1061 #28 ORA	31	6	SS		12	UL1061 #28 YLW/WHT	32	4	KEY		12	0.8DXV	8	2	E				
	13	UL1061 #28 ORA	58	2	SS		13	UL1061 #28 YLW/WHT	32	4	KEY		13	0.8DXV	8	2	E				
11	1	UL1061 #28 ORA/WHT	22	5	RL	25	1	UL1061 #28 RED/WHT	27	3	FB	43	1	UL1061 #28 BLU/WHT	9	2	LK				
	2	UL1061 #28 ORA	30	5	FMB		2	UL1061 #28 RED/WHT	27	3	FB		2	UL1061 #28 BLK	43	9	CC				
	3	UL1061 #28 BRN/WHT	5	9	CWB		3	UL1061 #28 RED	62	2	REC		3	UL1061 #28 YLW	9	2	SF				
	4	UL1061 #28 BRN/WHT	22	3	CWB		4	UL1061 #28 YLW	27	1	E		4	UL1061 #28 YLW	9	2	SF				
	5	UL1061 #28 GRY	6	3	C8		5	UL1061 #28 BLK	62	1	AFB		5	UL1061 #28 YLW	9	2	SF				
	6	UL1061 #28 GRY	24	3	C8		6	UL1061 #28 RED	60	1	13.8		6	UL1061 #28 YLW	9	2	SF				
12	1	UL1061 #28 ORA/WHT	8	7	K2	26*	7	UL1061 #28 YLW/WHT	28	1	OUT	44	1	UL1061 #28 GRN	15	6	SQ				
	2	UL1061 #28 GRY/WHT	8	10	FMB		8	UL1061 #28 BLK	28	2	E		2	UL1061 #28 RED/WHT	3	1	SD				
	3	UL1061 #28 VLT/WHT	8	6	LSB		9	UL1061 #28 BLK	28	2	E		3	UL1061 #28 RED/WHT	3	1	SD				
	4	UL1061 #28 BLU/WHT	8	8	CWB		10	UL1061 #28 BLU/WHT	28	3	IN		4	UL1061 #28 RED/WHT	3	1	SD				
	5	UL1061 #28 YLW	6	6	CWB		1	UL1007 #20 RED	62	3	COL</										

TOP INTERNAL VIEW

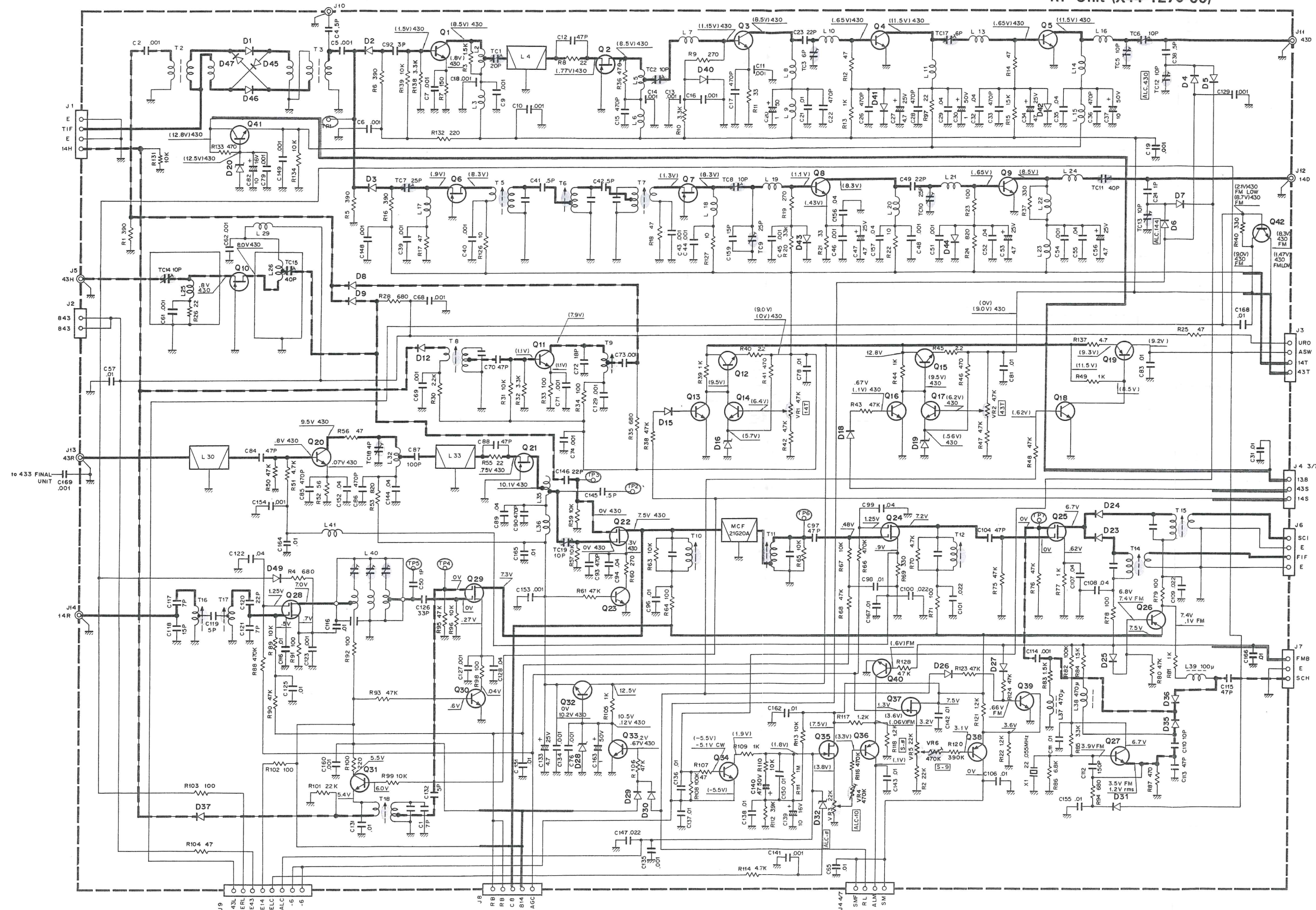


BOTTOM INTERNAL VIEW



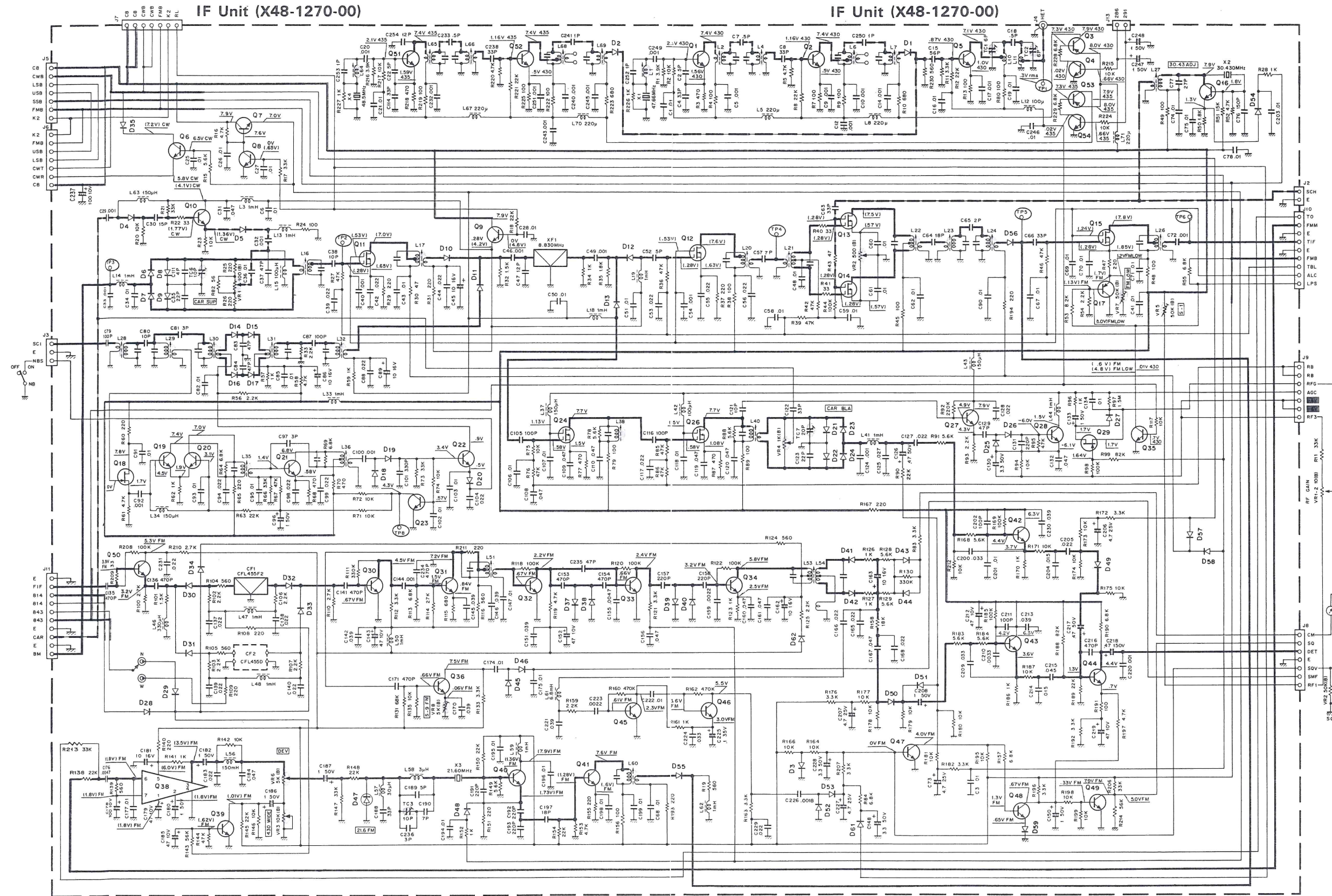
CIRCUIT DIAGRAM

RF Unit (X44-1270-00)



- | | |
|-------------------------|------------------|
| Q2, 6, 7, 10, 21 | : 2SK125 |
| Q3, 8 | : 2SC2407 |
| Q4, 5 | : MRF629 |
| Q9 | : 2SC741 |
| Q11 | : 2SC387A |
| Q12, 15, 41 | : 2SD235 |
| Q13, 14, 16, 18, 23 | : 2SC1815(Y) |
| 30, 31, 33, 34, 39, 40 | : 2SA562(Y) |
| Q19 | : 2SC2549 |
| Q1, 20 | : 3SK92 or 3SK76 |
| Q22 | : 3SK76 |
| Q24, 25 | : 3SK74(L) |
| Q26, 36, 38 | : 2SA1015(Y) |
| Q27 | : 2SC460(B) |
| Q28, 29 | : 3SK40(L) |
| Q32 | : 2SC735(Y) |
| Q35, 37 | : 2SK19(GR) |
| Q42 | : 2SC496(Y) |
| D1, 45, 47 | : 1S597 |
| D2, 3, 8, 9 | : 1S2588 |
| D4, 7, 25 | : 1N60 |
| D12, 23, 24, 35, 37 | : 1S1587 |
| D15, 18, 26, 27, 29, 31 | : 1S1555 |
| 41, 42, 44, 49 | : XZ060 |
| D16, 19, 32 | : XZ132 |
| D20 | : XZ117 |
| D28 | : MU13 |
| D40, 43 | |

CIRCUIT DIAGRAM



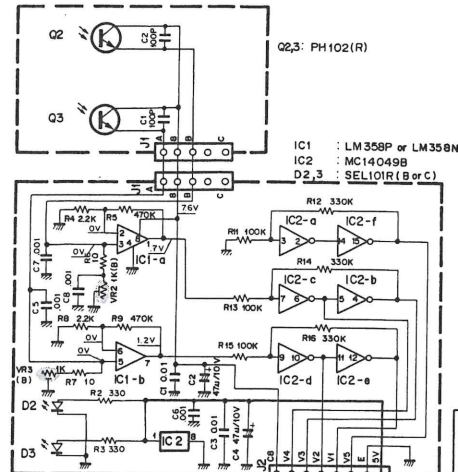
- | | | | | |
|--|----------------|-----|--|---------------------|
| Q1, 2, 10, 16, 19~21, 30~34, 40, 41, 50~52 | Q11~15, 24, 26 | Q38 | D1, 2 | D5, 10~17, 30~33 |
| Q3, 17, 53 | Q18 | Q39 | D3 | D6~9, 18, 19, 21~26 |
| Q4, 6~9, 22, 23, 27, 28, 35, 39, 42~49 | Q28 | Q38 | D4, 27~29, 34, 35, 37~40, 48~51, 54~59, 61, 62 | D7~10, 46, 52, 53 |
| Q5 | Q29 | Q38 | | D20 |
| | Q30 | Q38 | | D47 |
| | Q31 | Q38 | | |
| | Q32 | Q38 | | |
| | Q33 | Q38 | | |
| | Q34 | Q38 | | |
| | Q35 | Q38 | | |
| | Q36 | Q38 | | |
| | Q37 | Q38 | | |
| | Q38 | Q38 | | |
| | Q39 | Q38 | | |
| | Q40 | Q38 | | |
| | Q41 | Q38 | | |
| | Q42 | Q38 | | |
| | Q43 | Q38 | | |
| | Q44 | Q38 | | |
| | Q45 | Q38 | | |
| | Q46 | Q38 | | |
| | Q47 | Q38 | | |
| | Q48 | Q38 | | |
| | Q49 | Q38 | | |
| | Q50 | Q38 | | |
| | Q51 | Q38 | | |
| | Q52 | Q38 | | |
| | Q53 | Q38 | | |
| | Q54 | Q38 | | |
| | Q55 | Q38 | | |
| | Q56 | Q38 | | |
| | Q57 | Q38 | | |
| | Q58 | Q38 | | |
| | Q59 | Q38 | | |
| | Q60 | Q38 | | |
| | Q61 | Q38 | | |
| | Q62 | Q38 | | |
| | Q63 | Q38 | | |
| | Q64 | Q38 | | |
| | Q65 | Q38 | | |
| | Q66 | Q38 | | |
| | Q67 | Q38 | | |
| | Q68 | Q38 | | |
| | Q69 | Q38 | | |
| | Q70 | Q38 | | |
| | Q71 | Q38 | | |
| | Q72 | Q38 | | |
| | Q73 | Q38 | | |
| | Q74 | Q38 | | |
| | Q75 | Q38 | | |
| | Q76 | Q38 | | |
| | Q77 | Q38 | | |
| | Q78 | Q38 | | |
| | Q79 | Q38 | | |
| | Q80 | Q38 | | |
| | Q81 | Q38 | | |
| | Q82 | Q38 | | |
| | Q83 | Q38 | | |
| | Q84 | Q38 | | |
| | Q85 | Q38 | | |
| | Q86 | Q38 | | |
| | Q87 | Q38 | | |
| | Q88 | Q38 | | |
| | Q89 | Q38 | | |
| | Q90 | Q38 | | |
| | Q91 | Q38 | | |
| | Q92 | Q38 | | |
| | Q93 | Q38 | | |
| | Q94 | Q38 | | |
| | Q95 | Q38 | | |
| | Q96 | Q38 | | |
| | Q97 | Q38 | | |
| | Q98 | Q38 | | |
| | Q99 | Q38 | | |
| | Q100 | Q38 | | |

CIRCUIT DIAGRAM

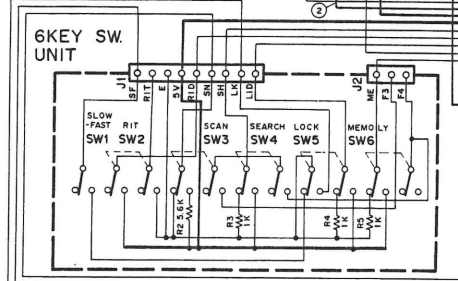
Signal ——— Control ——— Common DC line

PLL ASS'Y, ENCODER ASS'Y, DIGITAL, DISPLAY and 6KEY SW Unit.

ENCODER ASSY UNIT (X60-1080-61)
(X54-1400-00)

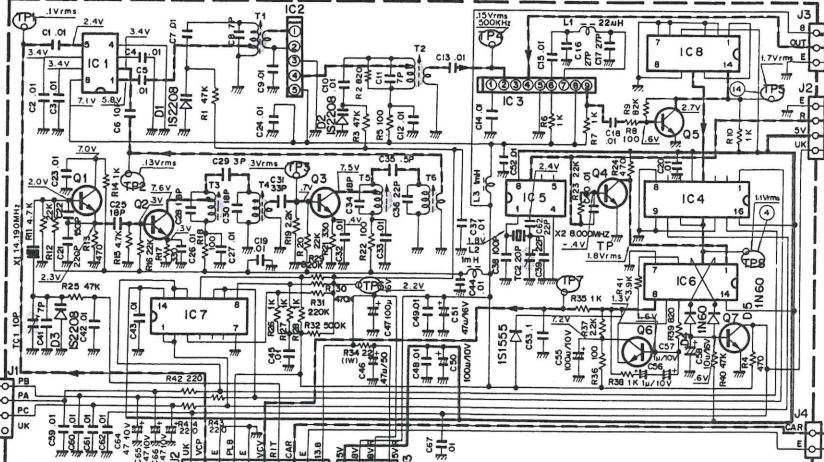


(X52-1120-61)
(X41-1160-00)

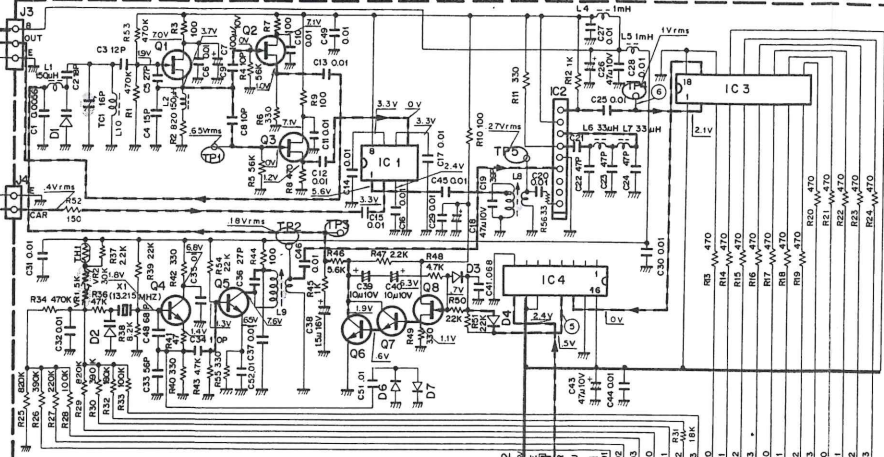


PLL ASSY UNIT (X60-1050-00)

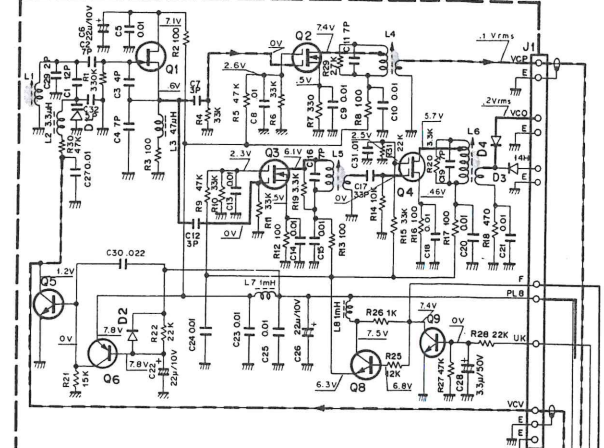
PLL (A) UNIT (X50-1530-00)



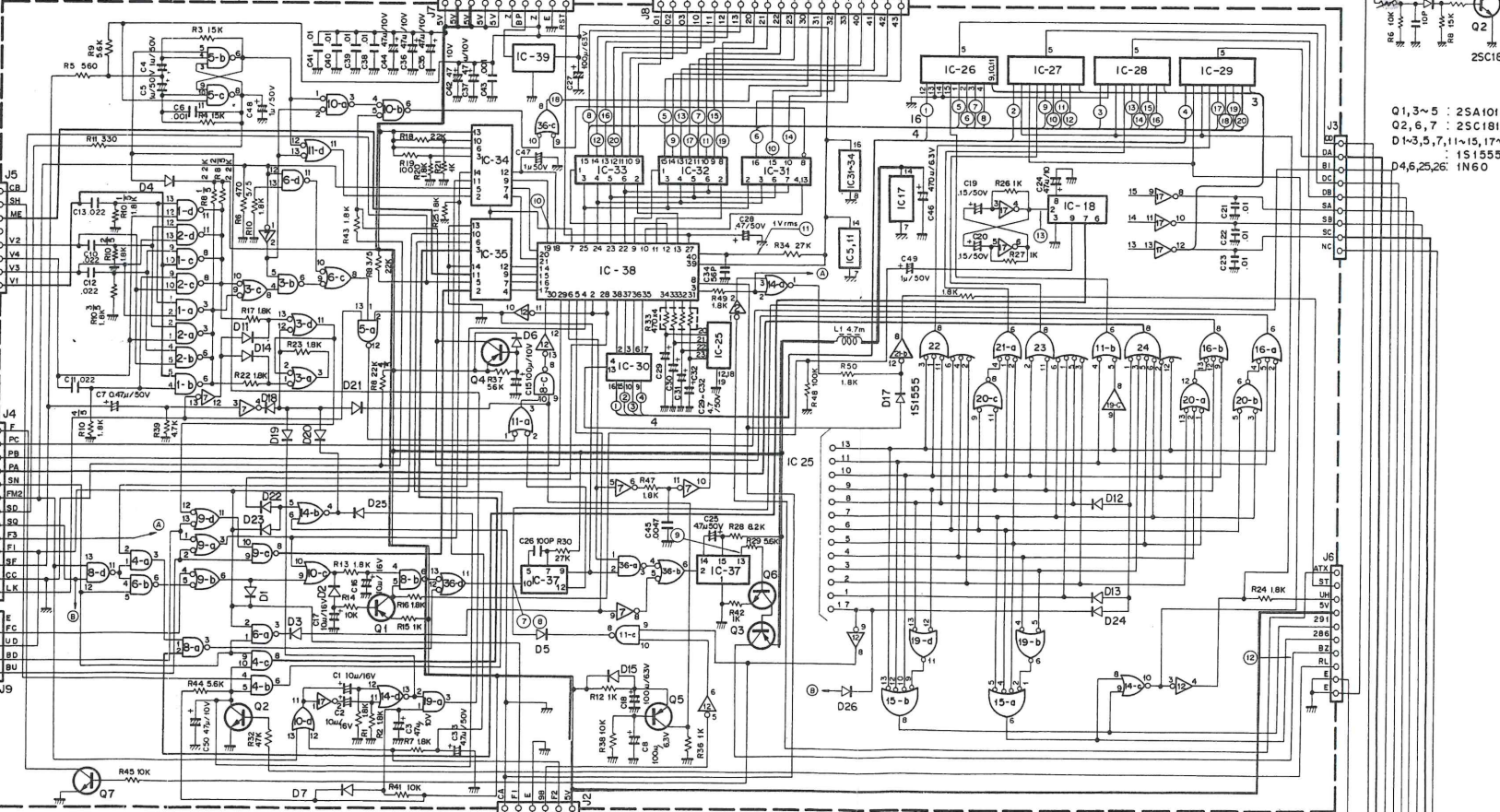
PLL (B) UNIT (X50-1540-00)



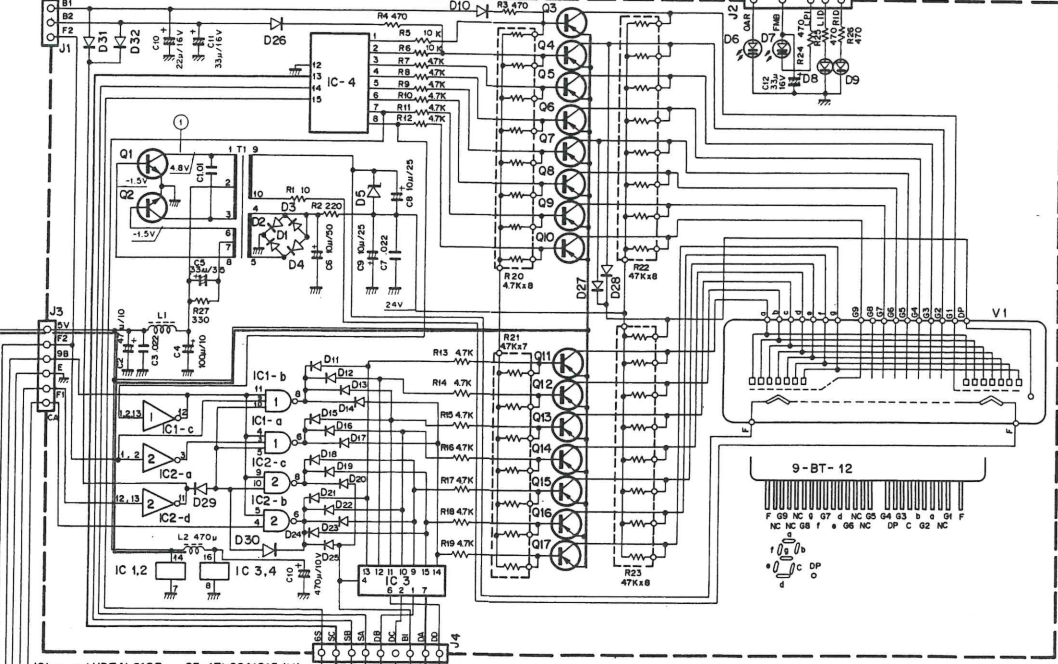
VCO UNIT (X50-1520-00)



DIGITAL UNIT (X54-1460-61)



DISPLAY UNIT (X54-1390-00)

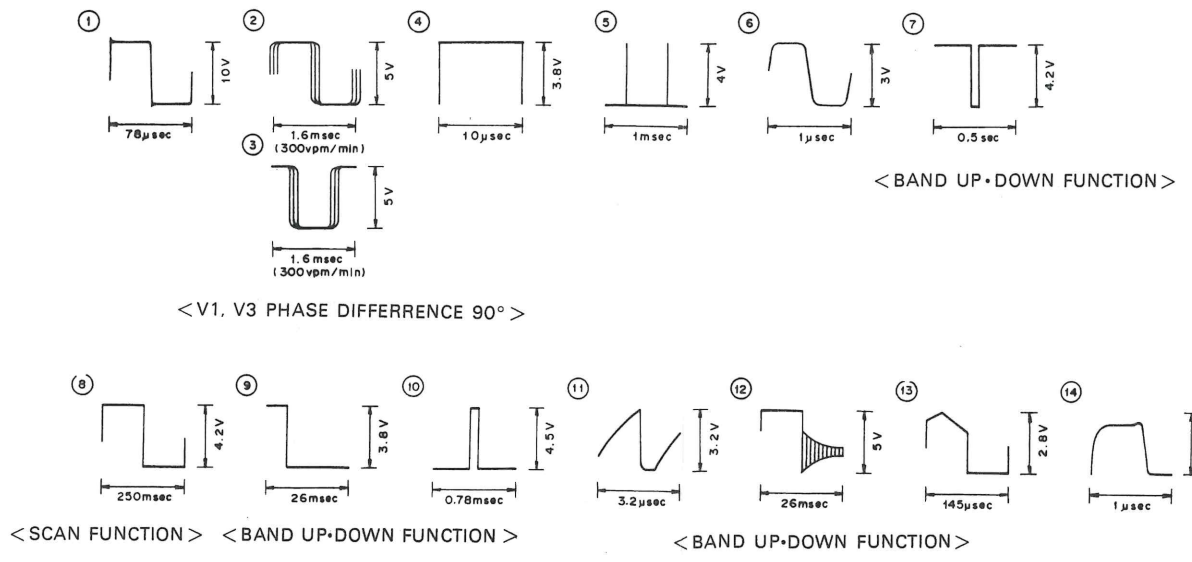
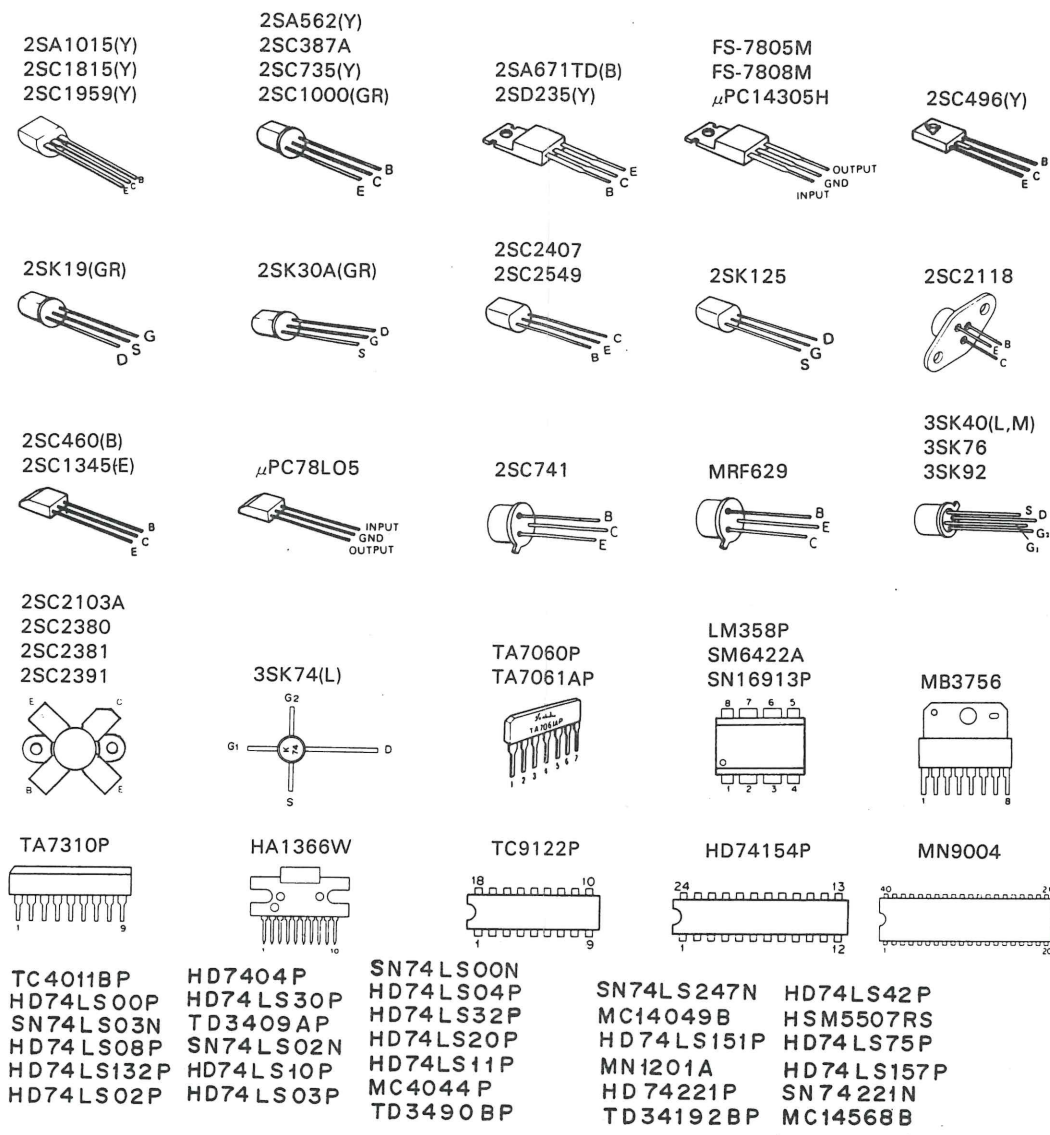
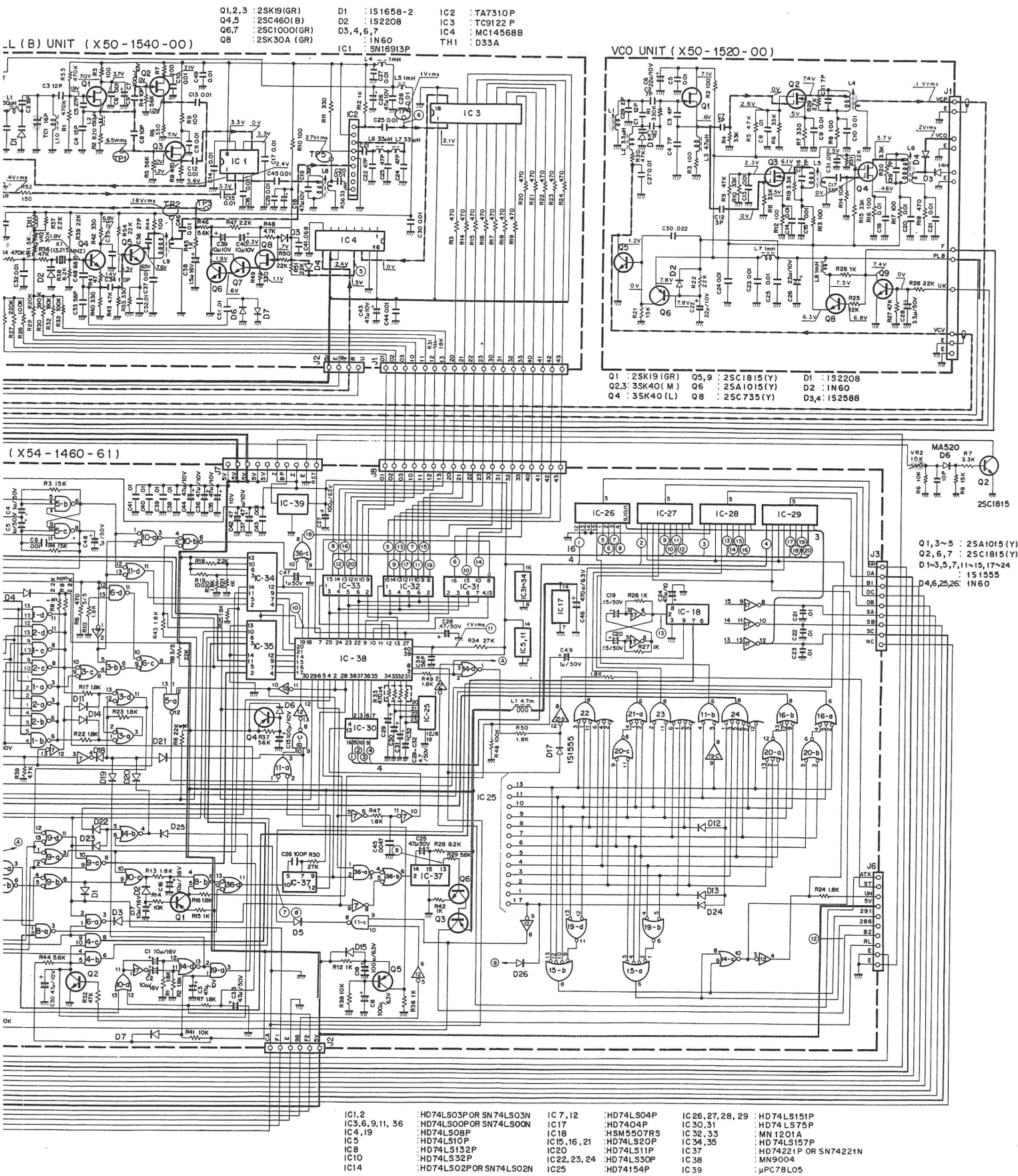


IC1-a-c : HD74LS10P Q3-17: 2SA1015 (Y)
IC2-a-d : HD74LS00P DI-4
IC3 : SN74LS247N DO-32 : 1S1555
IC4 : HD74LS42P D5 : WZ-071
V1 : 9-BT-12 D6-9 : SEL-103W
Q1,2 : 2SC1959 (Y)

BAND SWITCH

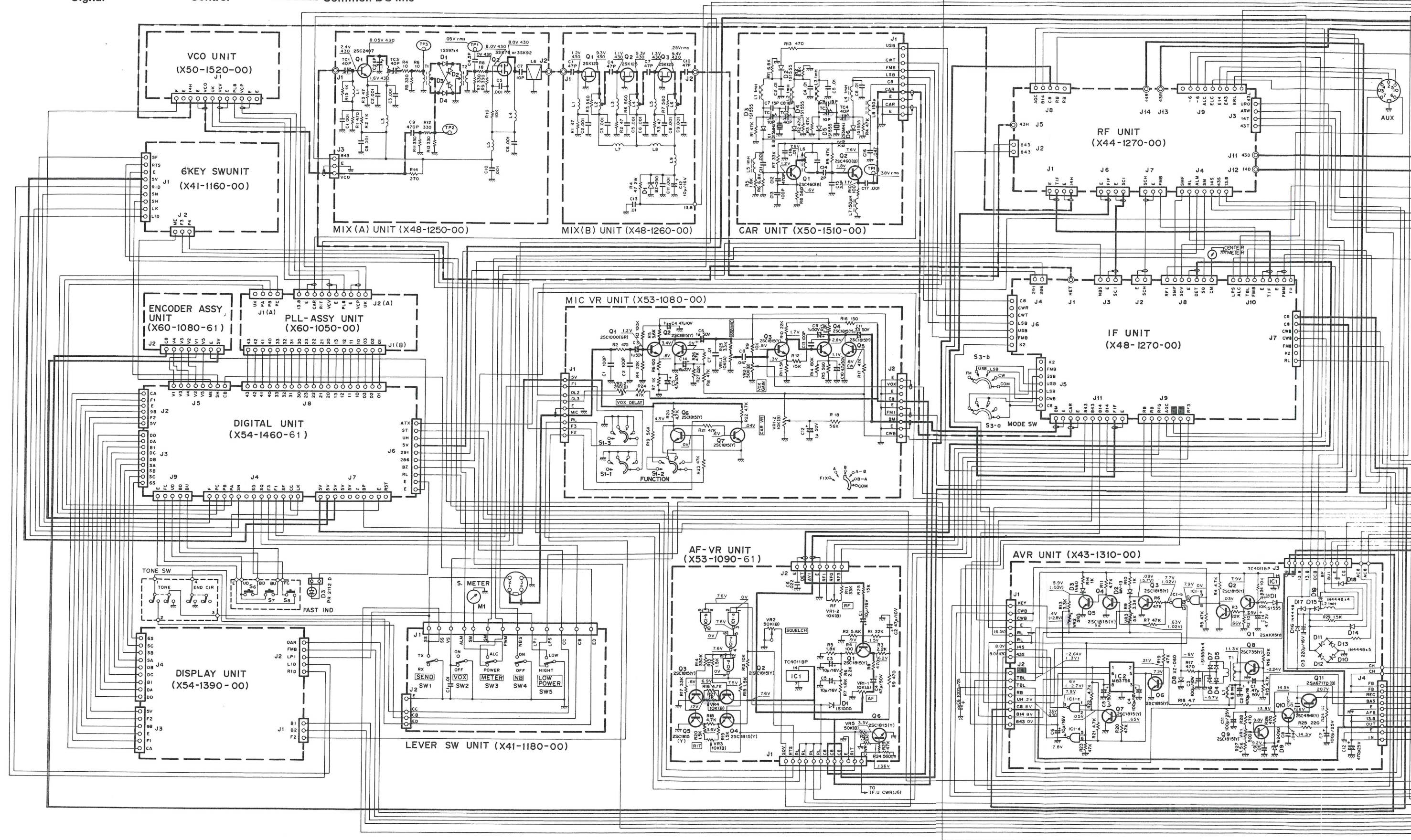
IC1,2 : HD74LS03P OR SN74LS03N IC 7,12 : HD74LS04P IC26,27,28,29 : HD74LS151P
IC3,6,9,11,36 : HD74LS00P OR SN74LS00N IC17 : HD74LS75P IC30,31 : HD74LS75P
IC4,19 : HD74LS08P IC18 : HSM5507RS IC32,33 : MN1201A
IC5 : HD74LS10P IC15,16,21 : HD74LS20P IC34,35 : HD74LS157P
IC8 : HD74LS132P IC20 : HD74LS11P IC37 : HD74LS221P OR SN74221N
IC10 : HD74LS32P IC22,23,24 : HD74LS30P IC38 : MN5004
IC14 : HD74LS02P OR SN74LS02N IC25 : HD74LS14P IC39 : μ PC74LO5

PLL ASS'Y, ENCODER ASS'Y, DIGITAL, DISPLAY and 6KEY SW Unit.

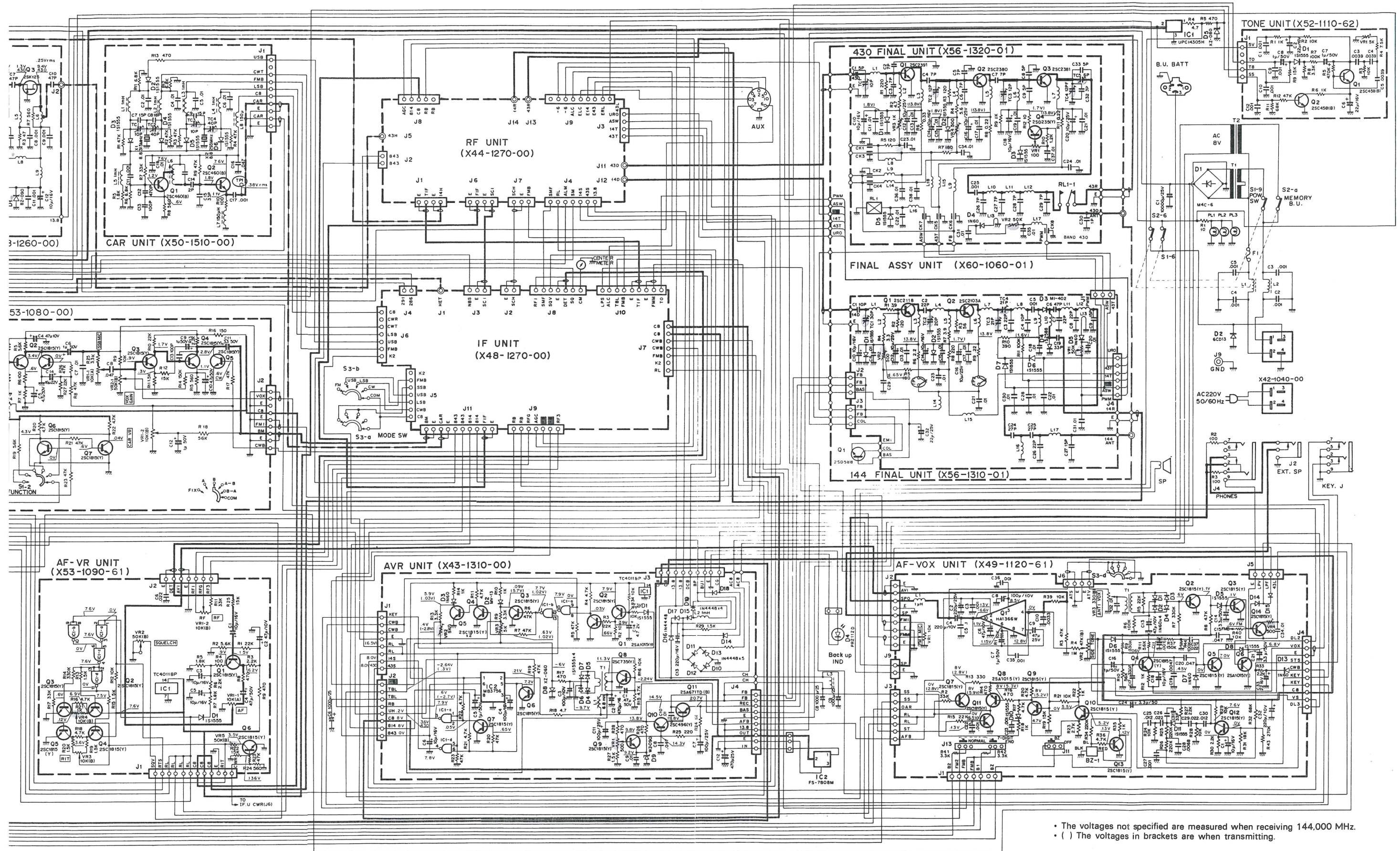


SCHEMATIC DIAGRAM

Signal ——— Control ——— Common DC line

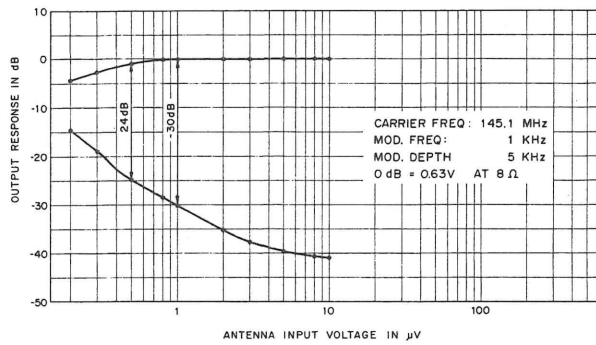


SCHEMATIC DIAGRAM

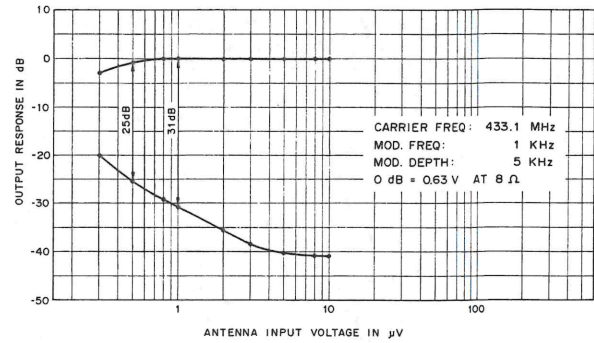


- The voltages not specified are measured when receiving 144,000 MHz.
- () The voltages in brackets are when transmitting.

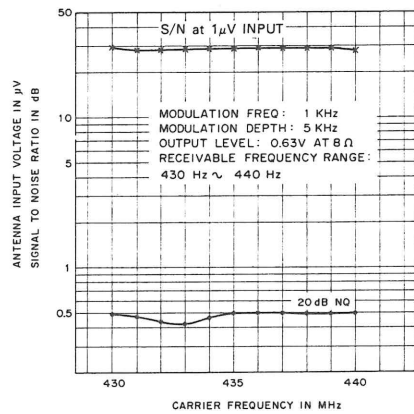
REFERENCE DATA(EXAMPLE)



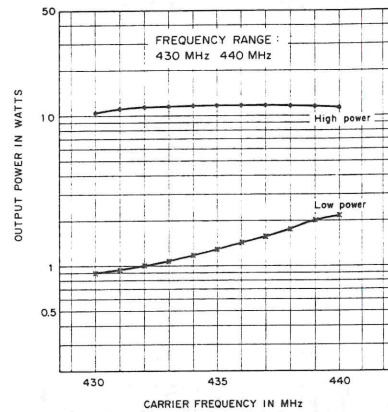
Signal to Noise Ratio and Output
VS Antenna Voltage (144MHz) (FM)



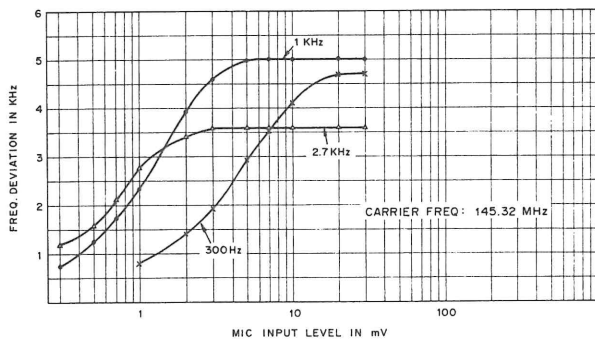
Signal to Noise Ratio and Output Level
VS Antenna Input Voltage (430MHz) (FM)



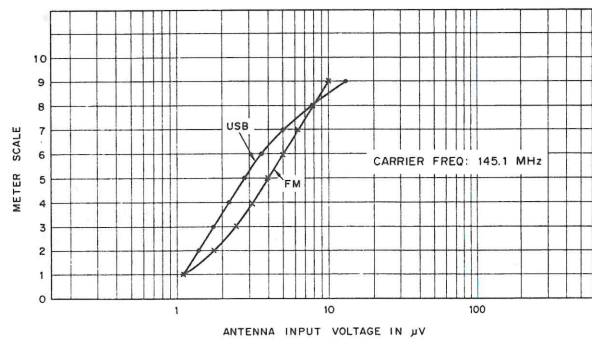
RX Sensitivity
(20dB N0) (430MHz)



Example of Transmission Output
(430MHz)



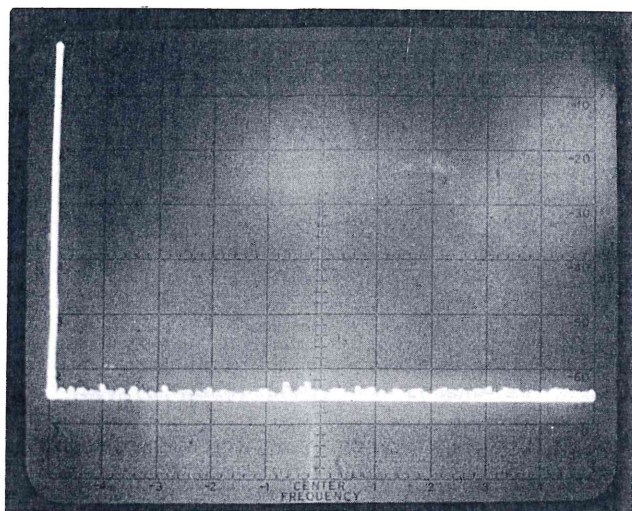
Deviation VS MIC input (144MHz)



S meter sensitivity (144MHz)

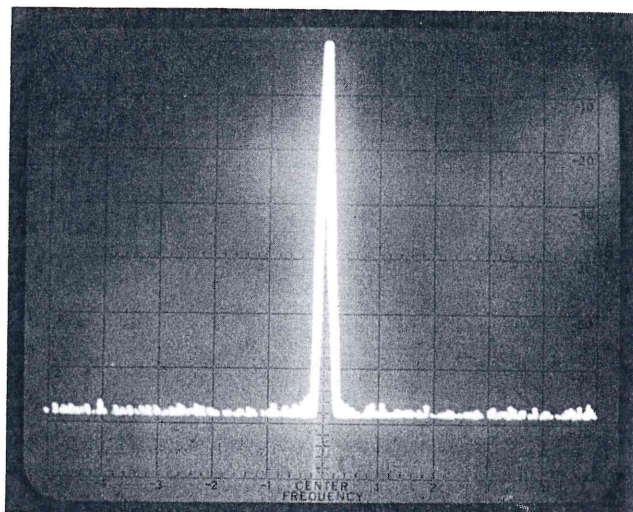
REFERENCE DATA(EXAMPLE)

SPURIOUS RESPONSE(CW)



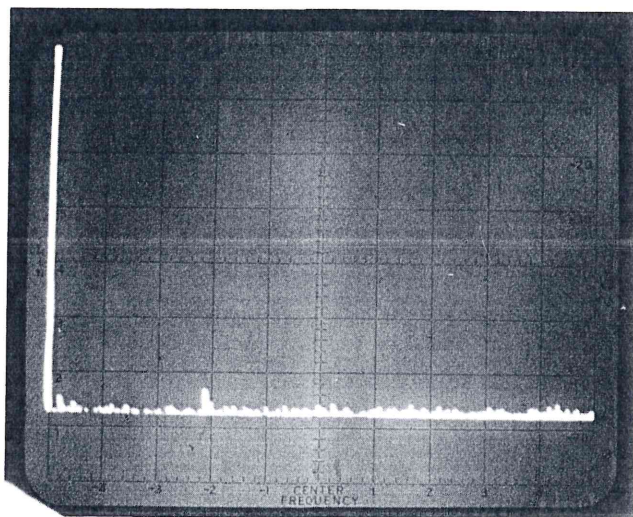
CARRIER FREQ.....145.1 MHz
RF POWER11.2 W
SCAN WIDTH.....100 MHz/DIV
BAND WIDTH.....100 kHz
SCAN TIME.....0.5 SEC
VIDEO FILTER10 kHz

SPURIOUS RESPONSE(CW)



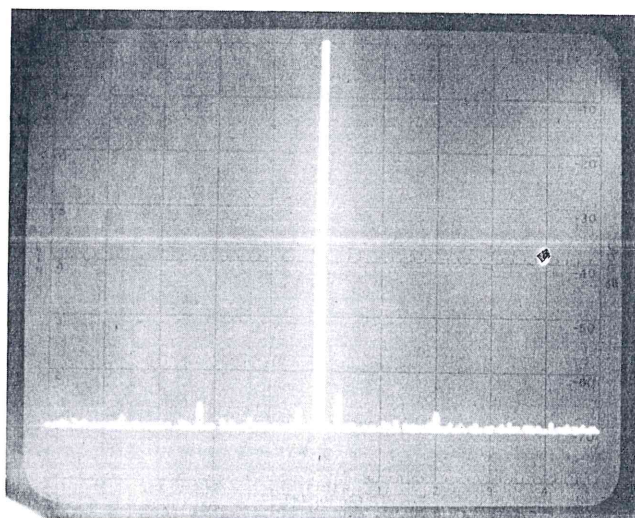
CARRIER FREQ.....145.5 MHz
RF POWER11.2 W
SCAN WIDTH.....5 MHz/DIV
BAND WIDTH.....100 kHz
SCAN TIME.....0.1 SEC
VIDEO FILTER10 kHz

SPURIOUS RESPONSE(FM)



CARRIER FREQ.....433.5 MHz
RF POWER11.8 W
SCAN WIDTH.....100 MHz/DIV
BAND WIDTH.....100 kHz
SCAN TIME.....0.5 SEC
VIDEO FILTER10 kHz

SPURIOUS RESPONSE(FM)



CARRIER FREQ.....433.5 MHz
RF POWER12.0 W
SCAN WIDTH.....10 MHz/DIV
BAND WIDTH.....100 kHz
SCAN TIME.....20 mSEC
VIDEO FILTER10 kHz

MEMO

SPECIFICATIONS

GENERAL

Frequency Range	144.0 ~ 146.0 MHz 430.0 ~ 440.0 MHz
Mode	SSB (USB, LSB), CW, FM
Voltage Requirements	220V AC, 50/60 Hz 12.0 ~ 16.0V DC (13.8V DC nominal)
Power Consumption	Receive (no signal): 45 watts (220V AC), 1.5A (13.8V DC) Transmit: 130 watts (220V AC), 6A (13.8V DC)
Semiconductor Complement	Transistors: 161 FETs: 31 ICs: 63 Diodes: 224
Dimensions	290 (W) × 124 (H) × 320 (D) mm (11"-7/16) × (4"-7/8) × (12"-5/8)
Weight	11 kg (24.2 lbs)

TRANSMITTER SECTION

RF Power Output	SSB, CW, FM: 10 watts FM (LOW): Approx. 1 watt
Modulation	SSB: Balanced modulation FM: Variable reactance frequency shift
Maximum frequency deviation (FM)	±5 kHz
Carrier Suppression	Better than 40 dB
Unwanted Sideband Suppression	Better than 40 dB
Spurious Radiation	Better than -60 dB
Microphone Impedance	500 ~ 600Ω
Antenna Impedance	50Ω
AF Response of Transmitter (SSB)	400 ~ 2600 Hz (-9 dB)
RPT Tone Frequency	1750 Hz

RECEIVER SECTION

Receiver Sensitivity	SSB, CW: 0.25 μV for 10 dB (S+N)/N FM: 1 μV for 30 dB (S+N)/N 0.4 μV for 20 dB
Intermediate Frequency	1st: 21.6 MHz 2nd: 8.83 MHz (144 MHz FM 455 kHz)
Image Rejection	1st IF: Better than 60 dB 2nd IF: Better than 50 dB
IF Rejection	Better than 70 dB
Squelch Sensitivity	0.25 μV
Audio Output	2.5 watts (with less than 10% distortion) into a 4 ohm load
Receiver Selectivity	SSB, CW: 2.4 kHz (-6 dB) 4.8 kHz (-60 dB) FM: 12 kHz (-6 dB) 24 kHz (-60 dB)
Frequency Stability	Within ±1 kHz during the first hour after 1 minute of warmup Within 150 Hz during any 30 minute period after warmup.

The above specifications are subject to change without notice for improvement.

A product of
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