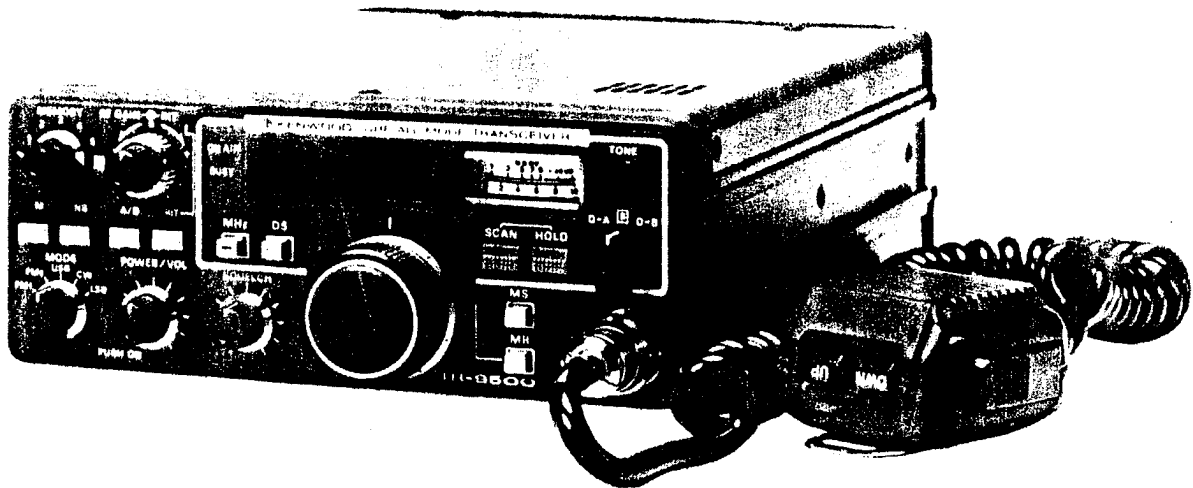




SERVICE MANUAL

TR-9500

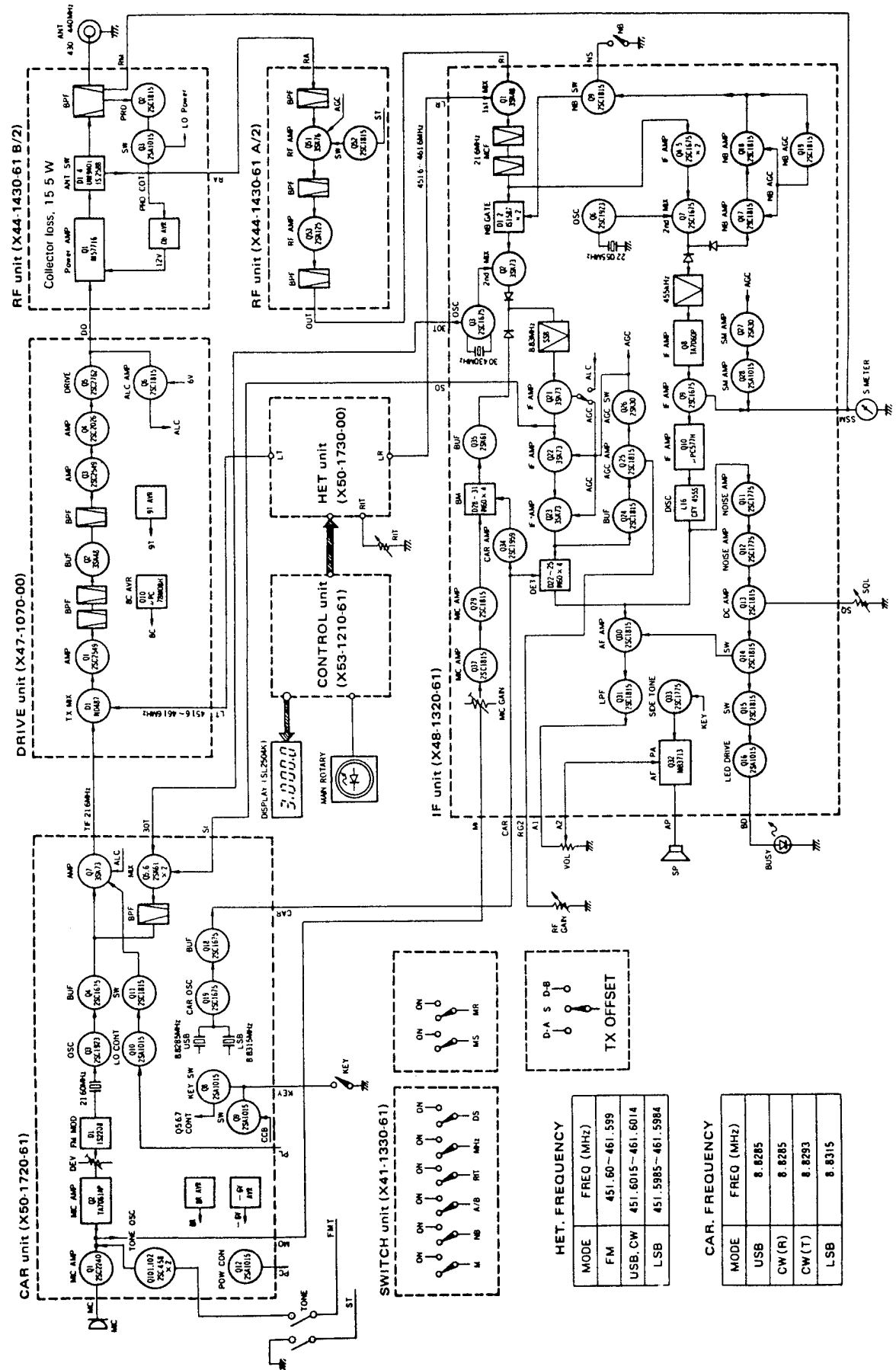


CONTENTS

BLOCK DIAGRAM	2	HET UNIT (X50-1730-00)	20, 21
CIRCUIT DESCRIPTION	3	CONTROL UNIT (X53-1210-51, -61, -71)	22, 23
OPTION (LSB CRYSTAL)	8	DRIVE UNIT (X47-1070-00)	24
PLL BLOCK DIAGRAM	9	CAR UNIT (X50-1720-00, -51, -61)	24
PARTS LIST	10	IF UNIT (X48-1320-61)	25
PACKING	17	DISASSEMBLY	26
PC BOARDS/CIRCUIT DIAGRAMS		LEVEL DIAGRAM	29
SWITCH UNIT (X41-1330-61)	18	ADJUSTMENTS	30
MODE BOARD (J25-2714-14)	18	SCHEMATIC ABBREVIATION	41
SCAN, HOLD BOARD (J25-2716-24)	18	SCHEMATIC DIAGRAM	43
TX OFFSET BOARD (J25-2744-04)	18	REFERENCE DATA	44
M. CH, MS, MR BOARD (J25-3023-04)	18	SPECIFICATIONS	BACK COVER
RF UNIT (X44-1430-61)	19		

UHF ALL MODE TRANSCEIVER

BLOCK DIAGRAM(W)

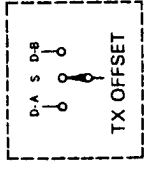
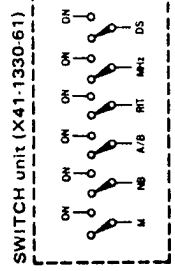


HET. FREQUENCY

MODE	FREQ (MHZ)
FM	451.60-461.599
USB, CW	451.6015-461.6014
LSB	451.5985-461.5984

CAR. FREQUENCY

MODE	FREQ (MHZ)
USB	8.8285
CW (R)	8.8285
CW (T)	8.8293
LSB	8.8315



CIRCUIT DESCRIPTION

RECEIVER CIRCUIT

The antenna signal is input to the front end (RF unit A/2) through the diode switch in the final unit (RF unit B/2). The front end is comprised of a two-stage RF amplifier consisting of a dual gate MOS FET (Q51 : 3SK76), a junction FET (Q53 : 2SK125) and a helical resonator with a bandwidth of 10 MHz.

The signal amplified in the front end is then applied to the IF unit. The IF unit has a first mixer (Q1 : 3SK48) followed by a two-stage monolithic filter (MCF), providing high sensitivity and superior two signal characteristics.

The first 21.6 MHz IF signal output from the MCF is applied to both the SSB circuit and the FM circuit.

In the SSB circuit, the SSB signal, after passing through the NB gate, is converted to 8.83 MHz with 2nd mixer Q2, then applied to the crystal filter (YK-88S). The signal is then amplified with IF amplifier Q21 (which is also used for transmission) and IF amplifiers Q22 and Q23 and is demodulated into an audio signal with a ring demodulator.

In the NB circuit, the noise signal is converted into a 455 kHz signal with 2nd mixer Q7, then amplified with the 2-stage amplifier consisting of Q17 and Q18 (2SC1815(Y)) to switch the NB gate.

The signal is picked up from the last stage of the IF amplifier (Q23), then detected and amplified to generate the AGC voltage. The AGC time constant is automatically set according to the mode : FAST for CW; SLOW for SSB. The AGC voltage is applied to IF amplifiers Q21, Q22 and Q23 (3SK73(GR)) and RF amplifier Q51. It is also used to drive the S meter.

In the FM circuit, the FM signal is converted into a 455 kHz IF signal with 2nd mixer Q7, then applied to the IF amplifier through the ceramic filter (CFW 455C). The IF signal is amplified with Q8 (TA7060P), Q9 (2SC1675(L)) and Q10 (μ PC577H), then is demodulated. In the squelch circuit, the noise signal is amplified with Q11 and Q12 (2SC1775(E)) and then rectified with D9 and D10 to switch Q13 thru Q16 ON and OFF so that AF amplifier Q30 and the BUSY indicator are switched ON and OFF. The Q16 output signal is also fed to the control unit (X53-1210-XX) as the scan stop signal (SS). The scan stop signal (SS) is applied to pin 4 of microprocessor Q12 in the control unit.

In every mode, the demodulated AF signal is amplified with AF amplifier Q30 (2SC1815(Y)), filtered with active L.P.F. Q31 (2SC1815(Y)) and applied to power amplifier Q32 (MB3713) through the AF gain control to drive the speaker.

Item	Rating
Nominal center frequency (f_0)	21.6 MHz
3 dB bandwidth	$f_0 \pm 7.5$ kHz or more
Attenuation bandwidth	$f_0 \pm 25$ kHz or less at 40 dB $f_0 \pm 45$ kHz or less at 60 dB
Guaranteed attenuation	70 dB or more within $f_0 \pm 1$ MHz 80 dB or more within $f_0 \pm (910 \text{ kHz} \pm 20 \text{ kHz})$
Spurious	35 dB or more within f_0 to $f_0 + 500$ kHz
Ripple	1.0 dB or less
Loss	2.0 dB or less
Input and output impedance	1 k Ω //1 pF

Table 1 MCF (L71-0227-05) XF1 (A), (B)

Item	Rating
Center frequency (f_0)	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 $f_0 \pm 1$ MHz
Input and output impedance	600 Ω //15 pF

Table 2 Crystal filter (L71-0208-05) XF2 YK-88S

Item	Rating
Nominal center frequency	455 kHz
6 dB bandwidth	± 7.5 kHz or more
50 dB bandwidth	± 15 kHz or less
Ripple (within 455 ± 5 kHz)	3 dB or less
Loss	6 dB or less
Guaranteed attenuation (within 455 ± 100 kHz)	35 dB or more
Input and output impedance	1.5 k Ω

Table 3 Ceramic filter (L72-0316-05) CF1, CWF455E

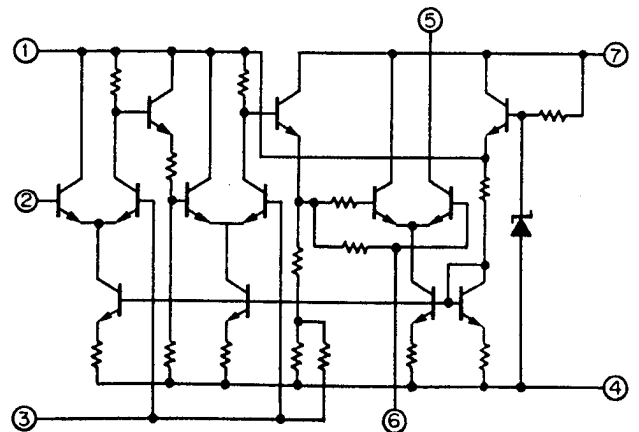


Fig. 1 μ PC577H Equivalent circuit

CIRCUIT DESCRIPTION

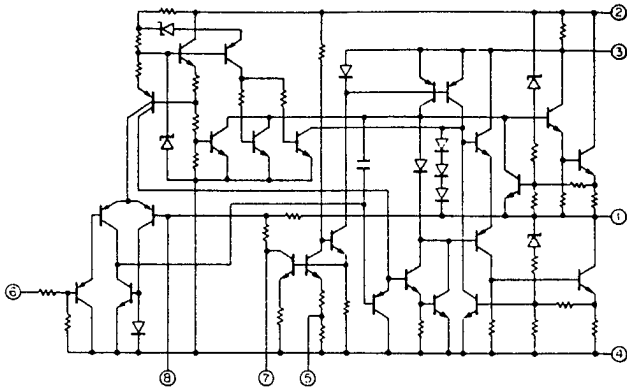


Fig. 2 MB3713 Equivalent circuit

TRANSMITTER CIRCUIT

The microphone signal is amplified with microphone amplifier Q1 (2SC2240(GR)), which is commonly used for both SSB and FM transmission modes and is incorporated in the carrier unit (X50-1720-XX). The amplified signal is then fed to both the SSB and FM circuits.

The microphone signal for SSB transmission is applied to microphone amplifiers Q37 and Q29 (2SC1815(Y)) through MIC GAIN control VR6 in the IF unit (X48-1320-61). Then, the microphone signal is applied to the balanced modulator (BM) along with the carrier (8.83 MHz). The resultant DSB signal is buffered by buffer amplifier Q35 (2SK61(GR)) then filtered by crystal filter XF2 to generate the SSB signal. The SSB signal is amplified with Q21 (3SK73(GR)) and applied through terminal SO to the transmitter balanced mixer consisting of Q5 and Q6 (2SK61(GR)) in the carrier unit to obtain the 21.6 MHz SSB signal. Unnecessary spurious signals accompanying the SSB signal are reduced by the 4-stage BPF, then the SSB signal is amplified with Q7 (this amplifier is used for all modes).

The microphone signal for FM transmission is applied to limiting amplifier Q2 (TA7061AP) in the carrier unit. Then, the signal directly frequency modulates the 21.60 MHz signal generated by oscillator Q3 (2SC1923(O)) through D1 (1S2208). The 21.6 MHz FM signal is amplified by buffer amplifier Q4 (2SC1675(L)), then amplified by Q7 (3SK73(GR)) which is also used for amplifying the SSB signal.

The signal amplified by Q7 is fed to the drive unit (X47-1070-00) through terminal TIF. In the drive unit, the 21.6 MHz signal is mixed with the signal supplied from the HET unit (through terminal LT) to generate the 430 MHz signal. The 430 MHz signal is amplified by Q1 (2SC2549) and Q2 (2SK48) with accompanying spurious signals reduced by the 2-pole, 3-stage helical resonator, then is amplified by Q3 (2SC2549), Q4 (2SC2026) and Q5 (2SC2762) and fed to the final unit (RF unit B/2) (X44-1430-61) through terminal DO.

In the final unit, the signal is first amplified by power module Q1 (M57716), then fed to the antenna through the B.P.F. M57716 provides stable performance, since its power idle current, intermodulation-distortion-product (IMD) and frequency response are appropriately designed. The drive unit output signal is also applied to Q6 (2SC1815(Y)) to generate the ALC voltage. The ALC voltage is supplied to the 2nd gates of IF amplifiers Q21 in the IF unit and Q7 in the carrier unit through the ALC terminals.

Protective operation and HI/LOW switching for FM and CW modes are achieved by varying the source voltage of IF amplifier Q7 in the carrier unit and the voltage applied to terminal 3 of the power module. For CW keying, the B+ line connected to the transmitter balanced mixer consisting of Q5 and Q6 and IF amplifier Q7 in the carrier unit is switched with Q8 (2SA1015(Y)).

Item	Symbol	Tc (°C)	Rating
Operating voltage	V _{cc}	25	17V
Base bias voltage	V _{bb}	25	10V
DC current	I _{cc}	25	6A
Operating case temperature	T _{c (op)}	—	-30~+110°C
Storage temperature	T _{stg}	—	-40~+110°C

Table 4 Power module M57716 Max Rating

Item	Symbol	Tc (°C)	Condition	Rating	
				MIN	TYP
Output power	P _o	25	V _{CC1} = V _{CC2} = 12.5 V, V _{BB} = 9 V	18.5 W	19 W
Total efficiency	η _T	25	f = 430~440 MHz, P _{in} = 0.2 W	40 %	42 %
Power gain linearity	G _p	25	V _{CC1} = V _{CC2} = 12.5 V, V _{BB} = 9 V f = 430~440 MHz, P _{in} = 10 dBm	21 dB	

Table 5 Power module M57716

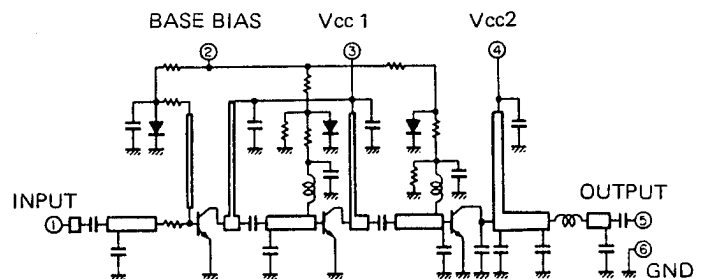


Fig. 3 Power module M57716 Equivalent circuit

CIRCUIT DESCRIPTION

HET CIRCUIT (X50-1730-00)

The 122-127 MHz signal generated by the VCO formed of Q12 (2SK19(GR)) is buffered and amplified by Q13 (2SC1923(O)) and Q17 (3SK73(GR)), then mixed with the 116.5 MHz signal by Q22 (2SC1923(O)) to generate the 5.5-10.49 MHz signal. The 116.5 MHz signal is generated by multiplying the 12.9444 MHz signal output by Q23 (2SC1675(L)) by 9 with D7 (1SS99). The 5.5-10.49 MHz signal is amplified with Q21, Q20 (2SC1675(L) x 2) and Q19 (2SC2603(E)), then applied to pin 9 of Q18 (TC9125P), which divides the frequency into 10 kHz according to the frequency dividing data applied to pins 4-8 through terminals PL through PD from the control unit and phase-compares the 10 kHz signal obtained with the reference frequency to generate the VCO control signal. The VCO control signal output from pin 14 of Q18 is applied to the low pass filter consisting of Q10 and Q11 (2SC2240(GR) x 2), then is applied to vari-cap diode D6 (1SV50S) to control the VCO frequency.

The DC signal level which is generated in the control unit (X53-1210-XX) and is applied to vari-cap diode D8 (1SV50S) through terminal HCV to vary the frequency output by Q23 within a range of 0-9.9 kHz.

The RIT control voltage is also applied to D8 to vary the frequency.

The signal supplied from the control unit through terminal HL is used to select either the high band or low band crystal. The signal oscillated by Q1 (2SC1923) is tripled by Q2 (2SC1675(L)) then tripled again by Q5 (2SC1923(O)) to obtain the 330 MHz signal. The 330 MHz signal is amplified by Q6 (2SC2549) and mixed with the 120 MHz signal from the PLL by D3 (ND487) to generate a 450 MHz signal.

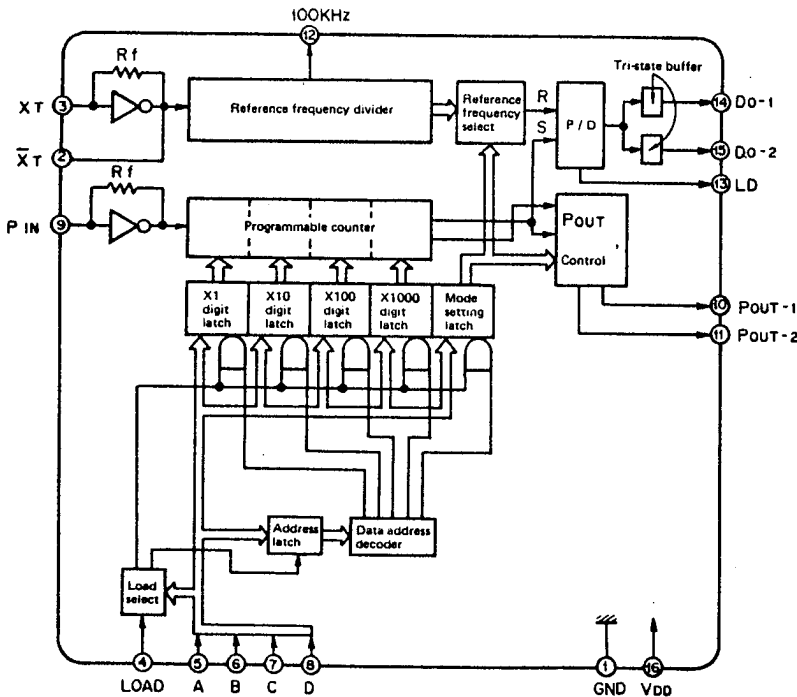


Fig. 4 TC9125P Block diagram

The 450 MHz signal is amplified by Q7, Q8 (2SC2026 x 2) and Q9 (2SC2549) and spurious elements are reduced by the 2-stage helical resonator. The resultant frequency range is 451.6 MHz~461.6 MHz, and is output through terminals LR and LT.

CONTROL CIRCUIT (X53-1210-XX)

Indicator

A 5-digit LED display is used as the indicator. BCD code data appearing at the D port (pins 8 thru 11) of micro-processor Q12 is converted into drive signals by 7-segment driver Q11 (SN74LS247N) to drive Q13 through Q19 (2SA1115). The digit signals output from ports E and F (pins 12~16) of Q12 turn Q22 through Q26 (2SC1959(Y)) ON in order to light each LED digit.

The signals output from ports C3 (pin 5) and F2 (pin 18) of Q12 drive Q21 and Q27 (2SC1815(Y)), then Q20 and Q28 (2SC1015(Y)) to turn the 100 Hz and MHz digit dots ON and OFF.

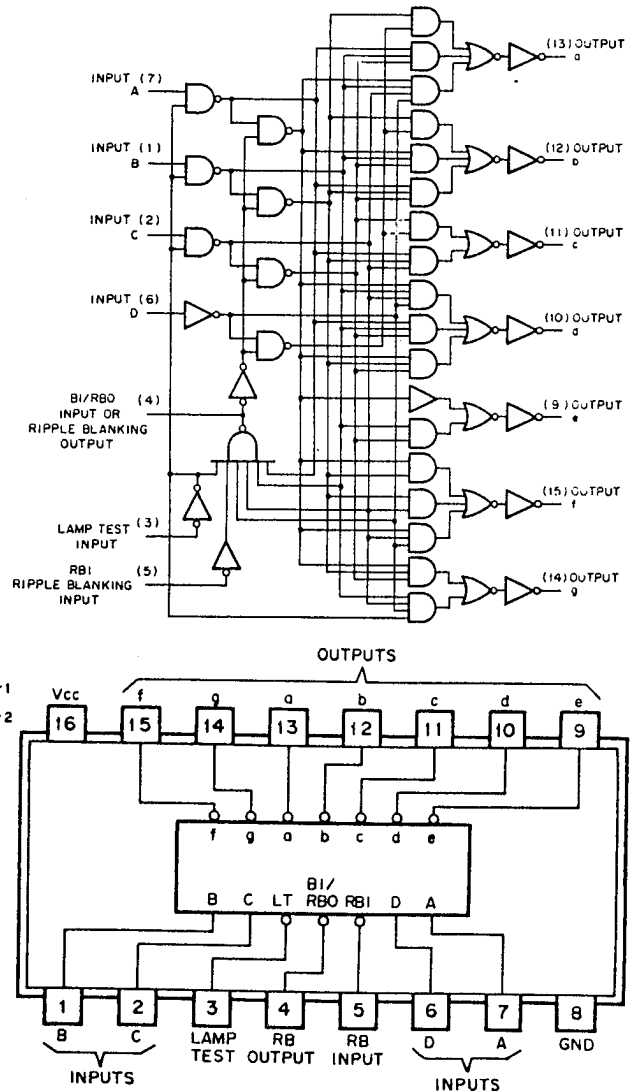
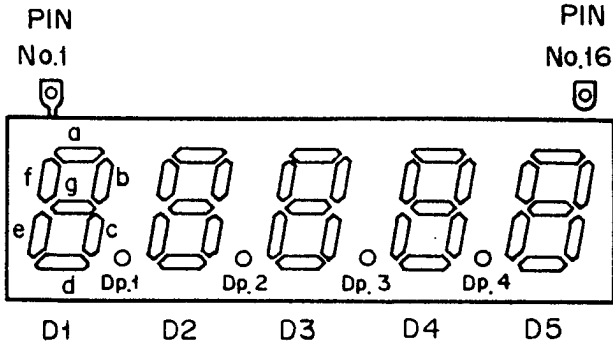


Fig. 5 SN74LS247N

CIRCUIT DESCRIPTION



Pin No.	Address	Pin No.	Address
1	D5 Cathode	9	g Anode
2	D4, Dp4 Cathode	10	b Anode
3	D3, Dp3 Cathode	11	a Anode
4	D2, Dp2 Cathode	12	f Anode
5	D1, Dp1 Cathode	13	Dp4 Anode
6	e Anode	14	Dp3 Anode
7	d Anode	15	Dp2 Anode
8	c Anode	16	Dp1 Anode

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

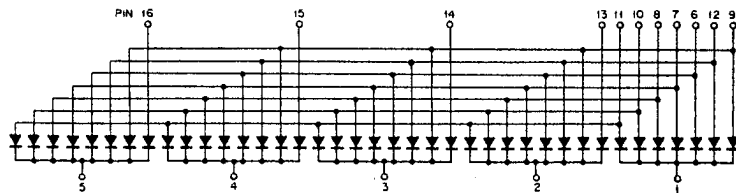


Fig. 6 5 digit LED SL-2504K

Table 6 Functions of MN1201A

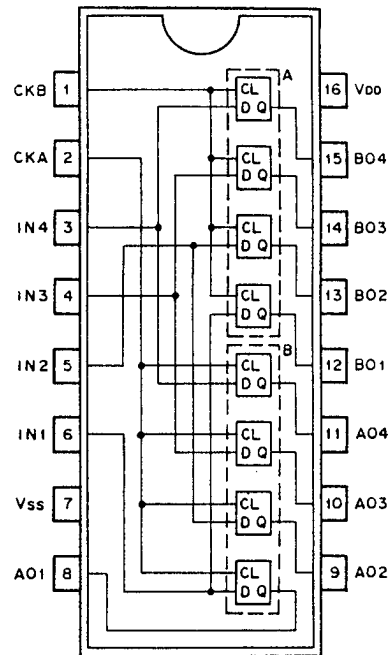


Fig. 7 MN1201A Block diagram

Data for HET circuit

Data output to the HET circuit is the frequency dividing data (output through terminals PL~PD), the 100 Hz and 1 kHz data (the DC signal output through terminal HCV) and the crystal selection data (output through terminal HL). The 100 Hz and 1 kHz data output from G port (pins 22~25) of microprocessor Q12 are latched in dual latch Q10 (MN1201A). The latch output data are converted into a DC signal by the D/A converter consisting of resistors R49 through R57, and the DC voltage is output to the HET circuit through terminal HCV.

The frequency dividing data is 550 when $\square.\square.\square$ is displayed in the FM mode and 1040 when $4.9\square$ is displayed in the FM mode. This data is output only when the frequency varies.

Shifting the frequency for the USB and LSB modes is performed by the microprocessor so that the following relationships are kept.

$$f_{USB} = f_{FM} + 1.5 \text{ kHz} \quad f_{LSB} = f_{FM} - 1.5 \text{ kHz}$$

Reset circuit

Lambda diode D7 (MA522(Q)) is used to detect the power supply voltage : when the power supply voltage exceeds the valley voltage (about 3.5 V) of the lambda diode, the diode is OFF and Q6 (2SA1015(Y)) is ON so that an "L" level signal is applied to the reset terminal (pin 7) of the microprocessor to reset it.

CIRCUIT DESCRIPTION

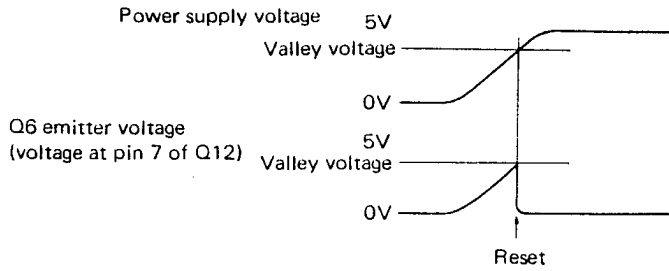


Fig. 8-A Reset timing

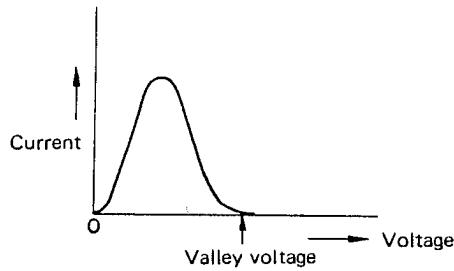


Fig. 8-B Lambda diode characteristics

Encoder and UP/DOWN inputs

Fig. 9 shows the output signal from the encoder (50 steps per rotation). This signal is used to discriminate UP and DOWN counts within the microprocessor. The UP counts starts when U/D is H level at the down edge of the clock signal, and the DOWN count when U/D is L level.

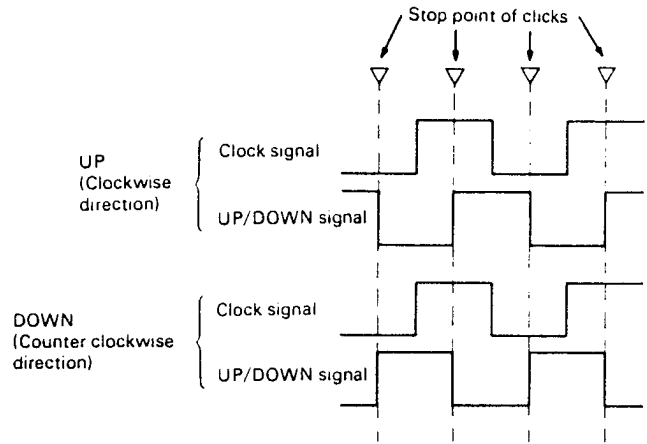


Fig. 9

Switching circuit

Switches are scanned using the signals output from ports E and F (pins 12 through 16) of the microprocessor and the input terminals (B port : pins 37 through 40) to determine if the switch circuit is ON ; various functions are performed according to the scanning result.

The E and F port output signals are kept from being output by Q29 through Q33 (2SA1115(Y)) during transmission to improve the S/N ratio of the transmitted signal. Many diodes (1S1555) are used to prevent the control pulse signals from entering the wrong circuits.

Power supply for the control circuit

There are three power supply circuits incorporated in the control unit : one for the LED display (5V), consisting of Q9 (μ PC78M05H) ; one for back-up, consisting of Q1 (2SC1815(Y)) ; and one for the microprocessor, consisting of Q5 (2SC496(Y)).

When power is fed to the power connector with the power switch OFF, the back-up power supply operates to maintain the microprocessor memory. At this time, all ports are at the "L" level and the power consumption is minimum. When the power switch is ON, the other power supply circuits operate and the back-up power supply is turned off by the control signal from the microprocessor.

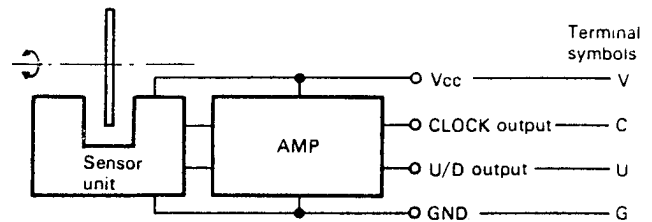


Fig. 10 Rotary encoder

Tone oscillator circuit

When the output for the microprocessor tone oscillator is H level, Q7 (2SC1815(Y)) is energized, allowing a current to flow into the piezo-electric buzzer oscillator, Q8 (2SC1815(Y)), producing a tone.

Repeater shift and tone circuit

Type	Shift SW markings	Shifted freq.	Tone circuit
W	D-A	-7.6 MHz	1750 Hz tone circuit
	D-B	-1.6 MHz	
T	⊕	+1.6 MHz	1750 Hz tone Burst circuit
	⊖	-1.6 MHz	
X	D-A	-5 MHz	None
	D-B	-1.6 MHz	

Table 7 Repeater shift and tone circuit

CIRCUIT DESCRIPTION/OPTION (LSB CRYSTAL)

Pin No.	Terminal name	Input signal	Output signal	Description	Pulse
1	CL1			Clock signal, 400 kHz	
2	PC0	○		L during reception and H during transmission in the FM1 and FM2 modes	
3	PC1	○		BACK UP detection, normally H ; L during back-up operation	
4	PC2	○		Squelch signal : normally L ; H when squelch is open in the FM1 and FM2 modes	
5	PC3		○	100 Hz digit dot signal : L in modes FM1 and FM2 and H in the USB, CW and LSB modes	
6	INT	○		Normally H	
7	RES	○		Normally L ; the micro-processor is reset when the level changes from H to L.	
8	PD0		○	} BCD data output signals for display	○
9	PD1		○		○
10	PD2		○		○
11	PD3		○		○
12	PE0		○	} Matrix scanning signal output terminals; used in conjunction with PB terminals	○
13	PE1		○		○
14	PE2		○		○
15	PE3		○		○
16	PF0		○		○
17	PF1		○		Normally H ; L during back-up operation

Pin No.	Terminal name	Input signal	Output signal	Description	Pulse
18	PF2		○	1 MHz digit dot signal : normally H	
19	PF3		○	Tone oscillator signal output	○
20	TEST	○		Normally 5V	
21	Vcc			5 V DC	
22	PG0		○	} BCD data output for MN1201 (D/A converter)	○
23	PG1		○		○
24	PG2		○		○
25	PG3		○		○
26	PH0		○	} Data output for TC9125P in the HET unit (normally L ; a pulsed signal is output when the frequency is changed).	○
27	PH1		○		○
28	PH2		○		○
29	PH3		○		○
30	PI0		○		○
31	PI1		○	HET unit L33 and L34 switching signal (L33 is selected at L and L34 at H.)	
32	PI2		○	Normally L ; H during transmission in the FM1 and FM2 modes	
33	PA0	○		Rotary encoder clock signal input	
34	PA1	○		Rotary encoder UP/DOWN signal input	
35	PA2	○		Normally L ; H when the MIC UP SW is pressed	
36	PA3	○		Normally L ; H when the MIC DOWN SW is pressed	
37	PB0	○		} Matrix scanning signal input terminals : used in conjunction with the PE terminals	○
38	PB1	○			○
39	PB2	○			○
40	PB3	○			○
41	Vss			Grounded	
42	CL0			Clock signal, 400 kHz	

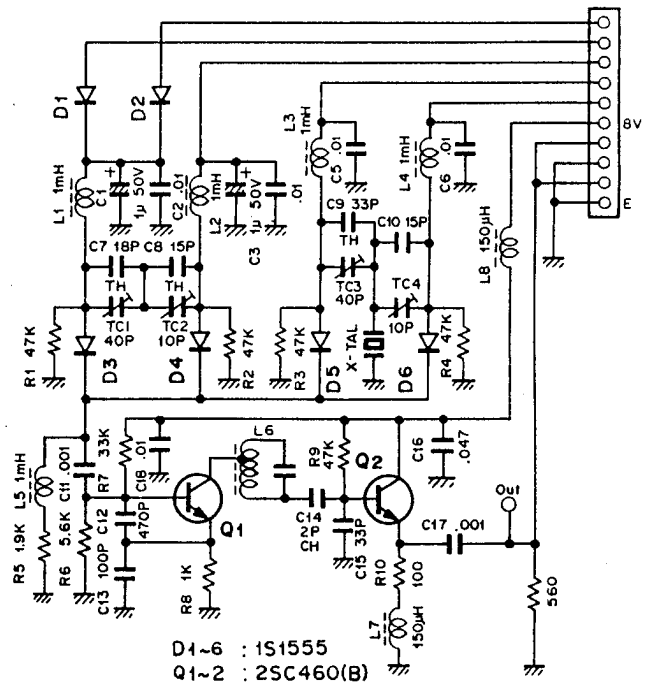
Table 8 μPC650C-093 Terminal function

LSB Crystal Specifications

1. Type HC-18/T (lead length 20 m/m)
2. Oscillation Fundamental
3. Frequency & Part No.

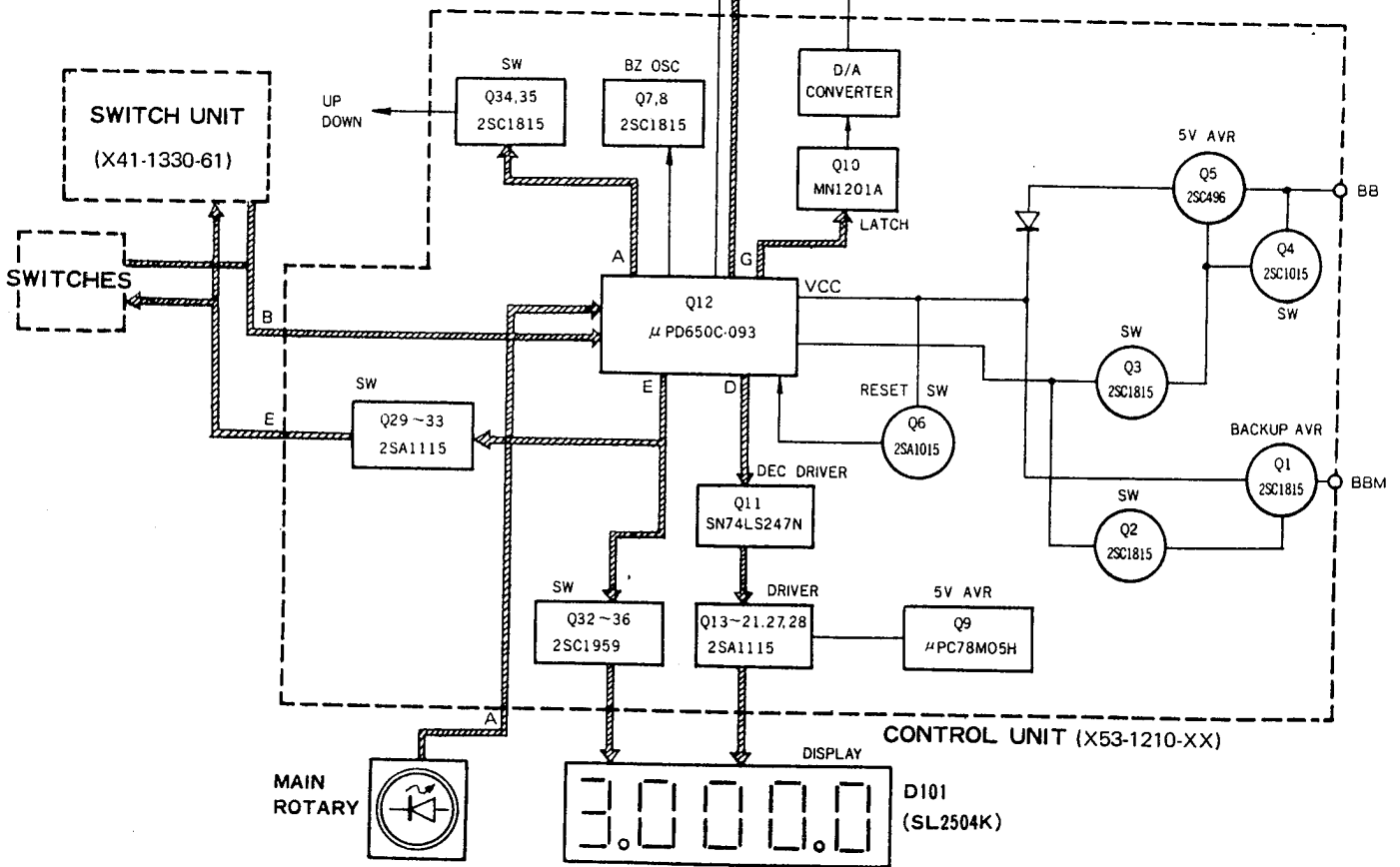
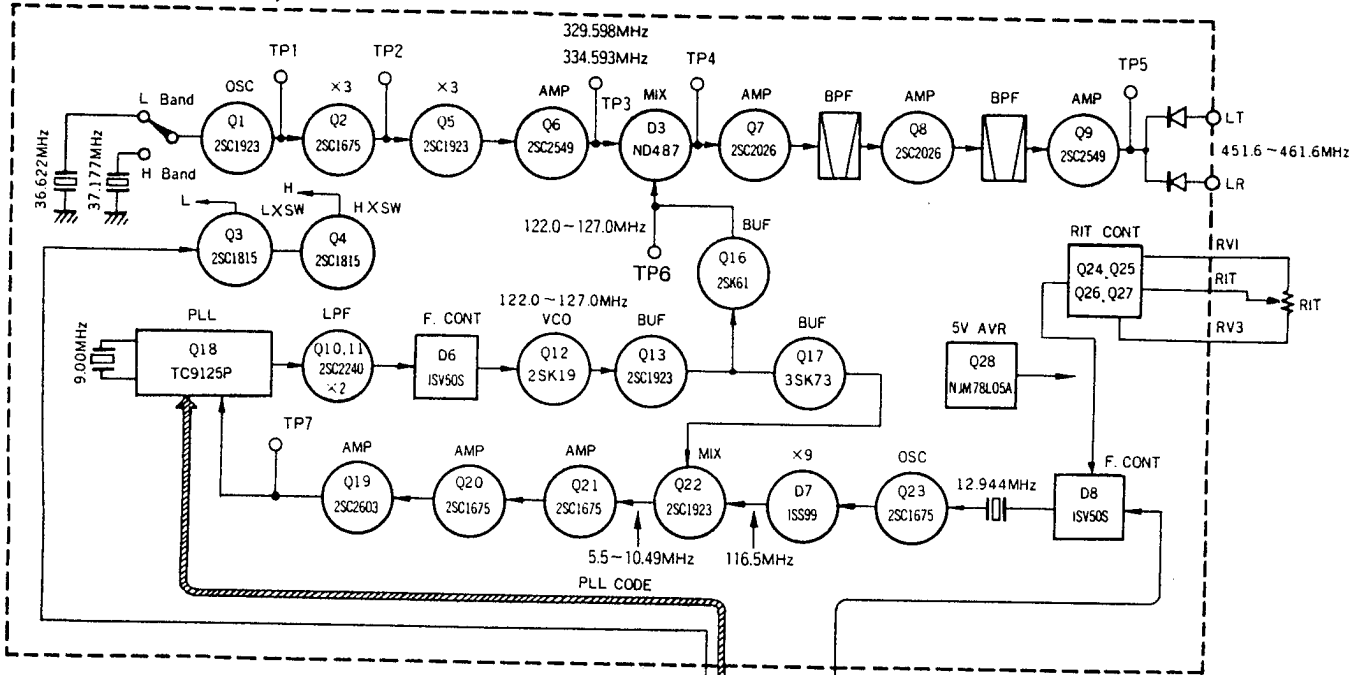
Frequency	Part No.
8.8293 MHz	L77-0932-05

4. Frequency Stability Within $\pm 2 \times 10^{-5}$ at 25°C
5. Output Voltage 0.4 Vrms
6. Oscillator Circuit Shown at right



PLL BLOCK DIAGRAM

HET UNIT (X50-1730-00)



PARTS LIST

Note 1:

K: U.S.A. T: Britain W: Europe X: Australia

Note 2:

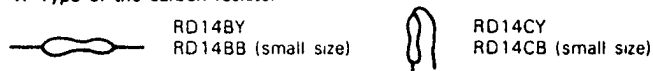
Only special type of resistors (example: cement, metal film, etc.) and capacitors (example: electrolytic, tantalum, mylar, temp. coeff. capacitors) are detailed in the PARTS LIST. For the value of all common type components, refer to the schematic diagram of the P.C. board illustration. Resistors not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

A carbon resistor's part number is RD14BY 2E222J.

A ceramic capacitor's number is CK45F1H103Z. CC45TH1H220J.

RESISTOR

1. Type of the carbon resistor



2. Wattage

1W → 3A 3W → 3F 5W → 3H
2W → 3D 4W → 3G

3' = **CC45** ○ ○ ...

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

1st word (Color)	C (Black)	L (Red)	P (Orange)	R (Yellow)	S (Green)	T (Blue)	U (Violet)
ppm/°C	0	-80	-150	-220	-330	-470	-750

3 = **CK45** ○

Ceramic capacitor (type II) 3

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

6 = Tolerance

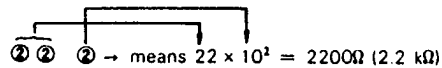
Cord	C	D	G	J	K	M	X	Z	P	No cord
(%)	±0.25	±0.5	±2	±5	±10	±20	+40 -20	+80 -20	+100 -0	More than 10 μF -10 ~ +50 Less than 4.7 μF -10 ~ +75

Less than 10 pF

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

Abbreviation		Abbreviation	
Cap.	Capacitor	ML	Mylar
C	Ceramic	S	Styren
E	Electrolytic	T	Tantalum
MC	Mica		

3. Resistance value



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

4. Tolerance

J = ±5% (Gold) K = ±10% (Silver)

CAPACITORS

Type I

Type II

CC	45	TH	1H	220	J	CK	45	F	1H	103	Z
1'	2	3'	4	5	6	1	2	3	4	5	6

1 = Type ceramic, electrolytic, etc. 4 = Voltage rating
2 = Shape round, square, etc. 5 = Value
3 = Temp range 6 = Tolerance
3' = Temp coefficient

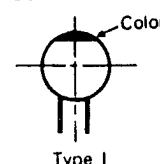
Ex. CC45TH = -470 ±60 ppm/°C

2nd Word	G	H	J	K	L
ppm/°C	±30	±60	±120	±250	±500

5 = Capacitor value

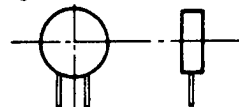
Example: 010 → 1 pF
100 → 10 pF
101 → 100 pF
102 → 1000 pF = 0.001 μF
103 → 0.01 μF

CC45



Type I

CK45



Type II

TR-9500 SEMICONDUCTOR

☆: New parts

Item	Name	Parts No.	Re- marks
Diode	1N60	V11-0051-05	
	1S1555	V11-0076-05	
	1S1587	V11-0370-05	
	1S2588	V11-0414-05	
	1SS99	V11-1277-86	☆
	MA522(Q)	V11-1173-46	
	ND487C1-3R	V11-1277-96	☆
	U05B	V11-0270-05	
Vari-cap diode	UM9401	V11-7778-16	☆
	V06B	V11-0219-05	
	1S2208	V11-0317-05	
	1SV50S	V11-1260-36	

Item	Name	Parts No.	Re- marks
Zener diode	WZ-032	V11-4172-26	
	XZ-057	V11-4176-76	
	XZ-060	V11-4101-20	
	XZ-070	V11-4161-96	
	XZ-090	V11-4167-06	
Varistor	1S1212	V11-1262-06	
	MV-13	V21-0004-05	
	VD1223	V11-1262-46	
Thermistor	D33A	V11-3161-86	

PARTS LIST

Item	Name	Parts No.	Re- marks	Ref. No.	Parts No.	Description	Re- marks	
LED	PR5532K	V11-7272-36		TR-9500 GENERAL				
	PY5532K	V11-7272-46						
TR	SL-2504 K	V11-6178-36	☆	A01-0798-03		Case (upper)	☆	
	SLP144B	V11-6172-56		A01-0799-02		Case (lower)	☆	
	SLP244B	V11-6172-66		A13-0612-02		Angle ass'y (right)		
				A13-0613-02		Angle ass'y (left)		
				A13-0614-04		Angle (top)		
				A20-2424-03		Panel	☆	
				B01-0636-02		Panel escutcheon	T ☆	
				B01-0637-02		Panel escutcheon	W ☆	
				B01-0638-02		Panel escutcheon	X ☆	
				B03-0513-14		Switch mask (B) x 4		
						13 x 13mm		
				B03-0518-04		Switch mask x 4	7 x 10mm	
				B05-0712-14		Grill cloth Case (lower)		
						30 x 148mm		
			B05-0713-04		Grill cloth Case (upper)			
					32 x 32 mm			
			B05-0714-04		SP grill cloth	64 x 80 mm		
			B07-0635-03		Side escutcheon x 2		☆	
			B10-0640-04		Front glass		☆	
			B30-0821-05		Pilot lamp	8 V, 70mA	☆	
			B31-0631-05		Meter		☆	
			B50-2795-00		Operating manual		W ☆	
			B50-2796-00		Operating manual		T ☆	
			B50-2797-00		Operating manual		X ☆	
Power module	M57716	V30-1235-16	☆	E06-0651-05		6P male socket MIC		
FET	2SK19(GR)-TRIO5	V09-1001-16		E07-0651-05		6P metal plug MIC		
	2SL30A(GR)	V09-0060-05		E12-0001-05		Phone plug (accessary)		
	2SK30A(O)	V09-0056-05		E12-0401-05		STBY plug (accessary)		
	2SK61(GR)	V09-1014-06		E23-0015-04		Lug terminal x 2 (LED)		
	2SK125	V09-0136-10		E29-0412-05		1P connector (male)		
	3SK48	V09-1003-16		E29-0413-05		1P connector (female)		
	3SK73(GR)	V09-1002-46		E30-1649-05		DC cord ass'y with 5A fuse		
	3SK76-O	V09-1012-16	☆	E31-0456-05		Connector with lead (SP)		
				E31-2088-05		Cable with terminal	☆	
				E40-0773-05		Mini connect wafer 7P		
IC	MB3713	V30-1233-16	☆	F05-5022-05		Fuse 5A		
	MN1201A	V30-1008-66		F15-0622-04		Shadow mask Meter		
				F15-0627-04		Shadow mask LED		
	NJM78L05A	V30-1149-06		F15-0635-04		Cushion (meter)	☆	
	SN74LS247N	V30-1030-56		F20-0078-05		Insulating sheet Q101		
				F29-0014-05		Shoulder washer Q101		
	TA7060P	V30-0087-05		G02-0505-05		Knob spring RIT		
	TA7061AP	V30-0039-05		G09-0417-04		Gnd spring (A) HET	☆	
	TC9125P	V30-1232-16	☆	G13-0608-04		Cushion (A) Case (upper)		
						85 x 138mm		
			G13-0644-04		Cushion	☆		
			G53-0510-04		Packing Case (lower)			
					10 x 184mm			
Micro-processor	μPD650C-093	V30-1234-16	☆	H01-2745-03		Carton case (inside)	T ☆	
				H01-2746-03		Carton case (inside)	W, X ☆	
				H10-2501-03		Packing fixture		
				H10-2528-22		Packing fixture		
				H25-0049-03		Accessory bag		
				H25-0079-04		Protective bag MIC		
			H25-0103-04		Protective bag Cord			
			H25-0106-04		Protective bag			

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks	Ref. No.	Parts No.	Description	Re- marks
	J02-0069-05	Foot x 2			S50-1406-05	Tact switch x 2 MIC	
	J02-0416-04	Foot (accessary)			S59-1405-05	Key board switch x 2 SCAN, HOLD	
	J25-2714-14	PC board MODE			T07-0216-05	Speaker	☆
	J25-2716-24	PC board SCAN			T91-0311-05	Microphone	T
	J25-2744-04	PC board TX OFFSET			T91-0313-05	Microphone	W, X
	J25-3023-04	PC board M ch, MS	☆		W01-0401-04	Allen key Angle	
	J31-0514-04	Spacer collar HI/LOW			W02-0308-05	Rotary encoder	
	J32-0198-14	Hex. boss x 7 L=17 mm			X41-1330-61	Switch unit	☆
	J32-0753-04	Hex. boss L=28 mm	☆		X44-1430-61	RF unit	☆
	J42-0409-04	Knob bushing			X47-1070-00	Drive unit	☆
	J61-0019-05	Vinyle tie			X48-1320-61	IF unit	☆
	K21-0749-03	Main knob			X50-1720-00	CAR unit	X ☆
	K21-0750-04	Knob (C) RF GAIN			X50-1720-51	CAR unit	T ☆
	K23-0727-04	Knob (A) x 2 MODE, M.CH			X50-1720-61	CAR unit	W ☆
	K23-0728-04	Knob (B) SQL			X50-1730-00	HET unit	☆
	K23-0729-04	Knob (D) RIT			X53-1210-51	Control unit	T ☆
	K23-0733-04	Knob (E) TX OFFSET			X53-1210-61	Control unit	W ☆
	K23-0742-04	Knob VOL			X53-1210-71	Control unit	X ☆
	K27-0408-04	Push knob (A) x 4 M, NB, A/B, RIT		SWITCH UNIT (X41-1330-61)			
	K27-0409-04	Push knob (B) x 2 SCAN, HOLD			E23-0046-04	Square terminal	
	K27-0416-05	Knob x 3 DS, MR, MS			E40-0373-05	Mini connect wafer 3P	
	K27-0425-05	Push knob (F) MHz	☆		E40-0573-05	Mini connect wafer 5P	
	K29-0733-04	Push knob (C) TONE, H/L			E40-0673-05	Mini connect wafer 6P	
	N09-0008-04	Ornamental screw Angle			E40-0773-05	Mini connect wafer 7P	
	N09-0256-05	Gnd screw			E40-1273-05	Mini connect wafer 12P	
	N13-0307-04	Ornamental nut AF GAIN	☆		N30-2604-46	Round screw	
	N14-0510-04	Flange nut x 4 Angle			R92-0150-05	Short jumper	
	N14-0512-05	Speed nut x 4		S1	S40-2409-15	Push switch M	
	N15-1040-46	Flat washer x 4 Angle		S2	S40-2405-05	Push switch NB	
	N15-1060-46	Flat washer x 4 Angle		S3,4	S40-2404-05	Push switch X2 A/B, RIT	
	N16-0060-46	Spring washer x 4 Angle		S5,6	S40-1401-05	Push switch X2 MHz, DS	
	N30-2004-46	Round screw MS		RF UNIT (X44-1430-61)			
	N30-2604-46	Round screw x 11		C1	CC45SL2H030C	C 3pF ±0.25pF 500V	
	N30-3004-46	Round screw x 6		C2	CC45SL2H010C	C 1pF ±0.25pF 500V	
	N30-3005-46	Flat screw x 10		C3	CC45SL2H030C	C 3pF ±0.25pF 500V	
	N30-3006-46	Round screw Tr		C4	CC45SL1H020C	C 2pF ±0.25pF	
	N33-2606-45	Round flat screw x 4 SP		C5,6	CC45SL2H030C	C 3pF ±0.25pF 500V	
	N33-3006-45	Round flat screw x 16		C7	CC45SL2H080D	C 8pF ±0.5pF 500V	
	N35-3004-46	Bind screw x 13		C8	CC45SL2H120J	C 12pF 500V	
	N35-3006-46	Bind screw x 13		C9	CC45SL2H030C	C 3pF ±0.25pF 500V	
	N87-3006-46	Self tapping screw x 13		C10	CC45SL2H020C	C 2pF ±0.25pF 500V	
	N89-3005-46	Bind tapping screw x 2 Lug terminal		C14	CS15E1C010M	T 1μF 16V	
	N99-0304-04	Hex. head screw x 4 Angle		C19	CS15E1V0R1M	T 0.1μF 35V	
R103	RS14AB3A121J	Metal film 120Ω 1W		C21	C90-0817-05	E 1000μF 16V	
VR101	R05-3412-05	Pot. 10kΩ(K) AF GAIN (with SW)	☆	C23	CE04W1C220M	E 22μF 16V	
VR102	R01-4409-05	Pot. 50kΩ(B) SQL	☆	C25	CE04W1C220M	E 22μF 16V	
VR103,104	R19-3406-05	Pot. 10kΩ(B) x 2 RF GAIN, RIT		C27	CE04W1C220M	E 22μF 16V	
	S01-1421-05	Rotary switch TX OFFSET		C30	CC45SL1H101J	C 100pF	
	S01-2421-05	Rotary switch MODE		C31	CC45SL2H020C	C 2pF ±0.25pF 500V	
	S01-2430-15	Rotary switch M. CH	☆				
	S40-1401-05	Push switch MS					
	S40-2403-05	Push switch TONE	T				
	S40-2403-05	Push switch H/L	X				
	S40-2406-05	Push switch TONE	W				
	S40-2417-05	Push switch MR					

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks	Ref. No.	Parts No.	Description	Re- marks
C51	CC45SL1H330J	C 33pF		C20	C90-0804-05	Cap. 0.001 μ F	
C52	CC45SL1H220J	C 22pF		C21	CE04W1A470M	E 47 μ F 10V	
C55	C91-0456-05	C 0.047 μ F		C23	CC45CH1H010C	C 1pF \pm 0.25pF	
C56	CC45SL1H101J	C 100pF		C25	C90-0804-05	Cap. 0.001 μ F	
C58	CC45SL1H101J	C 100pF		C26	CC45SL1H101J	C 100pF	
C59	CC45SL1H470J	C 47pF		C27	CC45CH1H010C	C 1pF \pm 0.25pF	
C62	CC45SL1H101J	C 100pF		C28	CC45CH1H020C	C 2pF \pm 0.25pF	
	E04-0154-05	Coax connector X2		C31	CS15E1VR47M	T 0.47 μ F 35V	
	E04-0156-05	N type connector	☆	C33	CE04W1C101M	E 100 μ F 16V	
	E08-0203-25	2P connector		C35	C90-0820-05	E 470 μ F 16V	
	E08-0304-05	Power jack (back up)		C37	C91-0457-05	C 0.022 μ F	
	E11-0405-05	Key Jack		C39	CE04W1A470M	E 47 μ F 10V	
	E11-0406-05	Stand-by Jack		C41	CE04W1A470M	E 47 μ F 10V	
	E11-0409-05	Earphone Jack		TC1,2	C05-0062-05	Ceramic trimmer 6P	
	E23-0046-04	Square terminal		TC3	C05-0030-15	Ceramic trimmer 20P	
	E23-0401-05	Round terminal			E04-0154-05	Coax connector X3	
	E31-2089-05	Cable with terminal	☆		E23-0401-05	Round terminal X2	
	E40-0373-05	Mini connect wafer 3P			E40-0273-05	Mini connector wafer 2P	
	E40-0473-05	Mini connect wafer 4P			E40-0373-05	Mini connector wafer X2 3P	
	F01-0744-15	Heat sink			E40-0573-05	Mini connector wafer 5P	
					E40-0673-05	Mini connector wafer 6P	
L1	L34-1018-05	Coil 3 ϕ 1.5T	☆		F20-0078-05	Insulating sheet (Q7)	
L2	L34-0908-05	Coil			F29-0014-05	Shoulder washer (Q7)	
L3	L34-1018-05	Coil 3 ϕ 1.5T	☆	L1	L34-0908-05	Coil	
L4	L34-1017-05	Coil 3 ϕ 3T	☆	L2,3	L19-0309-05	Wide band width trans	
L5,6	L34-1018-05	Coil 3 ϕ 1.5T	☆	L4	L79-0476-05	Helical block (F)	☆
L7	L33-0026-05	Choke coil 1 μ H	☆	L5	L79-0477-05	Helical block (G)	☆
L51	L79-0479-05	Helical block (I)	☆	L6	L79-0478-05	Helical block (H)	☆
L52	L79-0480-05	Helical block (J)	☆	L7,8	L34-0824-05	Coil 3.5 ϕ 3T	
L53	L79-0481-05	Helical block (K)	☆	L9	L34-1018-05	Coil 3 ϕ 2T	
L54	L33-0026-05	Choke coil 1 μ H		L10,11	L34-1019-05	Coil 3 ϕ 3T	☆
L55	L34-0908-05	Coil		L12	L33-0026-05	Choke coil 1 μ H	
	N09-0256-05	GND screw		L13	L40-1011-03	Ferri-inductor 100 μ H	
	N30-2606-45	Round screw X2 (Back Up)		L14	L15-0016-05	Low frequency choke	
	N30-3006-46	Round screw X8		L15	L40-1011-03	Ferri-inductor 100 μ H	
	N35-3006-46	Bind screw X2 (Pow module)			N30-3004-46	Round screw (Q10)	
	N87-2606-46	Self tapping screw X6			N30-3006-46	Round screw (Q7)	
R1	RC05GF2H221J	Solid 220 Ω 1/2W			N87-2606-46	Self tapping screw x 6	
	R92-0150-05	Short jumper		R31	RC05GF2H2R2J	Solid 2.2 Ω 1/2W	
VR1	R12-4020-05	Trim. pot 50k Ω (2 pole)		VR1	R12-3416-05	Trim. pot 47k Ω	
VR2	R12-4016-05	Trim. pot 50k Ω		VR2	R12-1020-05	Trim. pot 1k Ω	
VR3	R12-0417-05	Trim. pot 100 Ω (2 pole)	☆	VR3	R12-3027-05	Trim. pot 30k Ω	
				VR4	R12-0417-05	Trim. pot 100 Ω 2 pole	
					R92-0150-05	Short jumper x 3	
DRIVE UNIT (X47-1070-00)							
C3	CC45CH1H050C	C 5pF \pm 0.25pF					
C5	CC45SL1H101J	C 100pF					
C7	CC45CH1H070D	C 7pF \pm 0.5pF					
C10	CC45CH1H100D	C 10pF \pm 0.5pF					
C12	CC45SL1H101J	C 100pF					
C13,14	C90-0804-05	Cap. 0.001 μ F					
C15	C91-0131-05	C 0.01 μ F					
C17	CC45SL1H101J	C 100pF					
C18	CQ92M1H103K	ML 0.001 μ F					
C19	C91-0131-05	C 0.01 μ F					

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks	Ref. No.	Parts No.	Description	Re- marks
IF UNIT (X48-1320-61)				C95	CC45CH1H100D	C 10pF ±0.5pF	
C1	CC45SL1H470J	C 47pF		C96	C91-0457-05	C 0.022μF	
C2	CC45CH1H0R5C	C 0.5pF ±0.25pF		C97	CC45SL1H470J	C 47pF	
C3	CC45CH1H100D	C 10pF ±0.5pF		C99	C91-0457-05	C 0.022μF	
C4	CC45CH1H010C	C 1pF ±0.25pF		C100	CC45SL1H470J	C 47pF	
C5	CC45SL1H101J	C 100pF		C101	C91-0457-05	C 0.022μF	
C6	C91-0131-05	C 0.01μF		C102	CS15E1E010M	T 1μF 25V	
C7	CC45CH1H100D	C 10pF ±0.5pF		C103	CE04W1H010M	E 1μF 50V	
C8	CC45CH1H010C	C 1pF ±0.25pF		C106	C91-0456-05	C 0.047μF	
C9	C91-0456-05	C 0.047μF		C111	CC45SL1H101J	C 100pF	
C10	CC45SL1H470J	C 47pF		C112	CC45CH1H220J	C 22pF	
C11	CE04W1C100M	E 10μF 16V		C113	CC45CH1H150J	C 15pF	
C12	C91-0131-05	C 0.01μF		C114	C91-0131-05	C 0.01μF	
C13	CC45SL1H101J	C 100pF		C115	CQ92M1H103K	ML 0.01μF	
C14,15	C91-0457-05	C 0.022μF		C116	CQ92M1H104K	ML 0.1μF	
C16	CC45SL1H101J	C 100pF		C118	CE04W1H3R3M	E 3.3μF 50V	
C17	CC45CH1H070D	C 7pF ±0.5pF		C119	CE04W1A470M	E 47μF 10V	
C18	CC45SL1H151J	C 150pF		C121	CQ92M1H104K	ML 0.1μF	
C19	C91-0131-05	C 0.01μF		C122	CE04W1C100M	E 10μF 16V	
C20	CC45RH1H150J	C 15pF		C123	CQ92M1H332K	ML 0.0033μF	
C21	C91-0131-05	C 0.01μF		C124	CQ92M1H103K	ML 0.01μF	
C22	CC45SL1H101J	C 100pF		C125	CS15E1V0R1M	T 0.1μF 35V	
C23,24	C91-0131-05	C 0.01μF		C126	CE04W1C220M	E 22μF 16V	
C25	CC45CH1H120J	C 12pF		C127	CE04W1H010M	E 1μF 50V	
C26	CC45SL1H221J	C 220pF		C129	CE04W1A101M	E 100μF 10V	
C27	C91-0131-05	C 0.01μF		C130	CC45SL1H101J	C 100pF	
C28	CC45CH1H050C	C 5pF ±0.25pF		C131	CE04W1H010M	E 1μF 50V	
C30	C91-0456-05	C 0.047μF		C132	CE04W1A470M	E 47μF 10V	
C32	CE04W1A470M	E 47μF 10V		C133	C90-0834-05	Cap. 0.1μF	
C33,34	C91-0456-05	C 0.047μF		C134	CE04W1A101M	E 100μF 10V	
C36	C91-0456-05	C 0.047μF		C135	C90-0820-05	E 470μF 16V	
C37	CQ92M1H103K	ML 0.01μF		C137	CS15E1V0R1M	T 0.1μF 35V	
C38	CE04W1H010M	E 1μF 50V		C138,139	CQ92M1H103K	ML 0.01μF	
C39,40	C91-0456-05	C 0.047μF		C140,141	CQ92M1H123K	ML 0.012μF	
C42	C91-0131-05	C 0.01μF		C142	CS15E1C4R7M	T 4.7μF 16V	
C43~47	C91-0456-05	C 0.047μF		C143	CE04W1H010M	E 1μF 50V	
C48,49	CQ92M1H102K	ML 0.001μF		C144	CE04W1C100M	E 10μF 16V	
C50	CQ92M1H183K	ML 0.018μF		C147	CC45CH1H100D	C 10pF ±0.5pF	
C51	CQ92M1H222K	ML 0.0022μF		C148	C91-0457-05	C 0.022μF	
C52	CQ92M1H393K	ML 0.039μF		C150	C91-0457-05	C 0.022μF	
C53	CQ92M1H222K	ML 0.0022μF		C151	CC45CH1H330J	C 33pF	
C54	CC45SL1H220J	C 22pF		C152	CC45CH1H270J	C 27pF	
C55	CQ92M1H103K	ML 0.01μF		C153	CC45CH1H030C	C 3pF ±0.25pF	
C56	CC45SL1H330J	C 33pF		C154,155	C91-0457-05	C 0.022μF	
C57	CE04W1A470M	E 47μF 10V		C156	CC45CH1H030C	C 3pF ±0.25pF	
C58	CQ92M1H222K	ML 0.0022μF		C158	CE04W1H3R3M	E 3.3μF 50V	
C59,60	CE04W1H3R3M	E 3.3μF 50V		C161	CQ92M1H473K	ML 0.047μF	
C61	CE04W1H4R7M	E 4.7μF 50V		C162	CC45SL1H101J	C 100pF	
C63	CE04W1A101M	E 100μF 10V		C163	CE04W1H4R7M	E 4.7μF 50V	
C64	C91-0456-05	C 0.047μF		C164	CE04W1H010M	E 1μF 50V	
C67,68	C91-0456-05	C 0.047μF		TC1	C05-0067-05	Ceramic trimmer 25pF	
C70,71	C91-0456-05	C 0.047μF		TC2	C05-0031-15	Ceramic trimmer 10pF	
C74	C91-0131-05	C 0.01μF			E04-0154-05	Coax connector	
C75	CE04W1H010M	E 1μF 50V			E23-0046-04	Square terminal X5	
C76	C91-0456-05	C 0.047μF			E31-2090-05	Cable with terminal	☆
C80	CC45CH1H080D	C 8pF ±0.5pF			E40-0273-05	Mini connect wafer 2P	
C81~84	C91-0457-05	C 0.022μF			E40-0373-05	Mini connect wafer 3P	
C85	CC45CH1H470J	C 47pF			E40-0573-05	Mini connect wafer 5P	
C86	C91-0131-05	C 0.01μF			E40-0973-05	Mini connect wafer 9P	
C87~89	C91-0457-05	C 0.022μF			E40-1173-05	Mini connect wafer 11P	
C90	CC45CH1H470J	C 47pF					
C91	C91-0131-05	C 0.01μF					
C92~94	C91-0457-05	C 0.022μF					

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks	Ref. No.	Parts No.	Description	Re- marks
L1,2	L34-0909-05	Coil		C17	CQ92M1H333K	M 0.033 μ F	
L3	L34-0908-05	Coil		C18	C90-0824-05	E 1 μ F 50V	
L4~7	L30-0508-05	IFT 21.6MHz		C20	CC45UJ1H030C	C 3pF \pm 0.25pF	
L8,9	L34-0781-05	Tuning coil 8.83MHz		C21	CC45TH1H100D	C 10pF \pm 0.5pF	
L10	L34-0505-05	Tuning coil		C23	CC45SL1H221J	C 220pF	
L11	L30-0508-05	IFT 21.6MHz		C24	CC45CH1H101J	C 100pF	
L12	L40-1511-03	Ferri-inductor 150 μ H		C25	CC45CH1H100D	C 10pF \pm 0.5pF	
L13	L40-4711-03	Ferri-inductor 470 μ H		C27	CE04W1C220M	E 22 μ F 16V	
L14	L30-0504-05	IFT 455kHz		C29	CC45RH1H560J	C 56pF	
L15	L30-0503-05	IFT 455kHz		C30,31	CC45SL1H330J	C 33pF	
L16	L79-0446-05	Ceramic discri CFY455S		C32,33	C91-0131-05	C 0.01 μ F	
L17	L40-6825-04	Ferri-inductor 6.8mH		C37	CS15E1A3R3M	T 3.3 μ F 10V	
L18	L34-0536-05	Tuning coil 8.83MHz		C38	CE04W1C100M	E 10 μ F 16V	
L19	L30-0503-05	IFT 455kHz		C39	CC45CH1H150J	C 15pF	
L20	L40-1501-03	Ferri-inductor 15 μ H		C40,41	CC45CH1H010C	C 1pF \pm 0.25pF	
L21	L30-0503-05	IFT 455kHz		C42	CC45CH1H470J	C 47pF	
L22	L30-0504-05	IFT 455kHz		C43	CC45CH1H100D	C 10pF \pm 0.5pF	
L23	L40-1021-03	Ferri-inductor 1mH		C44,45	C91-0457-05	C 0.022 μ F	
L24	L34-0536-05	Tuning coil 8.83MHz		C49	C91-0131-05	C 0.01 μ F	
L25	L34-0781-05	Tuning coil 8.83MHz		C55	CE04W1C100M	E 10 μ F 16V	
L26	L34-0536-05	Tuning coil 8.83MHz		C56	CR04W1A470M	E 47 μ F 10V	
L27	L40-1511-03	Ferri-inductor 150 μ H		C61	CE04W1C101M	E 100 μ F 16V	
L28	L40-1011-03	Ferri-inductor 100 μ H		C62	CE04W1C470M	E 47 μ F 16V	
L29	L40-1511-03	Ferri-inductor 150 μ H		C63	CE04W1C101M	E 100 μ F 16V	
L30	L40-1021-03	Ferri-inductor 1mH		C64	C91-0457-05	C 0.022 μ F	
CF1	L72-0316-05	Ceramic filter CFW455E		C65	C91-0456-05	C 0.047 μ F	
XF1(A),(B)	L71-0227-05	MCF 21.6MHz \pm 7.5kHz		C66	CC45CH1H220J	C 22pF	
XF2	L71-0208-05	MCF YK-88S		C72	CC45SL1H221J	C 220pF	
X1	L77-0938-05	Crystal 30.43MHz	☆	C75	CC45CH1H020J	C 2pF \pm 0.25pF	
X2	L77-0870-05	Crystal 22.055MHz		C76	CC45SL1H270J	C 27pF	
	N30-3004-46	Round screw		C78	CC45SL1H221J	C 220pF	
VR1	R12-4016-05	Trim. pot 50k Ω		C79	C91-0131-05	C 0.01 μ F	
VR2	R12-7402-05	Trim. pot 500k Ω	☆	C80	CC45CH1H120J	C 12pF	
VR3	R12-1016-05	Trim. pot 3k Ω		C81	CC45CH1H070D	C 7pF \pm 0.5pF	
VR4	R12-4015-05	Trim. pot 50k Ω		C103	CE04W1C220M	E 22 μ F 16V W, T	
VR5	R12-0421-05	Trim. pot 100 Ω	☆	C104	CS15E1A150K	T 15 μ F 10V T	
VR6	R12-3027-05	Trim. pot 30k Ω		C105	CE04W1C220M	E 22 μ F 16V W, T	
VR7	R12-3025-05	Trim. pot 10k Ω		C106	CE04W1H010M	E 1 μ F 50V W, T	
	R92-0150-05	Short jumper x 9		C107~109	C91-0433-05	Laminated cap. 0.0039 μ F W, T	
RL1	S51-1407-05	Relay		C110	CQ92M1H472K	ML 0.0047 μ F W, T	
CAR UNIT (X50-1720-00, -51, -61) -00 : X, -51 : T -61 : W				C111	CS15E1A150K	T 15 μ F 10V T	
C3	C90-0824-05	E 1 μ F 50V		TC1	C05-0062-05	Ceramic trimmer 6pF	
C4	C90-0832-05	E 47 μ F 10V		TC2~4	C05-0067-05	Ceramic trimmer 25pF	
C5	C90-0482-05	E 4.7 μ F 25V		E23-0046-04	Square terminal		
C7	C90-0824-05	E 1 μ F 50V		E40-0273-05	Mini connect wafer 2P		
C8	C90-0832-05	E 47 μ F 10V		E40-0373-05	Mini connect wafer 3P		
C10	CC45SL1H101J	C 100pF		E40-0773-05	Mini connect wafer 7P		
C11	CQ92M1H332K	ML 0.0033 μ F		E40-0873-05	Mini connect wafer 8P		
C12	C90-0832-05	E 47 μ F 10V		E40-0973-05	Mini connect wafer 9P		
C13	C90-0482-05	E 4.7 μ F 25V		L1	L40-1541-27	Ferri-inductor 150mH	
C14	C90-0832-05	E 47 μ F 10V		L2	L77-0931-05	Crystal 21.60MHz	☆
C15	C90-0824-05	E 1 μ F 50V		L3	L33-0638-05	Choke coil 3.3 μ H	☆
C16	CQ92M1H103K	ML 0.01 μ F		L4	L40-1021-03	Ferri-inductor 1mH	
				L5	L40-4711-03	Ferri-inductor 470 μ H	
				L6	L31-0313-05	Tuning coil	
				L7	L34-0755-05	Tuning coil	
				L8~11	L34-0749-05	Tuning coil	
				L12	L40-6825-04	Ferri-inductor 6.8mH	
				L13,14	L40-1511-03	Ferri-inductor 150 μ H	
				L15	L32-0201-05	Oscillating coil	

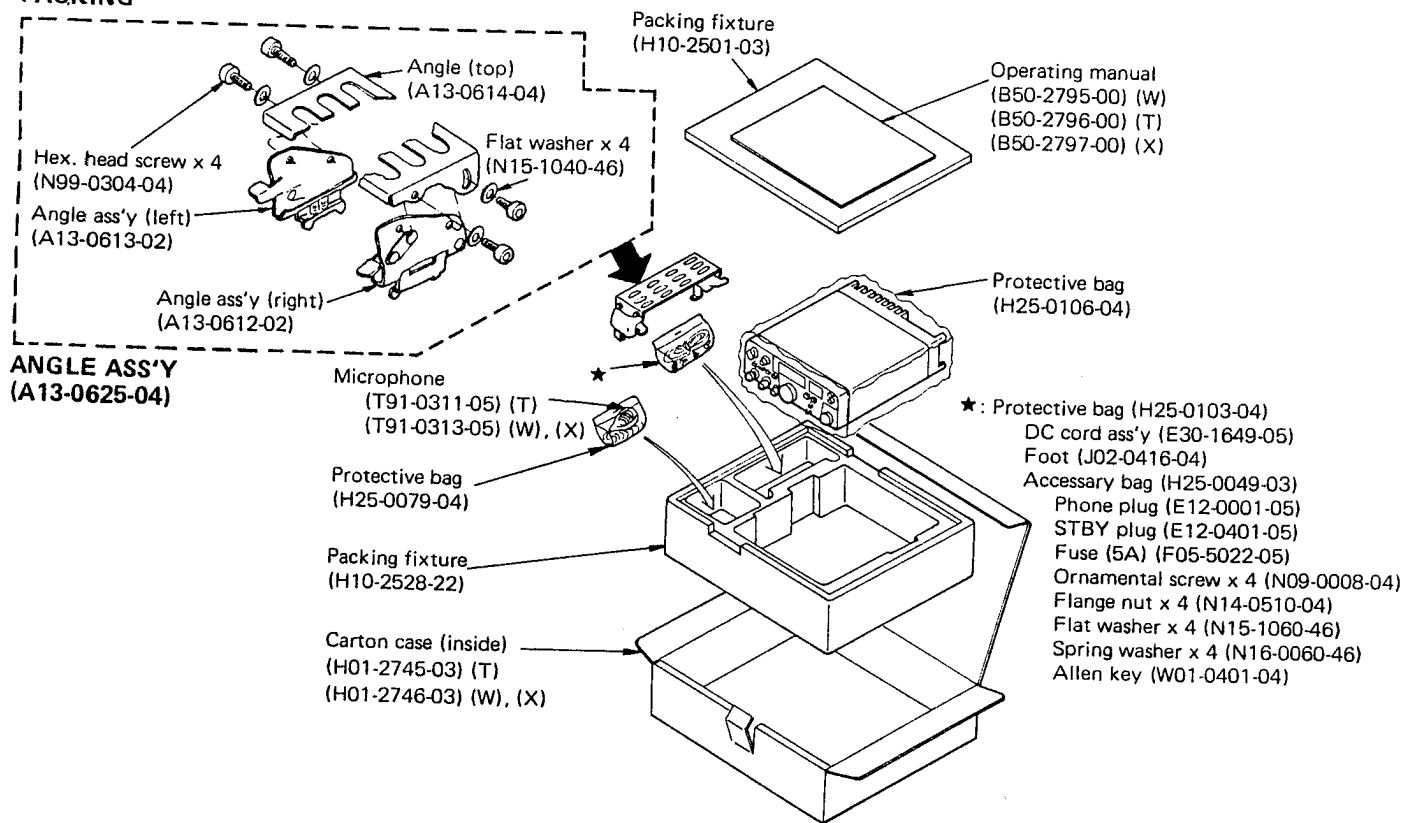
PARTS LIST

Ref. No.	Parts No.	Description	Re- marks	Ref. No.	Parts No.	Description	Re- marks
L16~18	L40-1021-03	Ferri-inductor 1mH		C74	CC45CH1H100D	C 10pF ±0.5pF	
L19	L77-0932-05	Crystal 8.8293MHz	☆	C75	CC45CH1H080D	C 8pF ±0.5pF	
L20	L77-0933-05	Crystal 8.8315 MHz	W, T ☆	C76	C91-0457-05	C 0.022μF	
	N30-3004-46	Round screw		C77	CE04W1C100M	E 10μF 16V	
R102	R92-0616-05	Metal film 10kΩ	W, T	C78	CC45CH1H100D	C 10pF ±0.5pF	
R103	RN14BK2E4703F	Metal film 470kΩ ±1% 1/4W	W, T	C79	CC45CH1H040C	C 4pF ±0.25pF	
R107	R92-0616-05	Metal film 10kΩ	W, T	C80,81	CC45CH1H0R5C	C 0.5pF ±0.25pF	
R108	R92-0617-05	Metal film 7.5kΩ	W, T	C82	CC45CH1H220J	C 22pF	
VR1	R12-1004-05	Trim. pot 4.7kΩ		C83	CE04W1A470M	E 47μF 10V	
VR2	R12-3004-05	Trim. pot 47kΩ	X	C85,86	CC45CH1H101J	C 100pF	
VR101	R12-3041-05	Trim. pot 10kΩ	W, T	C87	CC45UJ1H680J	C 68pF	
VR102	R12-3004-05	Trim. pot 47kΩ	T	C88	CC45UJ1H330J	C 33pF	
	R92-0150-05	Short jumper		C90	CS15E1VR47M	T 0.47μF 35V	
HET UNIT (X50-1730-00)				C92	CS15E1VR47M	T 0.47μF 35V	
C2	CC45CH1H100D	C 10pF ±0.5pF		C93	CE04W1A470M	E 47μF 10V	
C3	CC45RH1H560J	C 56pF		C96	CC45SL1H101J	C 100pF	
C6	CC45SL1H470J	C 47pF		C97	CC45SL1H470J	C 47pF	
C9	CC45CH1H010C	C 1pF ±0.25pF		C98	CC45CH1H0R5C	C 0.5pF ±0.25pF	
C13	CC45CH1H220J	C 22pF		C99	CC45CH1H050C	C 5pF ±0.25pF	
C17	CE04W1A470M	E 47μF 10V		TC1,2	C05-0067-05	Ceramic trimmer 25pF	
C18	CC45CH1H100D	C 10pF ±0.5pF		TC3,4	C05-0308-05	Ceramic trimmer 4pF	
C20	CC45SL1H101J	C 100pF		TC5,6	C05-0062-05	Ceramic trimmer 6pF	
C22	CC45CH1H220J	C 22pF		TC7	C05-0030-15	Ceramic trimmer 20pF	
C23	CC45CH1H050C	C 5pF ±0.25pF			E04-0154-05	Coax connector X2	
C25	CC45SL1H101J	C 100pF			E23-0046-04	Square terminal	
C27	CC45CH1H030C	C 3pF ±0.25pF			E40-0673-05	Mini connect wafer 6P	
C29	CC45SL1H101J	C 100pF			E40-0873-05	Mini connect wafer 8P	
C31	CC45CH1H100D	C 10pF ±0.5pF		L1,2	L40-1511-03	Ferri-inductor 150μH	
C32	C90-0804-05	C 0.001μF		L4	L32-0638-05	Oscillating coil 36MHz	☆
C33,34	CC45SL1H101J	C 100pF		L5	L40-4711-03	Ferri-inductor 470μH	
C38	CQ92M1H223K	ML 0.022μF		L6,7	L34-2016-05	Turning coil	☆
C39,40	CS15E1C2R2M	T 2.2μF 16V		L8	L34-1015-05	Coil 3φ 4.5T	☆
C41	CE04W1H010M	E 1μF 50V		L9	L34-1016-05	Coil 3φ 4.5T	☆
C42	C91-0457-05	C 0.022μF		L10	L40-1511-03	Ferri-inductor 150μH	
C44	CQ92M1H473K	ML 0.047μF		L11,12	L19-0309-05	Wide bandwidth trans	
C45	CC45PG1H100D	C 10pF ±0.5pF		L13	L40-4711-03	Ferri-inductor 470μH	
C46	CC45CH1H080D	C 8pF ±0.5pF		L14	L40-1021-03	Ferri-inductor 1mH	
C47	CC45CH1H0R5C	C 0.5pF ±0.25pF		L15	L34-0824-05	Coil 3.5φ 2.5T	
C48	CC45CH1H060D	C 6pF ±0.5pF		L16	L33-0026-05	Choke coil 1μH	
C49	CC45CH1H150J	C 15pF		L17	L40-3391-03	Ferri-inductor 3.3μH	
C50	CC45CH1H030C	C 3pF ±0.25pF		L18	L32-0624-05	Oscillating coil VCO	
C52	CE04W1A101M	E 100μF 10V		L19	L40-3391-03	Ferri-inductor 3.3μH	
C53	CC45CH1H040C	C 4pF ±0.25pF		L20	L34-0820-05	Tuning coil	
C54	CC45UJ1H100D	C 10pF ±0.5pF		L21	L34-2015-05	Tuning coil	☆
C56	CE04W1H4R7M	E 4.7μF 50V		L22	L34-0683-05	Tuning coil	
C57	CE04W1C100M	E 10μF 16V		L23	L40-4711-03	Ferri-inductor 470μH	
C60	CC45CH1H010C	C 1pF ±0.25pF		L24	L40-1021-03	Ferri-inductor 1mH	
C62	CC45CH1H330J	C 33pF		L25	L40-1501-03	Ferri-inductor 15μH	
C63	CC45CH1H050C	C 5pF ±0.25pF		L26	L40-1021-03	Ferri-inductor 1mH	
C67	CE04W1A470M	E 47μF 10V		L27,28	L34-2014-05	Tuning coil	☆
C68	C91-0457-05	C 0.022μF		L29	L33-0631-05	Choke coil 4.7μH ±0.5%	
C69,70	CC45CH1H330J	C 33pF		L30	L40-1021-03	Ferri-inductor 1mH	
C71	CC45SL1H101J	C 100pF		L31	L77-0934-05	Crystal 9MHz	☆
C72	CQ92M1H223K	ML 0.022μF		L32	L77-0935-05	Crystal 12.9444 MHz	☆
C73	CC45SL1H101J	C 100pF		L33	L77-0936-05	Crystal 36.6222 MHz	☆
				L34	L77-0937-05	Crystal 37.1777 MHz	☆
				L35	L79-0473-05	Helical block 332.1 MHz	☆
				L36	L79-0474-05	Helical block(D) 456.6 MHz	☆
				L37	L79-0475-05	Helical block(E) 456.6 MHz	☆

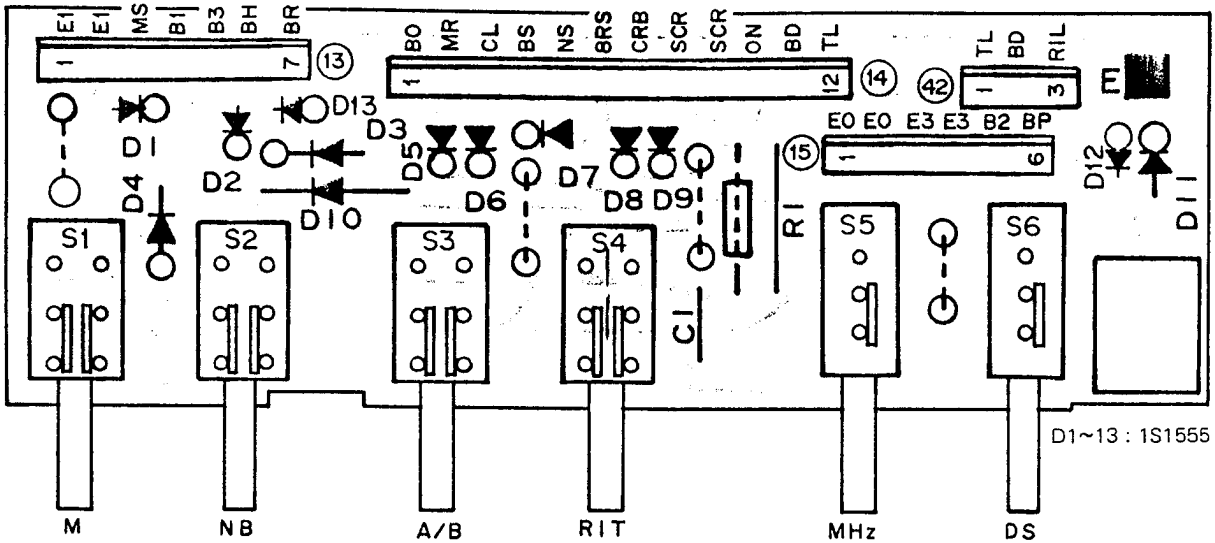
PARTS LIST/PACKING

Ref. No.	Parts No.	Description	Re- marks	Ref. No.	Parts No.	Description	Re- marks
	N87-2606-46	Self tapping screw			G11-0605-04	Cushion for BZ-1	
VR1	R12-6403-05	Trim. pot 470k Ω			J29-0403-04	Transducer plate	
VR2	R12-3416-05	Trim. pot 47k Ω		L1	L30-0503-05	IFT	
	R92-0150-05	Short jumper			N30-3006-46	Round screw	
	420-0009-05	Silicone (PLL, VCO)			N35-3006-46	Bind screw	
CONTROL UNIT (X53-1210-51, -61, -71)							
-51 : T, -61 : W, -71 : X							
C1	CE04W1C331M	E 330 μ F 16V		R1	RS14GB3D150J	Metal film 15 Ω 2W	
C2	CE04W1A221M	E 220 μ F 10V		R2	RC05GF2H330J	Solid 33 Ω 1/2W	
C3	CE04W1A470M	E 47 μ F 10V		R49	RN14BK2E1003F	Metal film 100k Ω \pm 1% 1/4W	
C4	CE04W1C470M	E 47 μ F 16V		R50	RN14BK2E2003F	Metal film 200k Ω \pm 1% 1/4W	
C6	CE04W1C470M	E 47 μ F 16V		R51	RN14BK2E4023F	Metal film 402k Ω \pm 1% 1/4W	
C7	CE04W1A470M	E 47 μ F 10V		R52	RN14BK2E8063F	Metal film 806k Ω \pm 1% 1/4W	
C8	CE04W1A471M	E 470 μ F 10V		R53	RN14BK2E1003F	Metal film 100k Ω \pm 1% 1/4W	
C9,10	CE04W1A221M	E 220 μ F 10V		R54	RN14BK2E4703F	Metal film 470k Ω \pm 1% 1/4W	
C11	CQ92M1H223K	ML 0.022 μ F 50V		R55	RN14BK2E2003F	Metal film 200k Ω \pm 1% 1/4W	
C12	CE04W1A101M	E 100 μ F 10V		R56	RN14BK2E4023F	Metal film 402k Ω \pm 1% 1/4W	
C14	CE04W1A221M	E 220 μ F 10V		R57	RN14BK2E8063F	Metal film 806k Ω \pm 1% 1/4W	
	E23-0046-04	Square terminal		R58	R90-0530-05	Resistor block 2.7k Ω X4	
	E40-0373-05	Mini connect wafer 3P		R59,60	R90-0526-05	Resistor block 27k Ω X4	
	E40-0573-05	Mini connect wafer 5P		R61	R90-0532-05	Resistor block 27k Ω X5	☆
	E40-0673-05	Mini connect wafer 6P		VR1	R12-1413-05	Trim. pot 1k Ω	☆
	E40-0873-05	Mini connect wafer 8P		BZ-1	T95-0051-05	Transducer	
	E40-0973-05	Mini connect wafer 9P					

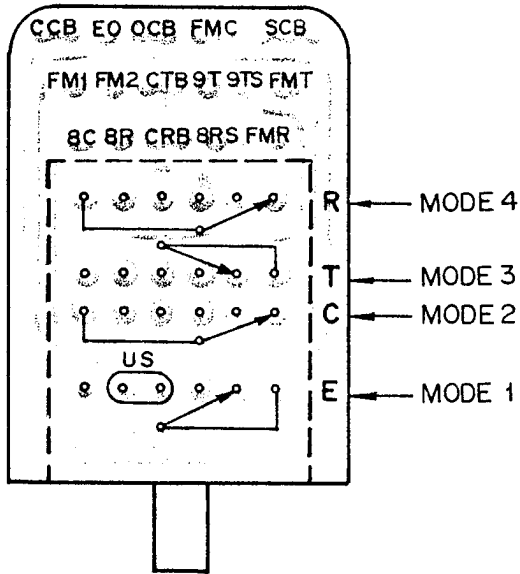
PACKING



▼ SWITCH UNIT (X41-1330-61) Components side view



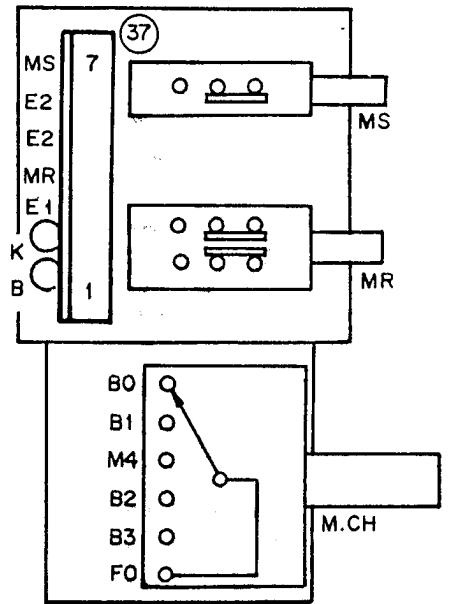
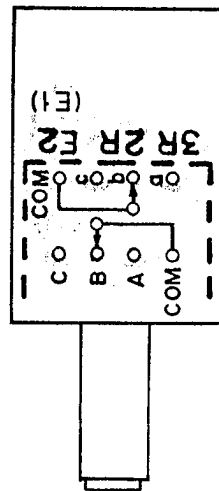
▼ MODE BOARD (J25-2714-14) Components side view



Abbreviation	Terminal name	Wire
BLK : BLACK	CCB :	BRN X2
BLU : BLUE	EO :	WHT/BLK
BRN : BROWN	OCB :	WHT/BLU
GRN : GREEN	FMC :	WHT/RED X2
GRY : GRAY	SCB :	BLU
ORA : ORANGE	FM1 :	YLW
RED : RED	FM2 :	GRN
WHT : WHITE	CTB :	WHT/ORAX2
YLW : YELLOW	9T :	ORA
	9TS :	BLK
	FMT :	WHT/YLW
	8C :	WHT
	8R :	GRY
	CRB :	WHT/GRNX2
	8RS :	WHT/BRN
	FMR :	WHT/GRY
	US :	RED

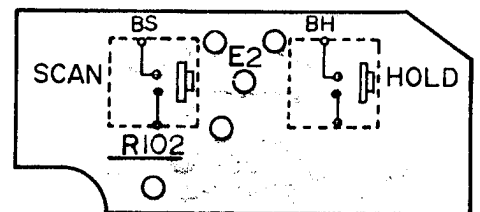
▼ M. CH, MS, MR BOARD (J25-3023-04) Components side view

▼ TX OFFSET BOARD (J25-2744-04) Components side view

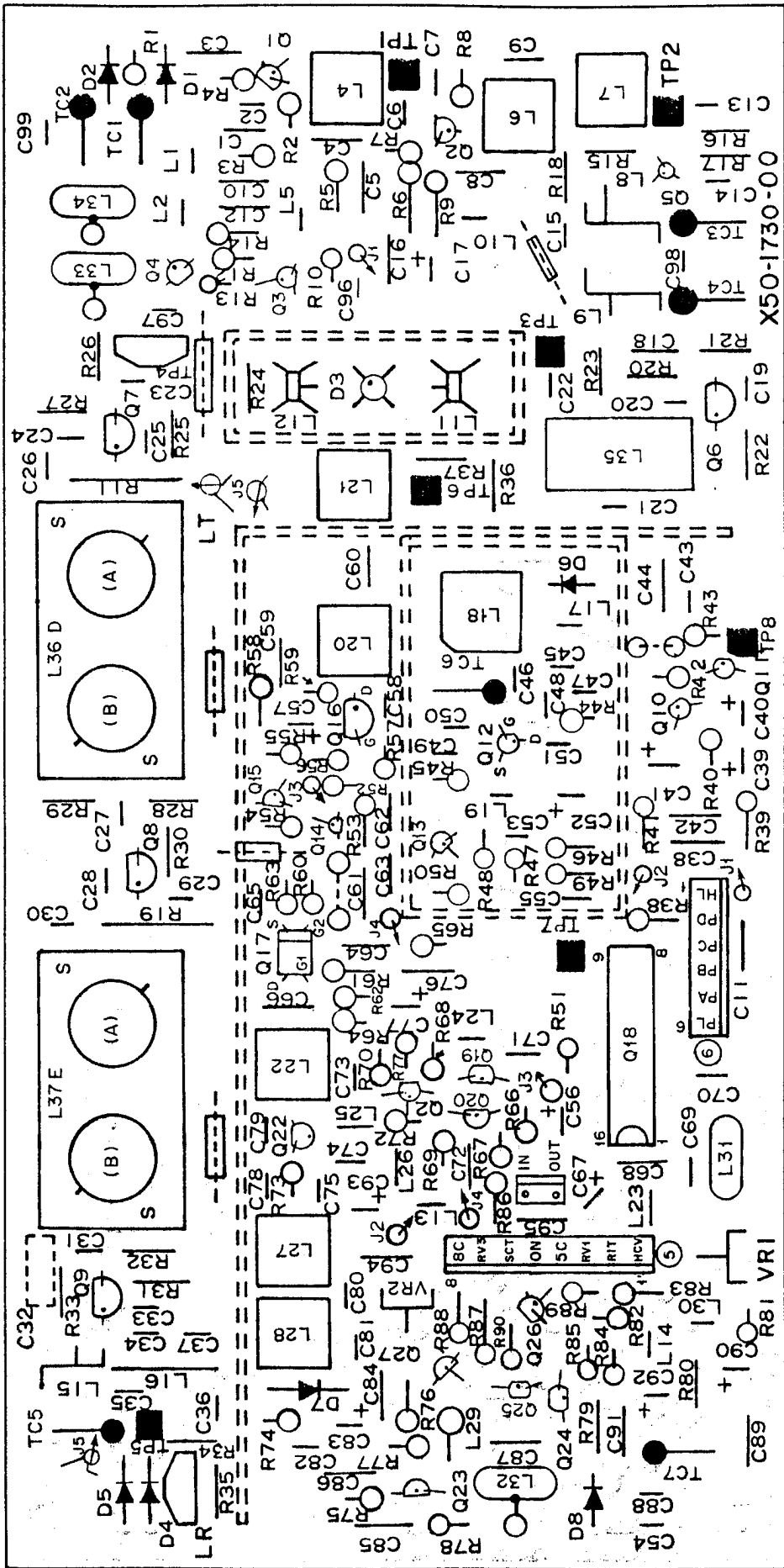


▼ SCAN, HOLD BOARD (J25-2716-24) Components side view

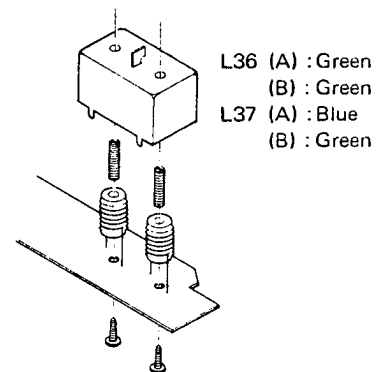
Components side view



▼ HET UNIT (X50-1730-00) Components side view

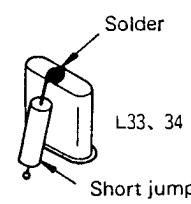


< Helical block assembly >



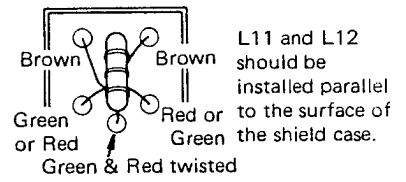
- * Helical coils are identified by bobbin color.
- * L36 (A), (B) and L37 (B) are of the same type.

< Attachment method of L33, 34 >

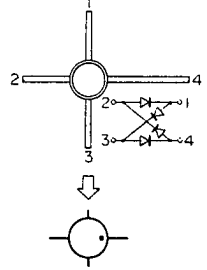


* Solder as quickly as possible.

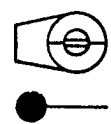
< Attachment direction of L11, 12 >



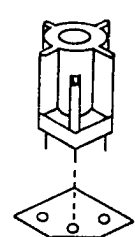
< Attachment direction of D3 >



< Attachment direction of TC1~7 >

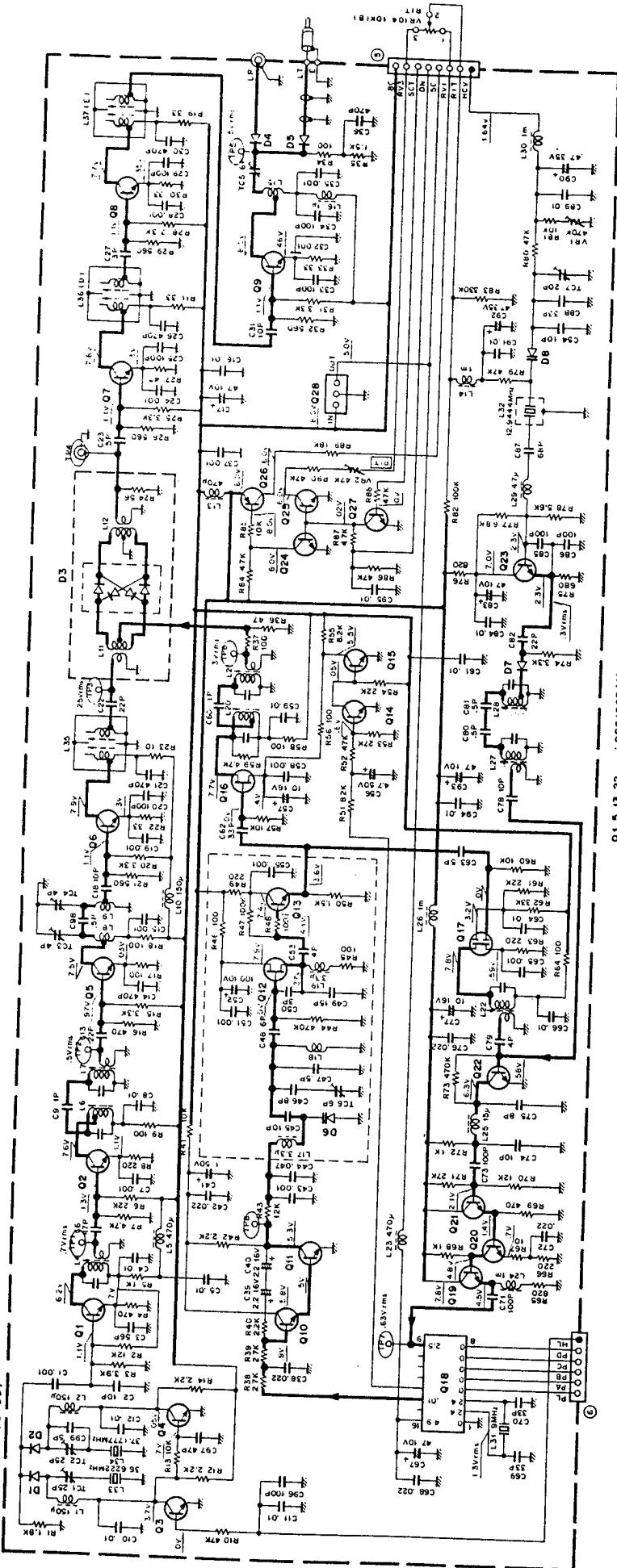


< Attachment direction of L18 >



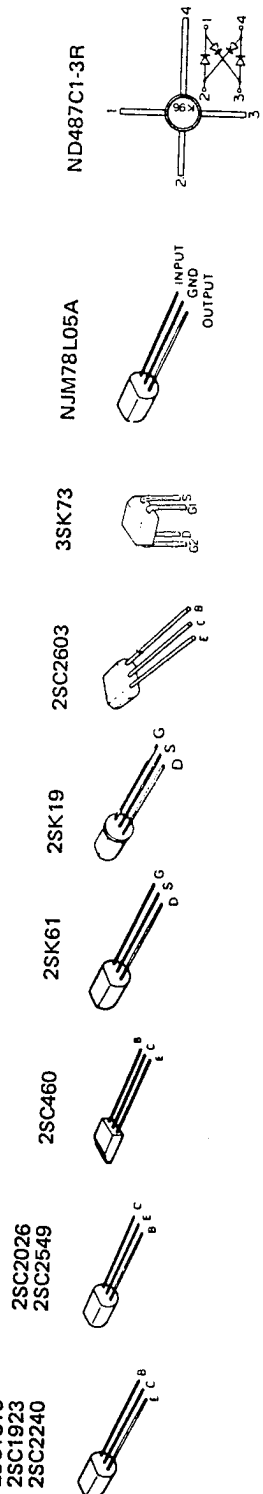
▼ HET UNIT (X50-1730-00)

HET UNIT (X50-1730-00)

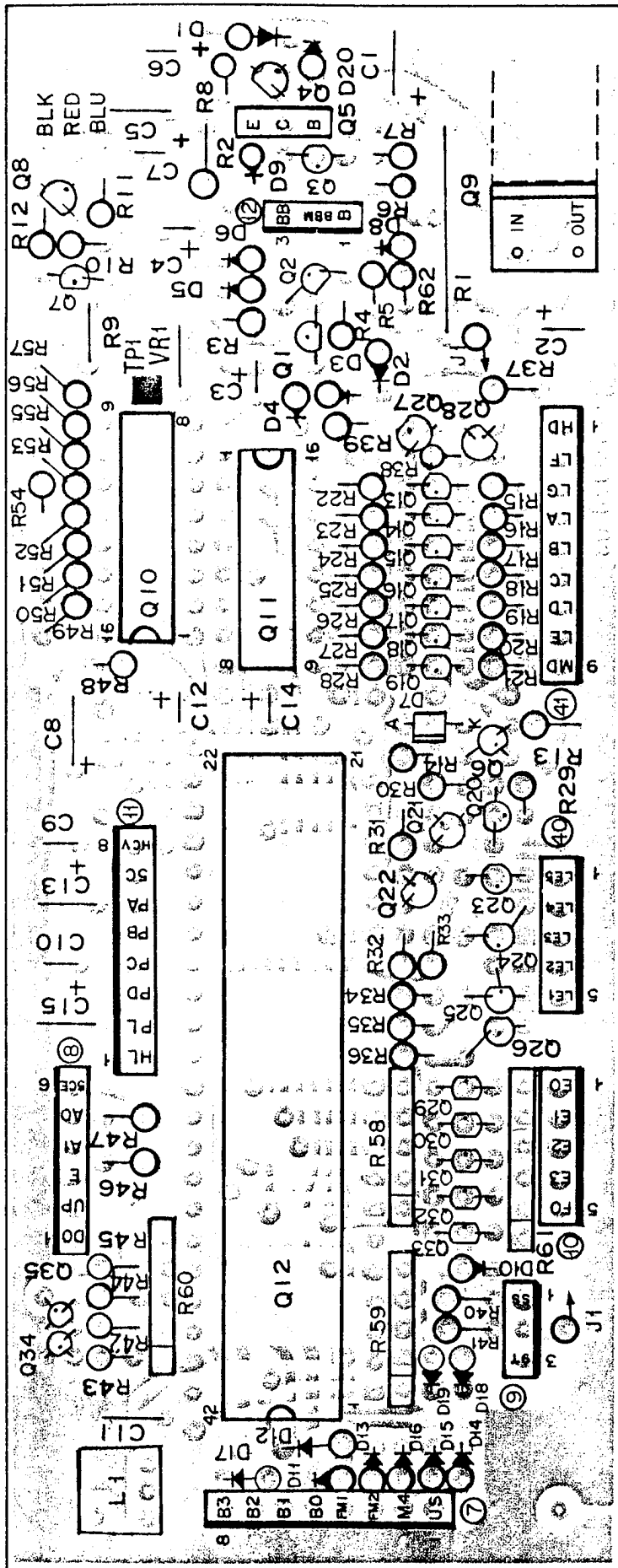


- | | | | | | |
|-------------|-----------------|--------|--------------------|-----------|---------------------|
| 01,5,13,22 | : 25C1923(O) | 07,8 | : 25C2026 | 018 | : TC9125P |
| 02,20,21,23 | : 25C1675(L) or | 010,11 | : 25C2240(GR) | 019,24,25 | : 25C2603(E) or (D) |
| 03,4,15,27 | : 25C460(B) | 012 | : 25K19(GR) TRIO-5 | 026 | : 25A1015(Y) |
| 06,9 | : 25C1815(Y) | 016 | : 25K61(GR) | 028 | : NJM78L05A |
| | : 25C2549 | 017 | : 35K73(GR) | 014 | : 25C1775(E) |

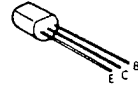
- 25A1015
- 25C1675
- 25C1775
- 25C1815
- 25C1923
- 25C2240



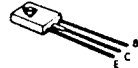
▼ CONTROL UNIT (X53-1210-51, -61, -71) -51 : T, -61 : W, -71 : X Components side view



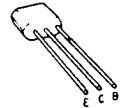
2SA1015
2SC1815
2SC1959



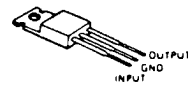
2SC496



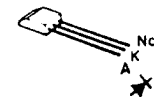
2SA1115



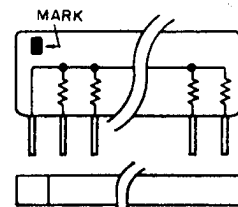
μPC78M05H



MA522



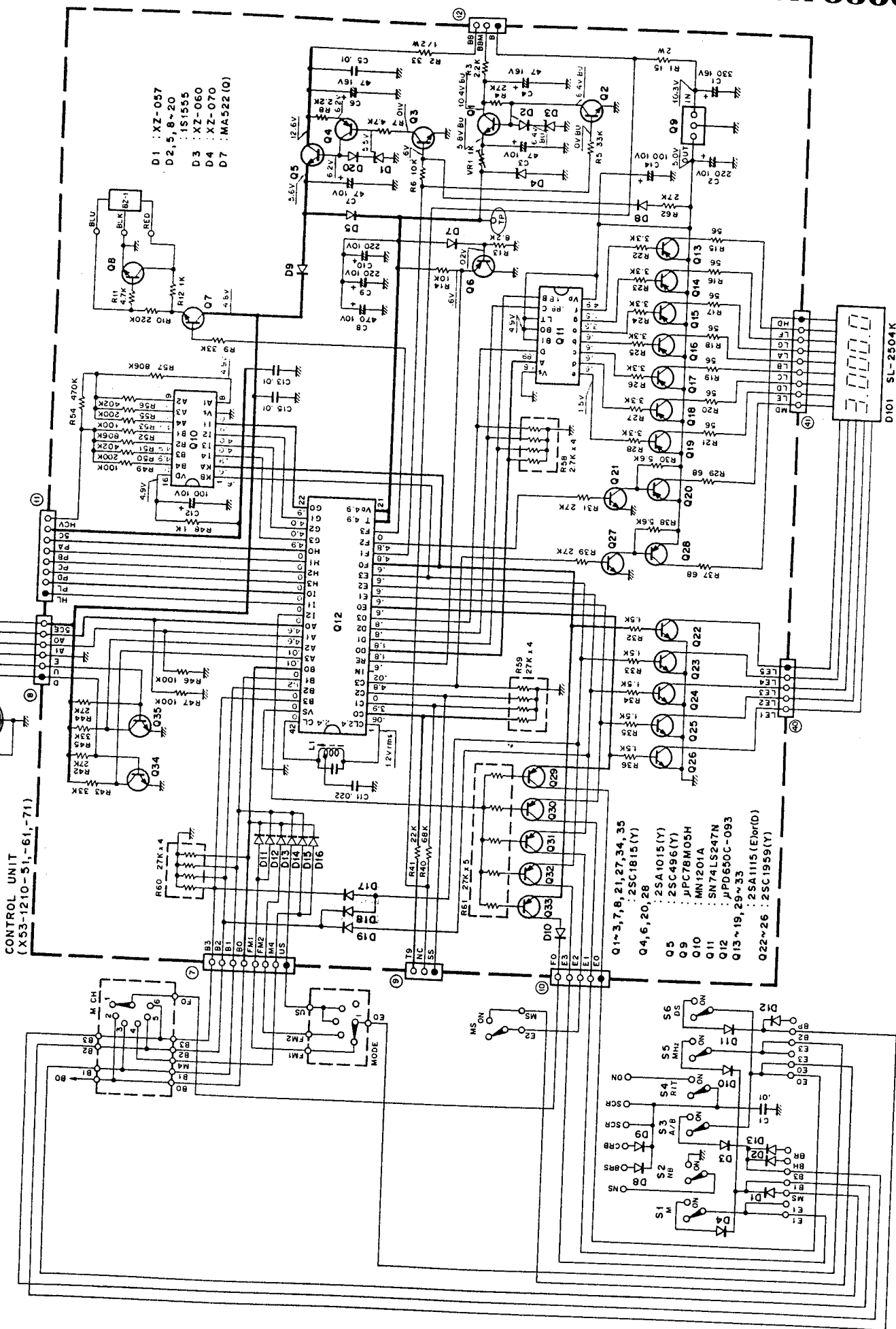
	T	W	X
D17	Not used	Used	Not used
D18	Not used	Not used	Used



R58~61

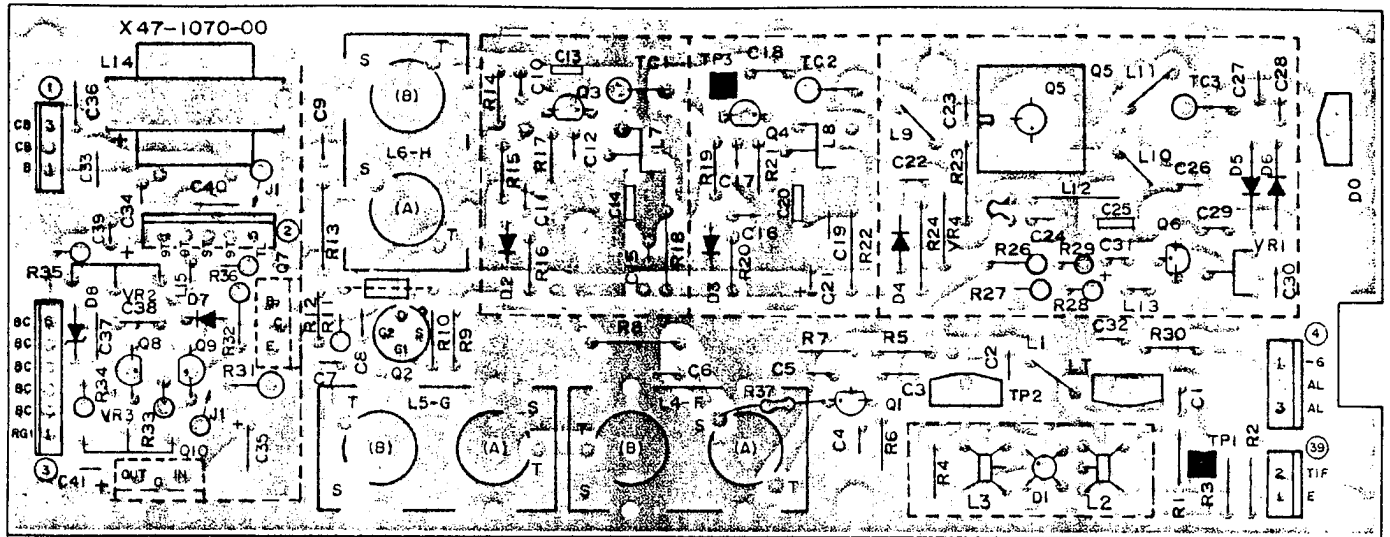
CIRCUIT DIAGRAM TR-9500

CONTROL UNIT (X53-1210-51, -61, -71)
 -51 : T, -61 : W, -71 : X



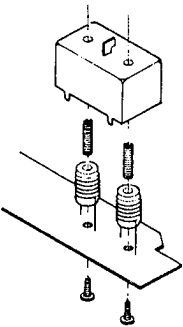
R-9500 PC BOARD VIEWS

▼ DRIVE UNIT (X47-1070-00) Components side view



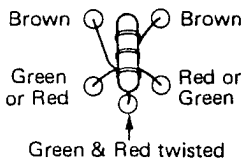
Q1, 3 : 2SC2549 Q2 : 3SK48 Q4 : 2SC2026 Q5 : 2SC2762 Q6, 9 : 2SC1815(Y) Q7 : 2SA1012(Yor O) Q8 : 2SA1015(Y)
 Q10 : μ PC78M08H D1 : ND487C1-3R D2, 3 : MV-13 D4 : 1S1555 D5, 6 : 1N60 D7 : VD1223 D8 : XZ-060

< Helical block assembly >

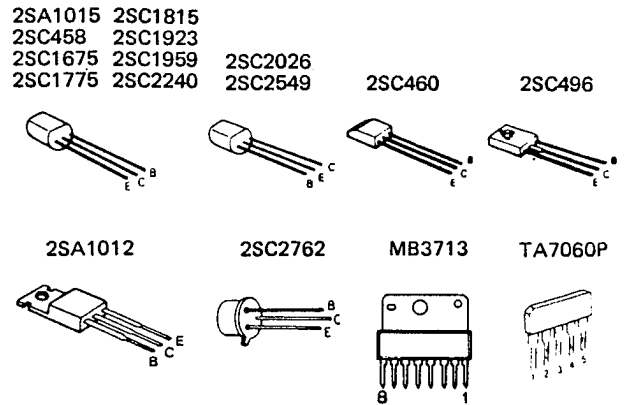


L4 (A) : Blue
 (B) : Pink
 L5 (A) : Pink
 (B) : Gray
 L6 (A) : Brown
 (B) : Gray

< Attachment direction of L2, 3 >

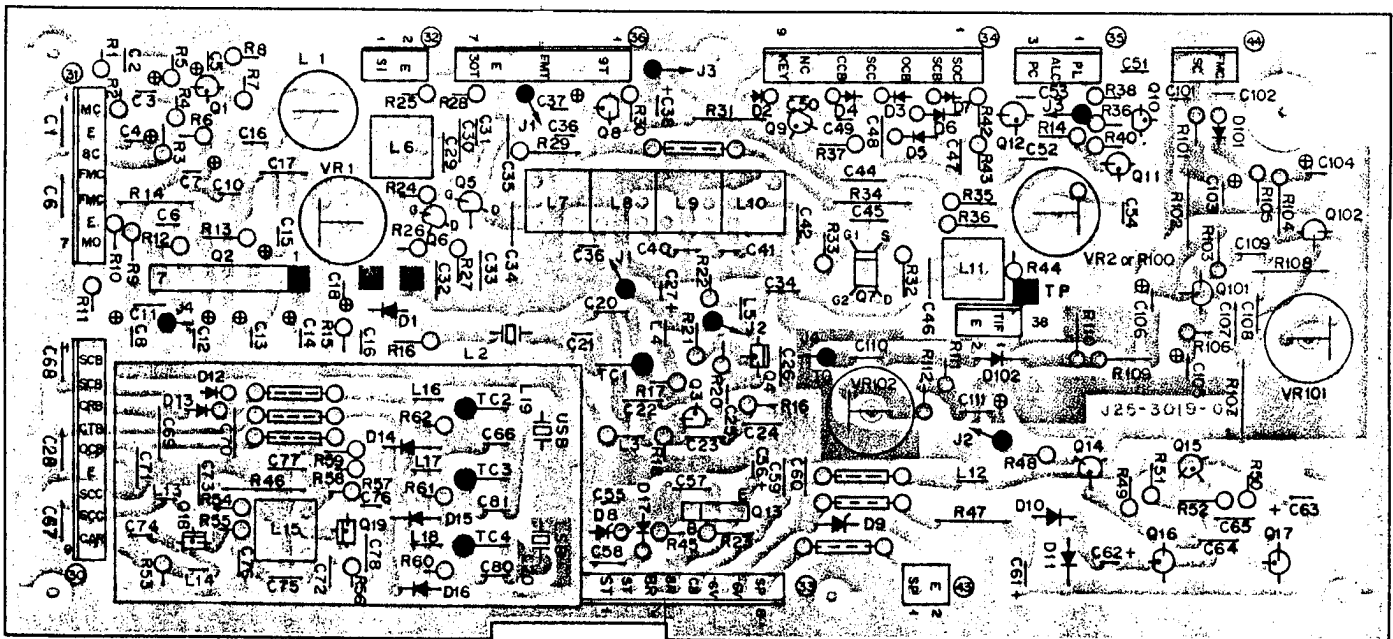


L2 and L3 should be installed parallel to the surface of the shield case.



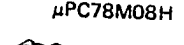
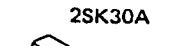
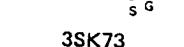
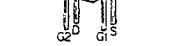

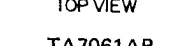




* Helical coils are identified by bobbin color.
 * L4 (B), L5 (A) and L5 (B), L6 (B) are of the same type.

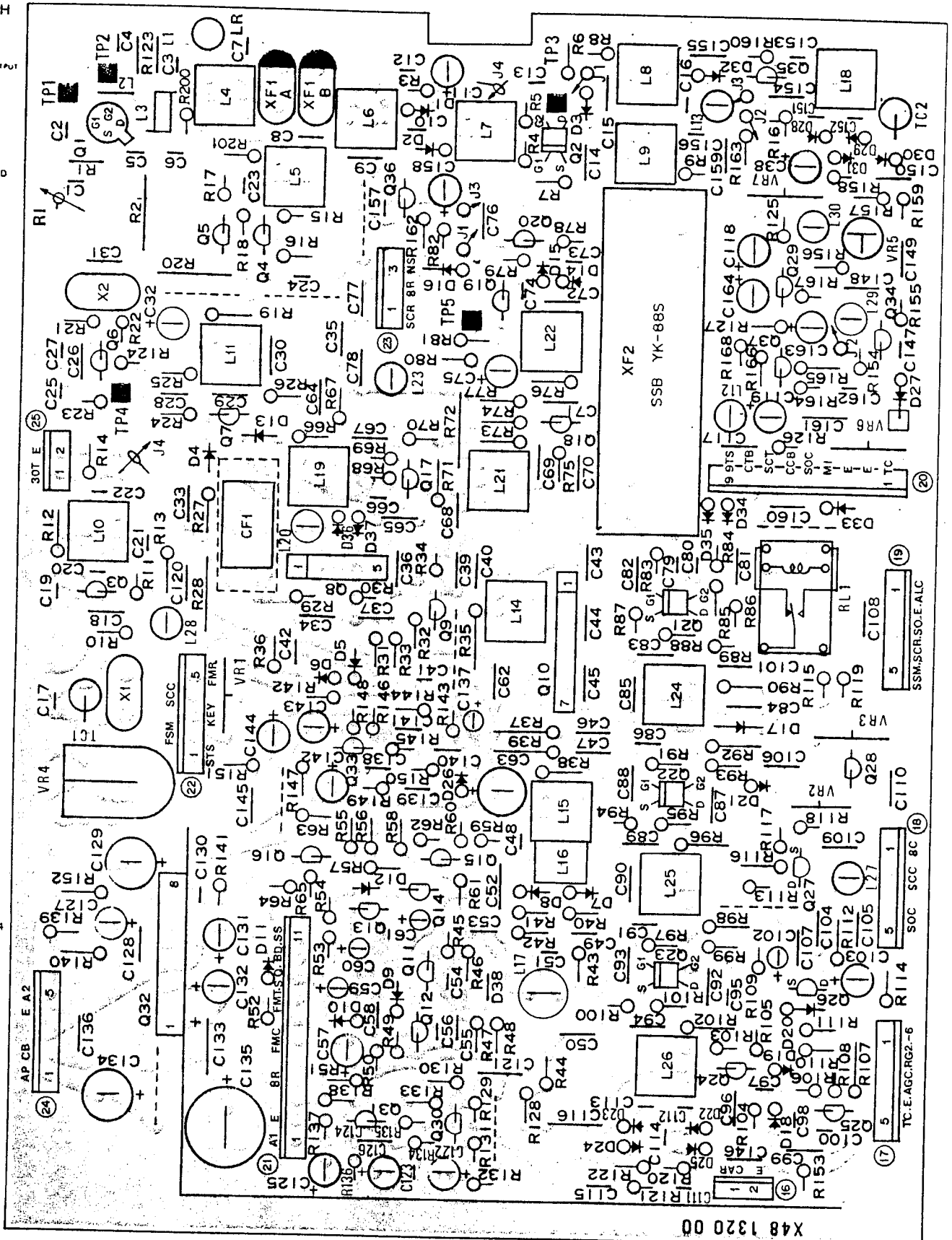
▼ CAR UNIT (X50-1720-00, -51, -61) -Q0 : X, -51 : T, -61 : W Foil side view



Q1 : 2SC2240(GR) Q2 : TA7061AP Q3 : 2SC1923(O) Q4, 18 : 2SC460(B) or 2SC1675(L) Q5, 6 : 2SK61(GR) Q7 : 3SK73(GR)
 Q8~10, 12, 15 : 2SA1015(Y) Q11, 14, 16, 17 : 2SC1815(Y) Q13 : 2SC496(Y) Q19 : 2SC1675(L) Q101, 102 : 2SC458(B)
 D1 : 1S2208 D2~7, 10~16, 101, 102 : 1S1555 D8 : XZ-090 D9 : XZ-060 D17 : V06B

IF UNIT (X48-1320-61) Components side view

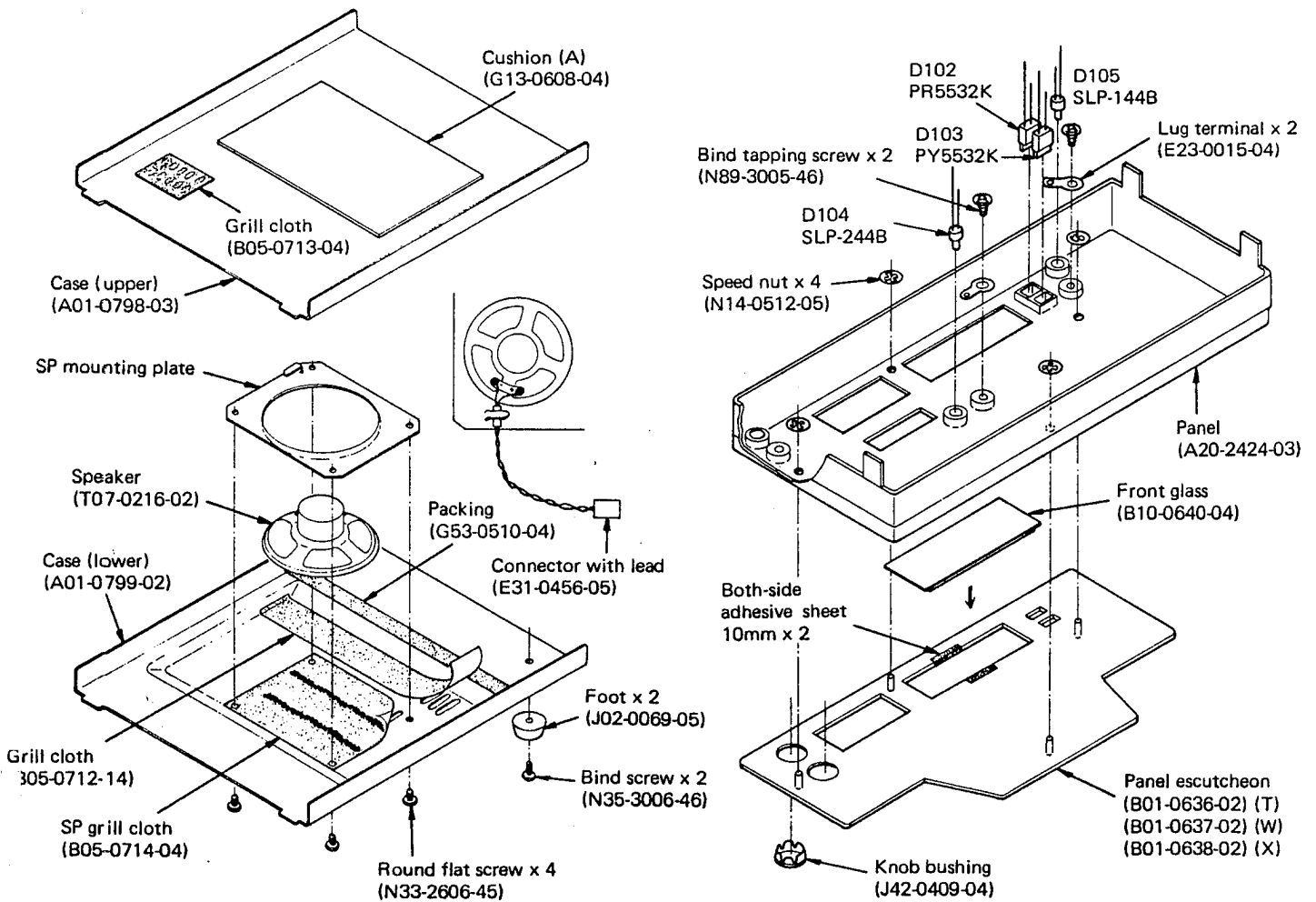
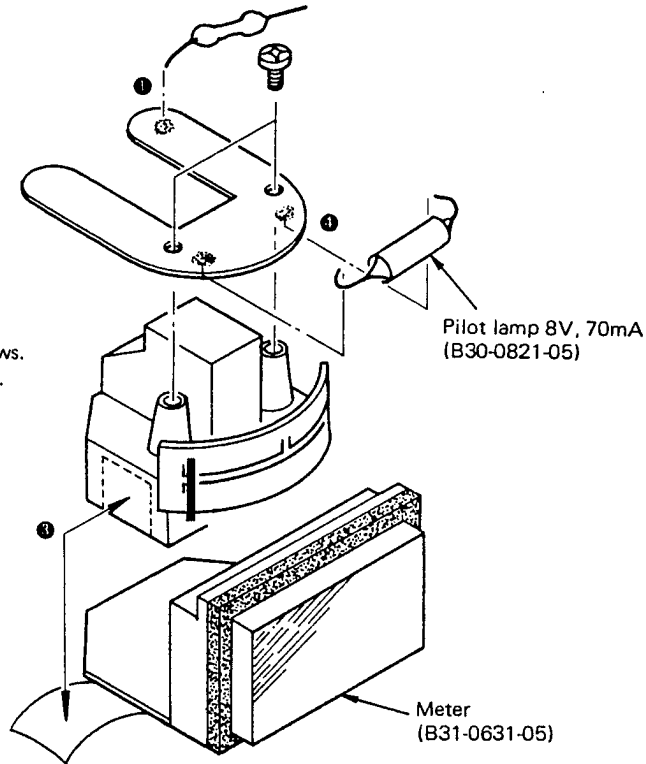
-  µPC78M08H
-  2SK30A
-  3SK73
-  3SK48
-  TA7061AP
µPC577H
-  VD1223
-  MV-13
-  GREEN
-  ND487C1-3R
-  <Attachment direction of XF1>



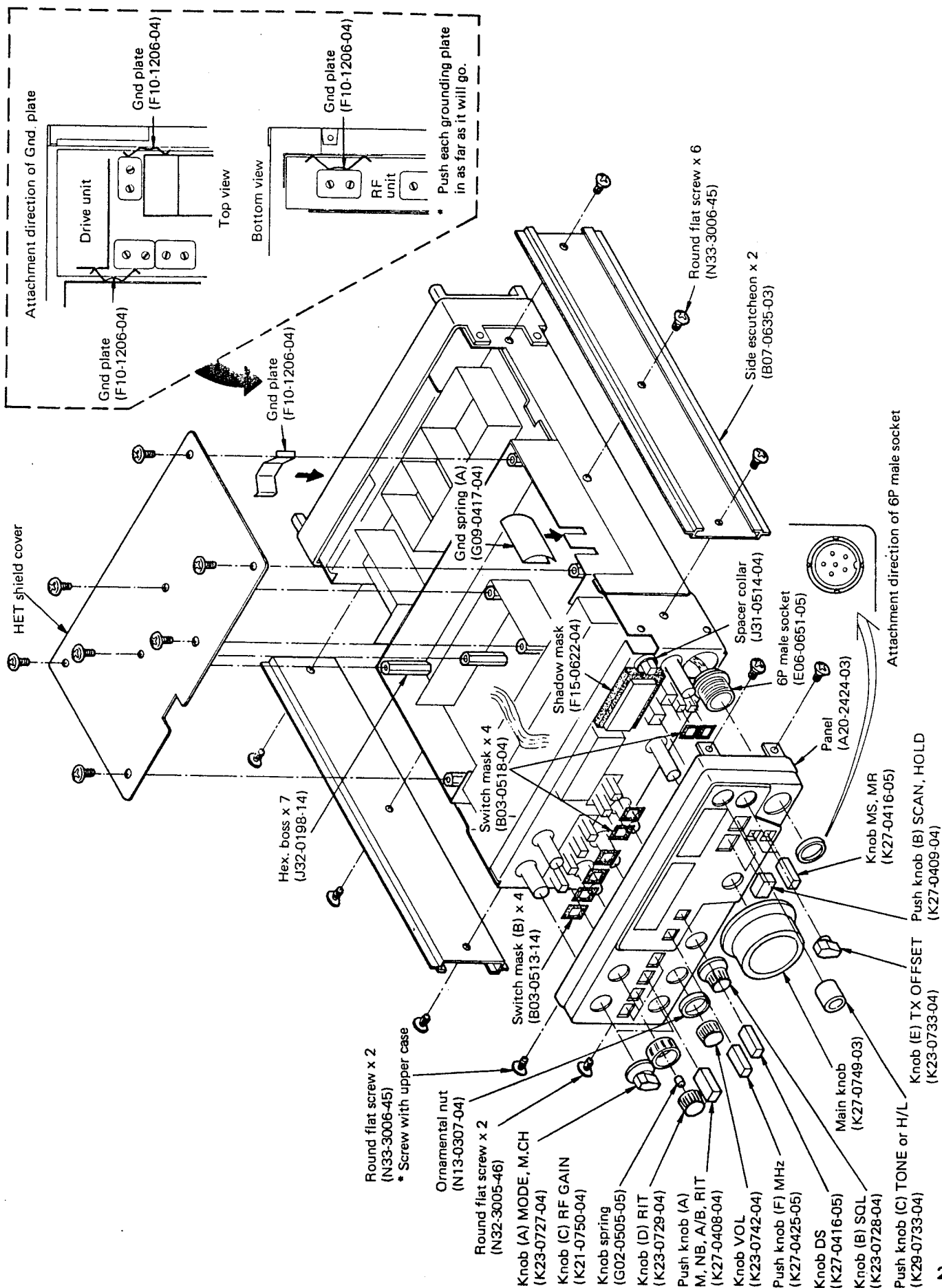
- Q1 : 3SK48 Q2, 21~23 : 3SK73(GR) Q3~5, 7, 9 : 2SC460(B) or 2SC1675(L) Q6 : 2SC1923(O) Q8 : TA7060P
 Q10 : µPC577H Q11, 12, 33 : 2SC1775(E) Q13~15, 17~20, 24, 25, 29~31, 36, 37 : 2SC1815(Y) Q16, 28 : 2SA1015(Y)
 Q26 : 2SK30A(GR) Q27 : 2SK30A(O) Q32 : MB3713 Q34 : 2SC1959(Y) Q35 : 2SK61(GR)
 D1~3, 17, 27, 32 : 1S1587 D4, 11, 13, 20, 21, 26, 33~35 : 1S1555 D5~10, 14, 15, 18, 19, 22~25, 28~31, 36, 37 : 1N60
 D12 : 1S1212 D16 : MV13 D38 : D33A

DISASSEMBLY

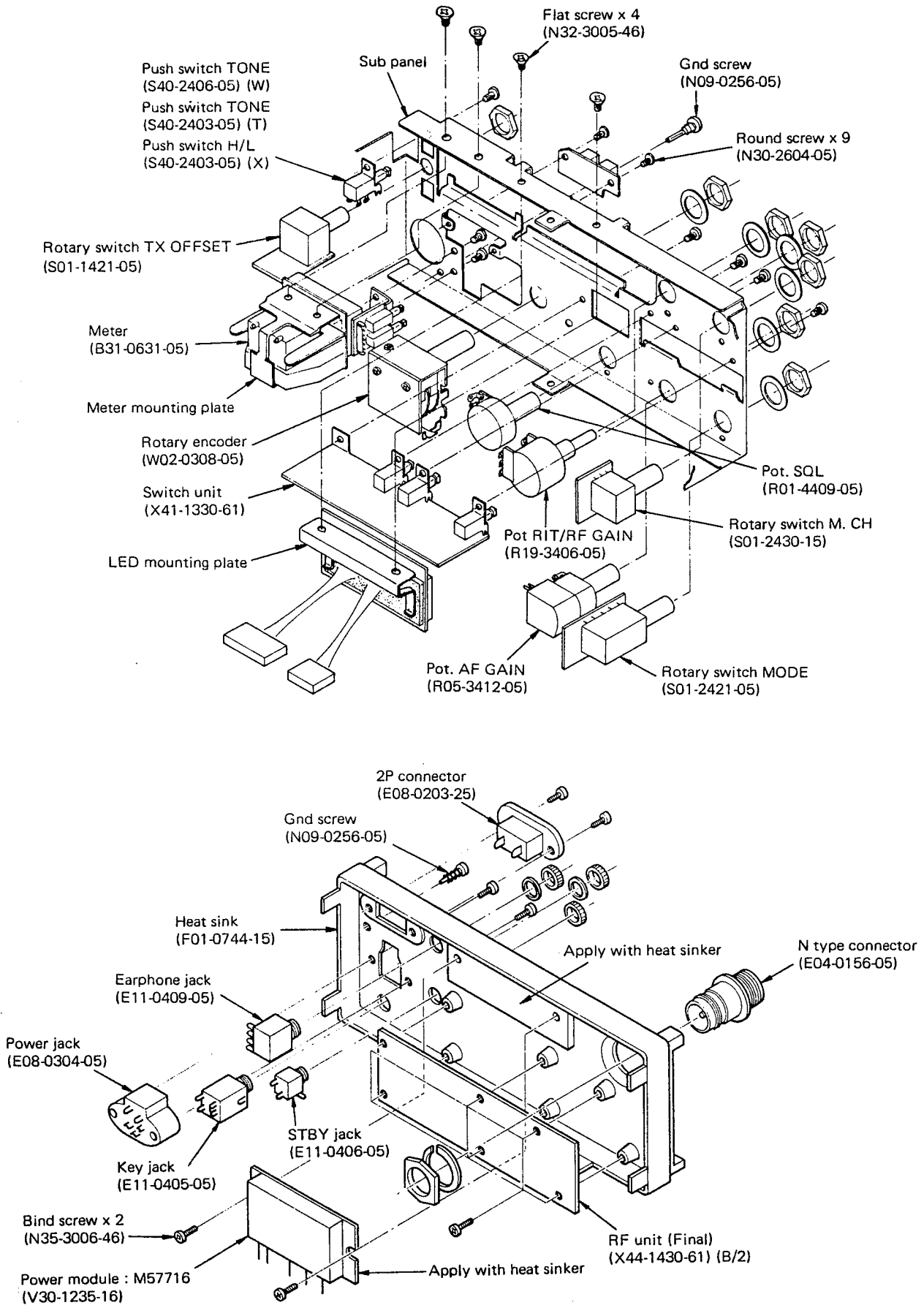
- ① Unsolder.
- ② Remove screws.
- ③ Remove tape.
- ④ Unsolder.



DISASSEMBLY



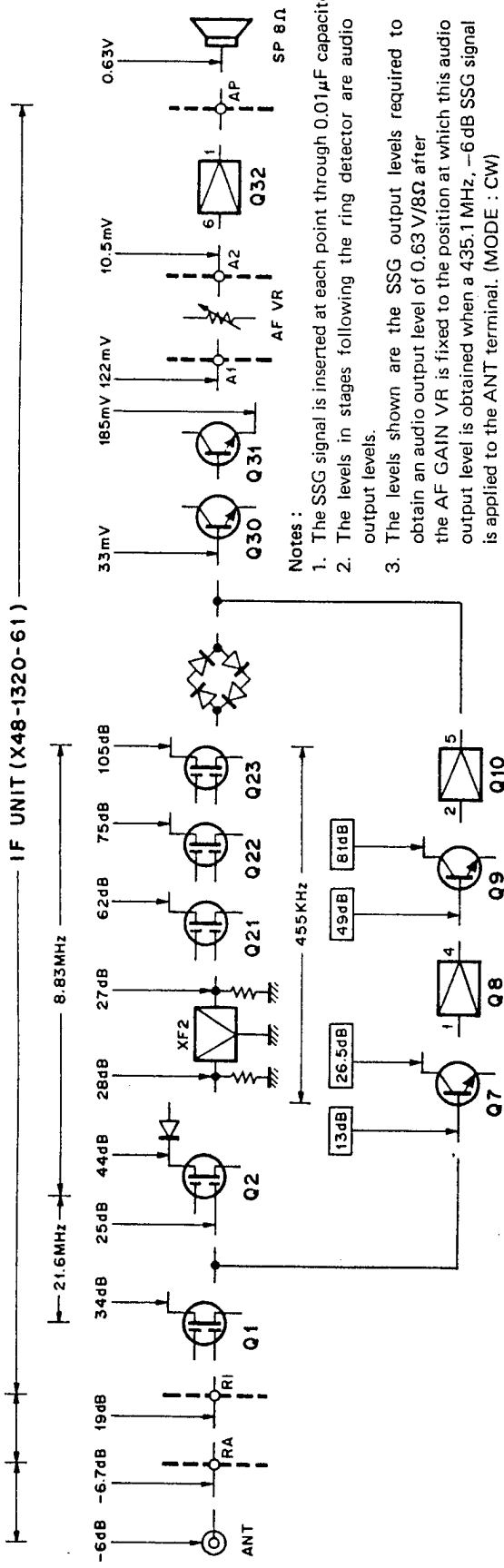
DISASSEMBLY



LEVEL DIAGRAMS

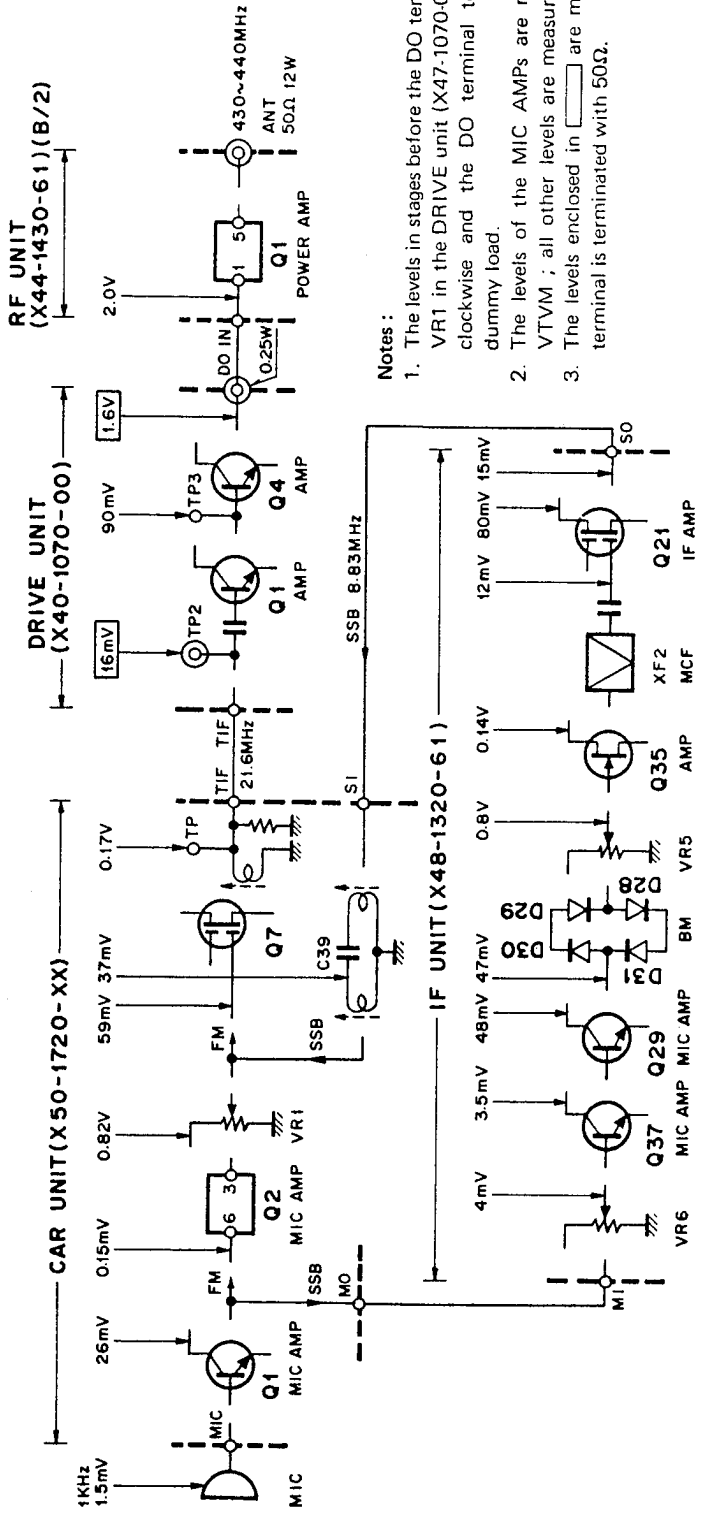
RECEIVER SECTION

RF UNIT
(X44-1430-61)
(B/2) (A/2)



- Notes:
1. The SSG signal is inserted at each point through 0.01μF capacitor.
 2. The levels in stages following the ring detector are audio output levels.
 3. The levels shown are the SSG output levels required to obtain an audio output level of 0.63 V/8Ω after the AF GAIN VR is fixed to the position at which this audio output level is obtained when a 435.1 MHz, -6 dB SSG signal is applied to the ANT terminal. (MODE : CW)
 4. The levels enclosed in are SSG output levels required to obtain a ratio of 20 dB NQ.

TRANSMITTER SECTION



- Notes:
1. The levels in stages before the DO terminal are measured with VRT in the DRIVE unit (X47-1070-00) turned fully counter-clockwise and the DO terminal terminated with a 50Ω dummy load.
 2. The levels of the MIC AMPS are measured with an audio VTVM ; all other levels are measured with an RF VTVM.
 3. The levels enclosed in are measured when the ANT terminal is terminated with 50Ω.

ADJUSTMENTS

< Test Equipment >

1. **Tester**
 - Input: Sufficient
2. **RF VTVM (RF V.M.)**
 - Input impedance: 1 M Ω and less than 2 pF
 - Voltage range: F.S. = 10 mV to 300V
 - Frequency range: 450 MHz or greater
3. **Frequency counter (F count)**
 - Minimum input voltage: 50 mV
 - Frequency range: 450 MHz or greater
4. **DC power supply**
 - Voltage 10V to 17V variable
 - Current: 6A min.
5. **RF Power Meter**
 - Dissipation: 3W, 20W
 - Impedance: 50 Ω
 - Frequency range: 450 MHz
6. **AF VTVM (AF V.M.)**
 - Input impedance: 1 M Ω or greater
 - Voltage range: F.S. = 1 mV to 30V
 - Frequency range: 50 Hz to 10 kHz
7. **AF Generator (AG)**
 - Frequency range: 100 Hz to 10 kHz
 - Output: 0.5 mV to 1V
8. **Linear detector**
 - Frequency range: 450 MHz
9. **Directional coupler**
10. **Oscilloscope**
 - With horizontal input and high sensitivity
11. **Standard signal generator (SSG)**
 - Frequency range: 450 MHz
 - Modulation: amplitude and frequency modulation
 - Output: -20 dB ~ 100 dB
12. **AF Dummy load**
 - 8 Ω , 5W (approx.)
13. **Sweep generator**
 - Frequency range: 450 MHz
14. **Field Strength Meter**
 - Frequency range: 450 MHz

< Preparation >

Unless otherwise specified, set the controls as follows.

POWER/VOL SW	ON
SEND/REC	REC
RF GAIN VOL	MAX (fully counterclockwise)
SQUELCH VOL	MIN
MODE SW	USB
VFO A/B SW	A
TONE SW	OFF
TX OFFSET SW	S
RIT VOL	Centered
RIT SW	OFF
NB SW	OFF
SCAN SW	OFF
D.STEP/SEARCH	OFF
MR	OFF
MS	OFF
MHz	OFF

Table 9

Notes:

- When adjusting the trimmers or coils, use a non-induced adjusting rod of bakelite, etc.
- When adjusting the RX section never transmit to prevent SSG damage.
- Connect MIC connector as shown in Fig 11.

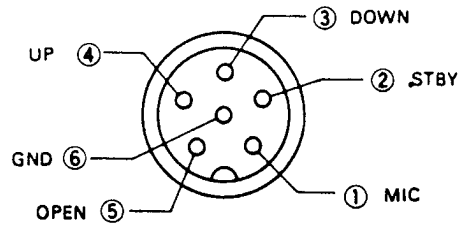


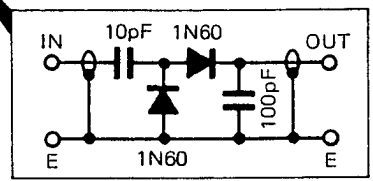
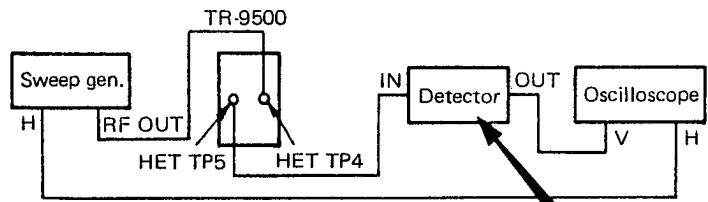
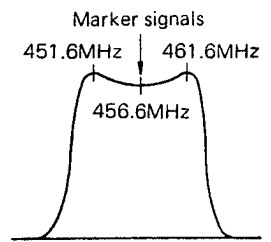
Fig. 11 MIC terminals
(view from front panel side)

- The output level of SSG is indicated as SSG's open circuit.

ADJUSTMENTS

TX/RX SECTION (COMMON)

Item	Condition	Measurement			Adjustment			Specification	Remarks								
		Test equipment	Unit	Terminal	Unit	Parts	Method										
1. Voltage check in RX mode	1) 8C	DC V.M	DRIVE	③ 8C				7.7~8.3V	Check								
	2) 9T		DRIVE	② 9T				Less than 0.1V									
	3) 5C		HET	⑤ 5C				4.7~5.3V	Check								
	4) 8R		CAR	③ 8R				8.0~8.6V									
	5) -6		CAR	③ -6				-5.8~-6.2V									
2. Voltage check in TX mode	1) -6 MODE : FM1, 2 Transmission mode	DC V.M	CAR	③ -6				0V	Check								
	2) 8R		CAR	③ 8R				Less than 0.5V									
	3) 9T MODE : USB	DC A.M	DRIVE	② 9T	DRIVE	VR2	9.1V	+0.1V, -0V									
	4) Bias current		DRIVE	Shorting jumper	DRIVE	VR4	25mA	±2mA									
	5) DB		DC V.M	RF (B/2)	② DB				11.7~12.1V	Check							
3. Back-up voltage check	1) RX mode POWER : OFF	DC V.M	Control	TP	Control	VR1	5.0V	±0.1V									
	2) POWER : ON																
4. PLL	1) MODE : USB MHz : ON f : 434.00 MHz	RF V.M	HET	TP1	HET	L4	Turn the core counterclockwise until the oscillating signal level becomes 0.5dB lower than its peak value.	(0.85V)	All parenthesized figures below are reference values.								
				TP2	HET	L6, 7	MAX	(0.85V)									
	2) f : 435.00 MHz	RF V.M	HET	TP2	HET	L7	Adjust the core so that the same level is obtained as at 434.00 MHz.	MAX Repeat adjustment	(0.65V)								
									3) f : 434.00 MHz	RF V.M	HET	TP3	HET	TC3,4 L35	MAX	(0.25V)	
												TP7	HET	L22,27,28	MAX	(0.65V)	
									DC V.M	HET	TP8	HET	TC6	6V	±0.1V		
	RF V.M	HET	TP7	HET	L22,27,28	MAX	More than 0.5V										
	4) f : 432.00 MHz	RF V.M	HET	TP6	HET	L20,21	MAX	(0.4V)									
	5) f : 435.00 MHz The sweep generator is connected to TP4 of the HET unit (Input : 30 ~ 35 dBμ) The detector is connected to TP5 and TP7 is grounded with the clip. TC5 : Maximum position (see the figure below).	Oscilloscope	HET			HET	L36,37	Adjust the four cores of the helical block so that the waveform shown at right is obtained.									

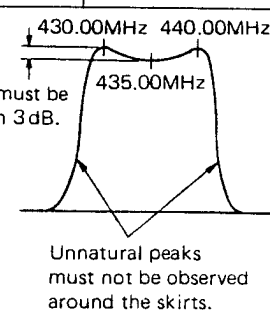
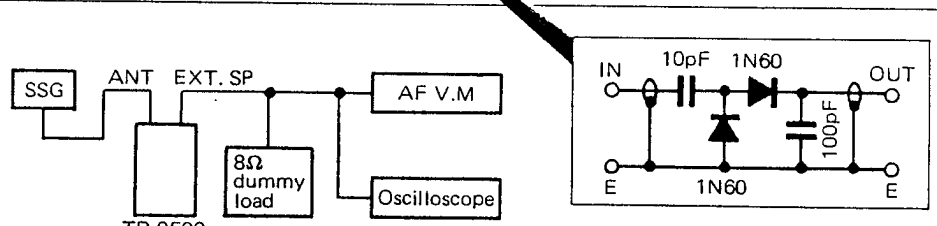
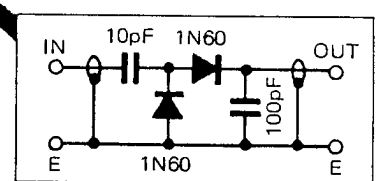


ADJUSTMENTS

Item	Condition	Measurement			Adjustment			Specification	Remarks		
		Test equipment	Unit	Terminal	Unit	Parts	Method				
	6) Disconnect the test equipment and the grounding wire.	RF V.M	HET	TP5	HET	TC5	MAX	(0.5V)			
	7) Install the HET shielding cover.										
5. HET frequency adjustment	1) f : 435.00 MHz	F counter	HET	TP2	HET	TC2	111.53333 MHz	±10 Hz			
	2) f : 433.00 MHz			TP2	HET	TC1	109.86666 MHz	±10 Hz			
	3) MODE : USB MHz : OFF f : 432.9999 MHz			TP6	HET	TC7	124.99840 MHz	±10 Hz			
	4) f : 433.00 MHz MODE : LSB			TP6	HET	VR1	124.99850 MHz	±10 Hz			
	5) RIT VOL : Centered RIT SW : ON			TP6	HET	VR2	124.99850 MHz	±10 Hz			
	6) RIT VOL : fully clockwise (+direction) fully counter- clockwise (- direction)			TP6	HET				124.99980 MHz or higher	Check	
	7) RIT SW : OFF RIT VOL : Centered MODE : USB								124.99770 MHz or lower		
6. SSB 2nd local oscillator	Set knobs as shown in Table 9.	RF V.M	IF	TP3	IF	L10	Turn the core a half turn out from the maximum.	(0.4V)			
	2)	F counter	IF	TP3	IF	TC1	30.4300 MHz	±10 Hz			
7. CAR	1) MODE : USB	RF V.M	IF	D27 cathode	CAR	L15	Turn the core a little to the left of the maximum reading position.	0.3V±0.02V			
	2)	F counter	IF	D27 cathode	CAR	TC2	8.8285 MHz	±50 Hz			
	3) MODE : CW								The same frequency as in paragraph 2) above	Check	
	4) Transmission mode					CAR	TC3	8.8293 MHz	±50 Hz		
	5) Reception mode									The same frequency as in paragraph 2) above	Check
	6) MODE : LSB					CAR	TC4	8.8315 MHz	±50 Hz		
	7) MODE : USB										

ADJUSTMENTS

RX SECTION


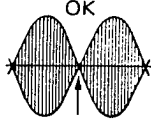
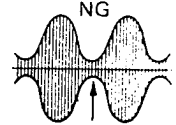
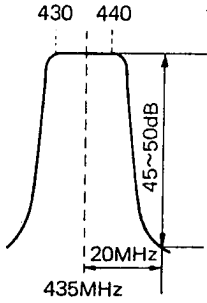
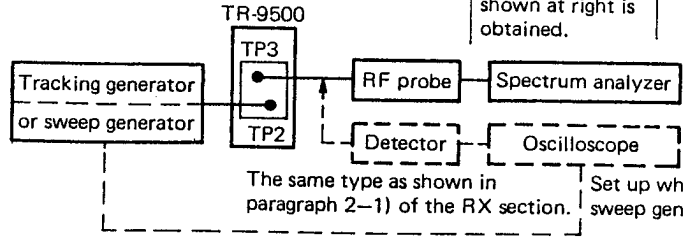

Item	Condition	Measurement			Adjustment			Specification	Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method		
1. RG1 voltage	1) RG1 voltage	DC V.M	DRIVE	③ RG1	DRIVE	VR3	4.0V	±0.1V	
2. Helical	1) Connect the sweep generator to the ANT terminal on the rear panel with its output level set to 30~40 dBμ.	Oscilloscope, Sweep generator	IF	TP1	RF (A/2)	L51~53	Adjust the 6 helical block cores so that the waveform shown at right is obtained.	Ripple must be less than 3dB.	
3. Sensitivity adjustment	1) Connect the AF VTVM to the EXT SP terminal on the rear panel with an 8Ω load connected. Connect the SSG to the ANT terminal on the rear panel.								
		2) Tune to the SSG signal (435.025 MHz, 6 dBμ) so that a beat signal of about 1.5 kHz is output.	AF V.M., S-meter		EXT.SP	IF	L4~9 L24~26	MAX Repeat adjustment	
	3) MODE : FM SSG : MOD 1 kHz DEV 3.5 kHz	S-meter			IF	L11	MAX Repeat adjustment		
	4) SSG output : 50 dBμ	AF V.M		EXT.SP	IF	L15	MAX		
	5) SSG output : 100 dBμ	AF V.M		EXT.SP				Normal output should be obtained.	Check
	6) SSG output : -6 dBμ	AF V.M., Oscilloscope		EXT.SP	RF (A/2)	L51	Fine adjust the core so that the optimum waveform is obtained.	S/N must be more than 20 dB.	S/N measurement for FM mode
4. S-meter reading in FM mode	1) SSG output : 26 dBμ	S-meter			IF	VR1	Adjust VR1 for a meter reading of "10" on a scale of 1-10.		
5. S-meter reading in the USB mode	1) MODE : USB SSG output : OFF	S-meter			IF	VR3	Turn VR3 counterclockwise so that the meter needle does not swing.		

ADJUSTMENTS

Item	Condition	Measurement			Adjustment			Specification	Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method		
	2) SSG output : ON 0 dB μ Adjust the frequency so that the S-meter reading is maximized.	S-meter			IF	L25	Adjust the core for the maximum meter reading, then turn it counterclockwise until the meter reads "1" on a scale of 1-9.		
	3) SSG output : 20 dB μ				IF	VR2	Adjust VR2 so that the S-meter reads "9" on a scale of 1-9.		
6. SSB sensitivity adjustment	1) SSG output : -6 dB μ	AF V.M		EXT.SP				S/N must be more than 14 dB.	Check
	2) Set the VFO dial to 430.00 and 439.975 and perform measurements described in paragraphs 3-6) and 6-1) at each point.							FM S/N must be more than 20 dB. SSB S/N must be more than 14 dB.	Check
7. NB	1) SSG output : 10 dB μ	DC V.M	IF	TP5	IF	L19, 21	MIN Repeat adjustment		
	2) Pulsed noise is input.							Pulsed noise should be reduced.	
8. Side tone	1) MODE : CW Connect a key to the KEY terminal on the rear panel. AF VOL : Centered	AF V.M		EXT.SP	IF	VR4	0.5V/8 Ω		
9. Squelch	1) MODE : FM SQ VOL : Threshold							The SQ VOL position should be at 9~12 o'clock position.	Check
	2) SQ VOL : Threshold Tune to the SSG signal (any frequency within the band, -10 dB μ).	SSG						Squelch should open.	

ADJUSTMENTS

TX SECTION

Item	Condition	Measurement			Adjustment			Specification	Remarks	
		Test equipment	Unit	Terminal	Unit	Parts	Method			
1. FM carrier	1) Pull out the TIF  connector of the CAR unit. MODE : FM1 Transmit.	RF V.M	CAR	TP	CAR	L10,11	MAX	(1.2V)		
		F counter	CAR	TP	CAR	TC1		21.6000 MHz	±200 Hz	
2. CW carrier level	1) MODE : CW Transmit.	RF V.M	CAR	TP	IF	L18	MAX			
					CAR	L6	MAX			
					CAR	L7~10	MAX Repeat adjustment			
					IF	VR7	Adjust VR7 for 1.2V reading.	±0.05V		
3. Carrier point	1) MODE : USB Transmit.	Oscilloscope, RF V.M	CAR	TP	IF	TC2	MIN Repeat adjustment			
	2) Apply a two-tone signal (300 Hz, 1 mV and 2700 Hz, 1 mV) to the MIC terminal.	Oscilloscope			IF	VR6	Set VR6 to the 11 o'clock position.			
					CAR	TC2	The waveform should be as shown at right.	 		
	4) MODE : LSB					CAR	TC4	Perform the same adjustment as in paragraph 3-3).		
3. Simplified carrier point adjustment	1) MODE : USB Adjust the AG output level so that a transmission power of 5W is obtained.	Power meter								
	2) AG : 300 Hz or 2700 Hz	Power meter			CAR	TC2	Alternate 300 Hz and 2700 Hz.	The output power should be the same at both frequencies.		
	3) MODE : LSB	Power meter			CAR	TC4	Alternate 300 Hz and 2700 Hz.	The output level should be the same at both frequencies.		
4. Helical	1) Drive unit VR1 : all the way to the left TC2 : Centered (see the figure below). Connect a tracking generator or sweep generator to TP2 of the drive unit and connect the RF probe to TP3.	Oscilloscope	DRIVE	TP3	DRIVE	TC1	Adjust TC1 so that the maximum level is obtained at 435.00 MHz.			
		spectrum analyzer				L4~6	Adjust the 6 helical block cores so that the waveform shown at right is obtained.			
		 <p style="text-align: center;">The same type as shown in paragraph 2-1) of the RX section. Set up when a sweep generator is used.</p>								
2) Disconnect the test equipment. Connect the TIF  connector of the CAR unit.										

ADJUSTMENTS

Item	Condition	Measurement			Adjustment			Specification	Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method		
5. Drive adjustment	1) f : 435.00MHz MODE : FM1 Disconnect the DO cable from the drive unit and connect a 3W power meter to the DO terminal. Transmit.	3W power meter (RM V.M)	DRIVE	DO	DRIVE	TC1~3	MAX Repeat adjustment	More than 0.25W (more than 3Vrms)	
	2) f : 430.00 MHz 439.975 MHz							More than 0.25W (more than 3Vrms)	Check
6. Power/RF meter adjustment	1) MODE : CW Disconnect the 3W power meter and connect the DO cable to the DO terminal. f : 430.00, 435.00, 439.975 MHz	20W power meter		ANT				More than 15W	Check
	2) f : 435.00 MHz	DC V.M	FINAL	TP	FINAL	VR3	MIN		
	3) f : 430.00 MHz	Power meter		ANT	DRIVE	VR1	Adjust VR1 for a reading of 11W.		
	4) Current consumption	DC A.M						The total current consumption should be less than 3.8A.	Check
	5) RF meter	RF meter			FINAL	VR1	Adjust the VR1 for a meter reading of "8" on a scale of 0-10.		
	6) f : 439.975 MHz	Power meter, DC A.M						More than 11W, Less than 3.8A	Check
	7) If the specifications were not satisfied on adjustment in paragraphs 6-4) and 6), widen the pitch of L5 in the final unit and perform power adjustment again.								
7. Low power adjustment	1) MODE : FM1 f : 435 MHz HI/LOW : LOW Transmit.	Power meter		ANT	Carrier	VR2	Adjust VR2 for a reading of 1.2W.		
	2) MODE : FM, CW f : 431 MHz Transmit.							Less than 3W	Check
	3) f : 439 MHz Transmit.							Less than 3W	
8. Protection	1) MODE : FM1 f : 435 MHz AMT terminal : open Transmit.	DC A.M			FINAL	VR2	Set VR2 to the 7 o'clock position as viewed from the front.	Less than 2A	Check
	2) Transmit when the meter reading is greater than 2A.				FINAL	VR2	Adjust VR2 for a reading of 2A.		
	3) Connect the power meter.							Normal output should be obtained.	Check

ADJUSTMENTS

Item	Condition	Measurement			Adjustment			Specification	Remarks				
		Test equipment	Unit	Terminal	Unit	Parts	Method						
9. FM deviation	1) Connect the AG (1 kHz, 30 mV) to the MIC terminal, then transmit.	Linear detector			CAR	VR1	Adjust the VR1 for 5 kHz deviation.						
	2) Adjust the AG level so that the linear detector reading becomes 3.5 kHz.	Linear detector, AG		MIC terminal				The AG output level must be less than 5 mV.	Check				
10. SSB MIC gain	1) MODE : USB f : 432 MHz Connect the AG (1.5 kHz, 1 mV) to the MIC terminal. Transmit.	Power meter		ANT	IF	VR6	5W	±0.5W					
	2) HI/LOW : HI → LOW → HI											The output power should not vary.	
	3) Set the AG output to 1.5 kHz, 10 mV.											12.5W	±2.5W
11. Carrier suppression	1) MODE : USB Transmit.	Field strength meter			IF	TC2 VR5	MIN Repeat adjustment	More than 50 dB (less than -10 dBm)					
12. Tone (W, T type)	1) TONE : ON Transmit.	Connect a F counter to the linear detector output.			CAR	VR101	1750 Hz DEV : more than 2.5 kHz	±10 Hz					
	2) T type only Transmit.				CAR	VR102	Adjust the tone burst interval to about 0.5 sec.						

Micro-processor operational check

Item	Condition	Specification	Item	Condition	Specification
1. Reset check	1) Pull the power connector out and reinsert it.	Display 3.000.0		3) D.S : ON Turn the VFO knob clockwise one click at a time until 3.10 is displayed, then turn it counterclockwise until 2.90 is displayed.	The display should vary in 5 kHz steps. (3 digit display)
	2) VFO A/B : B	Display 0.000.0			
	3) VFO A/B : A MR : ON MEMORY : 1	Display 3.000.0			
	4) MEMORY : 2~6	Display 0.000.0			
	5) MR : OFF	Display 3.000.0			
2. Dial step and number of digits displayed	1) A/B : A MODE : USB, CW, LSB Turn the VFO knob clockwise one click at a time until the display becomes 3.001.0, then turn it counterclockwise until 2.999.0 is displayed.	The display should vary in 100 Hz steps. (5 digit display)		4) MODE : FM1 VFO A/B : B Turn the VFO knob clockwise one click at a time until the display which starts at 0.000 reaches 0.100, turn it counterclockwise until the display becomes 9.900 (0.100 → 0.000 → 9.900), then turn it clockwise until 0.000 is displayed.	The display should vary in 25 kHz steps. (4 digit display)
	2) MODE : FM2	The display should vary in 1 kHz steps. (4 digit display)			
				5) D.S : OFF Perform the same operation as in paragraph 2-4).	The display should vary in 25 kHz steps. (4 digit display)

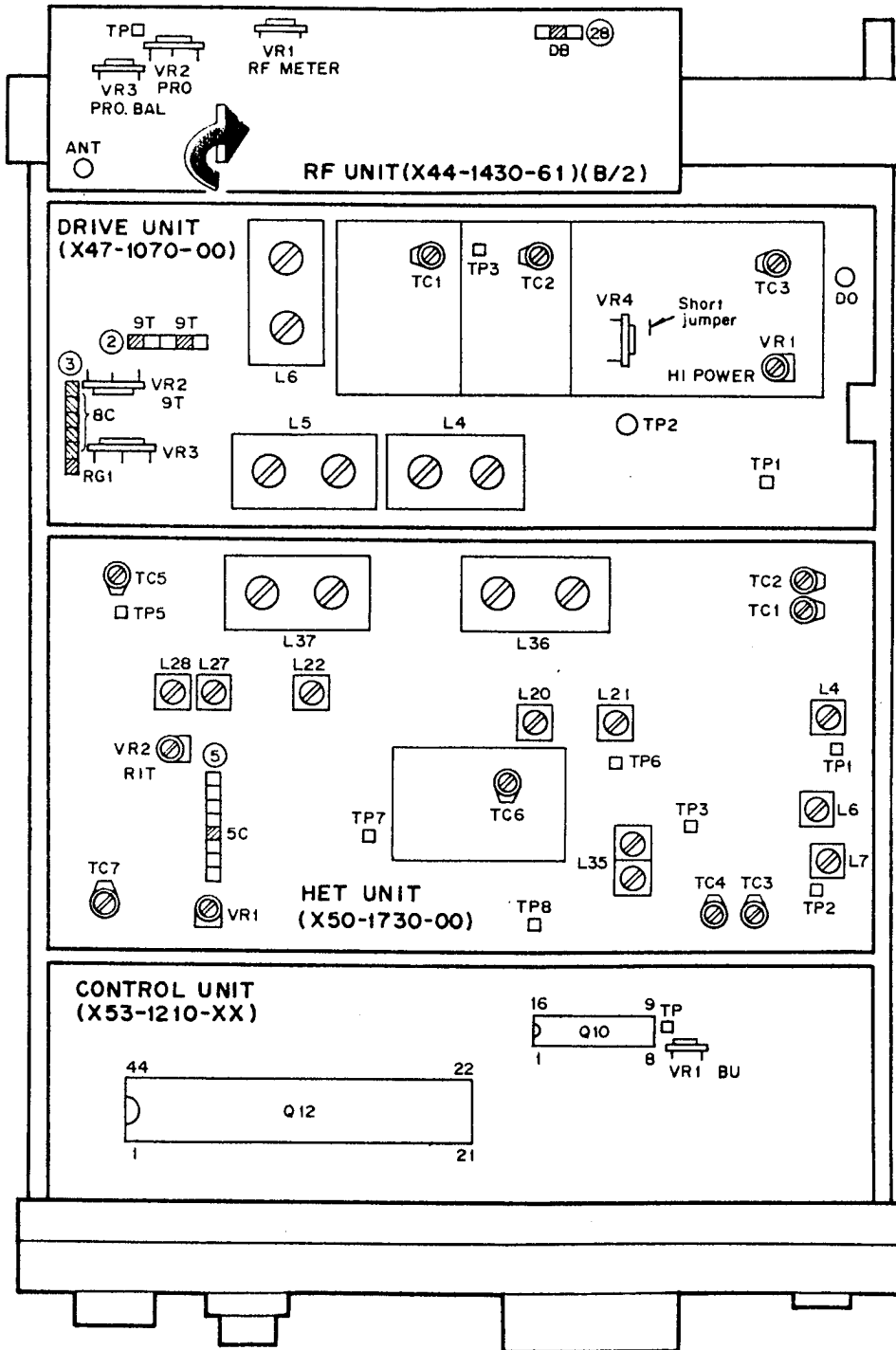
ADJUSTMENTS

Item	Condition	Specification
Search operation check	1) MODE : USB D.S : ON	The frequency range from 0 to 9.9 kHz must be searched in 100 Hz steps.
	2) VFO A/B : A Turn the MAIN knob.	The frequency should vary in 10 kHz steps.
	3) Transmit.	The ON AIR indicator (red) lights to indicate transmission.
	4) Receive. D.S : OFF	
4. MHz indication check	1) MHz : ON MODE : FM1 Turn the MAIN knob in both directions.	The display should vary in 1 MHz steps. The tone sounds everytime the display changes.
5. Memory write	1) f : 1.00 MEMORY : 1 M : ON	The tone sounds.
	2) f : 2.00 MEMORY : 2 M : ON	The tone sounds.
	3) f : 3.00 MEMORY : 3 M : ON	The tone sounds.
	4) f : 4.00 MEMORY : 4 M : ON	The tone sounds.
	5) f : 5.00 MEMORY : 5 M : ON	The tone sounds.
	6) f : 6.00 MEMORY : 6 M : ON	The intermittent tone sounds continuously.
	7) f : 7.00 M : ON	The intermittent tone stops.
Memory call	1) MR : ON	Display <i>5.000.0</i>
	2) Transmit.	Display <i>7.000.0</i>
	3) Receive.	Display <i>5.000.0</i>
	4) MEMORY : 5 : 4 : 3 : 2 : 1	Display <i>5.000.0</i> <i>4.000.0</i> <i>3.000.0</i> <i>2.000.0</i> <i>1.000.0</i>
	5) MR : OFF	Display <i>7.00</i>
7. MEMORY SCAN check	1) SQL : all the way to the right	Display <i>1.000.0</i> ~ <i>5.000.0</i> The frequency changes repeatedly from 1.000.0 to 6.000.0. The MHz dot flickers.
	2) SQL : all the way to the left	The display stops. The dot flickers. The BUSY indicator lights.
	3) SCAN : ON	The next memory channel is displayed.

Item	Condition	Specification	
	4) Turn SQL clockwise.	Scan starts. The BUSY indicator goes off.	
	5) HOLD : ON	The display stops changing. The dot flickers.	
	6) SCAN : ON	Scan starts.	
	7) Transmit.	Scan stops.	
	8) Receive.	The dot flickers.	
	9) MS : OFF	The dot lights continuously.	
	8. SCAN check	1) SQL : all the way to the right SCAN : ON	The display frequency increases. The dot flickers.
		2) SQL : all the way to the left	The display stops changing. The BUSY indicator lights. The MHz dot flickers.
		3) Turn SQL clockwise.	The display frequency increases. The BUSY indicator goes off.
4) HOLD : ON		The display stops changing. The MHz dot lights continuously.	
5) SCAN : ON		The display frequency increases. The MHz dot flickers.	
6) Transmit.		The display stops changing. The MHz dot lights continuously.	
7) Receive.		Scan stops.	
9. UP/DOWN check	1) MODE : USB MHz : OFF Set the MAIN dial to 7.000.0.	Display <i>7.000.0</i>	
	2) Press the MIC UP switch once.	The tone sounds. Display <i>7.000.1</i>	
	3) MHz : ON Press the MIC UP switch once.	The tone sounds. Display <i>8.000.1</i>	
	4) Hold down the MIC UP switch.	The intermittent tone sounds. The display frequency increases.	
	5) Press the MIC DOWN switch once.	The tone sounds. The display frequency decreases 1 MHz.	
	6) MHz : OFF Press the MIC DOWN switch once.	The tone sounds. The display frequency decreases 100 Hz.	
	7) Hold down the MIC DOWN switch.	The intermittent tone sounds. The display frequency decreases.	
10. RIT	1) RIT : ON	The RIT indicator (red) lights.	
	2) MODE : FM1, FM2	The RIT indicator (red) goes out.	
	3) Transmit.	The RIT indicator (red) goes out. The ON AIR indicator (red) lights.	
	4) Receive.	The RIT indicator (red) lights.	

ADJUSTMENTS

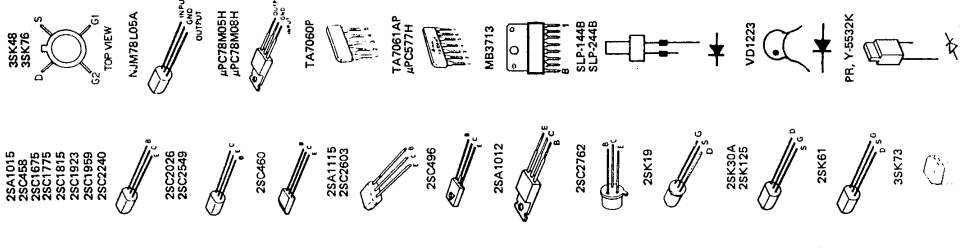
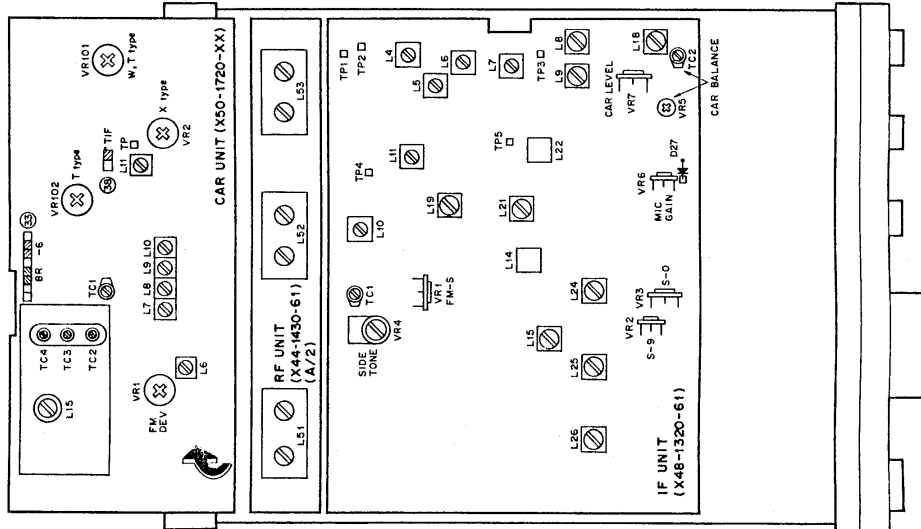
TOP VIEW



SCHEMATIC ABBREVIATION (W) TYPE TR-5500

ADJUSTMENTS

BOTTOM VIEW



Com- pon- ent No.	Termi- nal No.	Remarks	Unit/Switch	Con- nec- tion No.	Termi- nal No.
DRIVE UNIT (X47-1070-00)					
1	B	Switched B + 13.8 V	S/RF meter.	4	B
2	CB	Common B + 13.8 V	POW. SW	5	CB
3	CE		CAR UNIT	2	CB
4	9T	+9 V in TX	IF UNIT	2	9T
5	9T	Stand by	MIC terminal	2	9T
6	9T	+9 V in TX	MODE SW. 3	12	9T
7	TL	On air light B +	SW UNIT	12	TL
8	RG1	RF GAIN control Top	RF GAIN VR	1	RG1
9	8C	IF UNIT	IF UNIT	1	8C
10	8C	HET UNIT	HET UNIT	2	8C
11	8C	MODE SW. 2	MODE SW. 2	8	8C
12	8C	+8 V common	CAR UNIT	3	8C
13	-6	-6 V in. FX and SSB TX	CAR UNIT	6	-6
14	ALC	ALC	CAR UNIT	2	ALC
15	ALC	ALC	IF UNIT	1	ALC
16	E	GND	CAR UNIT	1	TIF
17	TIF	IF signal for TX	CAR UNIT	1	TIF
18	DO	Drive output to final	RF UNIT B/2	1	DO
19	LT	TX reference signal	HET UNIT	1	LT
IF UNIT (X48-1320-61)					
1	CAR	Carrier	CAR UNIT	9	CAR
2	E	GND	CAR UNIT	7	-6
3	-6	-6 in RX and SSB TX	CAR UNIT	2	RG2
4	RG2	RF GAIN CONTROL Arm	RF UNIT	3	AGC
5	AGC	AGC	IF UNIT	1	TC
6	E	GND	IF UNIT	2	8C
7	TC	Carrier for TX	DRIVE UNIT	2	SOC
8	8C	+8 V common	CAR UNIT	4	SOC
9	SOC	+8 V common in SSB, CW	IF UNIT	5	SOC
10	SOC	+8 V common in SSB	CAR UNIT	1	SOC
11	ALC	ALC	DRIVE UNIT	3	ALC
12	E	GND	CAR UNIT	1	SI
13	SI	1st IF output in SSB, CW TX	SW UNIT	8	SSM
14	SCR	+8 V in SSB, CW RX	S/RF meter	5	TC
15	SSM	S-Meter in SSB, CW	IF UNIT	7	MO
16	E	GND	CAR UNIT	4	SOC
17	MI	SSB MIC input from carrier unit	MODE SW. 2	6	CCB
18	SOC	+8 V common in SSB	MODE SW. 3	11	CCB
19	CCB	+8 V common in CW	MODE SW. 4	3	FMC
20	SCR	+8 V in SSB, CW TX	CAR UNIT	4	FMT
21	9T5	+8 V in SSB TX	SOL VP Arm	11	SS
22	9T5	+8 V in SSB TX	SW UNIT	1	SS
23	AT	AF GAIN CONTROL Top	AF GAIN VR	1	STS
24	E	GND	RF UNIT	1	BR
25	BR	+8 V in RX	MODE SW. 4	3	ER
26	BR	+8 V in RX	CAP UNIT	3	ER
27	FMC	+8 V common in FM	MODE SW. 2	4	FMT
28	NC	Not connected	CAR UNIT	4	FMT
29	FMT	+8 V in FM TX	SOL VP Arm	11	SS
30	SO	SOL	SW UNIT	1	SS
31	BC	Busy Sig. 1	CONTROL UNIT	3	SS
32	SS	SCAN Stop	KEY	3	SSM
33	STS	SIDE TONE SW	S/RF meter	5	TC
34	FSM	FMS Meter	KEY	3	SSM
35	KEY	KEY	IF UNIT	3	SOC
36	SOC	+8 V common in SSB, CW	MODE SW. 4	3	FMR
37	FMR	+8 V in FM RX			

TR-9500 SCHEMATIC ABBREVIATION (W) TYPE

Con- nector No.	Termi- nal No.	Remarks	Destination Unit/Switch	Con- nector No.	Termi- nal No.	Termi- nal
②	1	SCR +8V in SSB, CW RX	SW UNIT	9	SCR	HCV
	2	+8V in RX	CAR UNIT	4	8R	5C
	3	Noise blanker SW	SW UNIT	5	NS	ON
	4	Audio output	EXT. SP	3	AP	SCT
	5	Common B + 13.8 V	DRIVE UNIT	3	CB	BC
③	1	GND	AF GAIN VR	2	30T	HL
	2	30.43 MHz for TX	CAR UNIT	7	LR	PD
④	1	RX reference signal	HET UNIT			PC
	2	RF signal input	RF UNIT (A/Z)			PA
HET UNIT (X50-1730-00)						
⑤	1	HCV -HET control voltage	CONTROL UNIT	8	HCV	PL
	2	RIT control Arm	RIT VR	2		PL
	3	RIT control Top	CONTROL	7	9C	PD
	4	+5V common	SW UNIT	10	ON	PC
	5	+9V in SSB, SW TX	RIT VR	7	SCT	PD
	6	+8V common	DRIVE UNIT	3	BC	PD
	7	High/Low Band		1	HL	PD
	8	PLL IC data		5	PA	PD
⑥	1	PLL IC lead pulse	CONTROL UNIT			PD
	2	RX reference signal	IF UNIT			PD
⑦	1	TX reference signal	DRIVE UNIT			PD
	2	GND				PD
CONTROL UNIT (X53-1210-61)						
⑧	1	USB Memory channel IM4	MODE SW, 1		US	US
	2	FM2 mode	MODE SW, 1		M4	US
	3	FM1 mode	MODE SW, 1		FM1	US
	4	M, CH SW	M, CH SW		B0	US
	5	+8V common	M, CH SW		B1	US
	6	+8V common	M, CH SW		B2	US
	7	+8V common	M, CH SW		B3	US
	8	MIC down switch	MIC terminal		3	US
⑨	1	MIC up switch	Main rotary		4	US
	2	Encoder Up/Down input				US
	3	Encoder clock input				US
	4	+8V common to encoder				US
	5	SCAN stop	IF UNIT		11	SS
	6	+9V in TX	MODE SW, 3			FMT
⑩	1	+8V common	SW UNIT		E0	E0
	2	+8V common	MS SW		E1	E0
	3	+8V common	SW UNIT		E2	E0
	4	+8V common	SW UNIT		E3	E0
	5	+8V common	M, CH SW		F0	F0
⑪	1	High/Low Band			HL	HL
	2	PLL IC lead pulse			6	PD
	3	PLL IC data	HET UNIT		3	PC
	4	+5V common			4	PC
	5	+5V common			5	PA
	6	+5V common			4	PA
	7	+5V common			5	5C
	8	HET control voltage	POW. SW		1	HCV
⑫	1	Switched B + 13.8V	POW. SW		B	BBM
	2	INT. or EXT. Back-up voltage	BACK UP terminal		BBM	BBM
⑬	1	Unswitched B + 13.8 V	POW. SW		BB	BB
	2					BB

Con- nector No.	Termi- nal No.	Remarks	Destination Unit/Switch	Con- nector No.	Termi- nal No.	Termi- nal
⑭	1	5 digit LED pin No. 1	D101 SL2504K	1	E1	E1
	2	5 digit LED pin No. 2		2	E1	E1
	3	5 digit LED pin No. 3		3	MS	B1
	4	5 digit LED pin No. 4		4	B1	B1
	5	5 digit LED pin No. 5		5	B3	B3
⑮	1	5 digit LED pin No. 13	D101 SL2504K	13	2R	2R
	2	5 digit LED pin No. 12		12	MR	MR
	3	5 digit LED pin No. 9		9	MR	MR
	4	5 digit LED pin No. 11		11	MR	MR
	5	5 digit LED pin No. 10		10	MR	MR
	6	5 digit LED pin No. 8		8	MR	MR
	7	5 digit LED pin No. 7		7	MR	MR
	8	5 digit LED pin No. 6		6	MR	MR
	9	5 digit LED pin No. 16		16	MR	MR
SWITCH UNIT (X41-1330-61)						
⑯	1	μproc. E-output port M	CONTROL UNIT	1	E1	E1
	2	Memory scan	TX OFFSET	2	E1	E1
	3	μproc. B-input port M, MHz, MS	MS SW	7	MS	B1
	4	μproc. B-input port A/B, HOLD	M, CH SW		B1	B1
	5	Hold SW	HOLD SW		BH	BH
	6	Repeater SW	TX OFFSET SW		2R	2R
	7	μproc. B-input port	M, CH SW		B0	B0
	8	Memory read	MR SW		4	MR
	9	Scan	SCAN SW		3	BS
	10	Noise Blanker SW	IF UNIT		3	NS
	11	+8V in SSB RX	MODE SW, 4		4	8RS
	12	+8V in CW RX	MODE SW, 4		4	CRB
⑰	1	+8V in SSB, CW RX	IF UNIT		4	CRB
	2	RIT ON	IF UNIT		1	SCR
	3	Busy light	HET UNIT		5	ON
	4	On air light	DRIVE UNIT		10	BD
	5	On air light	DRIVE UNIT		5	TL
	6	On air light	DRIVE UNIT		5	TL
	7	On air light	DRIVE UNIT		5	TL
	8	On air light	DRIVE UNIT		5	TL
	9	On air light	DRIVE UNIT		5	TL
	10	On air light	DRIVE UNIT		5	TL
	11	On air light	DRIVE UNIT		5	TL
	12	On air light	DRIVE UNIT		5	TL
⑱	1	μproc. E-output port	CONTROL UNIT	1	E0	E0
	2	μproc. B-input port	MODE SW, 1		E0	E0
	3	Repeater SW	CONTROL UNIT		4	E3
	4	On air light	M, CH SW		B2	B2
	5	On air light	TX OFFSET SW		3R	3R
	6	On air light	D102			
	7	On air light	D105			
	8	On air light	D105			
	9	On air light	D105			
	10	On air light	D105			
	11	On air light	D105			
	12	On air light	D105			
RF UNIT (X44-1430-61) (B/2)						
⑲	1	Q101 Base	Q101 Collector		BA	BA
	2	Q101 Collector	Q101 Emitter		DB	DB
	3	Q101 Emitter	Q101 Base		B	B
	4	Q101 Base	Q101 Collector		BA	BA
	5	Q101 Collector	Q101 Emitter		DB	DB
	6	Q101 Emitter	Q101 Base		B	B
	7	RF METER	S/R Meter		NC	NC
	8	Not connected	CAR UNIT		9T	9T
	9	+9V in TX	MR/MS SW		9T	9T
	10	Low power control	DRIVE UNIT		PL	PL
	11	Drive input	DRIVE UNIT		IN	IN
	12	GND	RF UNIT (A/Z)		ANT	ANT
⑳	1	Antenna	Antenna		RA	RA
	2	Switched B + 13.8 V	S/R Meter		B	B

Con- nector No.	Termi- nal No.	Remarks	Destination Unit/Switch	Con- nector No.	Termi- nal No.	Termi- nal
㉑	1	+8V in RX	RF UNIT	1	BR	BR
	2	+8V common	AGC	3	AGC	AGC
	3	STAND BY	STAND BY	4	ST	ST
	4	RF AMP OUT	RF AMP OUT			
	5	RF AMP OUT	RF AMP OUT			
CAR UNIT (X50-1720-6)						
㉒	1	+8V common in USB	SCB		SCB	SCB
	2	+8V in CW RX	CRB		CRB	CRB
	3	+8V in CW TX	CTB		CTB	CTB
	4	+8V common in LSS	CCB		CCB	CCB
	5	GND	SOC		SOC	SOC
	6	+8V common in SSB, CW	SCC		SCC	SCC
	7	+8V common in SSB, CW	CCB		CCB	CCB
	8	Carrier	CAR		CAR	CAR
	9	MIC input	MIC		MIC	MIC
㉓	1	GND	E		E	E
	2	+8V common	FC		FC	FC
	3	+8V common	FC		FC	FC
	4	+8V common	FMC		FMC	FMC
	5	+8V common in FM	FMC		FMC	FMC
	6	GND	E		E	E
	7	MIC Amp output	MD		MD	MD
	8	1st IF signal in SSB, CW TX	SI		SI	SI
	9	GND	E		E	E
㉔	1	STAND BY	ST		ST	ST
	2	+8V in RX	SR		SR	SR
	3	Common B + 13.8 V	CB		CB	CB
	4	+8V in RX and SSB TX	DRIVE		DRIVE	DRIVE
	5	-6 V in RX and SSB TX	EXT		EXT	EXT
	6	-6 V in RX and SSB TX	EXT		EXT	EXT
	7	Speaker	SP		SP	SP
	8	+8V common in SSB	SOC		SOC	SOC
	9	+8V common in USB	SCB		SCB	SCB
㉕	1	+8V common in LSS	OCB		OCB	OCB
	2	+8V common in SSB, CW	CCB		CCB	CCB
	3	+8V common in CW	CCB		CCB	CCB
	4	Not connected	KEY		KEY	KEY
	5	Low Power control	ALC		ALC	ALC
	6	Power control	PC		PC	PC
	7	+9V in TX	9T		9T	9T
	8	+9V in FM TX	FMT		FMT	FMT
	9	GND	FMT		FMT	FMT
㉖	1	30.43 MHz for TX	DRIVE		DRIVE	DRIVE
	2	TX IF signal	TIF		TIF	TIF
	3	GND	E		E	E
	4	GND	FMC		FMC	FMC
	5	Switched in SSB, CW	SSM		SSM	SSM
	6	PM S-Meter	B		B	B
	7	Switched B + 13.8 V	B		B	B
	8		B		B	B
	9		B		B	B

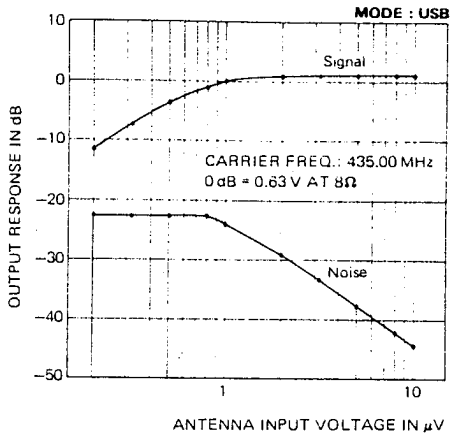
Con- nector No.	Termi- nal No.	Remarks	Destination Con- nector No.	Termi- nal No.
		M, CH SW		
	M4	Memory channel M4	CONTROL UNIT	2
	B0		CONTROL UNIT	7
	B1		SW UNIT	5
	B2		CONTROL UNIT	1
	B3		CONTROL UNIT	6
	B4		CONTROL UNIT	7
	B5		CONTROL UNIT	5
	B6		SW UNIT	5
	B7		SW UNIT	5
	B8		CONTROL UNIT	5
	B9		CONTROL UNIT	5
	B10		CONTROL UNIT	5
	B11		CONTROL UNIT	5
	B12		CONTROL UNIT	5
	B13		CONTROL UNIT	5
	B14		CONTROL UNIT	5
	B15		CONTROL UNIT	5
	B16		CONTROL UNIT	5
	B17		CONTROL UNIT	5
	B18		CONTROL UNIT	5
	B19		CONTROL UNIT	5
	B20		CONTROL UNIT	5
	B21		CONTROL UNIT	5
	B22		CONTROL UNIT	5
	B23		CONTROL UNIT	5
	B24		CONTROL UNIT	5
	B25		CONTROL UNIT	5
	B26		CONTROL UNIT	5
	B27		CONTROL UNIT	5
	B28		CONTROL UNIT	5
	B29		CONTROL UNIT	5
	B30		CONTROL UNIT	5
	B31		CONTROL UNIT	5
	B32		CONTROL UNIT	5
	B33		CONTROL UNIT	5
	B34		CONTROL UNIT	5
	B35		CONTROL UNIT	5
	B36		CONTROL UNIT	5
	B37		CONTROL UNIT	5
	B38		CONTROL UNIT	5
	B39		CONTROL UNIT	5
	B40		CONTROL UNIT	5
	B41		CONTROL UNIT	5
	B42		CONTROL UNIT	5
	B43		CONTROL UNIT	5
	B44		CONTROL UNIT	5
	B45		CONTROL UNIT	5
	B46		CONTROL UNIT	5
	B47		CONTROL UNIT	5
	B48		CONTROL UNIT	5
	B49		CONTROL UNIT	5
	B50		CONTROL UNIT	5
	B51		CONTROL UNIT	5
	B52		CONTROL UNIT	5
	B53		CONTROL UNIT	5
	B54		CONTROL UNIT	5
	B55		CONTROL UNIT	5
	B56		CONTROL UNIT	5
	B57		CONTROL UNIT	5
	B58		CONTROL UNIT	5
	B59		CONTROL UNIT	5
	B60		CONTROL UNIT	5
	B61		CONTROL UNIT	5
	B62		CONTROL UNIT	5
	B63		CONTROL UNIT	5
	B64		CONTROL UNIT	5
	B65		CONTROL UNIT	5
	B66		CONTROL UNIT	5
	B67		CONTROL UNIT	5
	B68		CONTROL UNIT	5
	B69		CONTROL UNIT	5
	B70		CONTROL UNIT	5
	B71		CONTROL UNIT	5
	B72		CONTROL UNIT	5
	B73		CONTROL UNIT	5
	B74		CONTROL UNIT	5
	B75		CONTROL UNIT	5
	B76		CONTROL UNIT	5
	B77		CONTROL UNIT	5
	B78		CONTROL UNIT	5
	B79		CONTROL UNIT	5
	B80		CONTROL UNIT	5
	B81		CONTROL UNIT	5
	B82		CONTROL UNIT	5
	B83		CONTROL UNIT	5
	B84		CONTROL UNIT	5
	B85		CONTROL UNIT	5
	B86		CONTROL UNIT	5
	B87		CONTROL UNIT	5
	B88		CONTROL UNIT	5
	B89		CONTROL UNIT	5
	B90		CONTROL UNIT	5
	B91		CONTROL UNIT	5
	B92		CONTROL UNIT	5
	B93		CONTROL UNIT	5
	B94		CONTROL UNIT	5
	B95		CONTROL UNIT	5
	B96		CONTROL UNIT	5
	B97		CONTROL UNIT	5
	B98		CONTROL UNIT	5
	B99		CONTROL UNIT	5
	B100		CONTROL UNIT	5

Con- nector No.	Termi- nal No.	Remarks	Destination Con- nector No.	Termi- nal No.
		RF UNIT (X44-1430-61) (A/2)		
	1	+8 V in RX	IF UNIT	3
	2	+8 V in common	DRIVE UNIT	3
	3	AGC	IF UNIT	3
	4	STAND BY	STBY JACK	3
	5	RA	RF UNIT (B/2)	RA
	6	OUT	IF UNIT	RI
	7	RF AMP OUT	IF UNIT	RI
	8	RF UNIT (B/2)	IF UNIT	RI
	9	RF UNIT (B/2)	IF UNIT	RI
	10	RF UNIT (B/2)	IF UNIT	RI
	11	RF UNIT (B/2)	IF UNIT	RI
	12	RF UNIT (B/2)	IF UNIT	RI
	13	RF UNIT (B/2)	IF UNIT	RI
	14	RF UNIT (B/2)	IF UNIT	RI
	15	RF UNIT (B/2)	IF UNIT	RI
	16	RF UNIT (B/2)	IF UNIT	RI
	17	RF UNIT (B/2)	IF UNIT	RI
	18	RF UNIT (B/2)	IF UNIT	RI
	19	RF UNIT (B/2)	IF UNIT	RI
	20	RF UNIT (B/2)	IF UNIT	RI
	21	RF UNIT (B/2)	IF UNIT	RI
	22	RF UNIT (B/2)	IF UNIT	RI
	23	RF UNIT (B/2)	IF UNIT	RI
	24	RF UNIT (B/2)	IF UNIT	RI
	25	RF UNIT (B/2)	IF UNIT	RI
	26	RF UNIT (B/2)	IF UNIT	RI
	27	RF UNIT (B/2)	IF UNIT	RI
	28	RF UNIT (B/2)	IF UNIT	RI
	29	RF UNIT (B/2)	IF UNIT	RI
	30	RF UNIT (B/2)	IF UNIT	RI
	31	RF UNIT (B/2)	IF UNIT	RI
	32	RF UNIT (B/2)	IF UNIT	RI
	33	RF UNIT (B/2)	IF UNIT	RI
	34	RF UNIT (B/2)	IF UNIT	RI
	35	RF UNIT (B/2)	IF UNIT	RI
	36	RF UNIT (B/2)	IF UNIT	RI
	37	RF UNIT (B/2)	IF UNIT	RI
	38	RF UNIT (B/2)	IF UNIT	RI
	39	RF UNIT (B/2)	IF UNIT	RI
	40	RF UNIT (B/2)	IF UNIT	RI
	41	RF UNIT (B/2)	IF UNIT	RI
	42	RF UNIT (B/2)	IF UNIT	RI
	43	RF UNIT (B/2)	IF UNIT	RI
	44	RF UNIT (B/2)	IF UNIT	RI
	45	RF UNIT (B/2)	IF UNIT	RI
	46	RF UNIT (B/2)	IF UNIT	RI
	47	RF UNIT (B/2)	IF UNIT	RI
	48	RF UNIT (B/2)	IF UNIT	RI
	49	RF UNIT (B/2)	IF UNIT	RI
	50	RF UNIT (B/2)	IF UNIT	RI
	51	RF UNIT (B/2)	IF UNIT	RI
	52	RF UNIT (B/2)	IF UNIT	RI
	53	RF UNIT (B/2)	IF UNIT	RI
	54	RF UNIT (B/2)	IF UNIT	RI
	55	RF UNIT (B/2)	IF UNIT	RI
	56	RF UNIT (B/2)	IF UNIT	RI
	57	RF UNIT (B/2)	IF UNIT	RI
	58	RF UNIT (B/2)	IF UNIT	RI
	59	RF UNIT (B/2)	IF UNIT	RI
	60	RF UNIT (B/2)	IF UNIT	RI
	61	RF UNIT (B/2)	IF UNIT	RI
	62	RF UNIT (B/2)	IF UNIT	RI
	63	RF UNIT (B/2)	IF UNIT	RI
	64	RF UNIT (B/2)	IF UNIT	RI
	65	RF UNIT (B/2)	IF UNIT	RI
	66	RF UNIT (B/2)	IF UNIT	RI
	67	RF UNIT (B/2)	IF UNIT	RI
	68	RF UNIT (B/2)	IF UNIT	RI
	69	RF UNIT (B/2)	IF UNIT	RI
	70	RF UNIT (B/2)	IF UNIT	RI
	71	RF UNIT (B/2)	IF UNIT	RI
	72	RF UNIT (B/2)	IF UNIT	RI
	73	RF UNIT (B/2)	IF UNIT	RI
	74	RF UNIT (B/2)	IF UNIT	RI
	75	RF UNIT (B/2)	IF UNIT	RI
	76	RF UNIT (B/2)	IF UNIT	RI
	77	RF UNIT (B/2)	IF UNIT	RI
	78	RF UNIT (B/2)	IF UNIT	RI
	79	RF UNIT (B/2)	IF UNIT	RI
	80	RF UNIT (B/2)	IF UNIT	RI
	81	RF UNIT (B/2)	IF UNIT	RI
	82	RF UNIT (B/2)	IF UNIT	RI
	83	RF UNIT (B/2)	IF UNIT	RI
	84	RF UNIT (B/2)	IF UNIT	RI
	85	RF UNIT (B/2)	IF UNIT	RI
	86	RF UNIT (B/2)	IF UNIT	RI
	87	RF UNIT (B/2)	IF UNIT	RI
	88	RF UNIT (B/2)	IF UNIT	RI
	89	RF UNIT (B/2)	IF UNIT	RI
	90	RF UNIT (B/2)	IF UNIT	RI
	91	RF UNIT (B/2)	IF UNIT	RI
	92	RF UNIT (B/2)	IF UNIT	RI
	93	RF UNIT (B/2)	IF UNIT	RI
	94	RF UNIT (B/2)	IF UNIT	RI
	95	RF UNIT (B/2)	IF UNIT	RI
	96	RF UNIT (B/2)	IF UNIT	RI
	97	RF UNIT (B/2)	IF UNIT	RI
	98	RF UNIT (B/2)	IF UNIT	RI
	99	RF UNIT (B/2)	IF UNIT	RI
	100	RF UNIT (B/2)	IF UNIT	RI

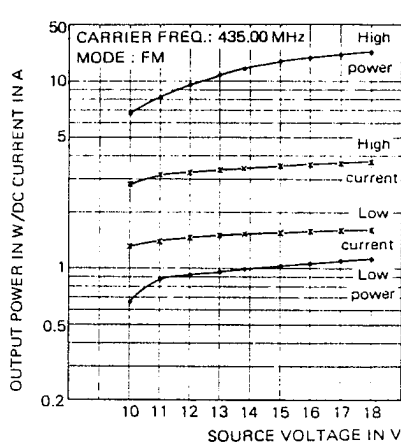
Con- nector No.	Termi- nal No.	Remarks	Destination Con- nector No.	Termi- nal No.
		SWITCH UNIT (X41-1330-61)		
	E1	μ-proc. E-output port	CONTROL UNIT	2
	E2	Memory scan	MS SW	7
	E3	μ-proc. B-input port	M, CH SW	1
	E4	μ-proc. B-input port	M, CH SW	1
	E5	Hold SW	HOLD SW	9
	E6	Repeater SW	TX OFFSET SW	2R
	E7	μ-proc. B-input port	M, CH SW	1
	E8	Memory read	MR SW	4
	E9	Call	—	
	E10	Scan	SCAN SW	3
	E11	Noise Blanker SW	IF UNIT	3
	E12	+8 V in SSB RX	MODE SW, 4	3
	E13	+8 V in CW RX	MODE SW, 4	3
	E14	+8 V in SSB, CW RX	IF UNIT	4
	E15	IF UNIT	IF UNIT	4
	E16	SCR	SCR	4
	E17	SCR	SCR	4
	E18	SCR	SCR	4
	E19	SCR	SCR	4
	E20	SCR	SCR	4
	E21	SCR	SCR	4
	E22	SCR	SCR	4
	E23	SCR	SCR	4
	E24	SCR	SCR	4
	E25	SCR	SCR	4
	E26	SCR	SCR	4
	E27	SCR	SCR	4
	E28	SCR	SCR	4
	E29	SCR	SCR	4
	E30	SCR	SCR	4
	E31	SCR	SCR	4
	E32	SCR	SCR	4
	E33	SCR	SCR	4
	E34	SCR	SCR	4
	E35	SCR	SCR	4
	E36	SCR	SCR	4
	E37	SCR	SCR	4
	E38	SCR	SCR	4
	E39	SCR	SCR	4
	E40	SCR	SCR	4
	E41	SCR	SCR	4
	E42	SCR	SCR	4
	E43	SCR	SCR	4
	E44	SCR	SCR	4
	E45	SCR	SCR	4
	E46	SCR	SCR	4
	E47	SCR	SCR	4
	E48	SCR	SCR	4
	E49	SCR	SCR	4
	E50	SCR	SCR	4
	E51	SCR	SCR	4
	E52	SCR	SCR	4
	E53	SCR	SCR	4
	E54	SCR	SCR	4
	E55	SCR	SCR	4
	E56	SCR	SCR	4
	E57	SCR	SCR	4
	E58	SCR	SCR	4
	E59	SCR	SCR	4
	E60	SCR	SCR	4
	E61	SCR	SCR	4
	E62	SCR	SCR	4
	E63	SCR	SCR	4
	E64	SCR	SCR	4
	E65	SCR	SCR	4
	E66	SCR	SCR	4
	E67	SCR	SCR	4
	E68	SCR	SCR	4
	E69	SCR	SCR	4
	E70	SCR	SCR	4
	E71	SCR	SCR	4
	E72	SCR	SCR	4
	E73	SCR	SCR	4
	E74	SCR	SCR	4

REFERENCE DATA

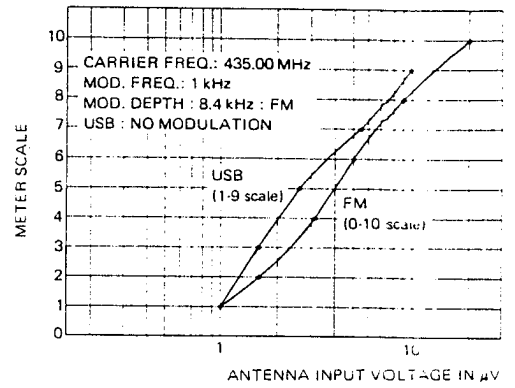
RX SENSITIVITY



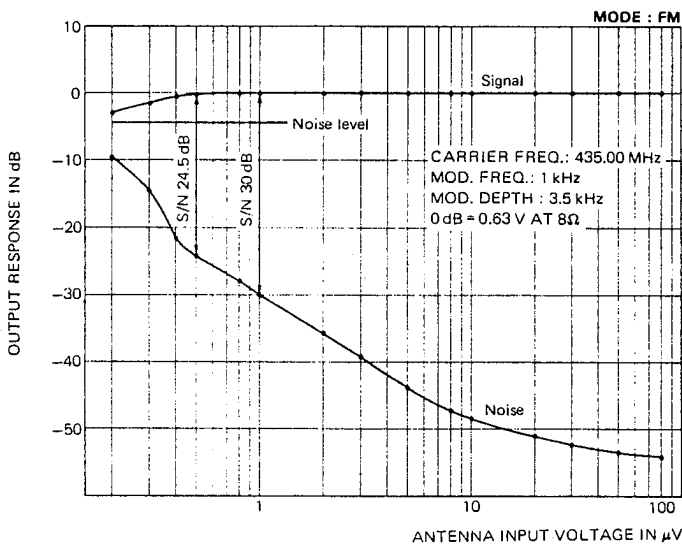
OUTPUT POWER/CURRENT



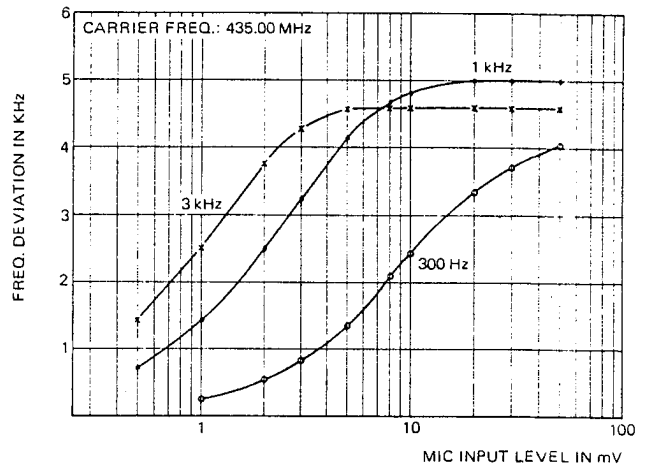
S LEVEL SENSITIVITY



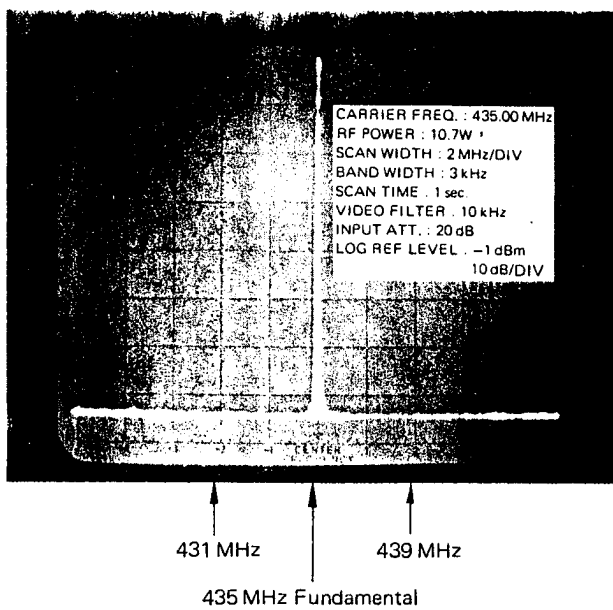
RX SENSITIVITY



DEVIATION

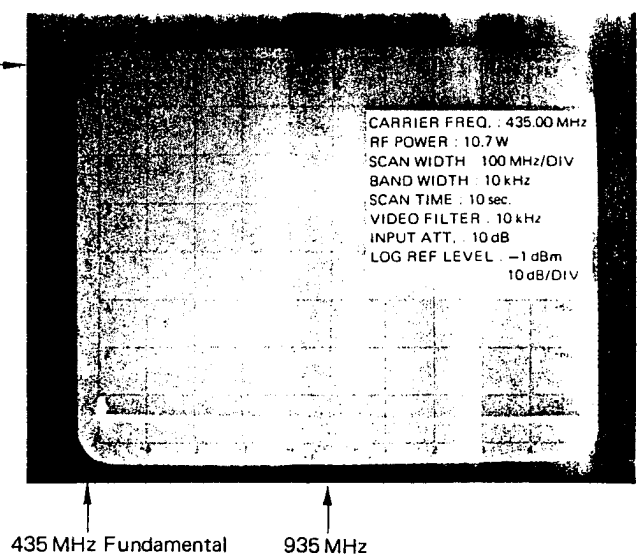


NEAR SPURIOUS RESPONSE



Fundamental level

HARMONICS SPURIOUS RESPONSE



* The fundamental has been reduced in amplitude by the H.P.F.

SPECIFICATIONS

General

Semiconductors	ICs	12
	FETs	17
	Transistors	111 (W, T), 109 (X)
	Diodes	115 (W, T), 114 (X)
Frequency range	430.000.0 to 439.999.9 MHz	
Frequency synthesizer	Digital control, phase locked VCO	
Mode	SSB (A3J), FM (F3), CW (A1)	
Antenna impedance	50 ohms	
RPT. Tone Frequency	1,750 Hz	
Power requirement	13.8 V DC \pm 15%	
Grounding	Negative	
Operating temperature	-20°C to +50°C	
Current drain	0.7A in receive mode with no input signal 3.8A in transmit mode (Approx.) 2.0 mA for memory back up	
Dimensions	170 mm (6-11/16") wide 68 mm (2-11/16") high 241 mm (9-1/2") deep	
Weight	2.7 kg (5.94 lbs)	

Transmitter Section

RF output power (at 13.8 V DC, 50 Ω load)	10 W	
Modulation	FM	Variable reactance direct shift
	SSB	Balanced modulation
Frequency tolerance	Less than $\pm 10 \times 10^{-6}$	
Spurious radiation	Less than -60 dB	
Carrier suppression	Better than 40 dB	
Unwanted side band suppression	Better than 40 dB	
Maximum frequency deviation (FM)	± 5 kHz	
Microphone	Dynamic microphone with PTT switch, 500 Ω	

Receiver Section

Circuitry	Double conversion superheterodyne	
Intermediate frequency	1st IF	21.6 MHz
	2nd IF	{FM} 455 kHz, {SSB/CW} 8.83 MHz
Receiver sensitivity	FM	Better than 0.5 μ V for 35 dB S/N Better than 0.25 μ V for 12 dB SINAD
	SSB, CW	Better than 0.5 μ V for 20 dB S/N
Receiver selectivity	FM	More than 14 kHz (-6 dB) Less than 20 kHz (-60 dB)
	SSB, CW	More than 2.4 kHz (-6 dB) Less than 4.8 kHz (-60 dB)
Spurious interference	Better than 60 dB	
Squelch sensitivity	0.2 μ V (Threshold)	
Auto scan stop level	Less than 0.2 μ V (Threshold)	
Audio output	More than 2.0 watts across 8 ohm load (10% dist.)	

Note : Circuit and ratings are subject to change without notice due to developments in technology.

A product of
TRIO-KENWOOD CORPORATION
17-5, 2-chome, Shibuya, Shibuya-ku, Tokyo 150, Japan

TRIO-KENWOOD COMMUNICATIONS, INC.
1111, West Walnut Street, Compton, California, 90220, U.S.A.
TRIO-KENWOOD COMMUNICATIONS, GmbH
D-6374 Steinbach TS, Industriestrasse 8A, West Germany
TRIO-KENWOOD(AUSTRALIA)PTY. LTD.
30 Whiting Street, Artarmon, Sydney N.S.W. Australia 2064
