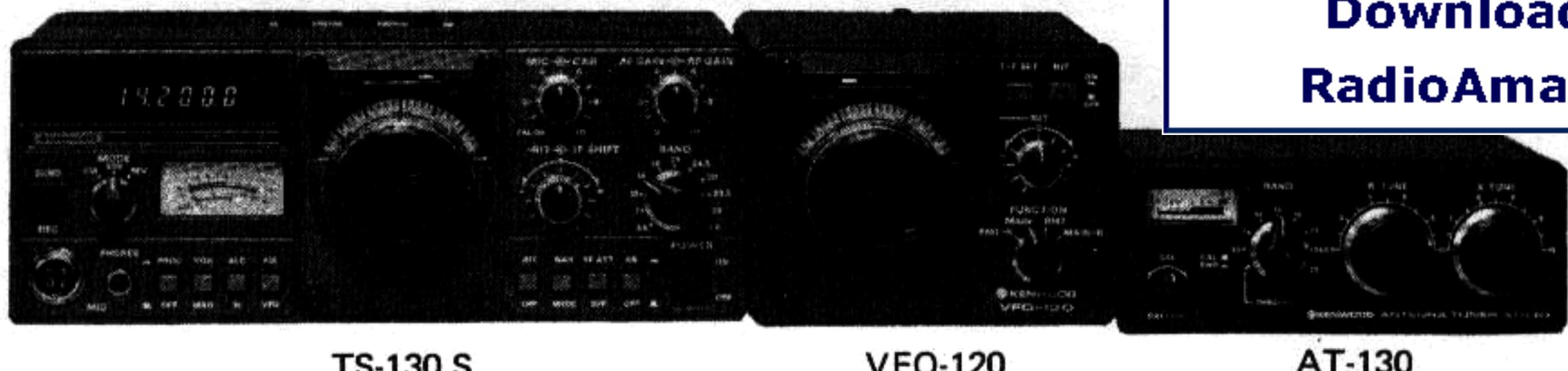




SERVICE MANUAL

TS-130S,V/VFO-120/AT-130

HF SSB TRANSCEIVER



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A product of
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SPECIFICATIONS

[GENERAL]

Frequency Range:

80 meter band	3.5 ~ 4.0 MHz
40 meter band	7.0 ~ 7.3 MHz
*30 meter band	10.1 ~ 10.15 MHz (10.0 MHz Receiving only)
20 meter band	14.0 ~ 14.35 MHz
*17 meter band	18.068 ~ 18.168 MHz
15 meter band	21.0 ~ 21.45 MHz
*12meter band	24.89 ~ 24.99 MHz
10 meter band	28.0 ~ 29.7 MHz

Mode:

SSB/CW

Power Requirement:

TS-130S	TS-130V
RX: 0.7A 13.8V DC	RX: 0.7A 13.8V DC
TX: 18A 13.8V DC	TX: 4A 13.8V DC

Dimensions:

TS-130S	TS-130V
241 (9.6) W × 94 (3.8) H × 293 (11.7) D mm (inch)	241 (9.6) W × 94 (3.8) H × 235 (9.4) D mm (inch)

Weight:

TS-130S	TS-130V
5.6 kg (12.4 lbs)	4.9 kg (10.8 lbs)

[TRANSMITTER]

Final Power Input:

TS-130S	TS-130V
80 — 15 meter band 200 W PEP for SSB operation 160 W DC for CW operation 10 meter band 160 W PEP for SSB operation 140 W DC for CW operation	25W PEP for SSB operation 20W DC for CW operation 25W PEP for SSB operation 20W DC for CW operation

Audio Input Impedance:

500Ω ~ 50 kΩ

RF Output Impedance:

50Ω

Frequency Stability:Within ± 1 kHz during the first hour after 1 minute of warmup
Within 100 Hz during any 30-minute period after warmup**Carrier Suppression:**

Better than 40 dB

Sideband Suppression:

Better than 50 dB

Spurious Radiation:

Better than 40 dB

Harmonic Radiation:

Better than 40 dB

[RECEIVER]

Receiver Sensitivity:

0.25µV at 10 dB S+N/N

Image Ratio:

Better than 50 dB

IF Rejection:

Better than 70 dB

Receiver Selectivity:

2.4 kHz (-6 dB), 4.2 kHz (-60 dB)

SSB/CW WIDE 1.8 kHz (-6 dB), 3.3 kHz (-60 dB) with optional YK-88SN filter

SSB NARROW 500 Hz (-6 dB), 1.5 kHz (-60 dB) with optional YK-88C filter

CW NARROW 270 Hz (-6 dB), 1.1 kHz (-60 dB) with optional YK-88CN filter

Audio Output Impedance:

4 ~ 16Ω

Audio Output:

1.5 W

NOTE: Circuit and ratings may change without notice due to developments in technology.

- * Will transmit on the new 30, 17, and 12 meter bands. Diodes installed for preventing accidental transmission before government amateur authorization.

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CIRCUIT DESCRIPTION

Features added from former TS-120S,V are as follows;

1. The three new HF bands (receive only).

Band	Receive frequency
10	10.0~10.25MHz
18	18.0~18.5MHz
24.5	24.5~25.0MHz

(Note) Receives WWV on 10MHz.

2. 20dB RF attenuator

3. 2-position selectivity (receive only).

- 1) Optional filters available.

Optional filter	-6dB bandwidth
YK-88SN SSB narrow filter	1.8kHz
YK-88C CW filter	500Hz
YK-88CN CW narrow filter	270Hz

(Note) YK-88S (-6 dB bandwidth:2.4kHz) is installed at the factory.

- 2) -6dB bandwidth with various optional filters.

No.	MODE Filter	CW		SSB	
		WIDE	NARROW	WIDE	NARROW
1)	YK-88S only (installed at factory)	2.4kHz	*	2.4kHz	*
2)	YK-88C or YK-88CN	2.4kHz	500Hz or 270Hz	2.4kHz	*
3)	YK-88SN	2.4kHz	1.8kHz	2.4kHz	1.8kHz
4)	YK-88C or YK-88CN, YK-88SN	2.4kHz	500Hz or 270Hz	2.4kHz	1.8kHz

(Note) 1. *: No receive.
 2. Jumper wire on the IF unit should be changed in No. 2 and No.4 Position.
 3. YK-88S is always used in transmit.

5. AGC-type speech processor

Item	Rating
Center frequency f_0	8830kHz
Center frequency deviation	8830kHz ± 150 Hz at 6dB
6dB bandwidth	± 900 Hz or more
60dB bandwidth	± 1800 Hz or less
Guaranteed attenuation	80dB or more within $f_0 \pm 2.5$ kHz to ± 1 MHz
Ripple	2dB or less
Loss	3dB ± 2 dB
Input and output impedance	600 Ω /15pF

Table 1. SSB crystal filter (L71-0220-05)

YK-88SN (Option)

Item	Rating
Center frequency f_0	8830.7kHz
Center frequency deviation	$f_0 \pm 150$ Hz at 6dB
6dB bandwidth	± 250 Hz or more
60dB bandwidth	± 900 Hz or less
Ripple	2dB or less
Loss	6dB ± 2 dB
Guaranteed attenuation	80dB or more within $f_0 \pm 2$ kHz to ± 1 MHz
Input and output impedance	600 Ω /15pF

Table 2. CW crystal filter (L71-0211-05)

YK-88C (Option)

Item	Rating
Center frequency f_0	8830.7kHz
Center frequency deviation	$f_0 \pm 50$ Hz at 6dB
6dB bandwidth	± 125 Hz or more
60dB bandwidth	± 600 Hz or less
Ripple	2dB or less
Loss	8dB ± 2 dB
Guaranteed attenuation	80dB or more within $f_0 \pm 2$ kHz to ± 1 MHz
Input and output impedance	600 Ω /15pF

Table 3. CW crystal filter (L71-0221-05)

YK-88CN (Option)

CIRCUIT DESCRIPTION

SPEECH PROCESSOR CIRCUIT (X54-1550-00)

The AGC-type speech processor is composed of Q2: μ PC1158H2, Q3:2SC1815(Y) and D3:1N60.

The audio signal amplified by Q18 on the AF-GEN unit goes through diode switch D1:1S1555 to the MIC control when the processor switch is OFF. When the processor switch is ON the audio signal, which is compressed and gains talk-power by the speech processor circuit, goes through D2:1S1555 to the MIC control. Q1(V type) or Q11 (S type):2SK30A on the filter unit is cut off when the processor switch is ON to shorten the ALC time constant to increase the average RF output power.

TS-130 FREQUENCY SYSTEM

The TS-130 employs single conversion with a unique PLL circuit, as shown in Fig.1.

The frequency system is basically that of the TS-820 with the exception of the PLL circuit.

PLL CIRCUIT

Fig. 2 shows PLL circuit construction and Table 4 shows the frequency in each circuit.

Referring to Fig.1, MIX (3) combines CAR and VFO signals and is operated straight through to mixer (1) on 3.5, 7 and 10 MHz. MIX (2) operates at 14 MHz and above with the output of MIX (3) to provide mixer (1) input, as shown in Table 4. MIX (1) output is filtered, amplified, shaped and divided by the programmable divider to obtain 500kHz output.

Band	RX.TX Frequency	VCO	MIX(1) Input	MIX(1) Output	Divider	D C B A
3.5	3.5 ~4.0	12.33 ~12.83	14.33 ~14.83	2.0	1/4	1 1 0 0
7	7.0 ~7.5	15.83 ~16.33	14.33 ~14.83	1.5	1/3	1 1 0 1
10	10.0 ~10.5	18.83 ~19.33	14.33 ~14.83	4.5	1/9	0 1 1 1
14	14.0 ~14.5	22.83 ~23.33	24.33 ~24.83	1.5	1/3	1 1 0 1
18	18.0 ~18.5	26.83 ~27.33	24.33 ~24.83	2.5	1/5	1 0 1 1
21	21.0 ~21.5	29.83 ~30.33	34.33 ~34.83	4.5	1/9	0 1 1 1
24.5	24.5 ~25.0	33.33 ~33.83	34.33 ~34.83	1	1/2	1 1 1 0
28	28.0 ~28.5	36.83 ~37.33	34.33 ~34.83	2.5	1/5	1 0 1 1
28.5	28.5 ~29.0	37.33 ~37.83	34.33 ~34.83	3.0	1/6	1 0 1 0
29	29.0 ~29.5	37.83 ~38.33	34.33 ~34.83	3.5	1/7	1 0 0 1
29.5	29.5 ~30.0	38.33 ~38.83	34.33 ~34.83	4.0	1/8	1 0 0 0

Table 4. The frequency chart

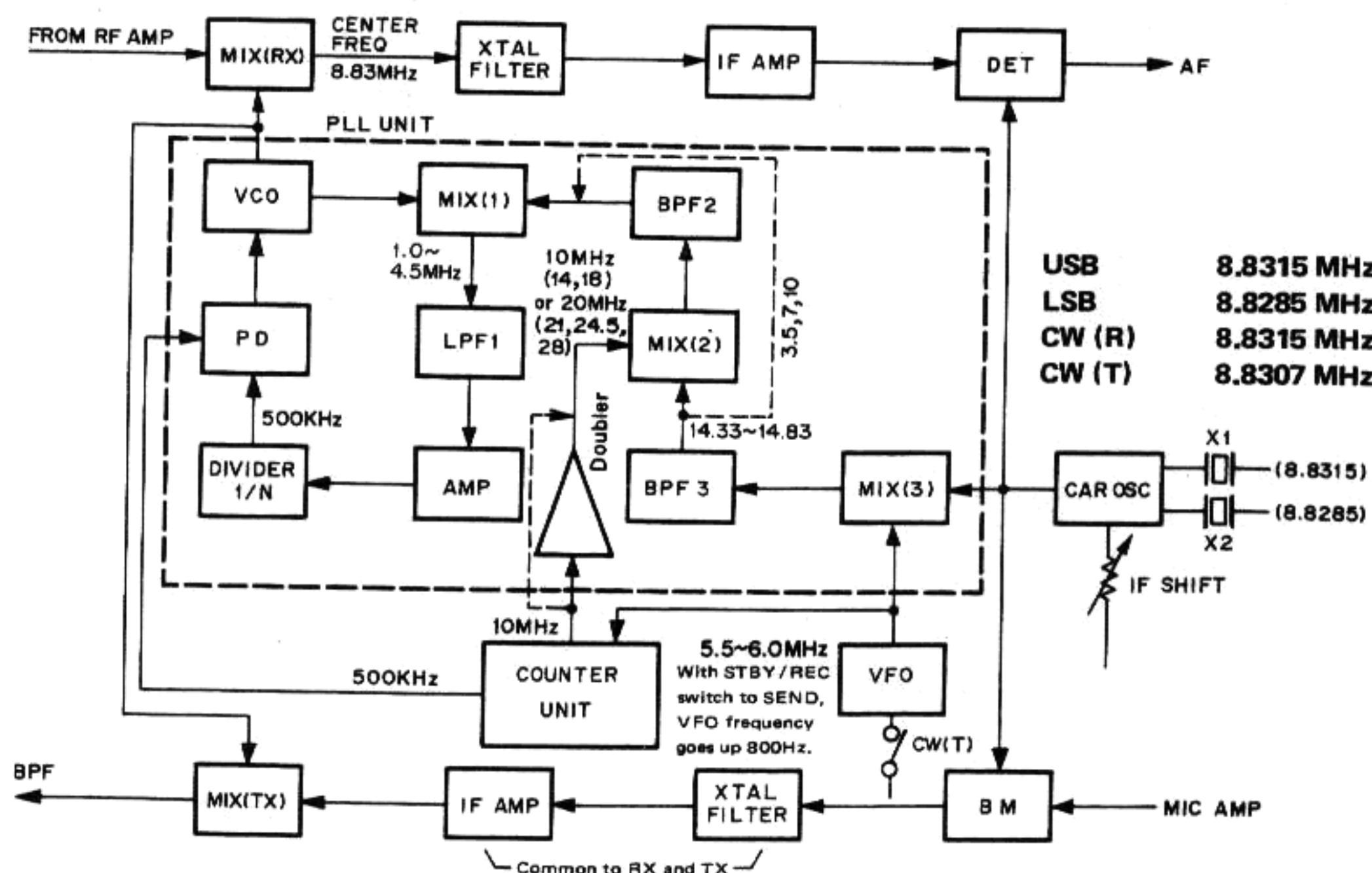


Fig. 1 TS-130 Frequency configuration

CIRCUIT DESCRIPTION

The programmable divider converts the information from the band switch into a BCD signal in the counter. By presetting, the signal is divided at the ratio shown in Table 4. The phase comparator is a Motorola MC4044P. The loop filter amplifier, component transistors, minimizes unwanted spurious signal. If output of the phase comparator unlocks for any reason, VCO output is switched off to prevent out of band emission and, simultaneously the digital display blanks

CAR OSCILLATOR

The CAR oscillator contains one oscillator and two crystals for LSB, USB and CW operation. The oscillator frequency in each mode is listed in Fig. 1.

Oscillator frequency can be varied by the IF SHIFT control during reception.

VFO OSCILLATOR

The TS-130 VFO has same circuit and gear ass'y as the VFO-830. An LED indicator for VFO and FIX operation has been added.

DIGITAL COUNTER

The TS-130 digital counter employs a VFO frequency counting system as shown in Fig.3.

The VFO frequency is mixed with a 5MHz signal obtained from the reference oscillator chain by a 3SK73 (Q7) and is converted to a 0.5MHz to 1MHz signal. This signal passes through the LPF, is amplified, buffered and shaped into a square wave, passes through the 0.1 second gate circuit and is applied to the 7-digit counter. The signal is counted from 10Hz to 10MHz.

The 100kHz, 1MHz and 10MHz order digits are preset by diode matrix operating on bandswitch information.

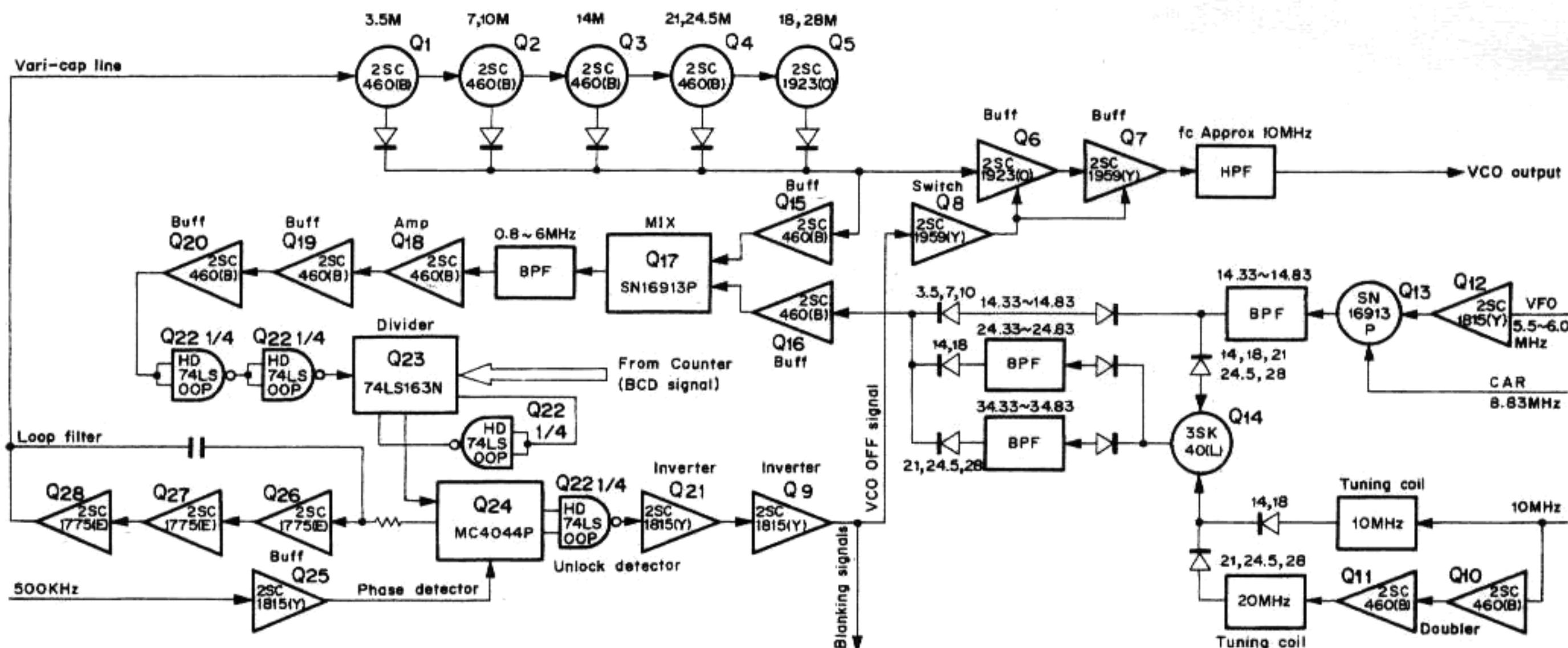


Fig. 2 TS-130 PLL circuit configuration

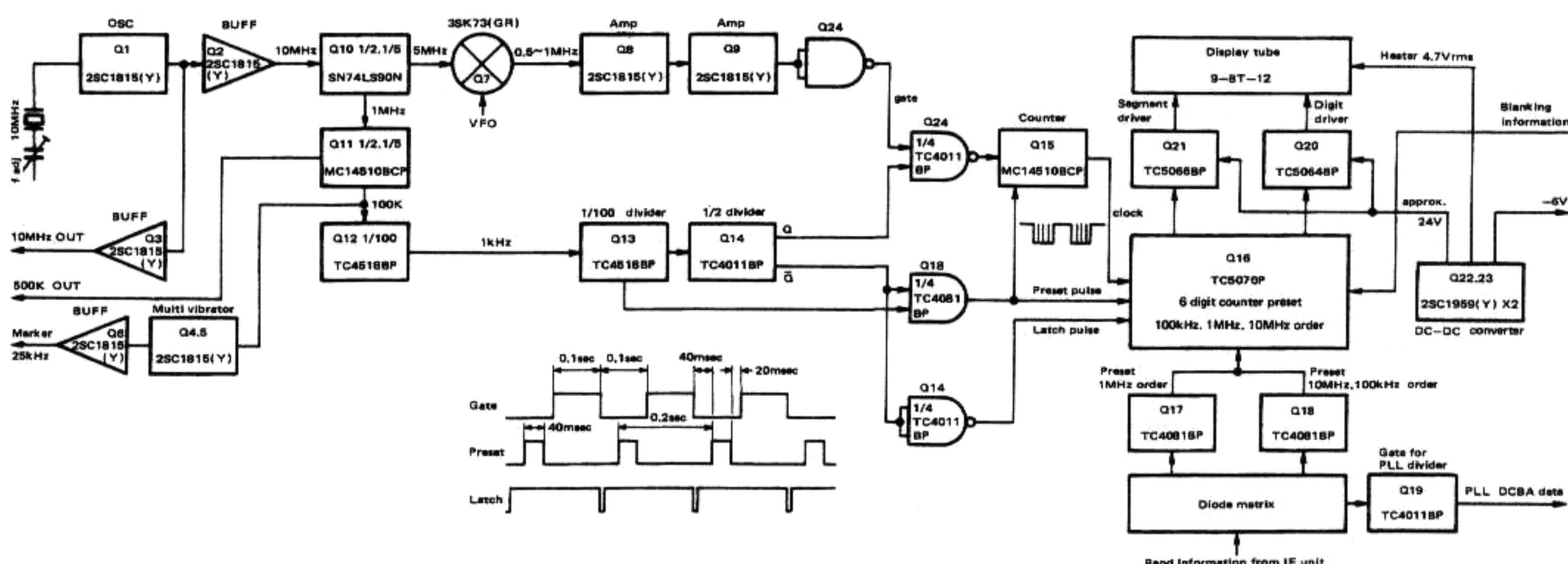


Fig. 3 TS-130 Counter unit block diagram

CIRCUIT DESCRIPTION/SPECIAL COMPONENTS DATA

The 10MHz signal from the time-base reference oscillator is divided to produce gate, latch, and reset pulses which are fed to the counter. The 10 MHz and 500kHz signals are fed to the PLL circuit.

The marker circuit produces a 100kHz signal which synchronizes the 25kHz multivibrator to obtain a marker signal as accurate as the reference frequency. The analog dial can be accurately calibrated to the marker signal.

The 1/10 division at the first-stage count-down chain uses low-power Schottky TTL, while the remaining divisions are made by a CMOS IC for low power consumption and minimum spurious emission.

Because of the IF SHIFT circuit, the CAR frequency is independent of the transmit/receive frequency. Once the VFO frequency is counted, the operating frequency is indicated as accurately as the 10 MHz reference oscillator frequency is calibrated to WWV. Operating frequency is indicated accurate to the 100Hz order, regardless of the band or mode.

PROTECTION CIRCUIT

When the transmit output load varies, the toroid in the final circuit samples reflected power. It is then rectified and amplified, producing a protection voltage to control the 2SK19 (Q12) on the AF-GEN unit, so transmitter output is continuously reduced.

FILTER UNIT

1. ALC : Protection circuit (VSWR)

The protection voltage picked up by L18 (S type), L11 (V type) in the filter unit is amplified by Q1 (S type), Q2 (V type) (2SC1815), then applied to the ALC line to control the output voltage.

2. Fan drive circuit (S type)

The output of the thermistor TH3 detecting the temperature of the final unit is applied to Q6 (2SA562) via Q7 and Q8, so that Q6 is switched to operate the fan. The fan starts to rotate at about 45°C although the operating range shown in specification is 30~60°C. It stops when the temperature drops to a level 5~15°C lower than the start temperature. This circuit operates regardless of transmission or reception because it detects the temperature of the heat sink.

3. AVR circuit

The 11V AVR consists of Q4, Q5 and Q6 (V type), Q4, Q5 and Q10 (S type). The regulated voltage is supplied to every unit except for the fan drive circuit during transmission. The fan drive circuit is always supplied with the regulated voltage regardless of transmission or reception.

4. Filter circuit

The filter is a 2-stage constant K filter (3-stage for 3.5 MHz band). When the processor switch is ON Q1 (V type) or Q11 (S type) is cut off to shorten the ALC time constant.

FINAL UNIT

1. Temperature protection (S type)

1. Core temperature protection

operates when the output transformer temperature exceeds 120°C. It recovers at approx. 80 to 110°C.

2. Operates when the heat sink temperature exceeds

90°C. It recovers at approx. 50 to 80°C.

When either of the above protection systems operate, the RL circuit in the AF-GEN unit is turned OFF and the unit is forcibly placed in the reception mode and transmission is inhibited. The protection circuit automatically recovers when the temperature drops to the normal level (i.e., the temperature drops by about 40°C).

2. Temperature detection by the fan drive circuit (S type)

The heat sink temperature is detected by the thermistor TH3 to control fan operation.

SPECIAL COMPONENTS DATA

• Applications

2SC2290(V03-2290-06) HF power amplifier for S type.

NPN Epitaxial planar Si transistor

• Absolute maximum ratings

Item	Pc	V _{CEO}	V _{CES}	V _{EBO}	IC	IE	T _{stg}
Value	175(W)	45(V)	45(V)	4.0(V)	20(A)	-20(A)	-65~175(°C) (Tc=25°C)

• Application

2SC2509 (V03-2509-06) HF power amplifier for S,V type.

NPN Epitaxial planar Si transistor

• Absolute maximum ratings

Item	Pc	V _{CEO}	V _{CES}	V _{EBO}	IC	IE	T _{stg}
Value	20(W)	40(V)	40(V)	18(V)	4(V)	5(A)	-5(A) -55~150(°C) (Tc=25°C)

• Application

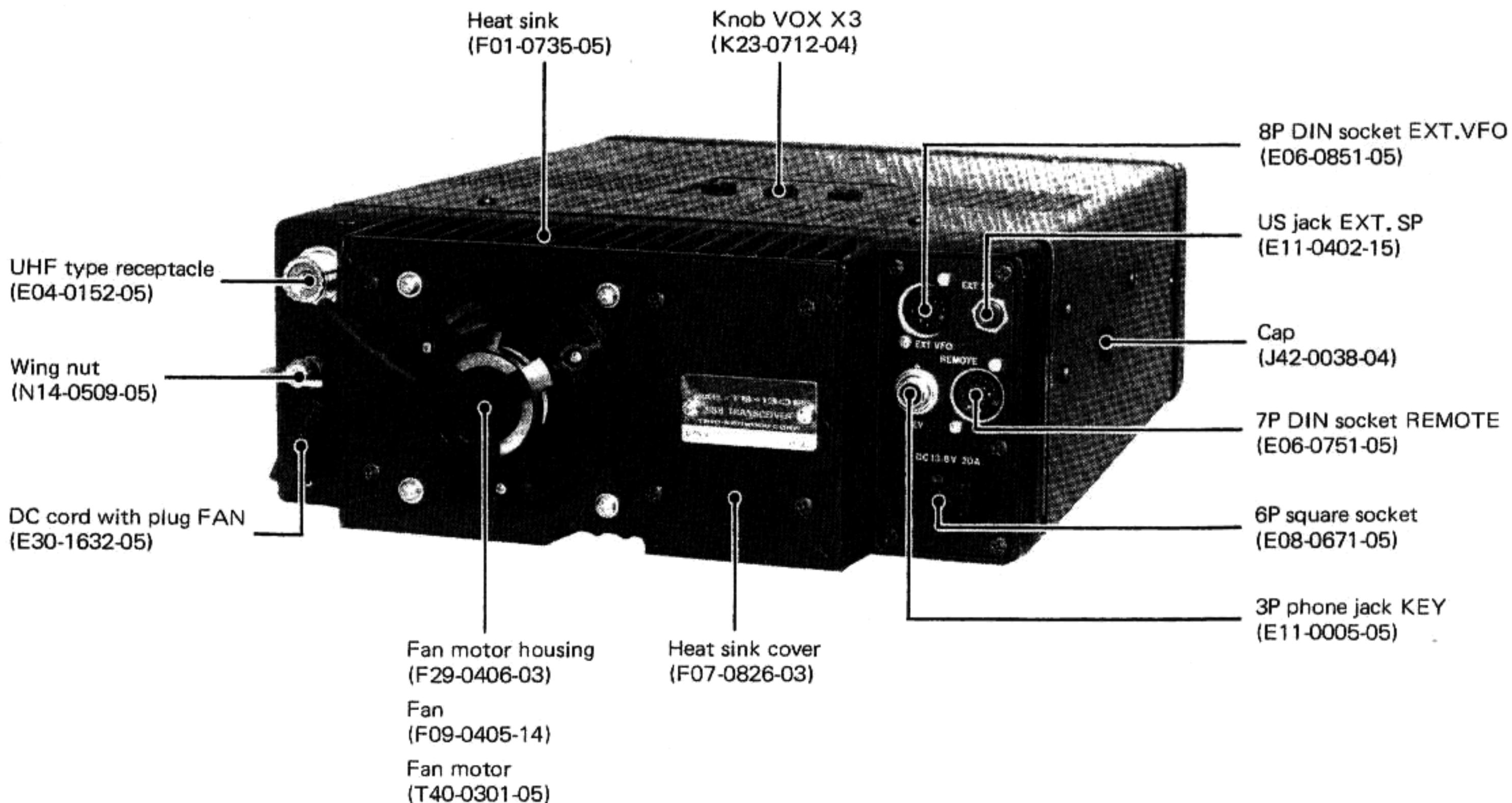
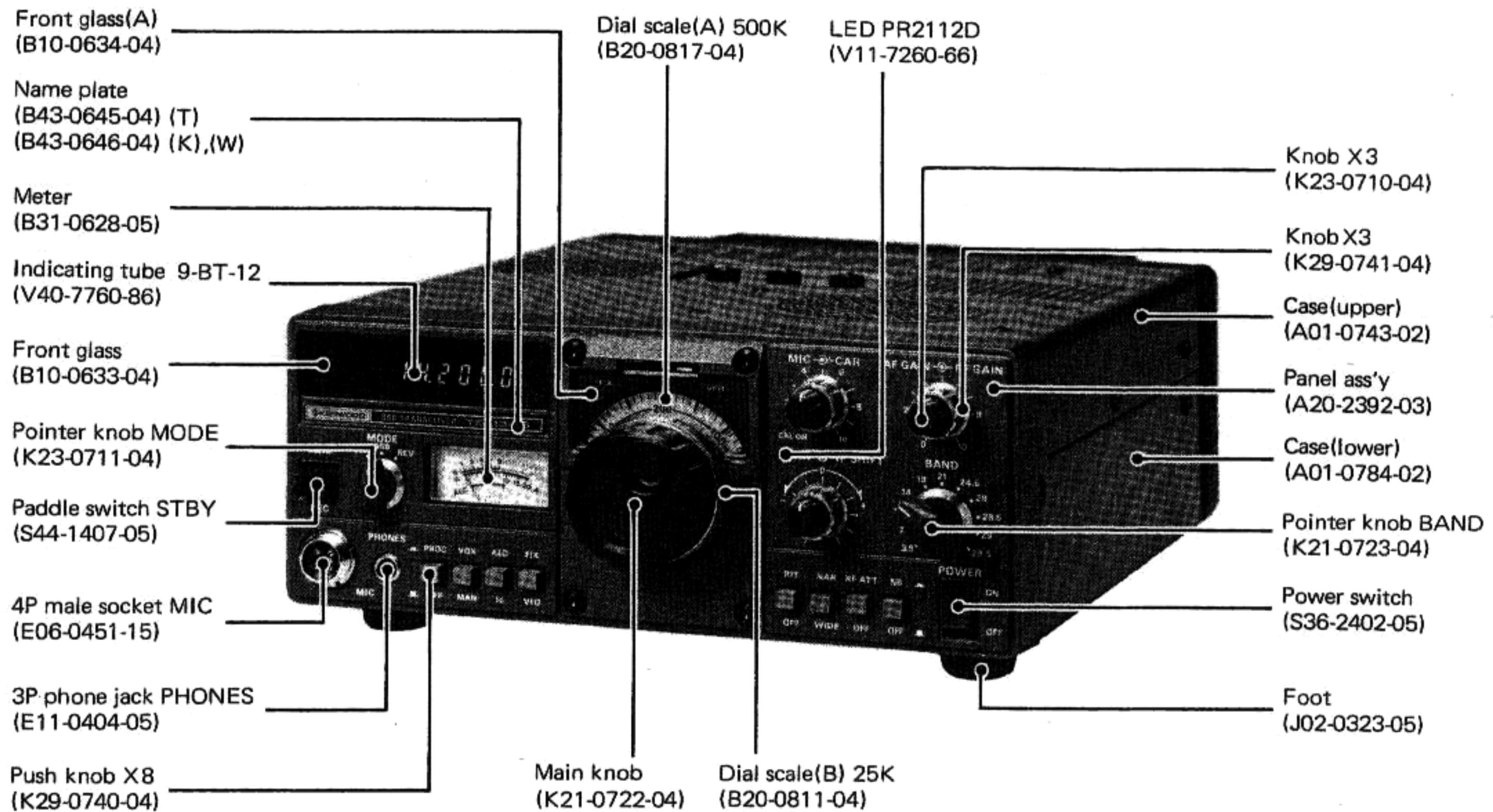
2SC2075(V03-2075-06) HF power amplifier for V type.

NPN Epitaxial planar Si transistor

• Absolute maximum ratings

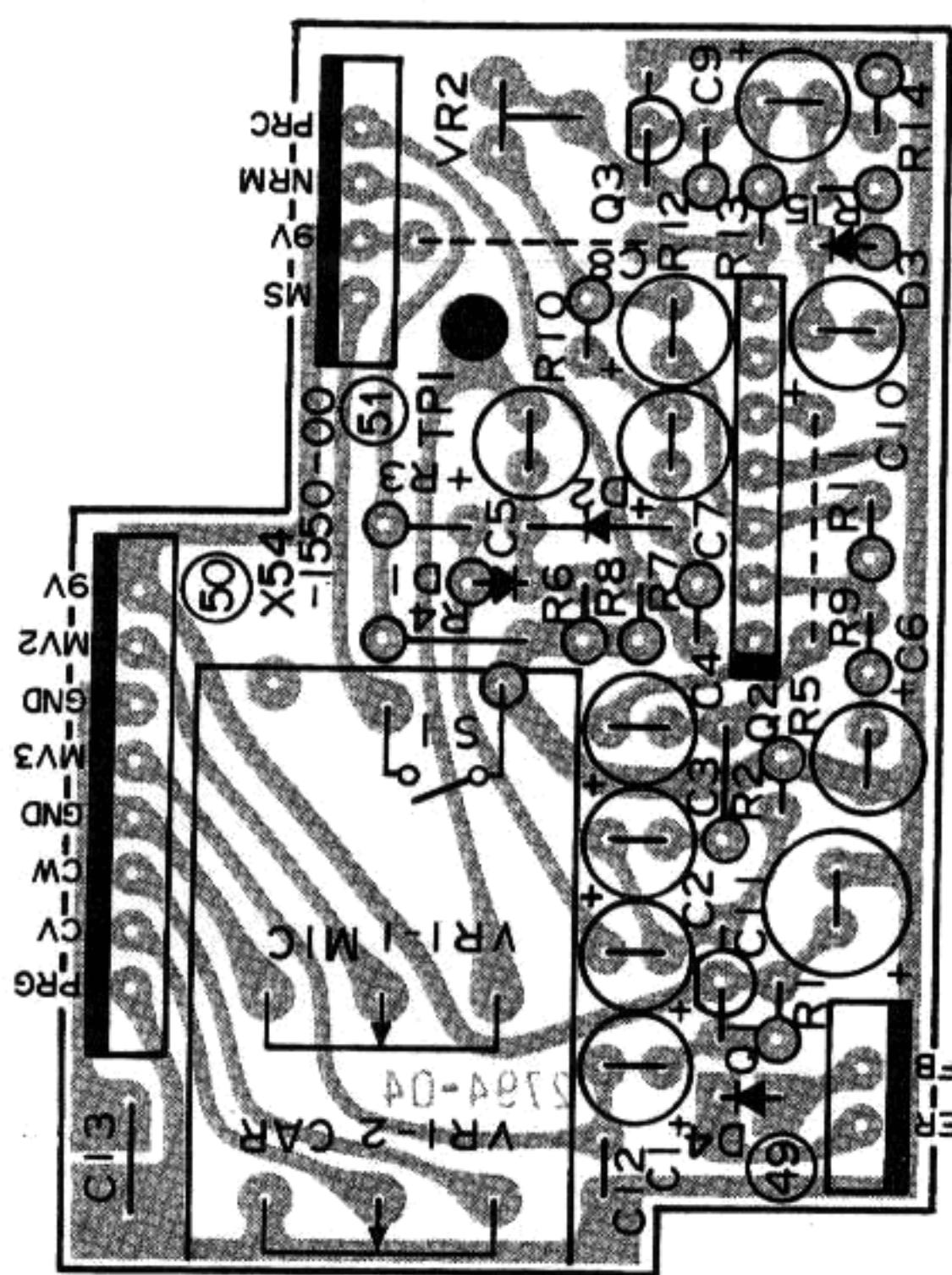
Item	Pc	V _{CEO}	V _{CES}	V _{EBO}	IC	IE	T _{stg}
Value	10(W)	80(V)	80(V)	4.0(V)	4(A)	-4(A)	-55~150(°C) (Tc=25°C)

OUTSIDE VIEWS (S TYPE)



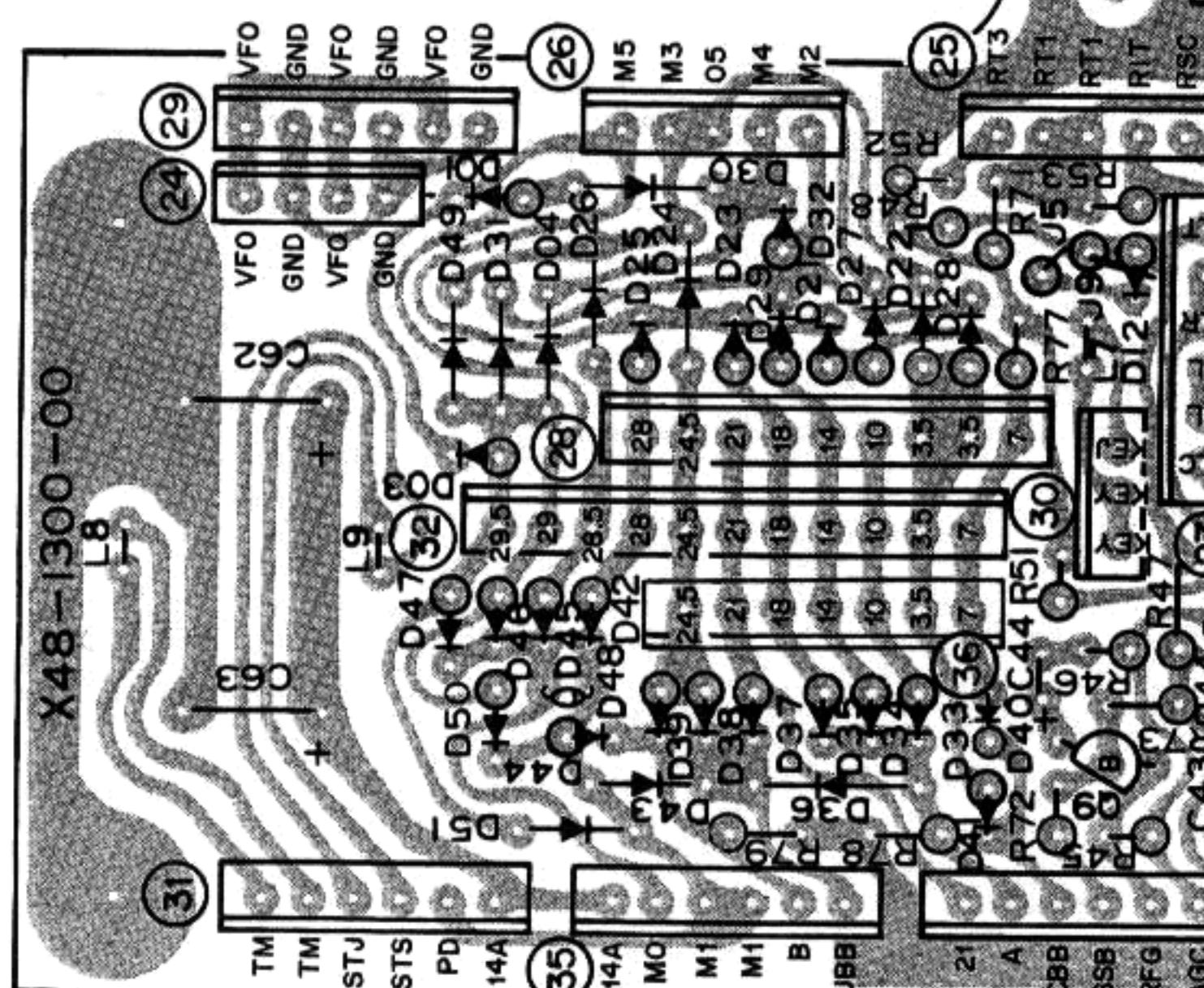
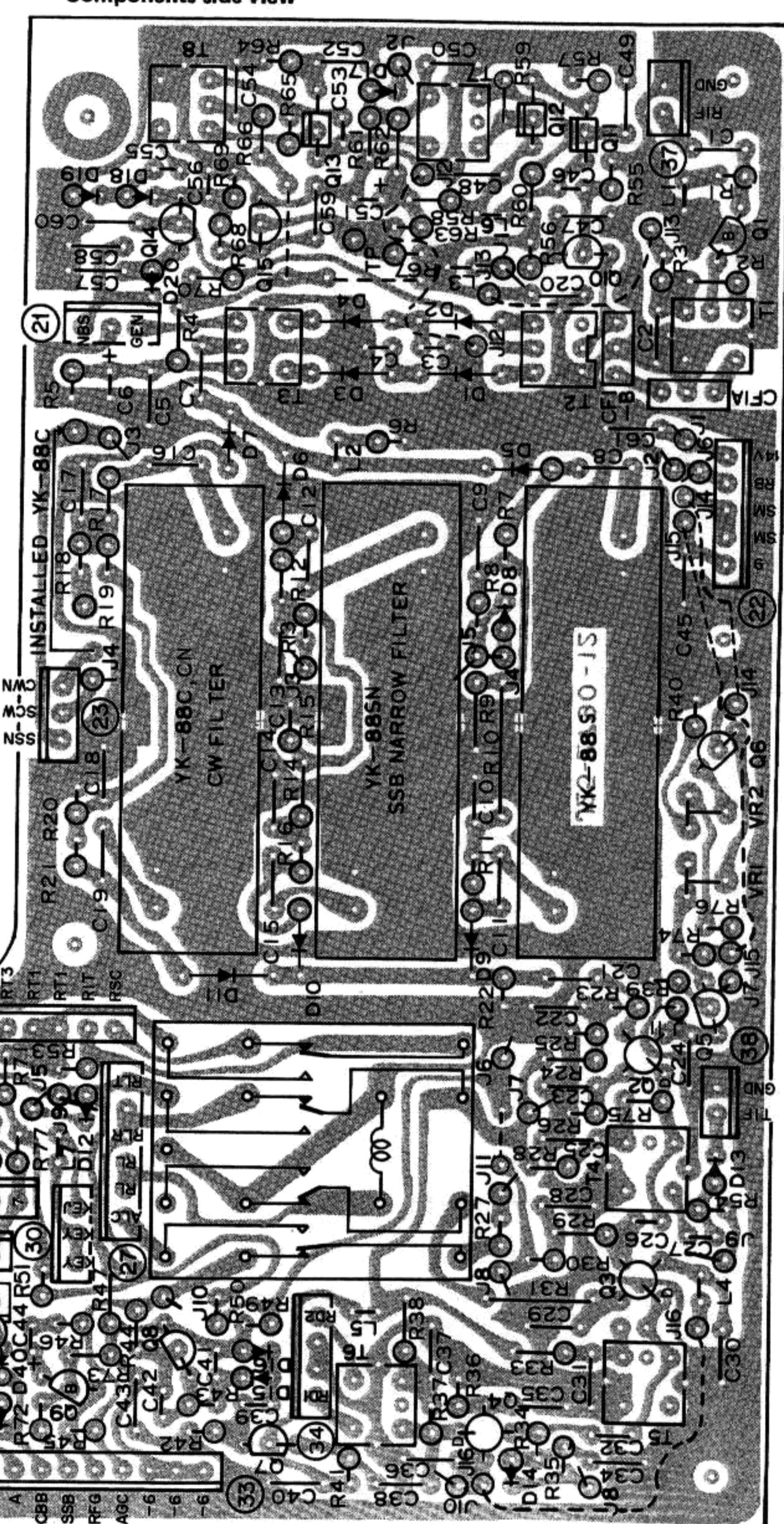
TS-130SV PC BOARD VIEWS

▼ PROCESSOR UNIT (X54-1550-00) Components side view

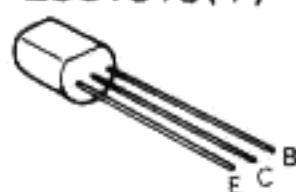


Q1,3: 2SC1815(Y) Q2: μ PC1158H2
D1,2: 2S1555 D3: 1N60 D4: PR2112D

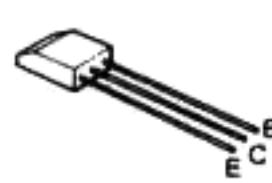
▼ IF UNIT (X48-1300-00,-01) 00:S,01:V Components side view



2SC1675L
2SC1815(Y)



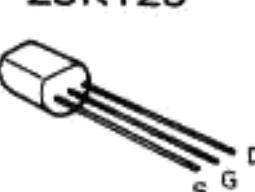
2SC460(B)



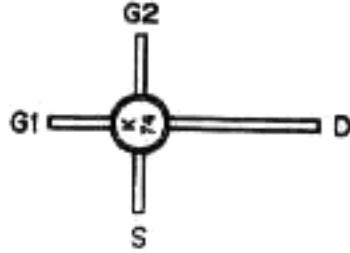
2SK19(GR)
2SK19(Y)



2SK30A(O)
2SK125



3SK74(L)



μ PC1158H2



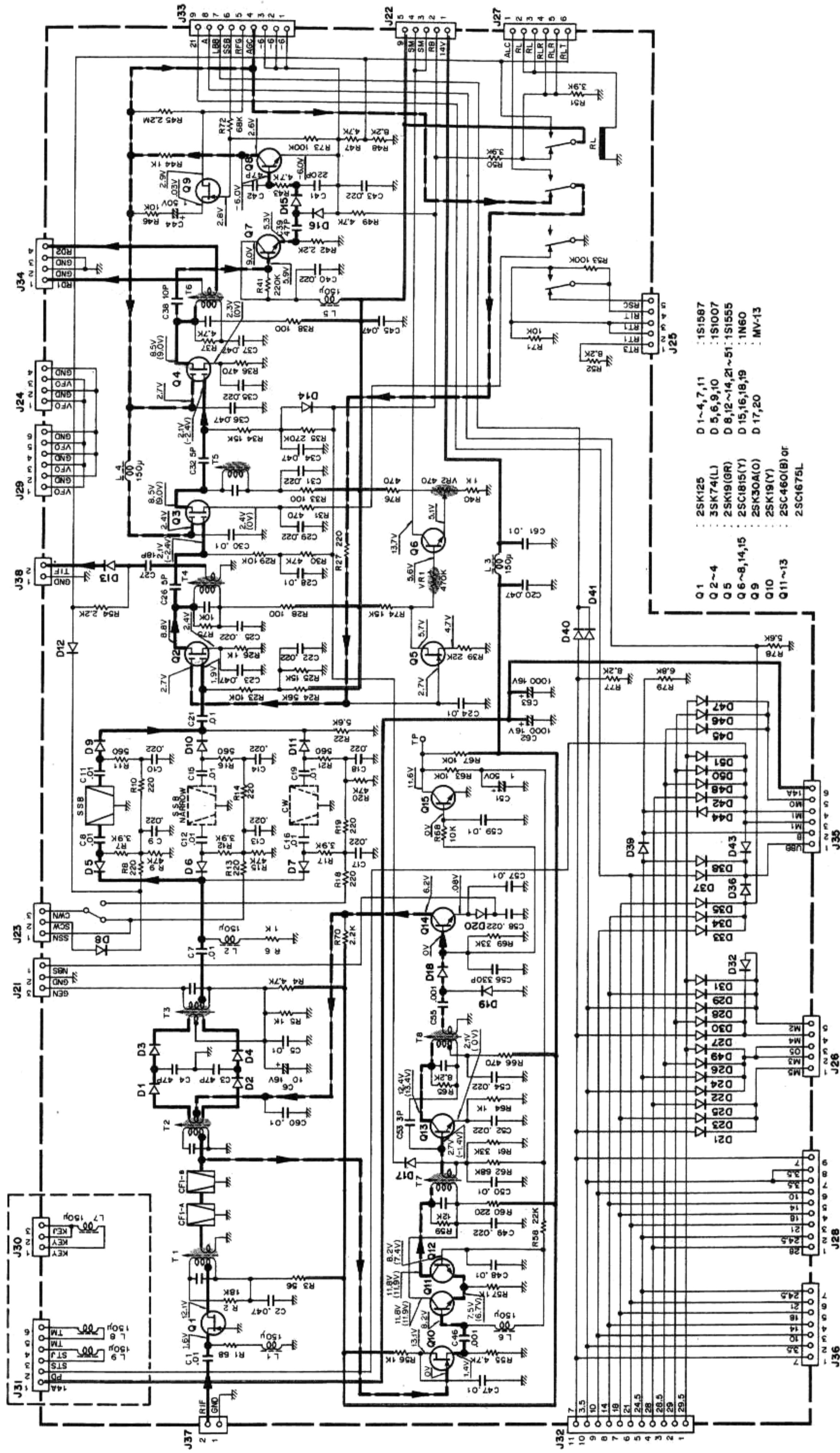
MV-13



CIRCUIT DIAGRAM TS-130SV

▼ IF UNIT (X48-1300-00,-01) 00:S,01:V

TS-130V does not use J30 and J31.

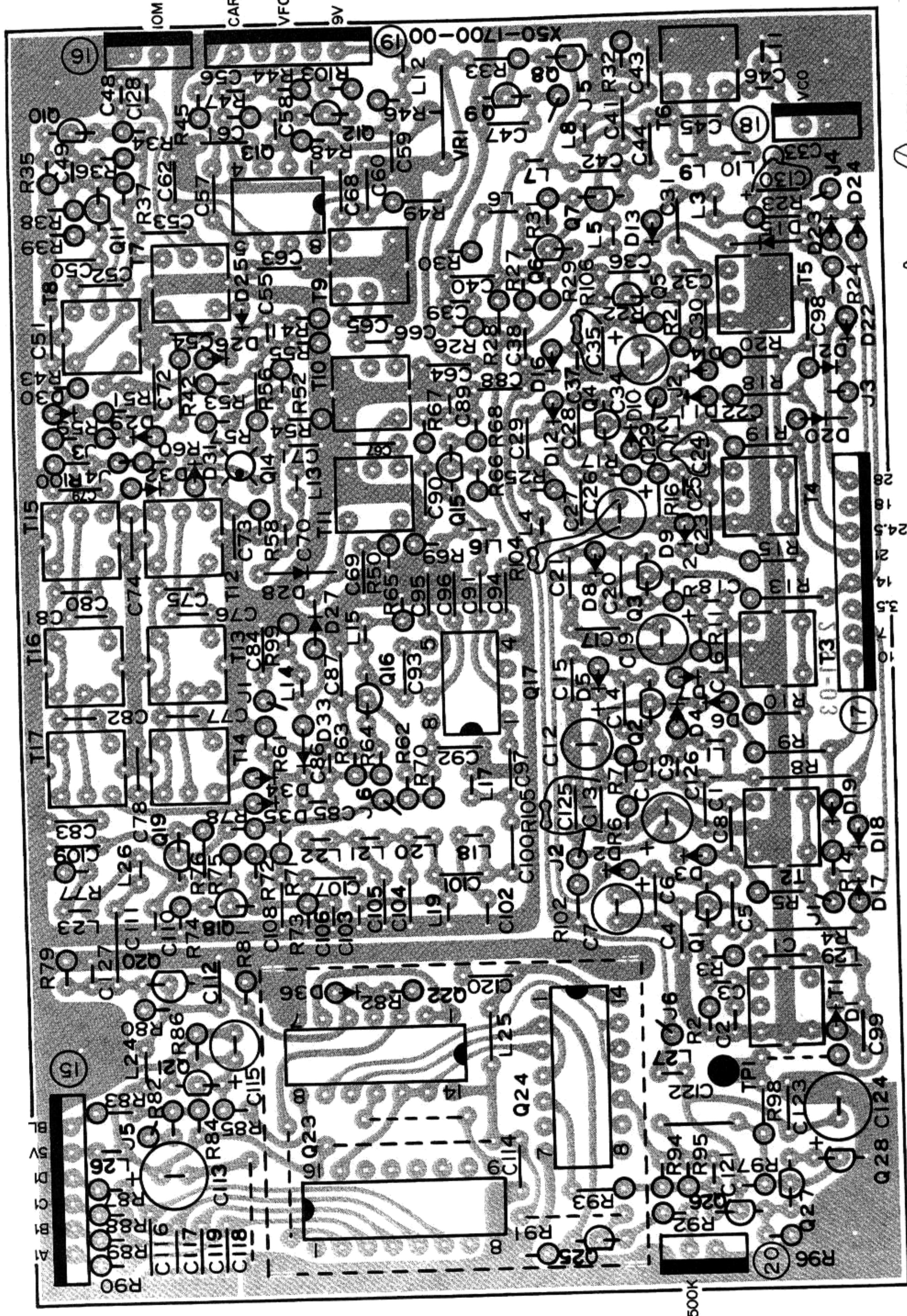


Q1	2SK125	D 1~4,7,11
Q2	3SK4(L)	D 5,6,9,10
Q5	2SK19(GR)	D 8,12~14,21~51,1IS1555
Q6~8,14,15	2SC1815(Y)	D 15,16,18,19
Q9	2SK30A(O)	D 17,20
Q10	2SK19(Y)	MV-13
Q11~13	2SC460(B) or 2SC4675L	

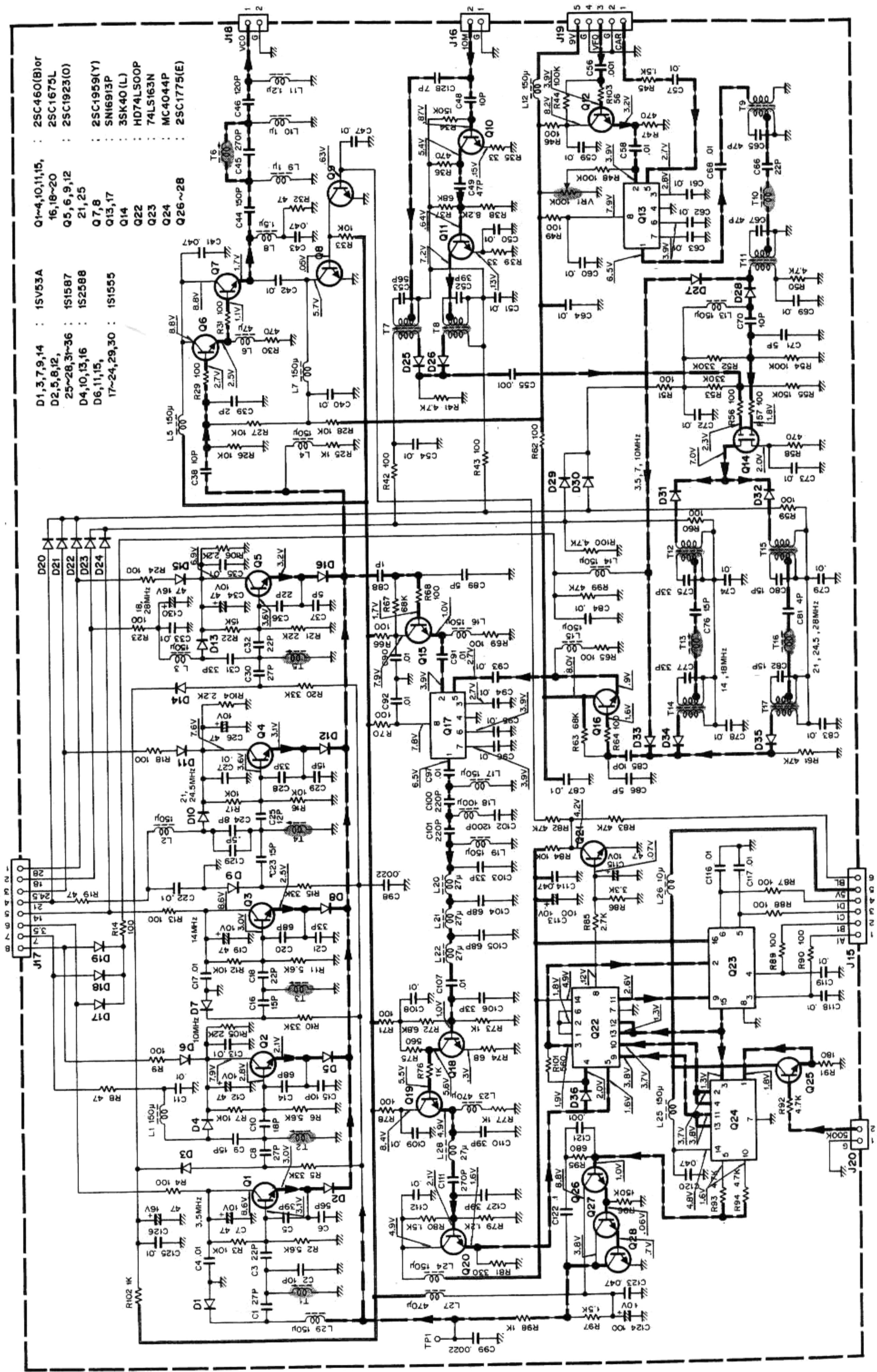
TS-130SV PC BOARD VIEW

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▼PLL UNIT (X50-1700-00) Components side view

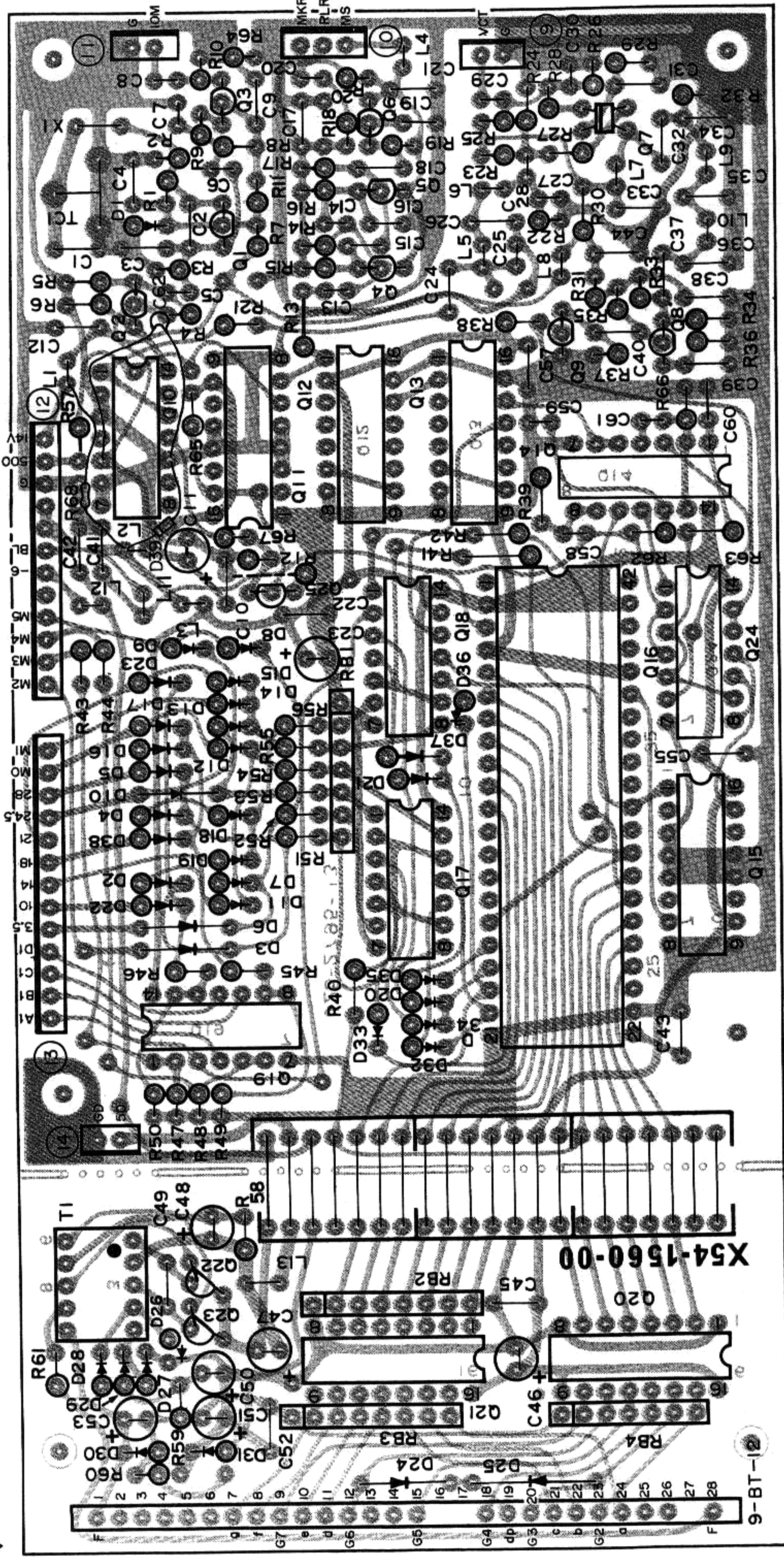


▼ PLL UNIT (X50-1700-00)

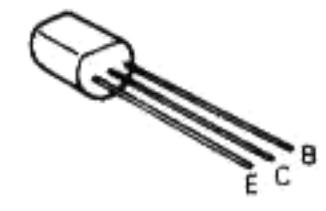


TS-130SV PC BOARD VIEW

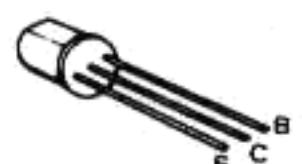
▼ COUNTER UNIT (X54-1560-00) Components side view



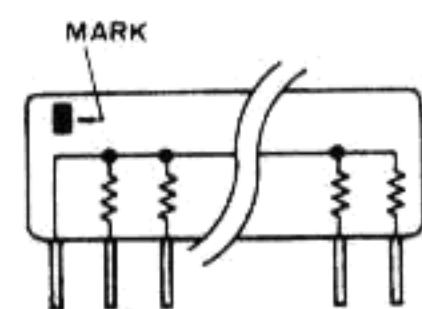
2SC1815(BL)
2SC1815(Y)
2SC1959(Y)



2SC785(O)

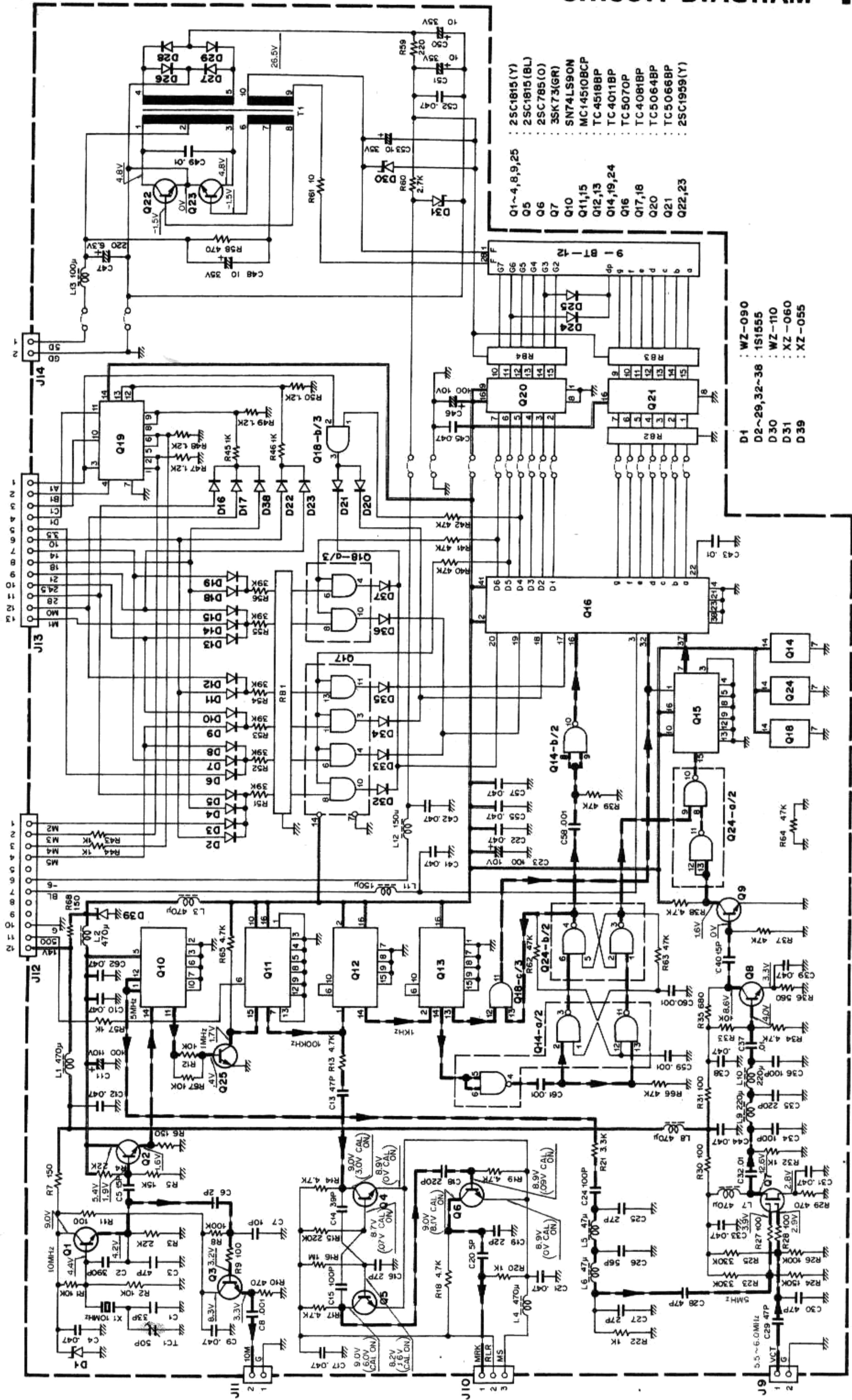


3SK73(GR)



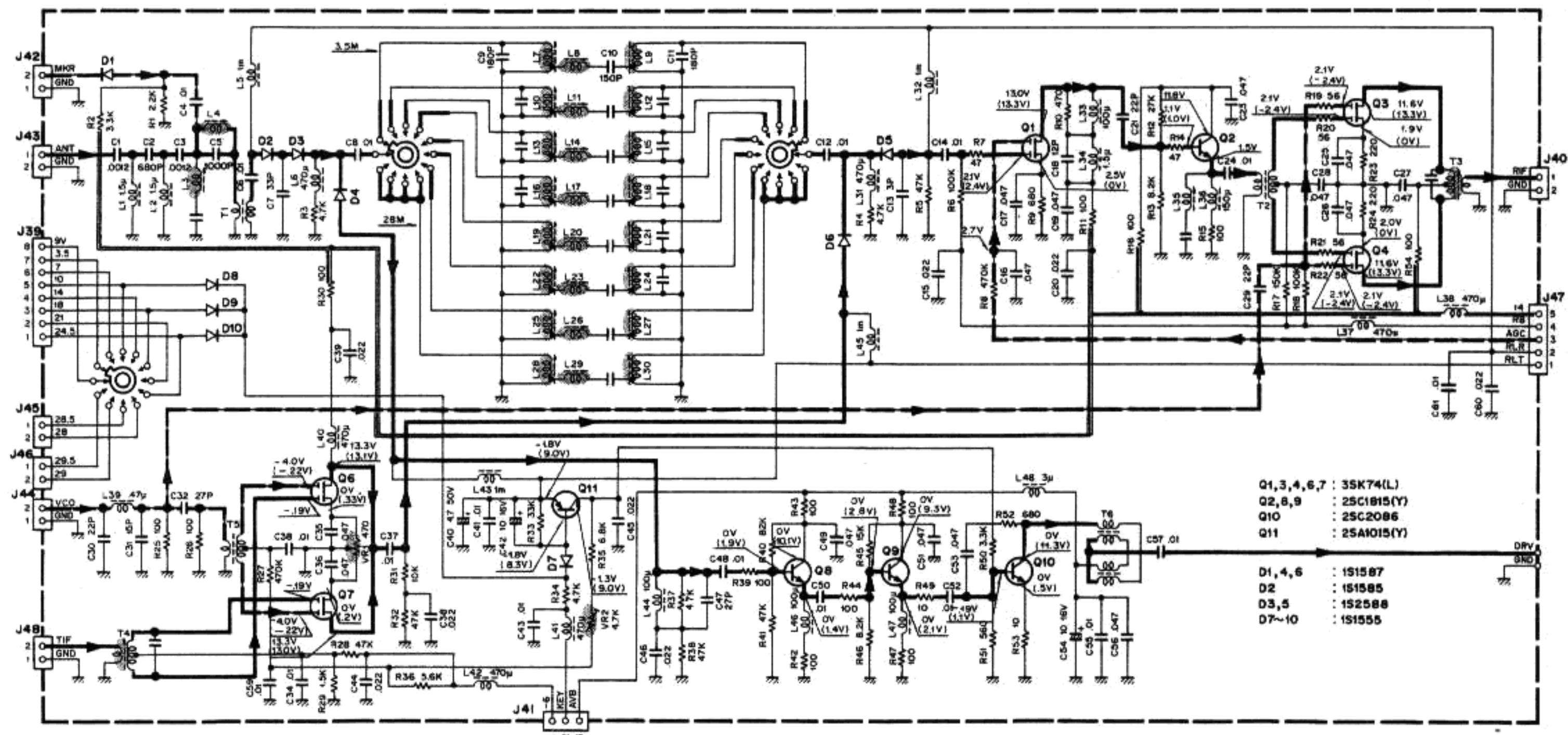
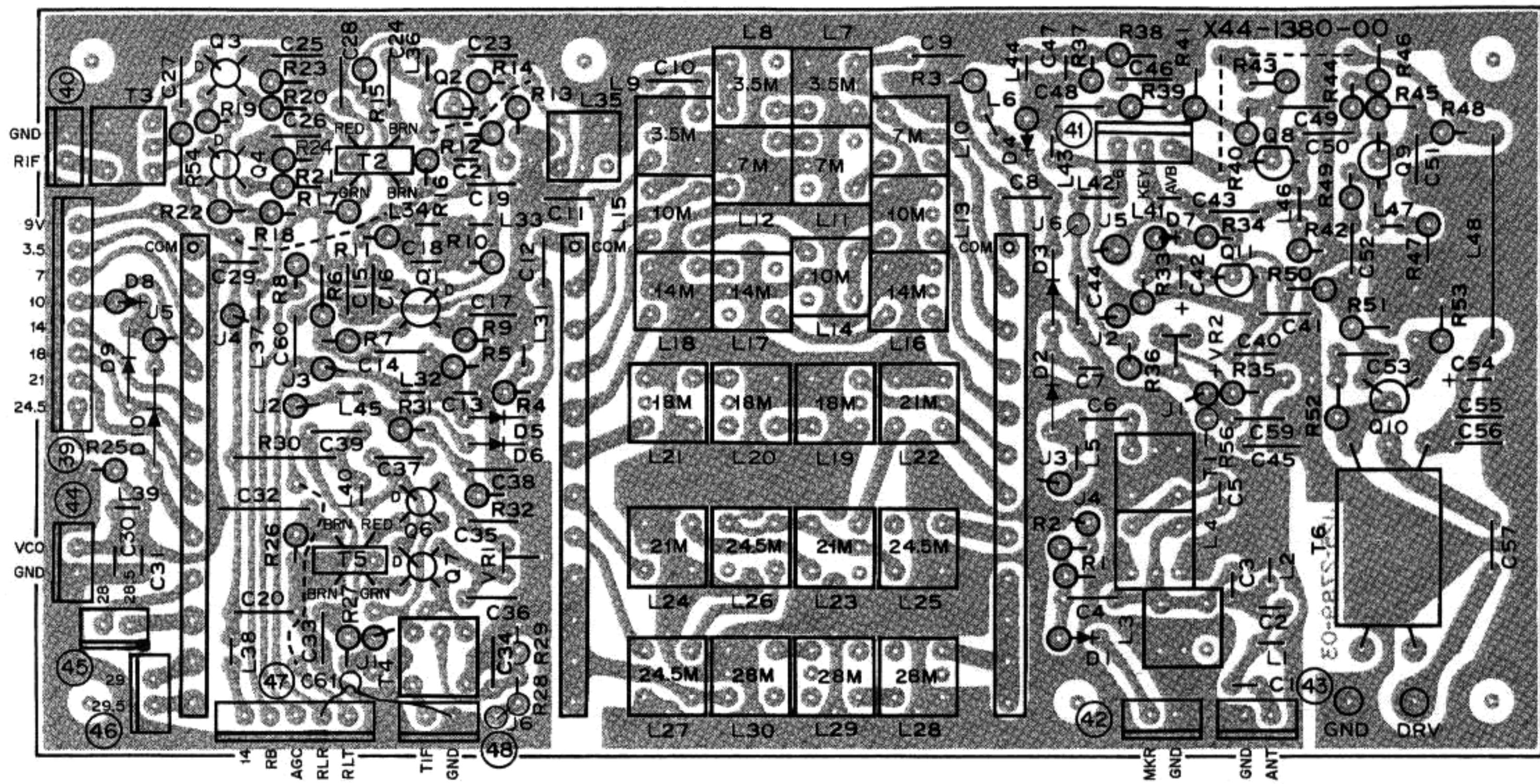
RB1~4

▼ COUNTER UNIT (X54-1560-00)



TS-130SV PC BOARD VIEW/CIRCUIT DIAGRAM

▼ RF UNIT (X44-1380-00) Components side view



2SC1015(Y)

2SC1675L

2SC1815(Y)

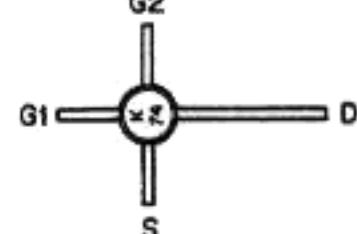
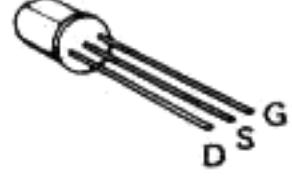
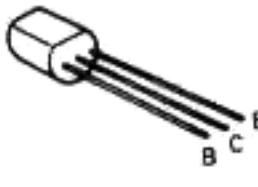
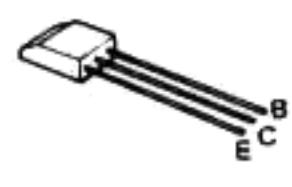
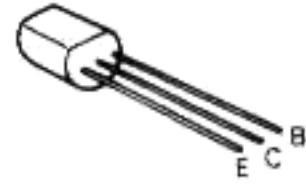
2SC1959(Y)

2SC460(B)

2SC2086

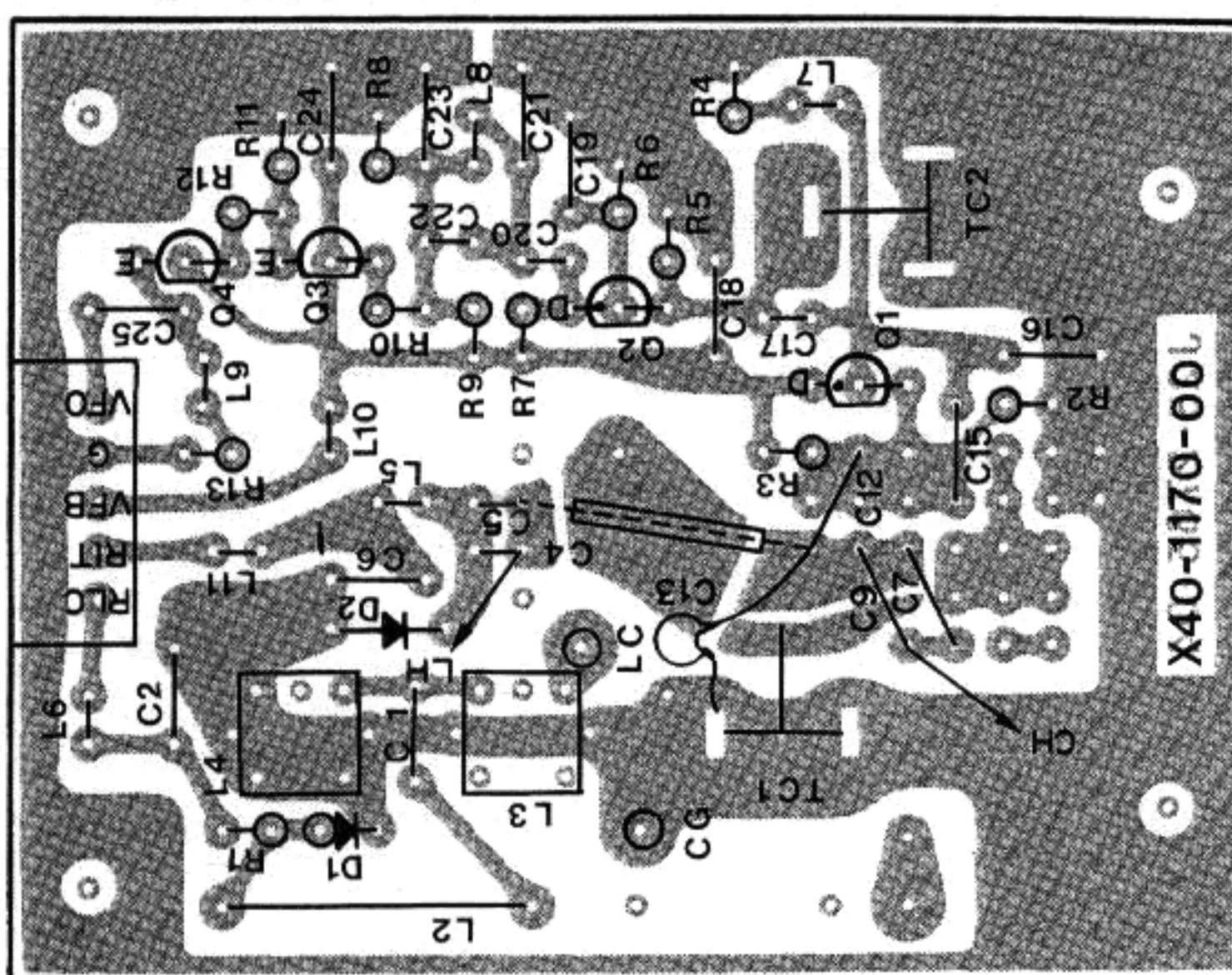
2SK19(Y)

3SK74(L)



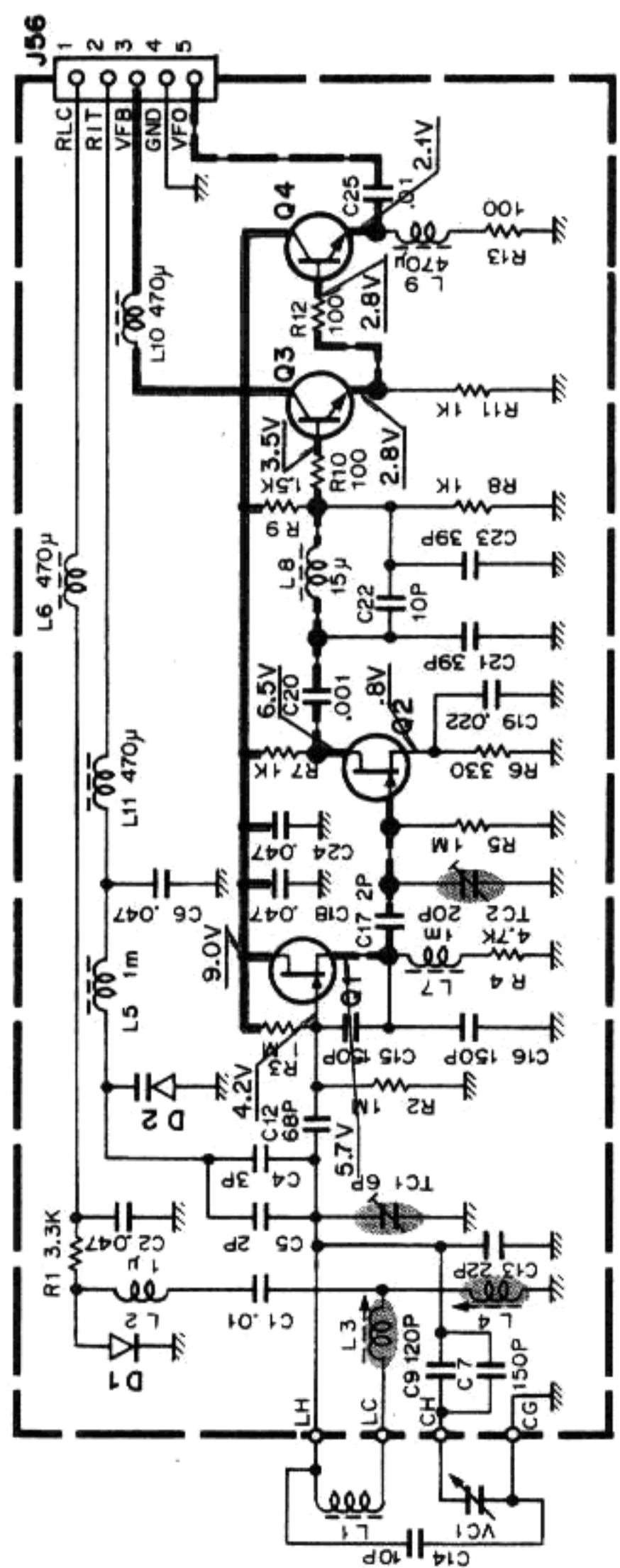
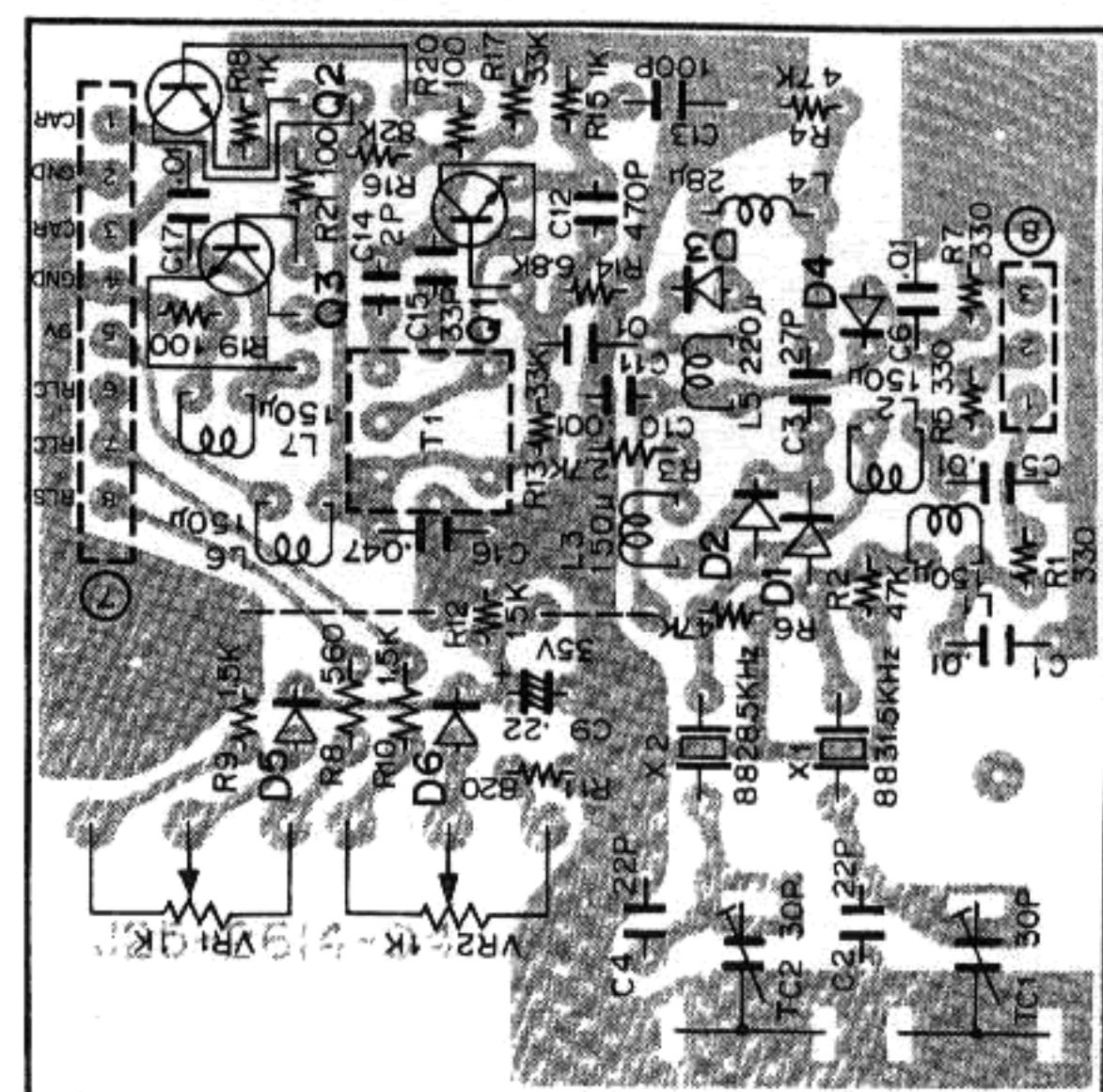
▼ VFO UNIT (X40-1170-00)

Components side view

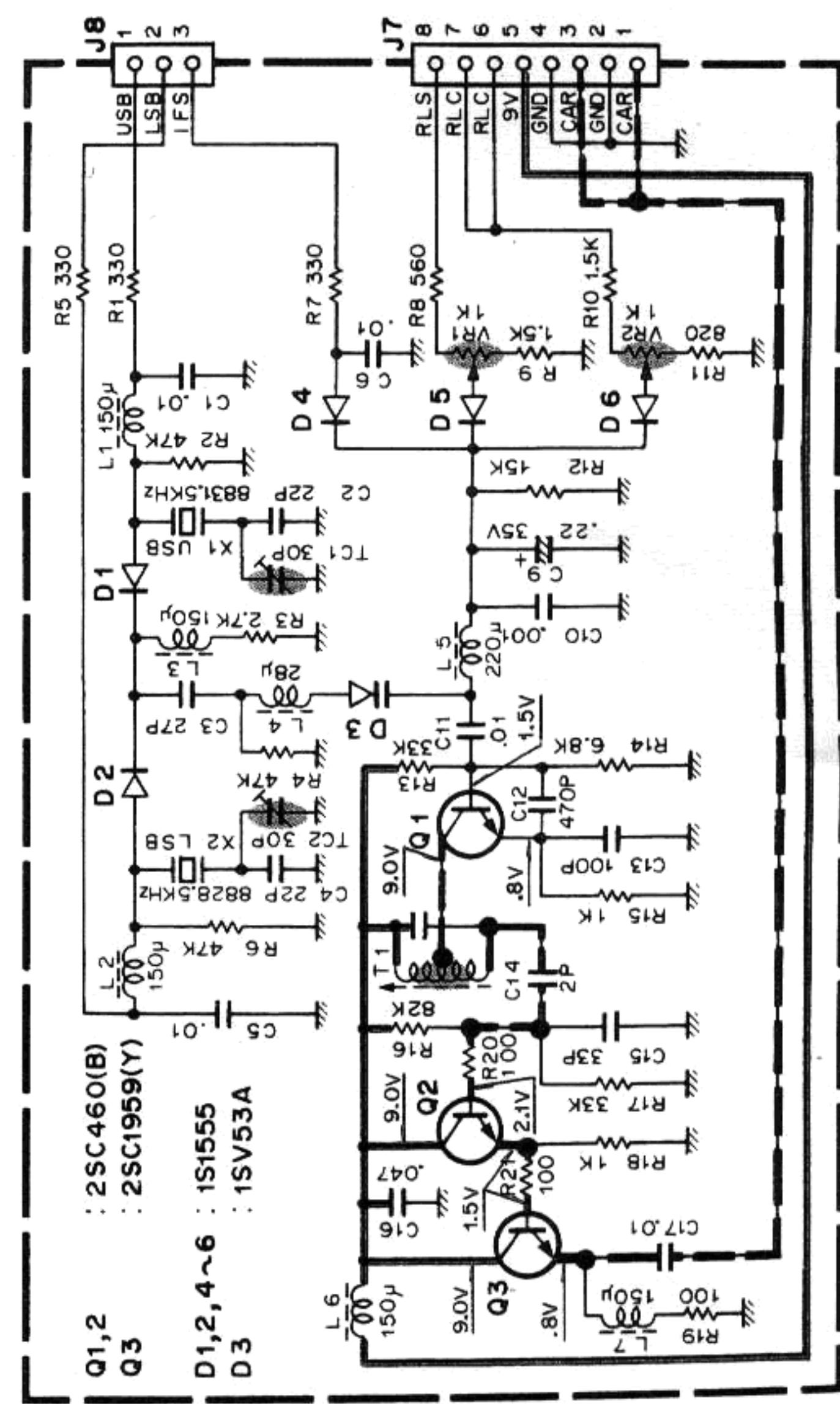


▼ CAR UNIT (X50-1500-00)

Foil side view



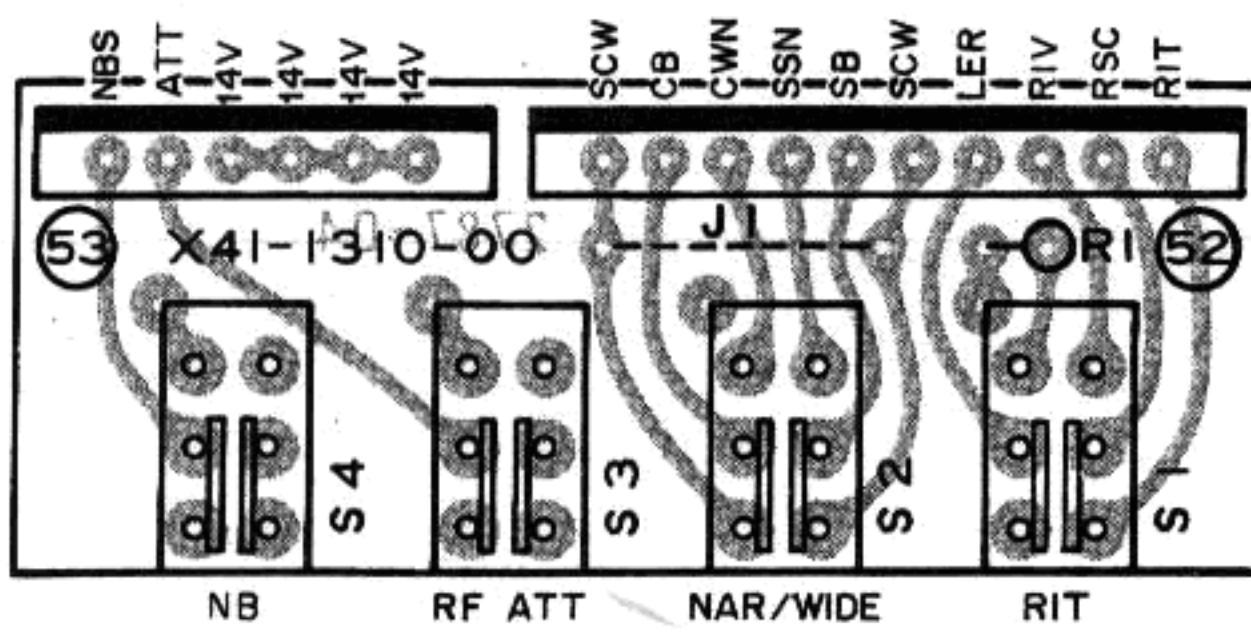
Q1,2 : 2SK19(Y)
 Q3 : 2SC460(B) or D2 : 1SV53A
 2SC1675L
 Q4 : 2SC1959(Y)



TS-130SV PC BOARD VIEWS

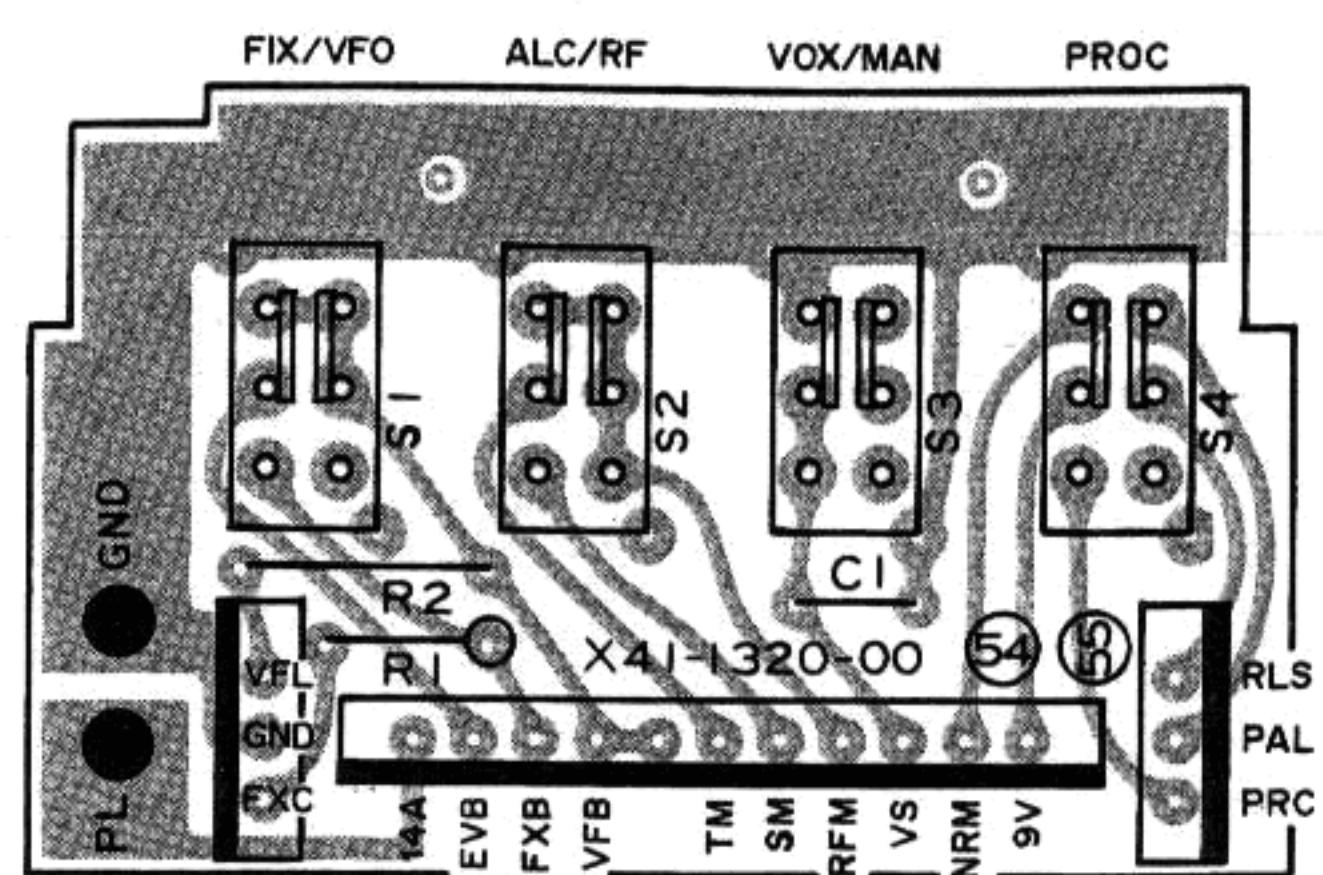
▼ SWITCH (A) UNIT (X41-1310-00)

Components side view



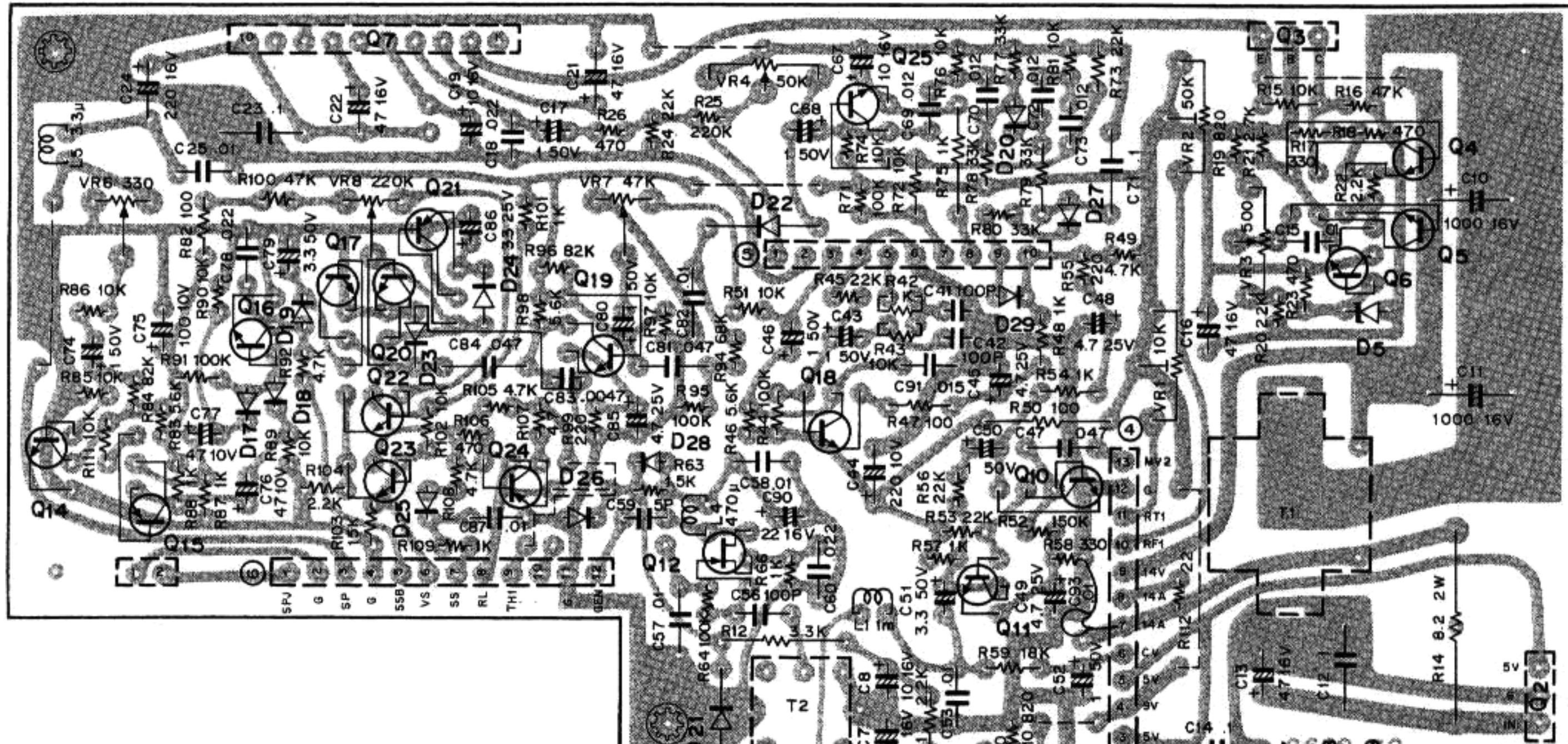
▼ SWITCH (B) UNIT (X41-1320-00)

Components side view



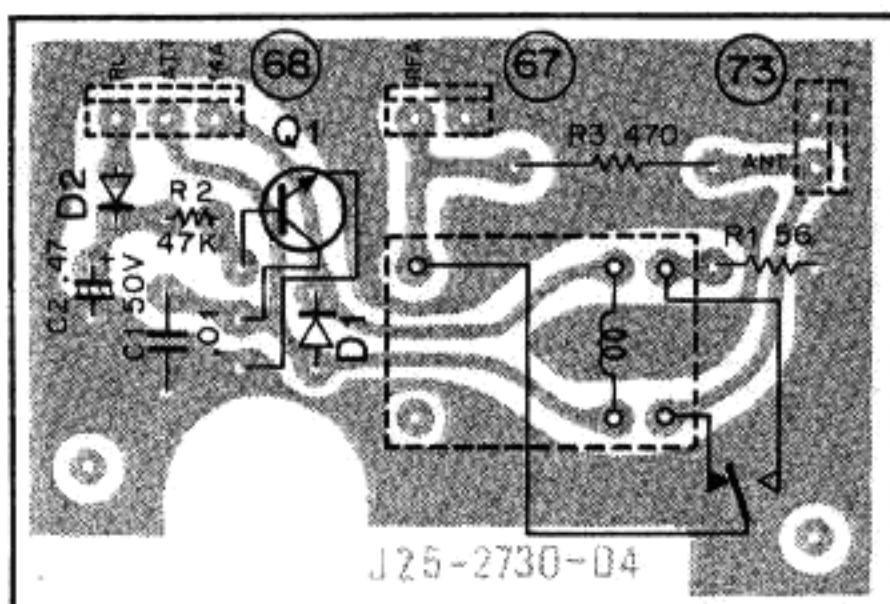
▼ AF-GEN UNIT (X49-1110-01)

Foil side view



▼ RELAY UNIT (X41-1300-00)

Foil side view



Q1: 2SC1959(Y) D1,2: 1S1555

Q1,18: 2SC2240(GR) Q2: μPC14305H Q3: 2SA473(Y)

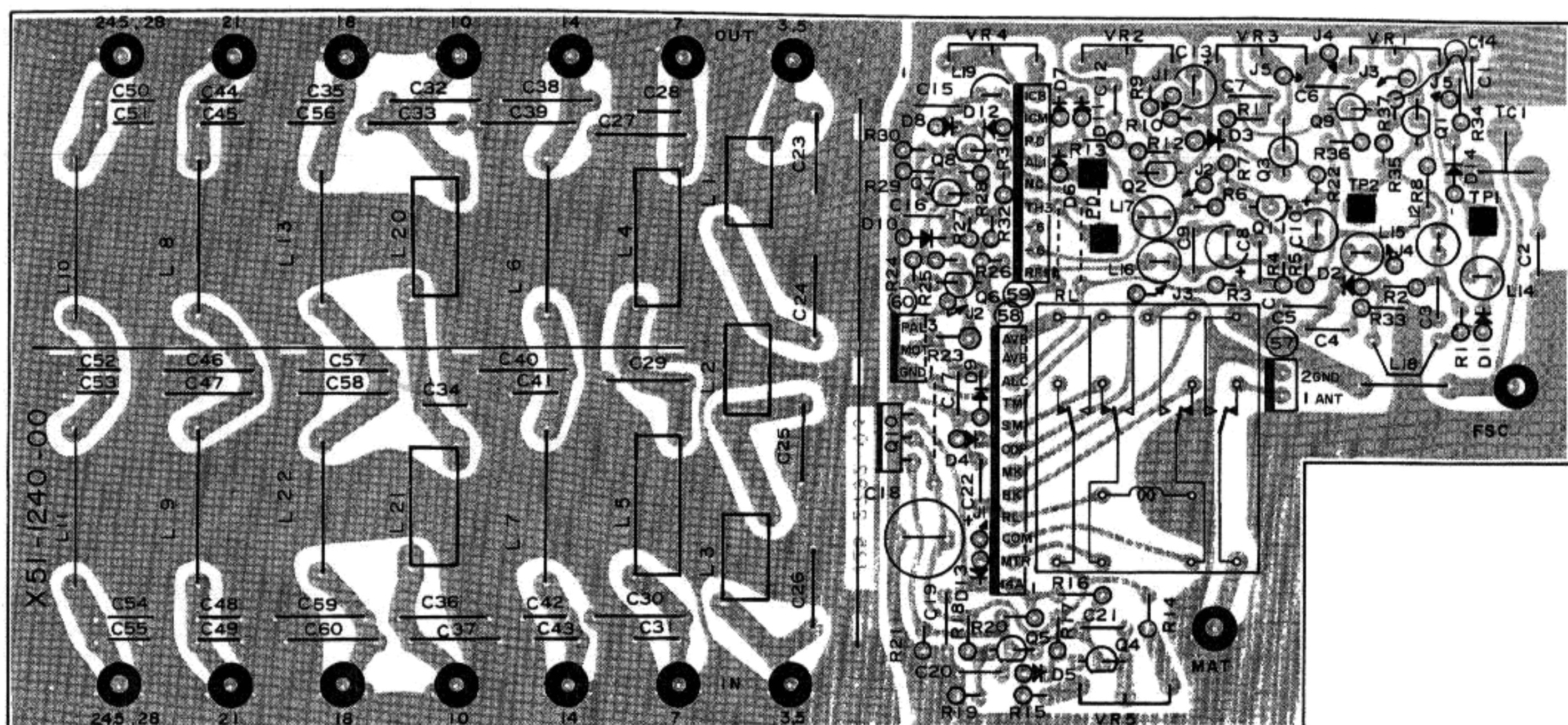
Q4~6,10,11,14,16,17,19,20,23,25: 2SC1815(Y) Q7: HA1366W or HA1366WR

Q8,13: 2SC460(B) or 2SC1675L Q9: 2SC1959(Y) Q12: 2SK19(GR) Q15,21: 2SA1015(Y)

Q22: 2SC1815(GR) Q24: 2SA562(Y) D1~4, 11~14,23,24,26: 1N60 D5: WZ-061

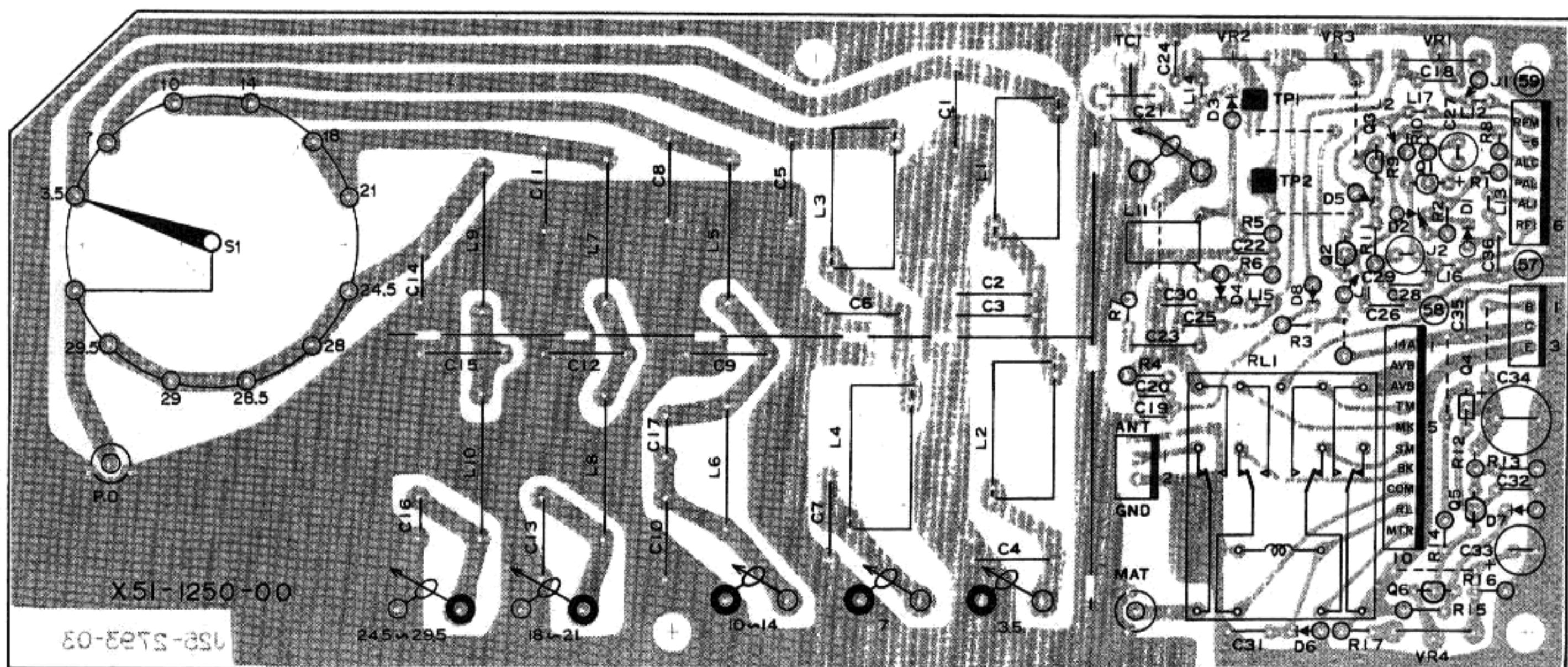
D6~9:1S2588 D15:1S1587 D17~22,25,27~29: 1S1555

▼ FILTER UNIT (X51-1240-00) S TYPE Components side view



Q1~5,7~9: 2SC1815(Y) Q6: 2SA562(Y) Q10: 2SA473(Y) Q11: 2SK30A(O) D1,2: 1N60 D3: WZ-044
D4,6,7,9,12,14: 1S1555 D5,10: WZ-061 D8,11,13: WZ-090

▼ FILTER UNIT (X51-1250-00) V TYPE Components side view



Q1: 2SK30A(O) Q2,3,5,6: 2SC1815(Y) Q4: 2SA496(Y) D1: WZ-090 D2,6: 1S1555 D3,4,8: 1N60 D5: WZ-044 D7: WZ-061

2SA1015(Y)

2SC1675L

2SC1815(GR)

2SC1815(Y)

2SC1959(Y)

2SC2240(GR)

2SC460(B)

2SA496(Y)

2SA473(Y)

2SA562(Y)

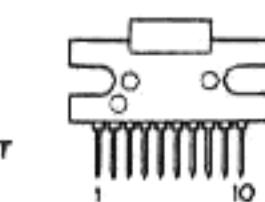
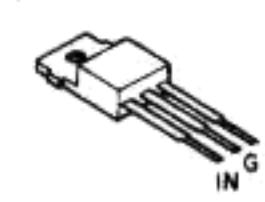
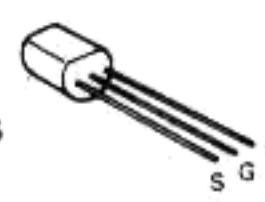
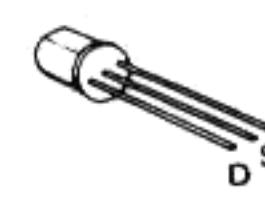
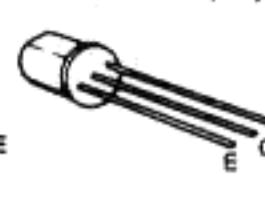
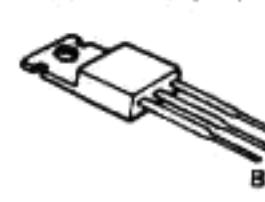
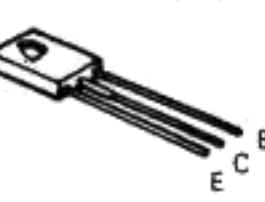
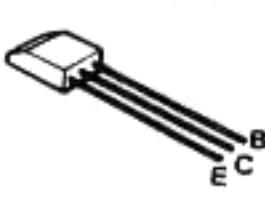
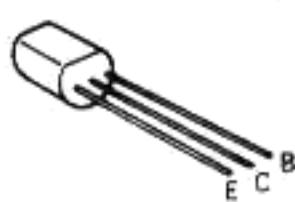
2SK19(GR)

2SK30A(O)

μ PC14305H

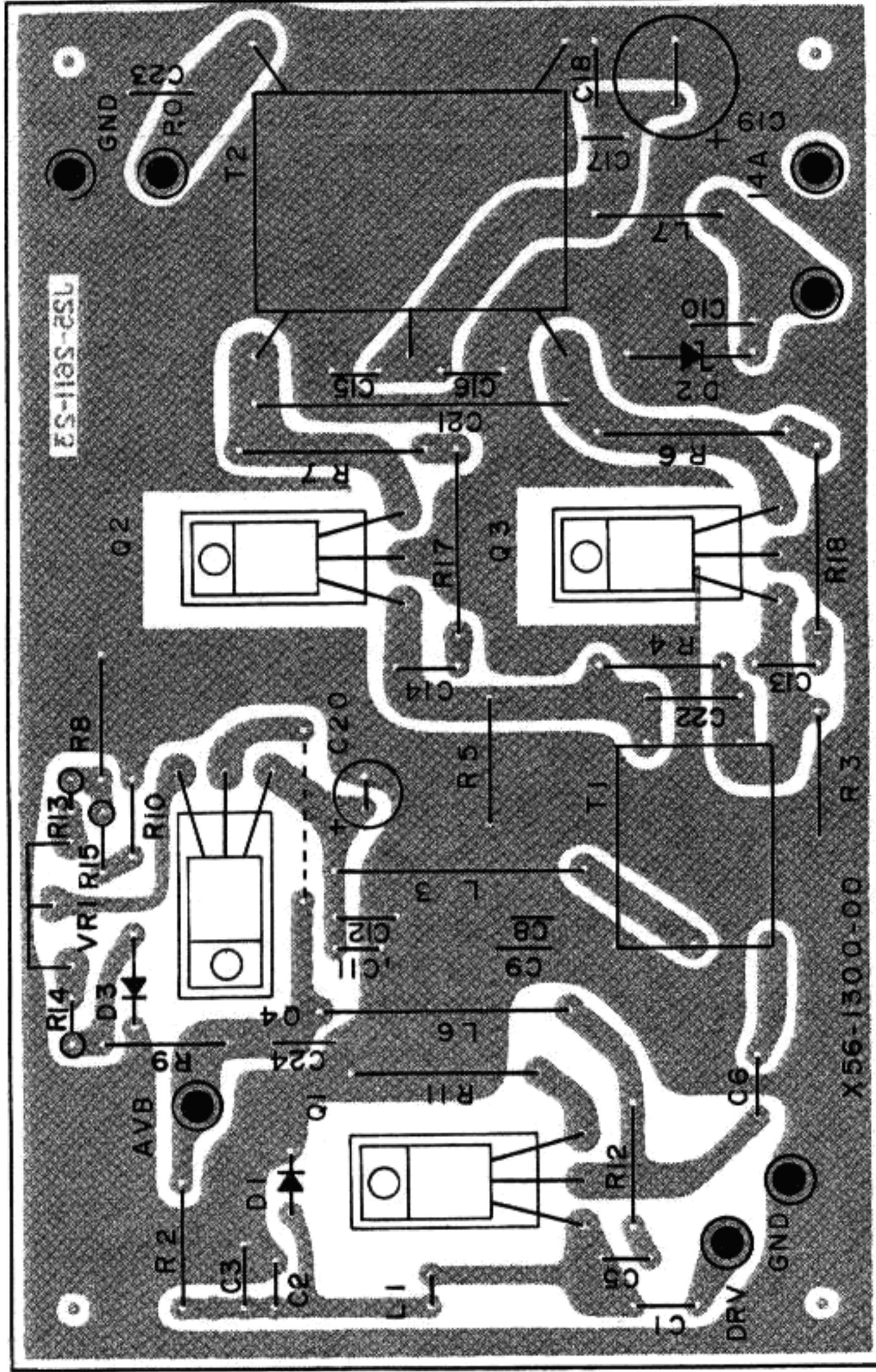
HA1366W

HA1366WR

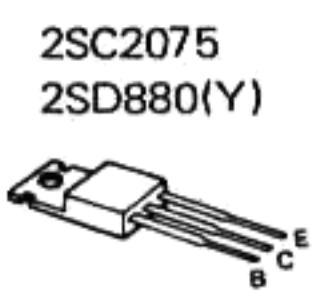


TS-130SV PC BOARD VIEWS

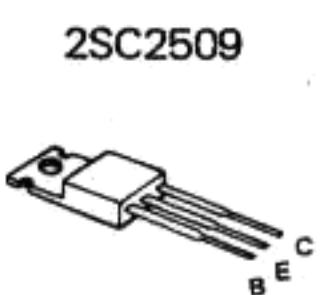
**▼ FINAL UNIT (X56-1300-00) V TYPE
Components side view**



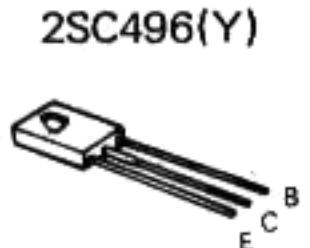
Q1: 2SC2075 Q2,3: 2SC2509 Q4: 2SC496(Y) Q5: 2SD880(Y)
D1: SV-4A D2: BZ-240 D3: SV-03



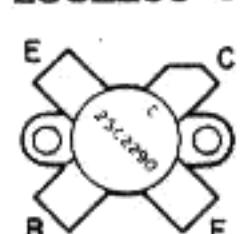
2SC2075
2SD880(Y)



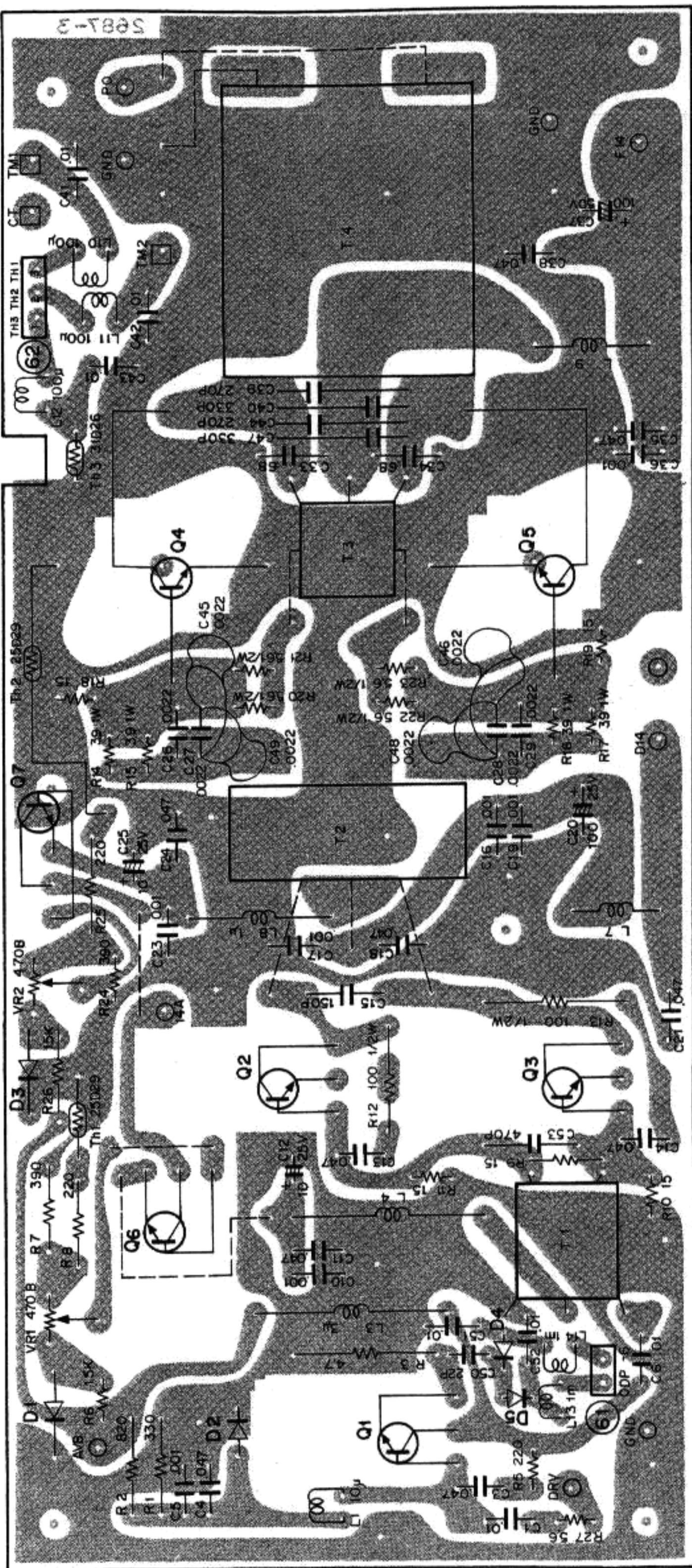
2SC2290*J



2SC496(Y)



▼ FINAL UNIT (X56-1350-00) S TYPE
Components side view



Q1: 2SC2075 Q2,3: 2SC2509 Q4,5: 2SC2290*J
Q6,7: 2SD880(Y) D1,3: SV-03 D2: SV-4A D4,5: 1N60

PARTS LIST

Note 1:

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

Note 2:

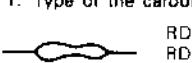
Only special type of resistors (example: cement, metal film, etc.) and capacitors (example: electrolytic, tantalum, mylar, temp. coeff. capacitors) are detailed in the PARTS LIST. For the value of all common type components, refer to the schematic diagram of the P.C. board illustration. Resistors not 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



RD14BY

RD14BB (small size)



RD14CY

RD14CB (small size)

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

TS-130 SEMICONDUCTOR

★: New parts

Item	Name	Parts No.	Re- marks
Diode	1N60	V11-0051-05	
	1S1007	V11-4180-66	
	1S7555	V11-0076-05	
	1S1585	V11-3172-76	
	1S1587	V11-0370-05	
	1S2588	V11-0414-05	
	S31C	V11-2163-86	
Varistor	UO5B	V11-0270-05	
	MV-13	V21-0004-05	
	SV-03	V21-0007-05	
Vari-cap diode	SV-4A	V11-4363-36	★
	1SV53A	V11-4161-36	

Item	Name	Parts No.	Re- marks
Thermistor	25D29	V11-3360-16	500Ω at 25°C
	31D26	V11-7762-16	1kΩ at 25°C
LED	PR2112D	V11-7260-66	
	TLY-205	V11-3163-16	
Zener diode	BZ-240	V11-4160-98	
	XZ-055	V11-4105-50	
	XZ-060	V11-4101-20	
	WZ-044	V11-4161-06	
	WZ-061	V11-0243-05	
	WZ-090	V11-0240-05	
	WZ-110	V11-4161-46	
	Indicating tube	9-BT-12	V40-7760-86

3. Resistance value

means $22 \times 10^2 = 2200\Omega$ (2.2 kΩ)
 Example 221 → 220Ω 223 → 22 kΩ 225 → 2.2 MΩ
 22 → 2.2 kΩ 224 → 220 kΩ

4. Tolerance

J = ±5% (Gold) K = ±10% (Silver)

CAPACITORS**Type I**

CC	45	TH	1H	220	J	CK	45	E	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

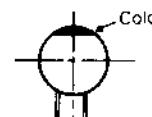
100 → 10 pF

101 → 100 pF

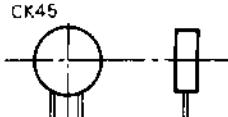
102 → 1000 pF = 0.001 μF

103 → 0.01 μF

CC45



Type I



Type II

PARTS LIST

Item	Name	Parts No.	Re-marks	Ref.No.	Parts No.	Description	Re-marks
TR	2SA473 (Y)	V01-0473-06			B05-0701-04	SP grill cloth	
	2SA496(Y)	V01-0113-05			B10-0633-04	Front glass	★
	2SA562(Y)	V01-0032-05			B30-0818-05	Pilot lamp	12V,40mA
	2SA1015(Y)	V01-1015-06			B31-0628-05	Meter	S ★
					B31-0629-05	Meter	V ★
	2SC460 (B)	V03-0079-05			B39-0407-04	Spacer	
	2SC496(Y)	V03-0336-05			B42-1644-04	Seal (VOX)	
	2SC785(O)	V03-0473-05			B42-1693-04	Seal (Adj.)	
	2SC1675L	V03-1675-10			B43-0645-04	Name plate	S(T) ★
	2SC1775(E)	V03-1775-06			B43-0646-04	Name plate	S(K),S(W) ★
	2SC1815(BL)	V03-1815-26			B43-0647-04	Name plate	V(T) ★
	2SC1815(GR)	V03-1815-16			B43-0648-04	Name plate	V(K),V(W) ★
	2SC1815(Y)	V03-1815-06			B46-0058-00	Warranty card	(K)
	2SC1923(O)	V03-1923-06			B50-2750-00	Operating manual	(K),(W) ★
	2SC1959(Y)	V03-1959-06			B50-2751-00	Operating manual	(T) ★
	2SC2075	V03-2075-06			D21-0807-05	Band shaft	
	2SC2086	V03-2086-06			D22-0404-05	Universal joint	
	2SC2240(GR)	V03-2240-06			D40-0615-04	Gear ass'y	★
	2SC2290*J	V03-2290-16			E04-0152-05	UHF type receptacle	ANT V
	2SC2509	V03-2509-06			E06-0252-05	2P male socket	POWER V
	2SD880(Y)	V04-0880-16			E06-0451-15	4P male socket	MIC
FET	2SK19(GR)	V09-0012-05			E06-0751-05	7P DIN socket	REMOTE
	2SK19(Y)	V09-0011-05			E06-0851-05	8P DIN socket	EXT.VFO
	2SK30A(O)	V09-0056-05			E07-0252-05	2P metal plug	POWER V
	2SK125	V09-0136-10			E07-0403-05	4P MIC plug	(W),(T)
	3SK40(L)	V09-0079-05			E07-0751-05	7P DIN plug	REMOTE
	3SK73(GR)	V09-1002-46			E08-0671-05	6P square socket	POWER S
	3SK74(L)	V09-1002-56			E09-0671-05	6P plug	POWER S
IC	74LS163N	V30-1037-06			E11-0005-15	3P phone jack	KEY V
	HA1366W	V30-1045-06			E11-0402-15	US jack	EXT. SP
	HD74LS00P	V30-0192-16			E11-0404-05	3P phone jack	PHONES V
	MC14510BCP	V30-1227-16			E11-0404-05	3P phone jack	KEY.PHONES S
	MC4044P	V30-0173-05			E12-0001-05	phone plug	EXT. SP
	SN74LS90N	V30-1005-26			E23-0015-04	Lug terminal	S
	SN16913P	V30-1048-06			E23-0417-05	Pin for 6P square socket	POWER S
	TC4011BP	V30-0301-70			E23-0418-05	Pin for 6P plug	POWER S
	TC4029BP	V30-1051-06			E23-0420-05	Lug terminal	S
	TC4081BP	V30-0299-10			E29-0407-05	Bridge connector	
	TC4518BP	V30-1039-06			E30-1632-05	DC cord with plug	FAN S
	TC5064BP	V30-1056-06			E30-1638-05	DC cord ass'y	S
	TC5066BP	V30-1057-06			E30-1675-05	DC cord ass'y	V
	TC5070P	V30-1172-06			E31-0431-05	Speaker cord with 2P plug	★
	μPC1158H2	V11-1177-26	★		F05-2034-05	Fuse (20A)	S
	μPC14305H	V30-1029-36	★		F05-4022-05	Fuse (4A)	V

Ref.No.	Parts No.	Description	Re-marks
TS-130 S,V GENERAL			
	A01-0725-02	Case (upper)	V
	A01-0743-02	Case (upper)	S
	A01-0784-02	Case (lower)	S
	A01-0785-02	Case (lower)	V ★
	A20-2392-03	Panel ass'y	S ★
	A20-2393-03	Panel ass'y	V ★

PARTS LIST

Ref.No.	Parts No.	Description	Re- marks	Ref.No.	Parts No.	Description	Re- marks	
	H10-2509-02 H10-2510-02 H10-2520-02 H12-0441-04 H12-0462-04 H20-1405-03 H20-1410-03 H21-0701-04 H25-0112-04 H25-0116-04	Packing fixture (F) Packing fixture (R) Packing fixture (R) Cushion Cushion Protective cover Protective cover Protective sheet Protective bag Protective bag	V S V S V S		X56-1300-00 X56-1350-00	Final unit Final unit	V S	
	J02-0323-05 J02-0407-04 J13-0404-05 J19-1301-04 J21-2504-04 J21-2573-04 J21-2631-04 J31-0141-04 J42-0038-04 J42-0423-04 J61-0019-05 J61-0401-05	Foot Assistant foot Fuse holder Diode holder SP mounting hardware Foot mounting hardware Motor mounting hardware Spacer ring Cap Knob bush Vinyle tie Nylon band	VOX S MIC Case (lower)		C2 CE04W1HR47 E40-0273-05 E40-0373-05 S51-1404-05	E 0.47μF Mini connect wafer Mini connect wafer Relay (G2E)	50V 2P 3P	
	K21-0723-04 K23-0710-04 K23-0711-04 K23-0712-04 K29-0740-04 K29-0741-04	Pointer knob Knob Pointer knob Knob Push knob Knob	BAND MODE VOX		S1~4 E40-0673-05 E40-1073-05 S40-2404-05	Mini connect wafer Mini connect wafer Push switch	6P 10P	
	L40-1511-03 L40-4711-03	Ferri-inductor Ferri-inductor	150μH 470μH		S1~4 E23-0046-04 E40-0373-05 S40-2405-05	Square terminal Mini connect wafer Push switch	3P 11P	
VR1 VR2 R7	R19-3409-05 R19-9405-05 R92-0620-05	Pot. 10kΩ(Α)/10kΩ(Β) RF/AF Pot. 10kΩ(Φ)/5kΩ(Β) RIT/IF Cement resistor 15mΩ			C5 C7 C9 C10 C11 C13 C16,17 C18 C19 C21 C23 C25~28 C29,30 C31 C32 C33,34 C35,36 C40 C42 C47 C49 C54 C56	CQ09S1H102J CC45RH1H330J CC45RH1H181J CC45RH1H151J CC45RH1H181J CC45RH1H030C C91-0456-05 CC45RH1H120J C91-0456-05 CC45SL1H220J C91-0456-05 C91-0456-05 CC45SL1H220J CC45SL1H150J CC45SL1H270J C91-0455-05 C91-0456-05 CE04W1H4R7Q CE04W1C100Q 	S 0.001μF C 33pF C 180pF C 150pF C 180pF 	
	S01-2422-05 S01-2423-05 S36-2402-05 \$44-1407-05	Rotary switch Rotary switch Power switch Paddle switch	MODE BAND			E23-0401-05 E40-0273-05 E40-0373-05 E40-0573-05 E40-0873-05	Round terminal Mini connect wafer Mini connect wafer Mini connect wafer Mini connect wafer	2P 3P 5P 8P
	T03-0027-15 T40-0301-05	Speaker Fan motor						
	X40-1170-00 X41-1300-00 X41-1310-00 X41-1320-00 X44-1380-00	VFO unit Relay unit Switch (A) unit Switch (B) unit RF unit	power side MIC side					
	X48-1300-00 X48-1300-01 X49-1110-01 X50-1500-00 X50-1700-00 X51-1240-00 X51-1250-00 X54-1450-01 X54-1550-00 X54-1560-00	IF unit IF unit AF-GEN unit CAR unit PLL unit Filter unit Filter unit Indicator unit Processor unit Counter unit	S V S V S V S V S V					

PARTS LIST

Ref.No.	Parts No.	Description	Re-marks	Ref.No.	Parts No.	Description	Re-marks
IF UNIT (X48-1380-00,-01) 00 : S, 01 : V							
L1,2	J31-0502-04	PC Board collar		C3,4	CC45SL1H470J	C 47pF	
	J42-0404-05	PC Board bush		C6	CE04W1C100	E 10μF 16V	
L3	L40-1592-02	Ferri-inductor 1.5μH	☆	C23	C91-0456-05	C 0.047μF 25V	
L4	L34-0966-05	Trap coil 8.83M	☆	C26	CC45SL1H050C	C 5pF ±0.25pF	
L5	L34-0558-05	Trap coil		C27	CC45SL1H180J	C 18pF	
L6	L40-1021-03	Ferri-inductor 1mH	☆	C32	CC45SL1H050C	C 5pF ±0.25pF	
L7	L40-4711-03	Ferri-inductor 470μH	☆	C34,36	C91-0456-05	C 0.047μF 25V	
L8	L34-0967-05	BPF coil 3.5A	☆	C38	CC45SL1H100D	C 10pF ±0.5pF	
L9	L34-0967-05	BPF coil 3.5A	☆	C39,42	CC45SL1H470J	C 47pF	
L10	L34-0969-05	BPF coil 7A	☆	C44,51	CE04W1H010	E 1μF 50V	
L11	L34-0970-05	BPF coil 7B	☆	C53	CC45SL1H030C	C 3pF ±0.25pF	
L12	L34-0971-05	BPF coil 7C	☆	C62,63	C90-0817-06	E 1000μF 16V	
L13	L34-0972-05	BPF coil 10A	☆				
L14	L34-0973-05	BPF coil 10B	☆	E23-0046-04		Square terminal	
L15	L34-0974-05	BPF coil 10C	☆	E23-0401-05		Round terminal	
L16	L34-0975-05	BPF coil 14A	☆	E40-0273-05		Mini connect wafer 2P	
L17	L34-0976-05	BPF coil 14B	☆	E40-0373-05		Mini connect wafer 3P	
L18	L34-0977-05	BPF coil 14C	☆	E40-0473-05		Mini connect wafer 4P	
L19	L34-0978-05	BPF coil 18A	☆	E40-0573-05		Mini connect wafer 5P	
L20	L34-0979-05	BPF coil 18B	☆	E40-0673-05		Mini connect wafer 6P	
L21	L34-0980-05	BPF coil 18C	☆	E40-0773-05		Mini connect wafer 7P	
L22	L34-0981-05	BPF coil 21A	☆	E40-0973-05		Mini connect wafer 9P	
L23	L34-0982-05	BPF coil 21B	☆	E40-1173-05		Mini connect wafer 11P	
L24	L34-0983-05	BPF coil 21C	☆				
L25	L34-0984-05	BPF coil 24.5A	☆	J31-0502-04		PC Board collar	
L26	L34-0985-05	BPF coil 24.5B	☆	J42-0404-05		PC Board bush	
L27	L34-0986-05	BPF coil 24.5C	☆				
L28	L34-0707-05	BPF coil 28A		L1~9	L40-1511-03	Ferri-inductor 150μH	S
L29	L34-0987-05	BPF coil 28B	☆	L1~6	L40-1511-03	Ferri-inductor 150μH	V
L30	L34-0738-05	BPF coil 28C		T1	L34-0957-05	Tuning coil	☆
L31	L40-4711-03	Ferri-inductor 470μH		T2	L34-0942-05	Tuning coil	
L32	L40-1021-03	Ferri-inductor 1mH		T3	L34-0538-05	Tuning coil	
L33	L40-1011-03	Ferri-inductor 100μH		T4,5	L34-0535-05	Tuning coil	
L34	L40-1592-02	Ferri-inductor 1.5μH	☆	T6	L34-0536-05	Tuning coil	
L35	L34-0966-05	Trap coil 8.83M	☆	T7	L34-0535-05	Tuning coil	
L36	L40-1511-03	Ferri-inductor 150μH		T8	L34-0536-05	Tuning coil	
L37,38	L40-4711-03	Ferri-inductor 470μH		CF1	L72-0310-05	Ceramic filter 8.83MHz	
L39	L40-4782-02	Ferri-inductor 0.47μH		XF1	L71-0208-05	MCF 8.83MHz	
L40~42	L40-4711-03	Ferri-inductor 470μH		VR1	R12-6405-05	Trim. pot 470kΩ	
L43	L40-1021-03	Ferri-inductor 1mH		VR2	R12-0416-05	Trim. pot 470Ω	☆
L44	L40-1011-03	Ferri-inductor 100μH					
L45	L40-1021-03	Ferri-inductor 1mH		R92-0150-05		Short jumper	
L46,47	L40-1011-03	Ferri-inductor 100μH		S51-4401-05		Relay (LZN-4)	
L48	L33-0032-05	Choke coil 3μH					
T1	L34-0696-35	Input coil	☆				
T2	L19-0303-05	Wide bandwidth trans					
T3	L30-0506-05	IFT					
T4	L34-0697-05	Output coil					
T5	L19-0303-05	Wide bandwidth trans					
T6	L19-0302-05	Wide bandwidth trans					
VR1	R12-0416-05	Trim. pot 470Ω					
VR2	R12-1408-05	Trim. pot 4.7kΩ	☆				
		R92-0150-05					
		Short jumper					
		S29-3406-05	Rotary wafer ass'y				
AF-GEN UNIT (X49-1110-01)							
C1	CC45CH1H100D	C 10pF ±0.5pF					
C3	CQ92M1H333K	ML 0.033μF					
C4	CE04W1HR47	E 0.47μF 50V					
C5	CE04W1A221	E 220μF 10V					
C7,8	CE04W1C100	E 10μF 16V					
C9	CQ92M1H104K	ML 0.1μF					
C10,11	C90-0817-05	E 1000μF 16V					
C12	CQ92M1H104K	ML 0.1μF					
C13	CE04W1C470	E 47μF 16V					

PARTS LIST

Ref.No.	Parts No.	Description			Re-marks	Ref.No.	Parts No.	Description			Re-marks
C14	CQ92M1H104K	ML	0.1μF			T1	L15-0016-05	Choke			
C16	CE04W1C470	E	47μF	16V		T2	L34-0567-05	Tuning coil			
C17	CE04W1H010	E	1μF	50V		R14	RS14GB3D8R2J	Metal film	8.2Ω	2W	
C18	CQ92M1H223K	ML	0.022μF			VR1	R12-3025-05	Trim.pot	10kΩ(B)	RIT	
C19	CE04W1C100	E	10μF	16V		VR2	R12-4016-05	Trim.pot	50kΩ(B)	RF	
C21,22	CE04W1C470	E	47μF	16V		VR3	R12-0042-05	Trim.pot	500Ω(B)	9V	
C23	CQ92M1H104K	ML	0.1μF	16V		VR4	R12-4016-05	Trim.pot	50kΩ(B)	SIDE TONE	
C24	CE04W1C221	E	220μF	16V		VR5	R12-0401-05	Trim.pot	100Ω(B)	BM	
C30~33	CC45CH1H220J	C	22pF			VR6	R12-0405-05	Trim.pot	330Ω(B)	ANT1.V	☆
C37	CC45SL1H151J	C	150pF			VR7	R12-3408-05	Trim.pot	47kΩ(B)	V.GAIN	☆
C38	CC45CH1H100D	C	10pF	±0.5pF		VR8	R12-5402-05	Trim.pot	220kΩ(B)	DELAY	☆
C39	CC45SL1H180J	C	18pF			R92-0150-05	Short jumper				
C41,42	CC45SL1H101J	C	100pF			CAR UNIT (X50-1500-00)					
C43	CE04W1H010	E	1μF	50V		C2	CC45UJ1H220J	C	22pF		
C44	CE04W1A221	E	220μF	10V		C3	CC45UJ1H270J	C	27pF		
C45	CE04W1E4R7	E	4.7μF	25V		C4	CC45UJ1H220J	C	22pF		
C46	CE04W1H010	E	1μF	50V		C9	CS15E1VR22M	T	0.22μF	35V	
C47	CQ92M1H473K	ML	0.047μF			C13	CC45SL1H101J	C	100pF		
C48,49	CE04W1E4R7	E	4.7μF	25V		C14	CC45CH1H020C	C	2pF	±0.25pF	
C50	CE04W1H010	E	1μF	50V		C15	CC45CH1H330J	C	33pF		
C51	CE04W1H3R3	E	3.3μF	50V		C16	C91-0456-05	C	0.047μF	25V	
C52	CE04W1H010	E	1μF	50V		TC1,2	C05-0056-05	Ceramic trimmer			
C55	CC45UJ1H220J	C	22pF								
C56	CC45SL1H101J	C	100pF								
C59	CC45CH1H050C	C	5pF	±0.25pF							
C64,66	CC45SL1H470J	C	47pF								
C67	CE04W1C100	E	10μF	16V							
C68	CE04W1H010	E	1μF	50V							
C69,70	CQ92M1H123K	ML	0.012μF								
C71	CQ92M1H104K	ML	0.1μF								
C72,73	CQ92M1H123K	ML	0.012μF								
C74	CE04W1H010	E	1μF	50V							
C75	CE04W1A101	E	100μF	10V							
C76,77	CE04W1A470	E	47μF	10V							
C78	CQ92M1H223K	ML	0.022μF								
C79	CE04W1H3R3	E	3.3μF	50V							
C80	CE04W1H010	E	1μF	50V							
C81	CQ92M1H473K	ML	0.047μF								
C83	CQ92M1H472K	ML	0.0047μF								
C84	CQ92M1H473K	ML	0.047μF								
C85	CE04W1E4R7	E	4.7μF	25V							
C86	CE04W1E3R3	E	3.3μF	25V							
C90	CE04W1C220	E	22μF	16V							
C91	CQ92M1H153K	ML	0.015μF								
C92	CC45SL1H050C	C	5pF	±0.25pF							
TC1~6	C05-0030-15	Ceramic trimmer		20pF							
	E18-0401-05	Crystal socket		4P							
	E40-0273-05	Mini connect wafer		2P							
	E40-0773-05	Mini connect wafer		7P		☆					
	E40-0911-05	Mini connect wafer		9P		☆					
	E40-1073-05	Mini connect wafer		10P		☆					
	E40-1273-05	Mini connect wafer		12P		☆					
	E40-1373-05	Mini connect wafer		13P		☆					
	F20-0078-05	Insulating board									
	F29-0014-05	Shoulder washer									
L1	L40-1021-03	Ferri-inductor		1mH			C1	CC45TH1H270J	C	27pF	
L2,3	L40-1511-03	Ferri-inductor		150μH			C2	CC45TH1H100D	C	10pF	±0.5pF
L4	L40-4711-03	Ferri-inductor		470μH			C3	CC45TH1H220J	C	22pF	
L5	L40-3392-02	Ferri-inductor		3.3μH			C5	CC45RH1H390J	C	39pF	
L6,7	L40-1511-03	Ferri-inductor		150μH			C6	CC45SH1H560J	C	56pF	
L8	L40-1021-03	Ferri-inductor		1mH			C7	CE04W1A470Q	E	47μF	10V
							C8	CC45TH1H270J	C	27pF	
PLL UNIT (X50-1700-00)											

PARTS LIST

Ref.No.	Parts No.	Description			Re-marks	Ref.No.	Parts No.	Description			Re-marks
C9	CC45TH1H150J	C	15pF			C126	CE04W1A470Q	E	47μF	10V	
C10	CC45TH1H180J	C	18pF			C127	CC45SL1H390J	C	39pF		
C12	CE04W1A470Q	E	47μF	10V		C128	CC45SL1H070D	C	7pF	±0.5pF	
C14	CC45UJ1H680J	C	68pF			C129	CC45CH1H0R5C	C	0.5pF	±0.25pF	
C15	CC45UJ1H100D	C	10pF	±0.5pF		C130	CE04W1C470M	E	47μF	16V	
C16	CC45TH1H150J	C	15pF					E23-0046-04	Square terminal		
C18	CC45TH1H220J	C	22pF					E40-0273-05	Mini connect wafer 2P		
C19	CE04W1A470Q	E	47μF	10V				E40-0573-05	Mini connect wafer 5P		
C20	CC45UJ1H680J	C	68pF					E40-0673-05	Mini connect wafer 6P		
C21	CC45UJ1H330J	C	33pF					E40-0873-05	Mini connect wafer 8P		
C23	CC45TH1H150J	C	15pF					J31-0502-04	PC Board collar		
C24	CC45TH1H080D	C	8pF	±0.5pF				J42-0404-05	PC Board bush		
C25	CC45TH1H120J	C	12pF								
C26	CE04W1A470Q	E	47μF	10V		L1~5	L40-1511-03	Ferri-inductor	150μH		
C28	CC45TH1H330J	C	33pF			L6	L40-4701-03	Ferri-inductor	47μH		
C29	CC45TH1H150J	C	15pF			L7	L40-1511-03	Ferri-inductor	150μH		
C30	CC45TH1H270J	C	27pF			L8	L40-1592-02	Ferri-inductor	1.5μH		
C31	CC45TH1H330J	C	33pF			L9,10	L40-1092-02	Ferri-inductor	1.0μH		
C32	CC45UJ1H220J	C	22pF			L11	L40-1292-02	Ferri-inductor	1.2μH		
C34	CE04W1A470Q	E	47μF	10V		L12~17	L40-1511-03	Ferri-inductor	150μH		
C36	CC45UJ1H220J	C	22pF			L18	L40-1011-03	Ferri-inductor	100μH		
C37	CC45UJ1H050C	C	5pF	±0.25pF		L19	L40-1511-03	Ferri-inductor	150μH		
C38	CC45CH1H100D	C	10pF	±0.5pF		L20~22	L40-2701-03	Ferri-inductor	27μH		
C39	CC45CH1H020C	C	2pF	±0.25pF		L23	L40-4711-03	Ferri-inductor	470μH		
C41,43	C91-0456-05	C	0.047μF	25V		L24,25	L40-1511-03	Ferri-inductor	150μH		
C44	CC45SL1H151J	C	150pF			L26	L40-1001-03	Ferri-inductor	10μH		
C45	CC45SL1H271J	C	270pF			L27	L40-4711-03	Ferri-inductor	470μH		
C46	CC45SL1H121J	C	120pF			L28	L40-2701-03	Ferri-inductor	27μH		
C48	CC45CH1H100D	C	10pF	±0.5pF		L29	L40-1511-03	Ferri-inductor	150μH		
C49	CC45SL1H470J	C	47pF					T1	L32-0193-05	OSC coil	
C52	CC45RH1H390J	C	39pF					T2	L32-0195-05	OSC coil	
C53	CC45RH1H560J	C	56pF					T3	L32-0196-05	OSC coil	
C65	CC45RH1H470J	C	47pF					T4	L32-0197-05	OSC coil	
C66	CC45RH1H220J	C	22pF					T5	L32-0198-05	OSC coil	
C67	CC45RH1H470J	C	47pF					T6	L34-0529-05	Trap coil	8.83M
C70	CC45RH1H100D	C	10pF	±0.5pF				T7	L34-0709-05	Tuning coil	10M
C71	CC45SL1H050D	C	5pF	±0.5pF				T8	L34-0710-05	Tuning coil	20M
C75	CC45RH1H330J	C	33pF					T9	L34-0712-05	Tuning coil	
C76	CC45RH1H150J	C	15pF					T10	L34-0713-05	Tuning coil	
C77	CC45RH1H330J	C	33pF					T11	L34-0711-05	Tuning coil	
C80	CC45RH1H150J	C	15pF					T12	L34-0716-05	Tuning coil	
C81	CC45RH1H040C	C	4pF	±0.25pF				T13	L34-0715-05	Tuning coil	
C82	CC45RH1H150J	C	15pF					T14	L34-0714-05	Tuning coil	
C85	CC45RH1H100D	C	10pF	±0.5pF				T15	L34-0757-05	Tuning coil	
C86	CC45SL1H050D	C	5pF	±0.5pF				T16	L34-0718-05	Tuning coil	
C88	CC45CH1H010C	C	1pF	±0.25pF				T17	L34-0717-05	Tuning coil	
C89	CC45CH1H050C	C	5pF	±0.25pF							
C100,101	CC45SL1H221J	C	220pF								
C102	CQ92M1H122K	ML	0.0012μF								
C103	CC45SL1H330J	C	33pF								
C104,105	CC45SL1H680J	C	68pF								
C106	CC45SL1H330J	C	33pF								
C108,109	C91-0456-05	C	0.047μF	25V							
C110	CC45SL1H390J	C	39pF								
C111	CC45SL1H271J	C	270pF								
C112	C91-0456-05	C	0.047μF	25V							
C113	CE04W1A101Q	E	100μF	10V							
C114	C91-0456-05	C	0.047μF	25V							
C115	CE04W1A470Q	E	47μF	10V							
C120	C91-0456-05	C	0.047μF	25V							
C121	CQ92M1H102K	ML	0.001μF								
C122	CQ92M1H104K	ML	0.1μF								
C123	C91-0456-05	C	0.047μF	25V							
C124	CE04W1A101Q	E	100μF	10V							
		VR1	R12-5014-05	Trim. pot	100kΩ						
			R92-0150-05	Short jumper							

PARTS LIST

Ref.No.	Parts No.	Description			Re-marks
FILTER UNIT (X51-1240-00) S TYPE					
C2	CC45SL2H221J	C	220pF	500V	
C3	C91-0456-05	C	0.047μF	25V	
C4	CC45CH1H680J	C	68pF		
C5	CC45CH2H030C	C	3pF ±0.25pF	500V	
C7	C91-0456-05	C	0.047μF	25V	
C8	CE04W1H010	E	1μF	50V	
C10	CE04W1HR47	E	0.47μF	50V	
C11	C91-0456-05	C	0.047μF	25V	
C13	CE04W1C100	E	10μF	16V	
C18	CE04W1C221	E	220μF	16V	
C19	C91-0456-05	C	0.047μF	25V	
C23	CM93D2H561J	MC	560pF	500V	
C24,25	CM93D2H122J	MC	0.0012μF	500V	
C26	CM93D2H821J	MC	820pF	500V	
C27	CC45CH2H151J	C	150pF	500V	
C28	CC45SL2H181J	C	180pF	500V	
C29	CM93D2H621J	MC	620pF	500V	
C30	CC45CH2H151J	C	150pF	500V	
C31	CC45SL2H181J	C	180pF	500V	
C32,33	CC45CH2H121J	C	120pF	500V	
C34	CM93D2H471J	MC	470pF	500V	
C35	CC45CH2H680J	C	68pF	500V	
C36	CC45CH2H151J	C	150pF	500V	
C37	CC45SL2H221J	C	220pF	500V	
C38	CC45CH2H121J	C	120pF	500V	
C39	CC45CH2H101J	C	100pF	500V	
C40	CC45CH2H151J	C	150pF	500V	
C41	CC45SL2H181J	C	180pF	500V	
C42	CC45CH2H680J	C	68pF	500V	
C43	CC45CH2H820J	C	82pF	500V	
C44	CC45CH2H560J	C	56pF	500V	
C45	CC45CH2H680J	C	68pF	500V	
C46	CC45CH2H101J	C	100pF	500V	
C47	CC45CH2H121J	C	120pF	500V	
C48	CC45CH2H560J	C	56pF	500V	
C49	CC45CH2H680J	C	68pF	500V	
C50	CC45CH2H470J	C	47pF	500V	
C51	CC45CH2H390J	C	39pF	500V	
C52,53	CC45CH2H820J	C	82pF	500V	
C54,55	CC45CH2H680J	C	68pF	500V	
C56	CC45CH2H820J	C	82pF	500V	
C57,58	CC45CH2H151J	C	150pF	500V	
C59,60	CC45CH2H101J	C	100pF	500V	
TC1	C05-0043-05	Ceramic trimmer	20pF		
	E04-0154-05	Coax. connector			
	E23-0046-04	Square terminal			
	E40-0273-05	Mini connect wafer 2P			
	E40-0373-05	Mini connect wafer 3P			
	E40-0973-05	Mini connect wafer 9P			
	E40-1273-05	Mini connect wafer 12P			
	F20-0078-05	Insulating board			
	F29-0014-05	Shoulder washer			
	J31-0502-04	PC Board collar			
	J42-0404-05	PC Board bush			
L1~3	L34-0826-05	Filter coil (A)			
L4,5	L34-0827-05	Filter coil (B)			
L6,7	L34-0828-05	Filter coil (C)			

Ref.No.	Parts No.	Description			Re-marks
L8,9	L34-3001-15	Filter coil (D)			
L10,11	L34-0830-05	Filter coil (E)			
L12	L40-1021-03	Ferri-inductor	1mH		
L13	L34-0989-05	Filter coil (G)			☆
L14,15	L40-1021-03	Ferri-inductor	1mH		
L16,17	L40-1511-03	Ferri-inductor	150μH		
L18	L39-0406-05	Detector coil			
L19	L40-1511-03	Ferri-inductor	150μH		
L20,21	L34-0988-05	Filter coil (F)			☆
L22	L34-0989-05	Filter coil (G)			☆
R23	RC05GF2H151J	Solid	150Ω	1/2W	
VR1	R12-4016-05	Trim. pot	50kΩ(B)		
VR2	R12-3025-05	Trim. pot	10kΩ(B)		
VR3	R12-4016-05	Trim. pot	50kΩ(B)		
VR4	R12-0042-05	Trim. pot	500Ω(B)		
VR5	R12-1020-05	Trim. pot	1kΩ(B)		
	R92-0150-05	Short jumper			
RL1	S51-4402-05	Relay (LZN403)			

FILTER UNIT (X51-1250-00) V TYPE					
C1	CC45SL2H102JTD	C	0.001μF	500V	
C2	CC45SL2H821JTD	C	820pF	500V	
C3	CC45SL2H331J	C	330pF	500V	
C4	CC45SL2H561JTD	C	560pF	500V	
C5	CC45SL2H331J	C	330pF	500V	
C6	CC45SL2H561JTD	C	560pF	500V	
C7	CC45SL2H331J	C	330pF	500V	
C8	CC45CH2H131J	C	130pF	500V	
C9	CC45SL2H331J	C	330pF	500V	
C10	CC45SL2H161J	C	160pF	500V	
C11	CC45SL2H151J	C	150pF	500V	
C12	CC45SL2H241J	C	240pF	500V	
C13	CC45CH2H121J	C	120pF	500V	
C14	CC45CH2H820J	C	82pF	500V	
C15	CC45SL2H161J	C	160pF	500V	
C16	CC45CH2H820J	C	82pF	500V	
C17	CC45CH2H750J	C	75pF	500V	
C19	CC45CH1H100D	C	10pF	±0.5pF	
C20	CC45CH1H101J	C	100pF	500V	
C21	CC45SL2H221J	C	220pF	500V	
C22	C91-0456-05	C	0.047μF	25V	
C23	CC45SL2H151J	C	150pF	500V	
C26	C91-0456-05	C	0.047μF	25V	
C27	CE04W1HR47	E	0.47μF	50V	
C29	CE04W1H010	E	1μF	50V	
C30	CC45CH2H150J	C	15pF	500V	
C33	CE04W1C470Q	E	47μF	16V	
C34	CE04W1C221Q	E	220μF	16V	
C35	C91-0456-05	C	0.047μF	25V	
TC1	C05-0043-05	Ceramic trimmer	20pF		
	E04-0154-05	Coax. connector			
	E23-0046-04	Square terminal			
	E40-0273-05	Mini connect wafer 2P			
	E40-0373-05	Mini connect wafer 3P			
	E40-0973-05	Mini connect wafer 9P			
	E40-1273-05	Mini connect wafer 12P			
	F20-0078-05	Insulating board			
	F29-0014-05	Shoulder washer			
	J31-0502-04	PC Board collar			
	J42-0404-05	PC Board bush			
L1~3	L34-0826-05	Filter coil (A)			
L4,5	L34-0827-05	Filter coil (B)			
L6,7	L34-0828-05	Filter coil (C)			

PARTS LIST

Ref.No.	Parts No.	Description		Re- marks
	E40-0673-05	Mini connect wafer	6P	
	E40-1073-05	Mini connect wafer	10P	
	J31-0502-04	PC Board collar		
	J42-0404-05	PC Board bush		
	J61-0019-05	Vinyle tie		
L1,2	L34-0826-05	Filter coil		
L3,4	L34-0827-05	Filter coil		
L5	L34-0828-05	Filter coil		
L6	L34-0724-05	Filter coil		
L7,8	L34-0829-05	Filter coil		
L9,10	L34-0830-05	Filter coil		
L11	L39-0404-05	Detector coil		
L12,13	L40-1511-03	Ferri-inductor	150μH	
L14,15	L40-1021-03	Ferri-inductor	1mH	
L16,17	L40-1511-03	Ferri-inductor	150μH	
R4	RC05GF2H103K	Solid	10kΩ 1/2W	
VR1	R12-3025-05	Trim. pot	10kΩ(B)	
VR2,3	R12-4016-05	Trim. pot	50kΩ(B)	
VR4	R12-1020-05	Trim. pot	1kΩ(B)	
	R92-0150-05	Short jumper		★
	S01-2424-05	Rotary switch		
	S51-4402-05	Relay (LZN403)		

PROCESSOR UNIT (X54-1550-00)

C1~4	CE04W1H010Q	E	1μF	50V	
C5	CE04W1H3R3Q	E	3.3μF	50V	
C6,7	CE04W1H010Q	E	1μF	50V	
C8	CE04W1H4R7Q	E	4.7μF	50V	
C9	CE04W1C100Q	E	10μF	16V	
C10	CE04W1H4R7Q	E	4.7μF	50V	
C11	CE04W1C470Q	E	47μF	16V	
	E23-0047-04	Square terminal			
	E40-0273-05	Mini connect wafer	2P		
	E40-0473-05	Mini connect wafer	4P		
	E40-0873-05	Mini connect wafer	8P		
VR1,S1	R19-3408-05	Pot. with SW	10kΩ(A),10kΩ(B)		★
VR2	R12-5406-05	Pot.	100kΩ		★
	R92-0150-05	Short jumper			

COUNTER UNIT (X54-1560-00)

C1	CC45CH1H330J	C	33pF		
C2	CC45SL1H391J	C	390pF		
C3	CC45CH1H470J	C	47pF		
C4	C91-0456-05	C	0.047μF	25V	
C5	CC45SL1H150J	C	15pF		
C6	CC45SL1H020C	C	2pF	±0.25pF	
C7	CC45SL1H100D	C	10pF	±0.5pF	
C9,10	C91-0456-05	C	0.047μF	25V	

Ref.No.	Parts No.	Description			Re- marks
C11	CE04W1A101Q	E	100μF	10V	
C12	C91-0456-05	C	0.047μF	25V	
C13	CC45SL1H470J	C	47pF		
C14	CC45CH1H390J	C	39pF		
C15	CC45CH1H101J	C	100pF		
C16	CC45CH1H270J	C	27pF		
C17	C91-0456-05	C	0.047μF	25V	
C18	CC45SL1H221J	C	220pF		
C19	CC45SL1H220J	C	22pF		
C20	CC45SL1H050C	C	5pF	±0.25pF	
C21,22	C91-0456-05	C	0.047μF	25V	
C23	CE04W1A101Q	E	100μF	10V	
C24	CC45SL1H101J	C	100pF		
C25	CC45SL1H270J	C	27pF		
C26	CC45SL1H560J	C	56pF		
C27	CC45SL1H270J	C	27pF		
C28~30	CC45SL1H470J	C	47pF		
C31,33	C91-0456-05	C	0.047μF	25V	
C34	CC45SL1H101J	C	100pF		
C35	CC45SL1H221J	C	220pF		
C36	CC45SL1H101J	C	100pF		
C38,39	C91-0456-05	C	0.047μF	25V	
C40	CC45SL1H150J	C	15pF		
C41,42	C91-0456-05	C	0.047μF	25V	
C43	CQ92M1H103K	ML	0.01μF		
C44,45	C91-0456-05	C	0.047μF	25V	
C46	CE04W1A101Q	E	100μF	10V	
C47	CE04W0J221Q	E	220μF	6.3V	
C48	CE04W1V100Q	E	10μF	35V	
C49	CQ92M1H103K	ML	0.01μF		
C50,51	CE04W1V100Q	E	10μF	35V	
C52	C91-0456-05	C	0.047μF	25V	
C53	CE04W1V100Q	E	10μF	35V	
C55,57,62	C91-0456-05	C	0.047μF	25V	

TC1	C05-0035-05	Ceramic trimmer	50pF	
	E31-0466-05	Tape cable		
	E40-0273-05	Mini connect wafer	2P	
	E40-0373-05	Mini connect wafer	3P	
	E40-1273-05	Mini connect wafer	12P	
	E40-1373-05	Mini connect wafer	13P	
	J31-0502-04	PC Board collar		
	J42-0404-05	PC Board bush		
L1~4	L40-4711-03	Ferri-inductor	470μH	
L5,6	L40-4701-03	Ferri-inductor	47μH	
L7,8	L40-4711-03	Ferri-inductor	470μH	
L9,10	L40-2211-03	Ferri-inductor	220μH	
L11,12	L40-1511-03	Ferri-inductor	150μH	
L13	L40-1011-04	Ferri-inductor	100μH	
T1	L19-0305-05	OSC trans		
X1	L77-0482-05	Crystal	10MHz	
R68	RC05GF2H151K	Solid	150Ω 1/2W	
RB1	R90-0522-05	Resistor block	47kΩ X6	
RB2,3	R90-0521-05	Resistor block	47kΩ X7	
RB4	R90-0522-05	Resistor block	47kΩ X6	
	R92-0150-05	Short jumper		

PARTS LIST

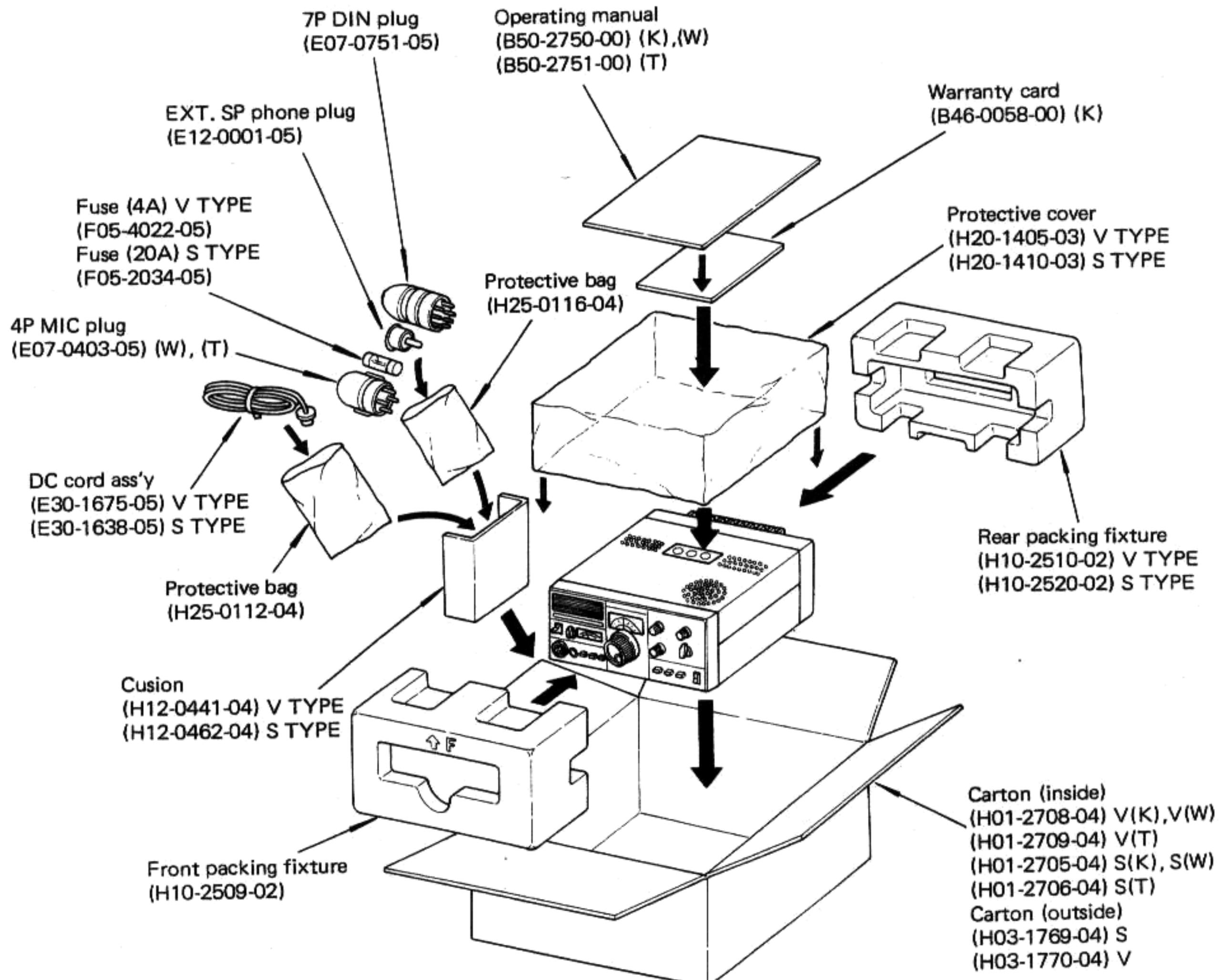
Ref.No.	Parts No.	Description			Re-marks	Ref.No.	Parts No.	Description			Re-marks	
FINAL UNIT (X-56-1300-00) V TYPE												
C1,3	C91-0456-05	C	0.047μF	25V			E23-0043-04	Antenna earth lug				
C5,6,10	C91-0456-05	C	0.047μF	25V			E23-0046-04	Square terminal				
C12~14	C91-0456-05	C	0.047μF	25V			E23-0401-05	Round terminal				
C16,18	C91-0456-05	C	0.047μF	25V			E23-0420-05	Earth lug				
C19	CE04W1C101	E	100μF	16V			E40-0273-05	Mini connect wafer 2P				
C20	CE04W1C100	E	10μF	16V			E40-0373-05	Mini connect wafer 3P				
C21	CC45SL2H151J	C	150pF	500V			F01-0735-05	Heat sink				
C22	CC45SL1H471J	C	470pF				F20-0078-05	Insulating board				
C23	CC45SL2H680J	C	68pF	500V			F29-0014-05	Shoulder washer				
C24	C91-0456-05	C	0.047μF	25V			J31-0503-05	Bees				
		E23-0401-05	Round terminal				J32-0730-04	Hex. boss			☆	
		F01-0717-13	Heat sink A			☆	L1	L40-1001-04	Ferri-inductor 10μH			
		F20-0078-05	Insulating board				L3,4	L33-0032-05	RFC			
		F29-0014-05	Shoulder washer				L7	L33-0617-05	RFC			
L1	L40-4701-03	Ferri-inductor	47μH				L8	L33-0025-05	RFC			
L3,6	L33-0032-05	RFC	3μH				L9	L33-0625-15	RFC			
L7	L33-0617-05	RFC					L10~12	L40-1011-04	Ferri-inductor 100μH			
T1	L19-0315-15	Wide bandwidth trans					L13,14	L40-1021-03	Ferri-inductor 1mH			
T2	L19-0306-15	Output trans				☆	T1	L19-0315-25	Wide bandwidth trans			
R6,7	RC05GF2H560J	Solid	56Ω	1/2W			T2	L19-0311-05	Input trans			☆
R11	RC05GF2H4R7J	Solid	4.7Ω	1/2W			T3	L19-0313-15	NF trans			☆
R17,18	RC05GF2H560J	Solid	56Ω	1/2W			T4	L19-0312-05	Output trans			☆
VR1	R12-0412-05	Trim. pot	200Ω(B)				N19-0611-04	Washer				
	R92-0150-05	Short jumper					R3	RC05GF2H4R7J	Solid	4.7Ω	1/2W	
							R12,13	RC05GF2H101J	Solid	100Ω	1/2W	
							R14~17	RS14A83A3R9J	Metal film	3.9Ω	1W	
							R18,19	RC05GF2H150J	Solid	15Ω	1/2W	
							R20~23	RC05GF2H5R6J	Solid	5.6Ω	1/2W	
							VR1,2	R12-0058-05	Trim. pot	470Ω(B)		
							R92-0150-05	Short jumper				
C1	C91-0456-05	C	0.01μF	25V			TM1	S59-1404-05	Thermostat	Heat sink		
C3,4	C91-0456-05	C	0.047μF	25V			TM2	S59-1403-05	Thermostat	core		
C6	C91-0456-05	C	0.01μF	25V			VFO ASS'Y UNIT (X60-1160-00)					
C11	C91-0456-05	C	0.047μF	25V			B01-0821-04	Dial escutcheon				
C12	CE04W1E100	E	10μF	25V			B08-4301-04	Dial back board				☆
C13,14	C91-0456-05	C	0.047μF	25V			B10-0634-04	Front glass (A)				☆
C15	CM93AD2H151J	MC	150pF	500V			B20-0811-04	Dial scale (B) 25K				
C18,19	C91-0456-05	C	0.047μF	25V			B20-0817-04	Dial scale (A) 500K				☆
C20	CE04W1E101	E	100μF	25V			B42-1645-04	Seal Bottom				
C21,24	C91-0456-05	C	0.047μF	25V			B42-1671-04	Seal Top				
C25	CE04W1E100	E	10μF	25V			G01-0804-04	Coil spring				
C33,34	C91-0448-05	Laminated cap.	0.68μF				J19-1317-04	Diode holder				
C35	C91-0456-05	C	0.047μF	25V			K21-0722-04	Main knob				
C37	CE04W1H101Q	E	100μF	50V			N19-0613-04	washer B				
C38	C91-0456-05	C	0.047μF	25V			X40-1170-00	VFO unit				
C39	CM93AD2H271J	MC	270pF	500V			X54-1450-01	INDICATOR unit				☆
C40	CM93AD2H331J	MC	330pF	500V								
C41~43	C91-0455-05	C	0.01μF	25V								
C44	CM93AD2H271J	MC	270pF	500V								
C47	CM93AD2H331J	MC	330pF	500V								
C50	CC45SL1H220J	C	22pF									
C51,52	C91-0455-05	C	0.01μF	25V								
C53	CC45SL1H471J	C	470pF									
	E04-0152-05	UHF type receptacle										
	E08-0271-05	DC socket	FAN									

PARTS LIST/PACKING

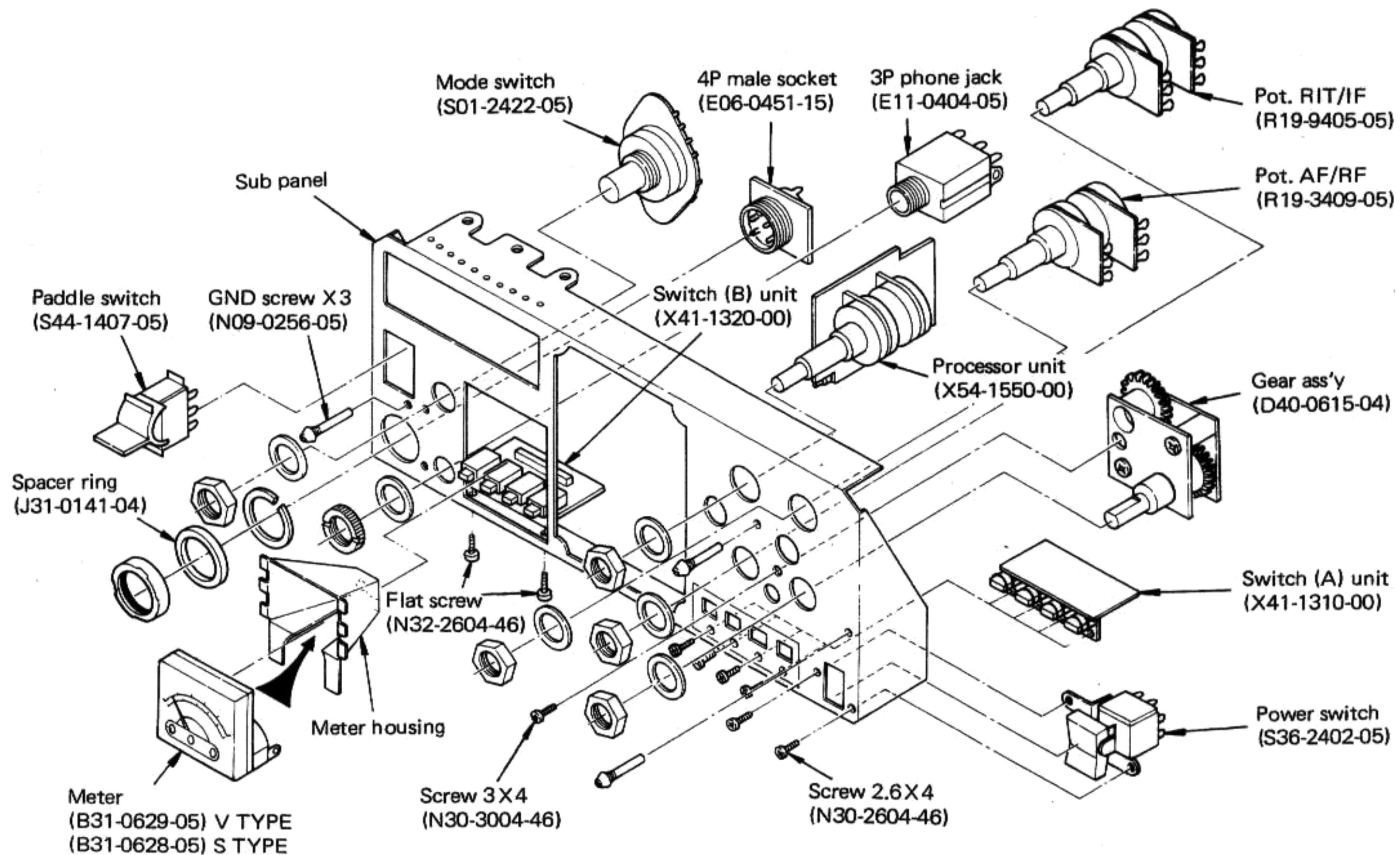
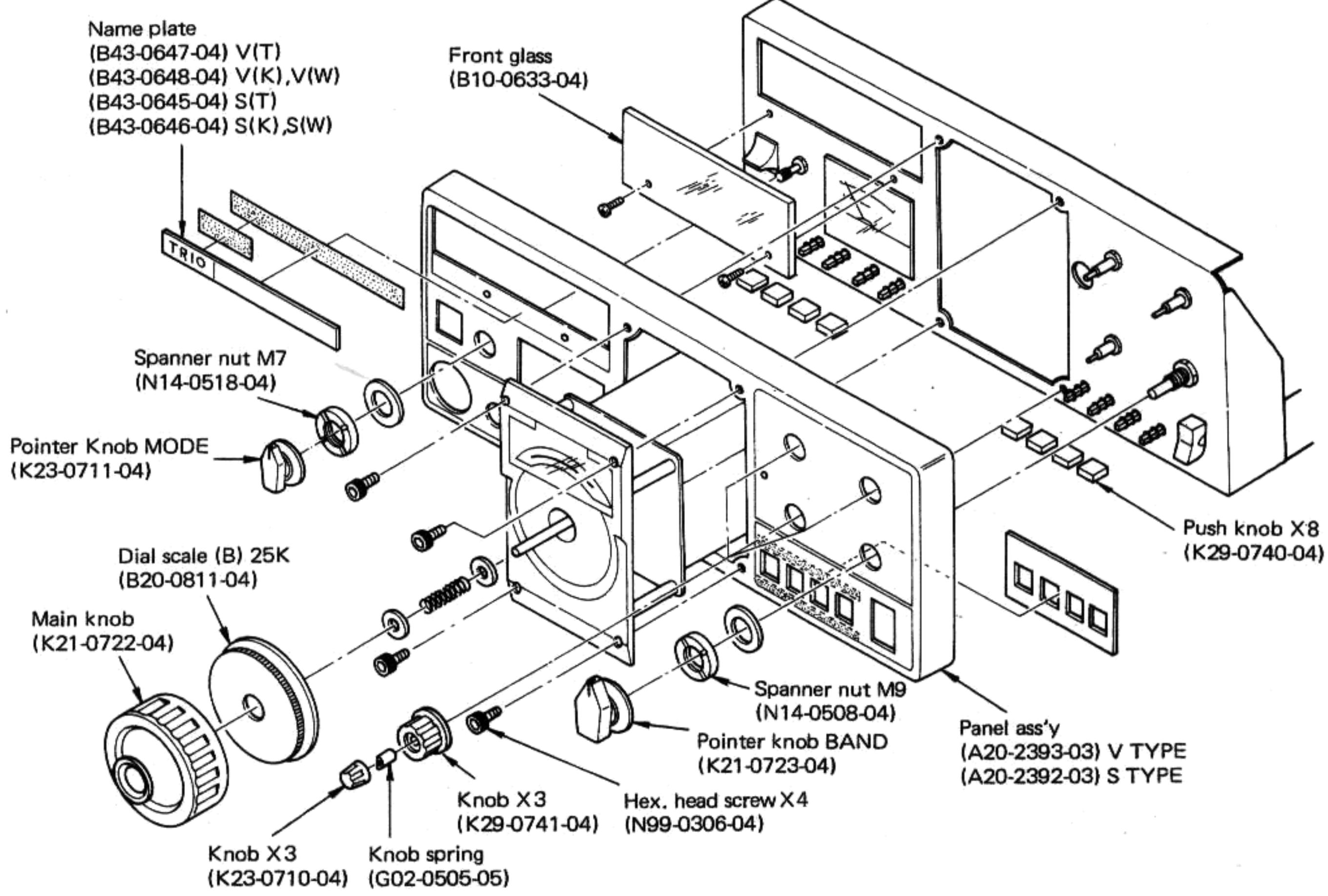
Ref.No.	Parts No.	Description	Re-marks
VFO UNIT (X40-1170-00)			
C2	C91-0456-05	C 0.047μF 25V	
C4	CC45RG1H030C	C 3pF ±0.25pF	
C5	CC45PG1H020C	C 2pF ±0.25pF	
C6	C91-0456-05	C 0.047μF 25V	
C7	CC45LG1H151J	C 150pF	
C9	CC45LG1H121J	C 120pF	
C12	CC45LG1H680J	C 68pF	
C13	CC45LG1H220J	C 22pF	
C14	CC45CG1H100D	C 10pF ±0.5pF	
C15	CC45LG1H151J	C 150pF	
C16	CC45LG1H151J	C 150pF	
C17	CC45CH1H020C	C 2pF ±0.25pF	
C18	C91-0456-05	C 0.047μF 25V	
C21	CC45SL1H390J	C 39pF	
C22	CC45CH1H100D	C 10pF ±0.5pF	
C23	CC45SL1H390J	C 39pF	
C24	C91-0456-05	C 0.047μF 25V	

Ref. No.	Parts No.	Description	Re-marks
TC1	C05-0009-15	Ceramic trimmer 6pF	
TC2	C05-0013-15	Ceramic trimmer 20pF	
	C02-0019-05	Variable cap.	★
	D40-0614-05	Dial mechanism ass'y	★
	E40-0574-05	Mini connect wafer 5P	
L1	L32-0628-05	OSC coil	★
L2	L33-0025-05	Choke coil 1μH	★
L3	L32-0629-05	OSC coil (C)	★
L4	L32-0609-05	OSC coil (B)	
L5	L40-1021-03	Ferri-inductor 1mH	
L6	L40-4711-03	Ferri-inductor 470μH	
L7	L40-1021-03	Ferri-inductor 1mH	
L8	L40-1501-03	Ferri-inductor 15μH	
L9~11	L40-4711-03	Ferri-inductor 470μH	
	R92-0150-05	Short jumper	

PACKING

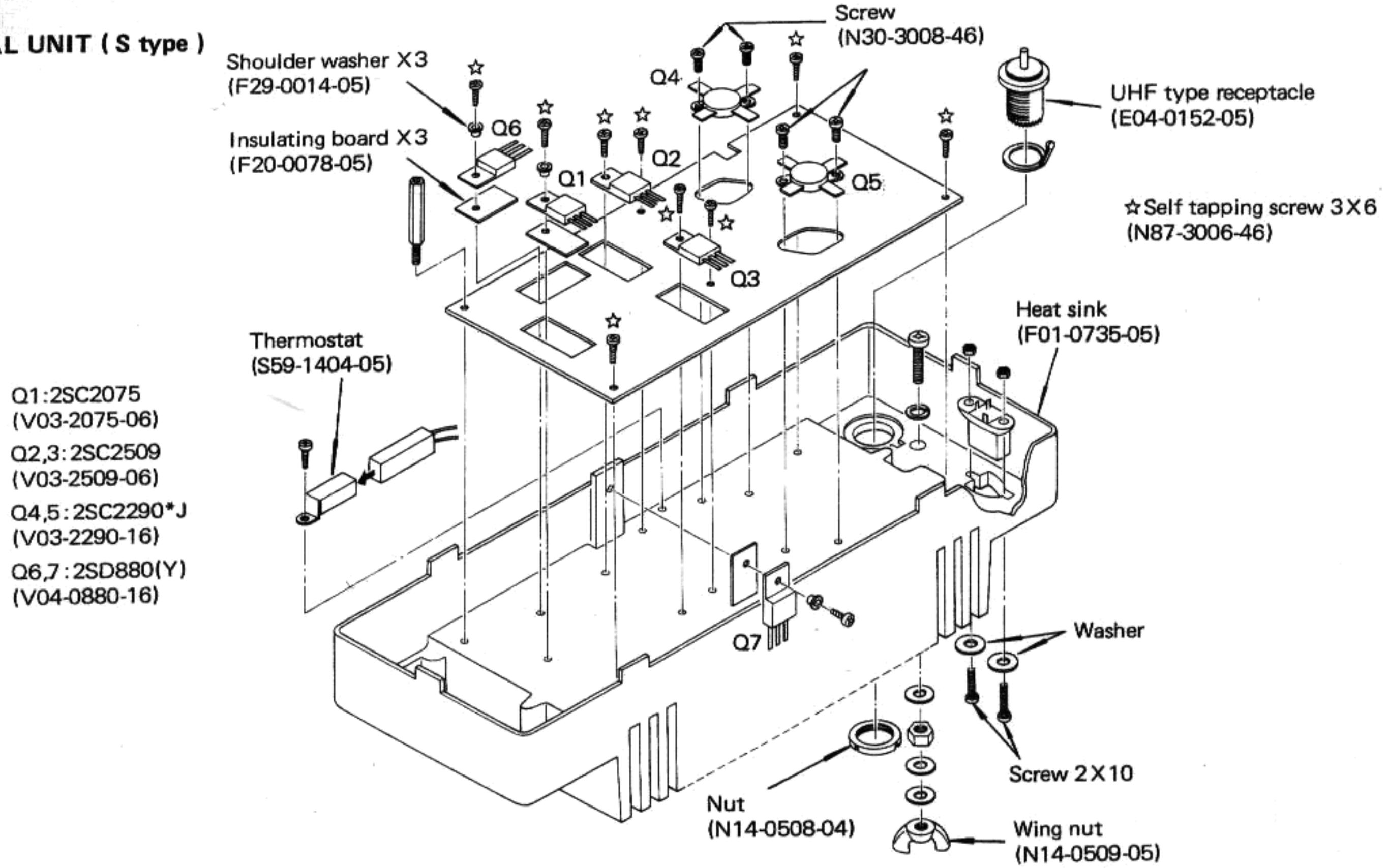


DISASSEMBLY

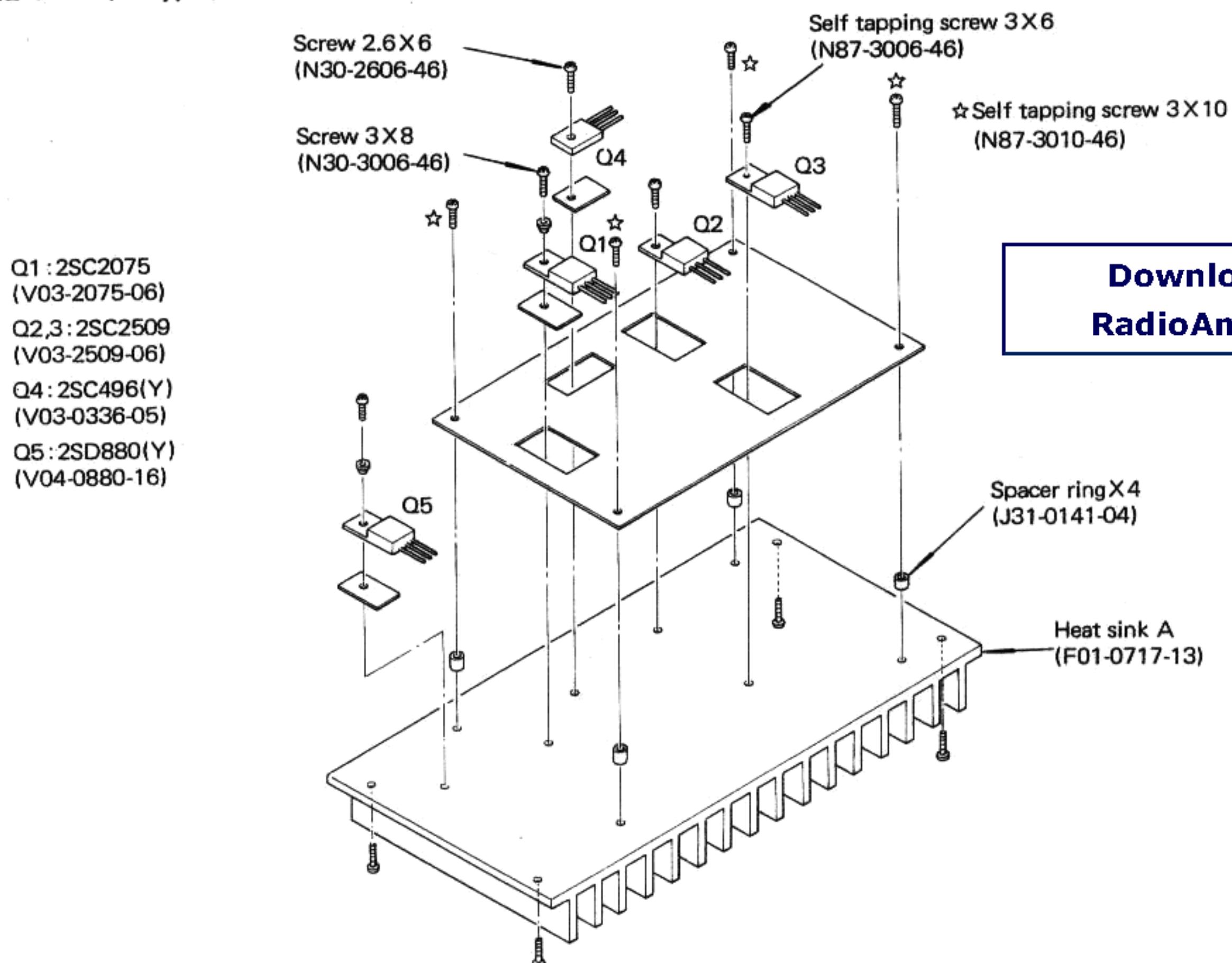


DISASSEMBLY

FINAL UNIT (S type)

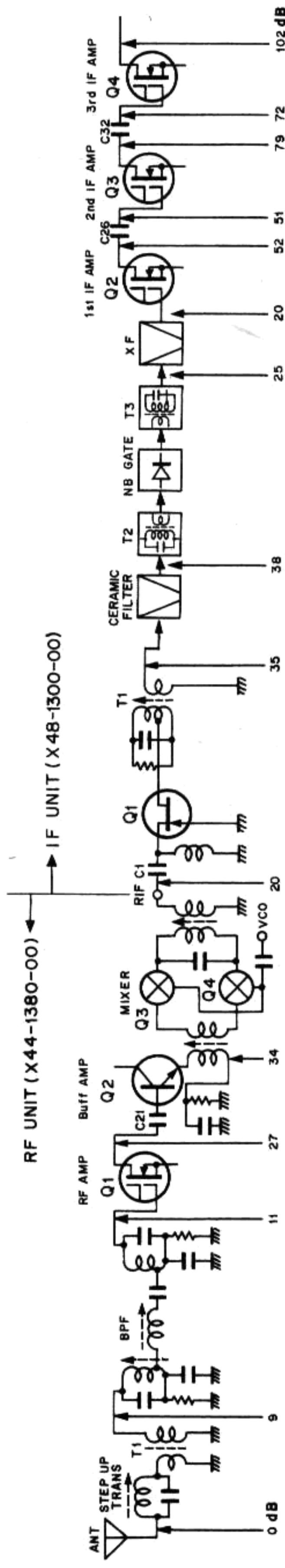


FINAL UNIT (V type)

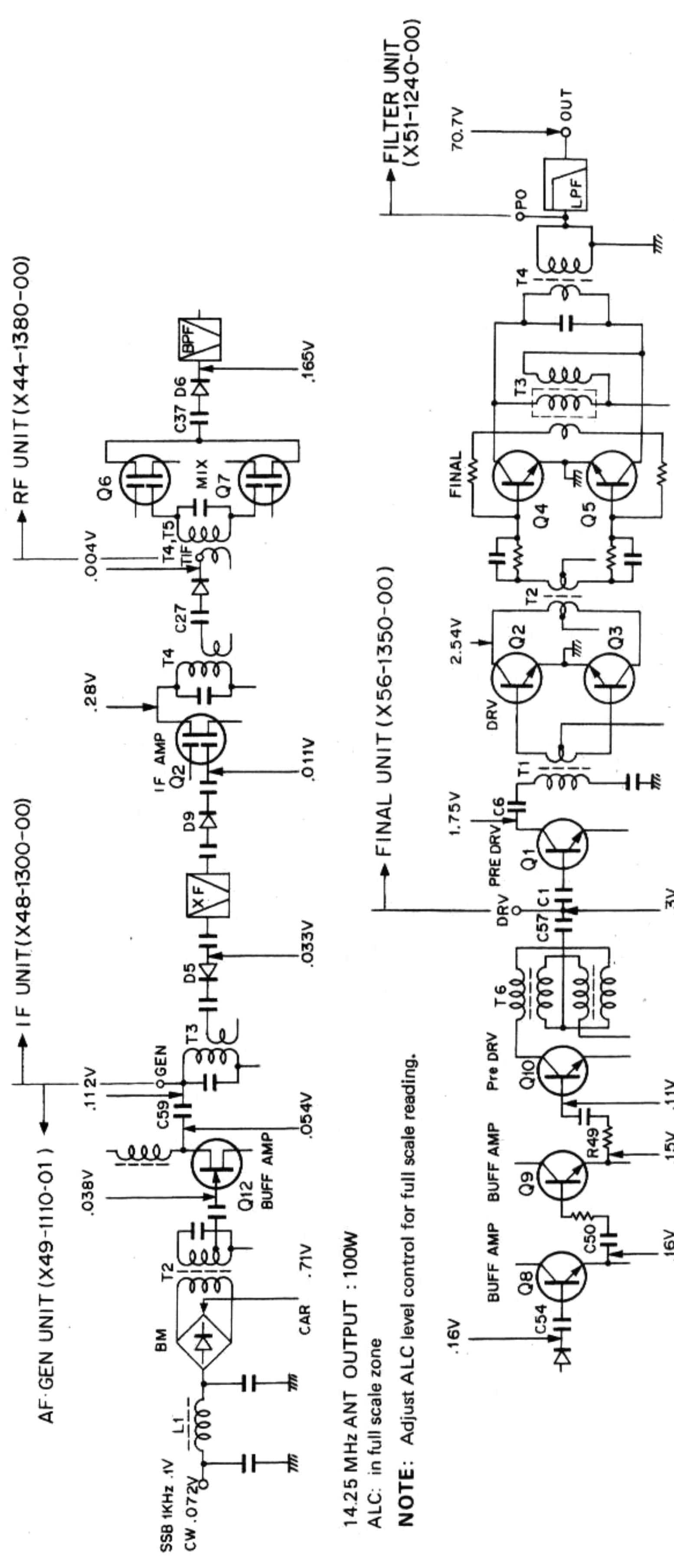


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RECEIVER SECTION



TRANSMITTER SECTION (S TYPE)



ADJUSTMENTS

GENERAL

Adjustment procedures for this transceiver are classified into formal adjustments requiring a full service bench and simplified adjustment using a VTVM, AF and RF VTVM, AG, and AF and RF dummy load. Complete adjustment also requires a frequency counter, SSG, sweep generator, etc.

TEST EQUIPMENT REQUIRED

1. VTVM or DVM

- 1) Input resistance: More than $1M\Omega$
- 2) Voltage range: 1.5 to 1000V AC/DC

NOTE: A high-precision voltmeter may be used. However, accurate readings can not be obtained for high-impedance circuits.

2. DC current meter

- 1) Current range: 100mA, 200mA, 2A, 10A, High-precision current meter may be used.

3. RF VTVM

- 1) Input impedance: $1M\Omega$ and less than 3 pF, min.
- 2) Voltage range: 10mV to 300V
- 3) Frequency range: 50MHz or greater

NOTE: During adjustment special accuracy is not required (such as input level or PLL circuit carrier oscillator output), a VTVM or VOM may substitute for an RF VTVM by measuring through the output of a detector as shown in item 14.

4. AF VTVM

- 1) Frequency range: 50Hz to 10kHz
- 2) Input resistance: $1M\Omega$ or greater
- 3) Voltage range: 10mV to 30V

5. AF GENERATOR (AG)

- 1) Frequency range: 200Hz to 5kHz
- 2) Output: 2mV~1V, low distortion

6. AF DUMMY LOAD

- 1) Impedance: 8Ω
- 2) Dissipation: 3W or greater

7. RF DUMMY LOAD

- 1) Impedance: 50Ω , 150Ω
- 2) Dissipation: 100W continuous or greater
- 3) Frequency limits: 1.8 to 30MHz

The above-mentioned instruments may be used for simplified adjustment. For complete, precise adjustment, the following instruments are also necessary.

8. OSCILLOSCOPE

Requires high sensitivity, and external synchronization capability.

9. SWEEP GENERATOR

- 1) Center frequency: 8.83MHz
- 2) Frequency deviation: Maximum $\pm 5\text{kHz}$
- 3) Output voltage: More than 0.1V
- 4) Sweep rate: At least 0.5 sec/cm

10. Standard Signal Generator (SSG)

- 1) Frequency range: 1.8 to 30MHz
- 2) Output: $-20\text{dB}/0.1\mu\text{V} \sim 120\text{dB}/1\text{V}$

NOTE: Generator must be frequency stable.

11. FREQUENCY COUNTER

- 1) Minimum input voltage: 50mV
- 2) Frequency range: Greater than 40MHz

12. NOISE GENERATOR

Must generate ignition noise containing harmonics beyond 30MHz.

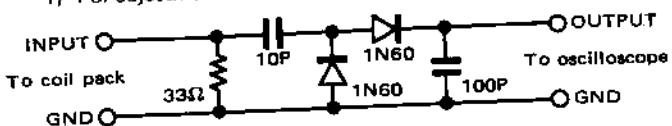
13. Spectrum analyzer

- 1) Frequency range: 100K to 110MHz
- 2) Bandwidth: 1kHz to 3MHz

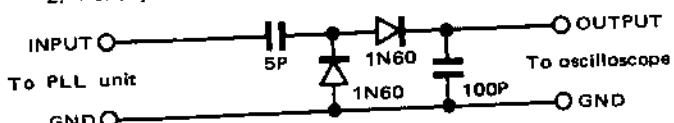
NOTE: R-1000 receiver may be used.

14. Detector

- 1) For adjustment of TX BPF



- 2) For adjustment of PLL unit BPF



15. Directional coupler

16. FIX-CH adjusting crystal element

- 1) 5.750MHz (center: 250kHz)

REFERENCE

Japanese "SSG"	American "SG"
-6dB	.025μV
0dB	.5μV
6dB	1μV
12dB	.2μV
24dB	.8μV
30dB	15.8μV
40dB	.50μV
50dB	.158μV
60dB	.500μV
70dB	.1.58mV
80dB	.5mV
90dB	15.8mV
100dB	.50mV
120dB	.0.5V

ADJUSTMENTS

PREPARATION

Unless otherwise specified, set the controls as follows.

POWERON	SEND/RECREC
AF GAINCOUNTERCLOCKWISE	NBOFF
RF GAINFULL CLOCKWISE	FIX./VFOVFO
RIT SW.OFF	VOX/MAN.MAN
IF SHIFTCENTERED	PROC.OFF
NODESSB	WIDE/NARWIDE

(V): TS-130 V type

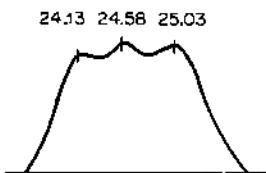
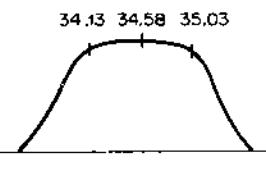
(S): TS-130 S type

Item	Condition	Measuring point			Adjust			Specifications/Remarks		
		Test equipment	Unit	Terminal	Unit	Parts	Reference			
1. Power Supply voltage	DC VTVM STBY:SEND	AF-GEN	J4,7P	AF-GEN	3.8V					
			J4,4P		9V					
			J4,5P		50V					
			J4,10P	AF-GEN	2.8V	VR2				
	STBY:REC IF SHIFT: Centered MODE:SSB MODE:REV MODE:CW STBY:SEND	Filter	AVB	Filter	VR4(V) VR5(S)	VR4(V) VR5(S)	11.0V			
2. CAR	BAND:3.5	RF VTVM Frequency counter	AF-GEN	J3,2P	CAR	T1	0.3Vrms	0.3V±1dB		
	1) CAR output 2) Freq. RX					TC2 TC1	8.82850MHz 8.83150MHz			
	STBY:SEND			J3,2P	CAR	VR2	8.83070MHz			
3. IF SHIFT	MODE:SSB STBY:Alternate SEND/REC	Frequency counter	AF-GEN	J3,2P	CAR	VR1	8.82850MHz	RX and TX frequency no change.		
4. VFO	1) Output 2) 800Hz shift	VFO scale:250 MODE:CW STBY:SEND VFO:50 Set the CAL control to the index. VFO scale: Approx.450 Set the CAL control calibrated under this VFO setting exactly to the index. Set the VFO main tuning to 5750.000kHz.	RF VTVM Frequency counter	AF-GEN	J1,6P	VFO	TC2 L4 L3 TC1	0.2Vrms Adjust for 800Hz higher than receive state. 5550.00 kHz ±200Hz 5950.00 kHz ±200Hz	0.2V±1dB rms 800±50Hz	
							Repeat this adjustment several times until the frequency is within specification.			
							The 50 kHz point on the dial scale must be aligned to the index.			
	Under the above condition, set the CAL control to the index. Turn the main tuning, and set the calibrated CAL control to the index in the order of 0, 100, 200, 300, 400, and 500 to check frequency deviation at each 100 kHz point.					0 100 200 300 400 500	5.5MHz 5.6 5.7 5.8 5.9 6.0	Within ±2kHz		
	Set the CAL control back to 250 under the above condition (do not turn excessively.), then further set back the CAL control to 0 with respect to the frequency at 250 to check The difference from the reference frequency.						Less than 400Hz	Backlash		

ADJUSTMENTS

Item	Condition	Measuring point			Adjust			Specification/Remarks																																																																	
		Instruments	Unit	Terminal	Unit	Parts	Reference																																																																		
5. RIT	1) Adjust VFO frequency to 5.75MHz 2) RIT control: Centered	Frequency counter	AF-GEN	J1,6P	AF-GEN	VR1	Alternate RIT ON and OFF	1) No frequency change between RIT ON and OFF 2) More than ± 1.5kHz variable RIT range																																																																	
6. VCO	VFO BAND 250 3.5 250 7 250 14 250 18 250 21 500 29.0	DCVTVM Frequency counter	PLL	TP1	PLL	T1 T2 T3 T5 T4 —	3.5V 5.0V 4.0V 6.1V 3.75V 4.75V (check)	Oscillator level 1V + 3dB, - 1dB at J18, 1P on PLL unit																																																																	
								<table border="1"> <tr> <td>VFO</td><td>0</td><td>250</td><td>500</td><td></td></tr> <tr> <td>BAND</td><td></td><td></td><td></td><td></td></tr> <tr> <td>3.5</td><td>12.33M</td><td>(3.5V)</td><td>12.58M</td><td>12.83M</td></tr> <tr> <td>7.0</td><td>15.83M</td><td>(5.0V)</td><td>16.08M</td><td>16.33M</td></tr> <tr> <td>10.0</td><td>18.33M</td><td>19.08M</td><td>19.33M</td><td></td></tr> <tr> <td>14.0</td><td>22.83M</td><td>(4V)</td><td>23.08M</td><td>23.33M</td></tr> <tr> <td>21.0</td><td>29.83M</td><td>(3.75V)</td><td>30.08M</td><td>30.33M</td></tr> <tr> <td>24.5</td><td>33.33M</td><td>33.58M</td><td>33.83M</td><td></td></tr> <tr> <td>18.0</td><td>26.83M</td><td>(6.1V)</td><td>27.08M</td><td>27.33M</td></tr> <tr> <td>28.0</td><td>36.83M</td><td>37.08M</td><td>37.33M</td><td></td></tr> <tr> <td>28.5</td><td>37.33M</td><td>37.58M</td><td>37.83M</td><td></td></tr> <tr> <td>29.0</td><td>37.83M</td><td>38.08M</td><td>38.33M</td><td></td></tr> <tr> <td>29.5</td><td>38.33M</td><td>38.58M</td><td>38.83M</td><td></td></tr> </table>	VFO	0	250	500		BAND					3.5	12.33M	(3.5V)	12.58M	12.83M	7.0	15.83M	(5.0V)	16.08M	16.33M	10.0	18.33M	19.08M	19.33M		14.0	22.83M	(4V)	23.08M	23.33M	21.0	29.83M	(3.75V)	30.08M	30.33M	24.5	33.33M	33.58M	33.83M		18.0	26.83M	(6.1V)	27.08M	27.33M	28.0	36.83M	37.08M	37.33M		28.5	37.33M	37.58M	37.83M		29.0	37.83M	38.08M	38.33M		29.5	38.33M	38.58M	38.83M	
VFO	0	250	500																																																																						
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								Note():control voltage																																																																	
7. TX BPF (RX BPF)	MODE:SSB STBY:SEND Make adjustments in the following sequence: 3.5 → 7 → 10 → 14 → 18 → 21 → 24.5 → 28MHz. Disconnect connector J18 on the PLL unit and connect the sweep generator RF output to it. Connect the detector input to the DRV terminal on the RF unit.	Sweep generator, Oscilloscope, Detector 3.5M	PLL RF	J18 DRV	RF	L7~30	Adjust coils for waveform as shown.																																																																		
8. PLL BPF 1) BPF-A	STBY:REC Disconnect connectors J17 and J19 on the PLL unit. Connect the cathode of D17 on the PLL unit to the jumper wire next to the D22 on the AF-GEN unit with a lead. Connect the sweep generator RF output to the J19, 3P (VFO) on the PLL unit. Connect the detector input to Q16 emitter on the PLL unit.	Detector, Oscilloscope, Sweep generator	PLL	Q16(E)	PLL	T9 T10 T11	Adjust T9~T11 for waveform as shown at right.																																																																		

ADJUSTMENTS

Item	Condition	Measuring point			Adjust			Specifications/Remarks
		Instruments	Unit	Terminal	Unit	Parts	Reference	
2) BPF-B	Disconnect connectors J17 and J19 on the PLL unit. Connect the cathode of D24 and D27 on the PLL unit to the jumper wire next to the D22 on the AF-GEN unit with a lead. Connect the sweep generator RF output to the anode of D28 on the PLL unit via a 15pF capacitor. Detector input: Same as above.	Detector, Oscillo-scope, Sweep generator	PLL	Q16 (E)	PLL	T12 T13 T14 T7	Adjust T12~T14 for waveform as shown at right. Adjust T7 for maximum output.	 24.13 24.58 25.03
3) BPF-C	Disconnect connectors J17 and J19 on the PLL unit. Connect the cathode of D20 and D27 on the PLL unit to the jumper wire next to the D22 on the AF-GEN unit. Sweep generator RF output: Same as above. Detector input: Same as above.					T15 T16 T17 T8	Adjust T15~T17 for waveform as shown at right. Adjust T8 for maximum output.	 34.13 34.58 35.03
9. VFO,MIX spurious	Note: This adjustment should be done after completing the BPF-A adjustment(or check). Disconnect connector J17 on the PLL unit. Connect the cathode of D17 on the PLL unit to the jumper wire next to the D22 on the AF-GEN unit. VFO scale:250 MODE:CW	Spectrum analyzer or monitor receiver	PLL	Q16 (E)	PLL	VR1	Adjust for minimum output at 14.99MHz.	Less than -55dB
10. PLL-IF trap	Disconnect connector J17 on the PLL unit. Connect the SSG output 8.83MHz, 60dB to Q7 emitter on the PLL unit via a 0.01μF capacitor.	SSG, RF VTVM	PLL	Q7 (E) J18,1P	PLL	T6	Adjust for minimum output.	

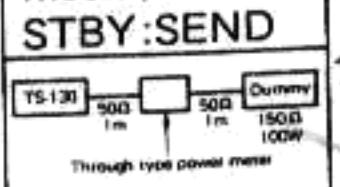
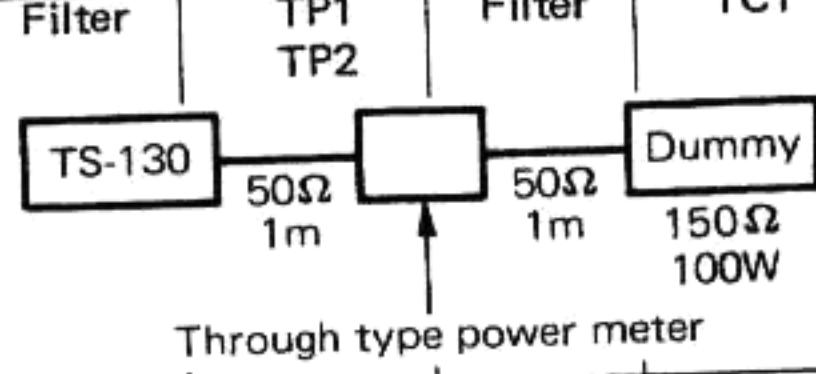
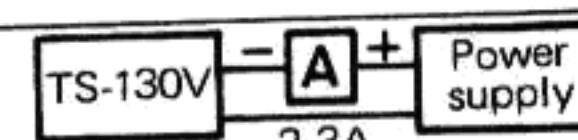
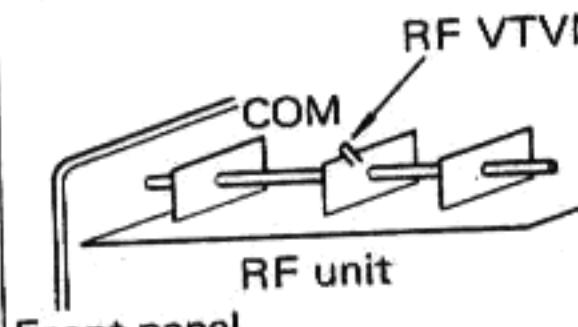
ADJUSTMENTS

Item	Condition	Measuring point			Adjust			Specifications/Remarks
		Instruments	Unit	Terminal	Unit	Parts	Reference	
11. IF AMP	VFO:250 IF SHIFT: Centered VFO/FIX: VFO MODE:SSB BAND:14 AF GAIN:10 o'clock RF GAIN: Fully clockwise Connect the SSG output 14.25MHz, -6dB to the ANT terminal.	SSG, Oscillo- scope, AF VTVM, AF Dum- my load		SP	RF	T3	The slug of T3 should be turned counter- clockwise from the peak point to reduce audio output by 2dB. Adjust T1~T6 for maximum audio output.	
12. IF trap	1) BAND: 10MHz VFO:any frequency SSG:8.83MHz, 80dB	SSG, AF VTVM		SP	RF	L3 L4 L35	Adjust for minimum S-meter reading and AF output level. Repeat the procedure two or three times.	L3 and L4 should be adjusted while they are turned counterclockwise.
13. NB	BAND:10 VFO:250 NB SW:ON Connect the SSG output 10.25 MHz, 60dB to the ANT terminal.	DC VTVM, SSG	IF	TP (Q15 (C))	IF	T7 T8	Adjust for mini- mum DC voltage.	
	Disconnect the SSG output. Connect the noise genera- tor output to the ANT ter- minal. Set the noise ge- nerator output level to S6~7.	Noise generator			IF	T2	Turned counter- clockwise 90 de- gree from the peak point. If adequate effect is not obtained, repeat the adjust- ment several times.	T2 has been adjusted for the peak point in item 11. The NB must provide adequate effect.
14. Carrier balance (IF SHIFT)	IF SHIFT: Centered RF GAIN: Counterclock- wise	RF VTVM	IF	Q7 (E)	AF-GEN	TC1	Adjust for mini- mum.	
15. S meter 1) Starting level 2) S1 3) S9	RF GAIN: Fully counter- clockwise				IF	VR2	Set to starting level.	
	BAND:14 VFO:175 MODE:CW SSG:14.175M, 8dB					T5	Set to S1.	T5 should be adjusted while it is turned counterclockwise.
	SSG:14.175M, 40dB					VR2	Set to S9.	
16. Counter standard Oscillator	BAND:10 VFO:0 Receive WWV signal.				Counter	TC1	Set to zero beat.	

ADJUSTMENTS

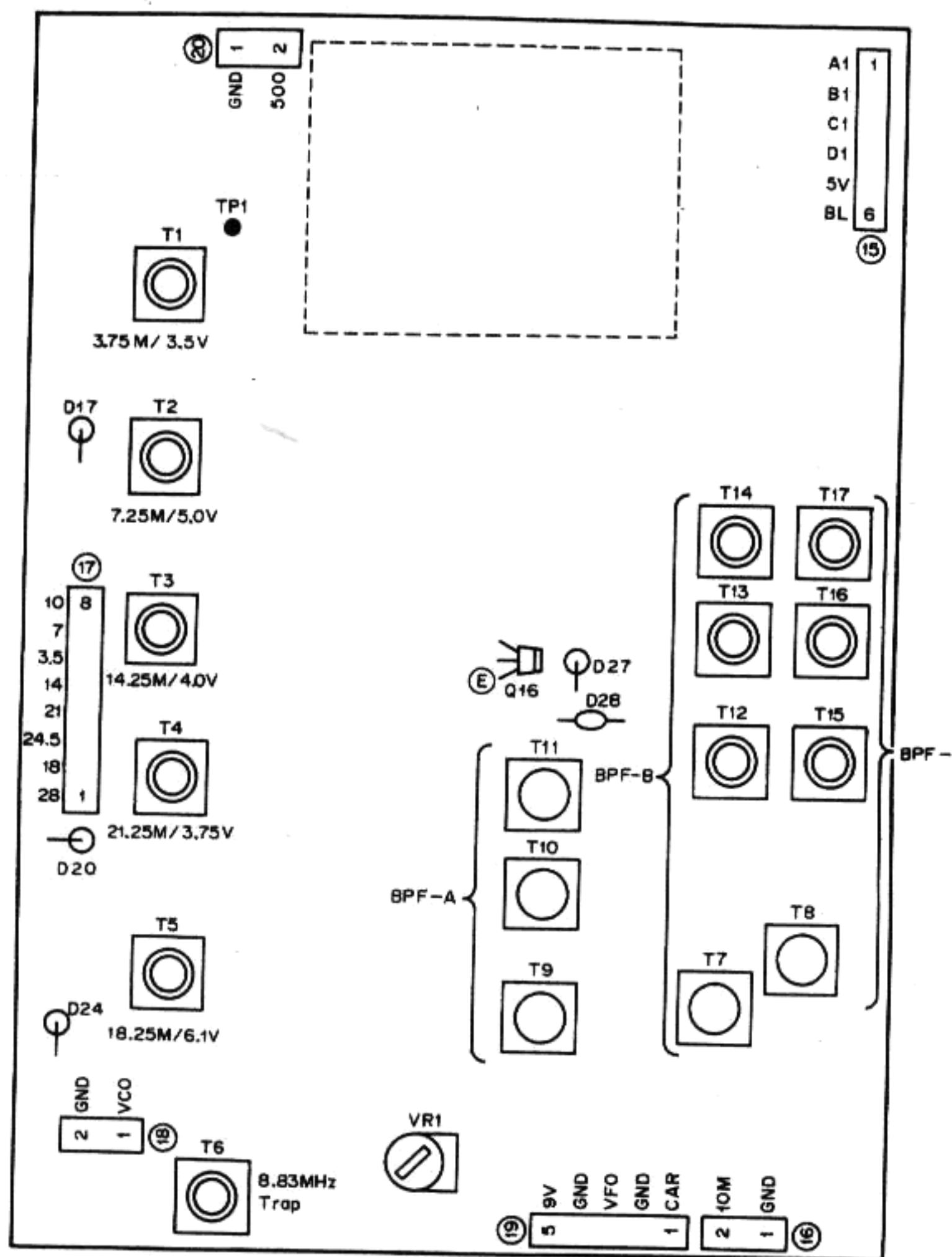
Item	Condition	Measuring point			Adjust			Specifications/Remarks
		Instruments	Unit	Terminal	Unit	Parts	Reference	
17. Base current 1) S type	MODE:SSB MIC GAIN: Full counter- clockwise DC current meter:Conne- ct \oplus to D14 lead, \ominus to D14 terminal. STBY:SEND STBY:REC	DC curre- nt meter	Final	D14	Final	VR1	150mA	
	DC current meter:Connect \ominus to red wire from F14 ter- minal, \oplus to 3P terminal. STBY:SEND STBY:REC							
2) V type	DC current meter:Connec- t \oplus to 14A, \ominus to D2 side. STBY:SEND STBY:REC	DC curre- nt meter	Final	14A	Final	VR1	100mA	
18. Carrier level	BAND:14 MODE:CW STBY:SEND Reduce RF power(S type) to 30W, RF meter(V type) to 3 by CAR level control. STBY:REC	Power meter			AF-GEN RF	T2 T4	Adjust for maxi- mum RF output.	
19. ALC (RF power) 1) S type	BAMD:14 CAR LEVEL: Centered VFO:200 MODE:CW STBY:SEND Filter unit, VR2:Counter- clockwise	Power meter			Filter	VR3	Set to 95W.	
	BAND:28.5						VR2 Set to 75W.	
2) V type	Same as above.				Filter	VR3	Set to 11W.	
20. RF meter (V type only)	BAND:14 MODE:CW Meter:RF(IIC) STBY:SEND STBY:REC	Power meter			Filter	VR1	Set to 8W.	
21. IC meter (S type only)	MODE:CW DC current meter:Conne- ct \ominus to red wire from F14 terminal \oplus to 3P ter- minal. STBY:SEND STBY:REC	Power meter, DC curr- ent meter			Filter	VR4	Set to 11A on IC meter.	

ADJUSTMENTS

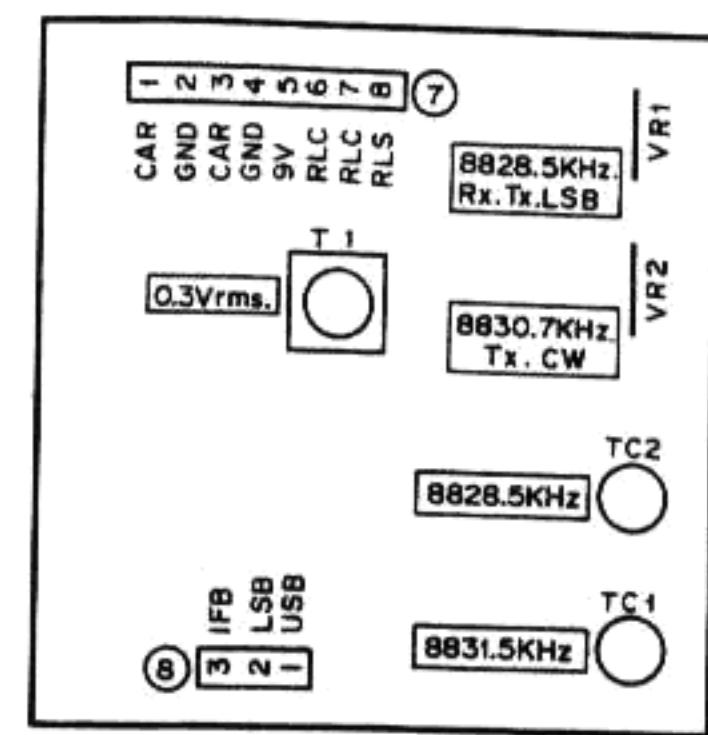
Item	Condition	Measuring point			Adjust			Specifications/Remarks
		Instruments	Unit	Terminal	Unit	Parts	Reference	
22. Protection 1) S type	Filter unit,VR1: Fully clockwise BAND:14 MODE:CW ANT:Power meter(50Ω) STBY:SEND	DVM, power meter (50Ω)	Filter	TP1 TP2	Filter	TC1	Adjust for minimum.	Approx. 0.2~0.4V 
	150Ω,100W Dummy load		Filter	TP1 TP2	Filter	TC1	Adjust VR1 to obtain 39W RF power.	Approx. 40~50mV.
	Filter unit,VR1: Fully clockwise BAND:14 MODE:CW ANT:50Ω Dummy STBY:SEND STBY:REC							
	ANT:Shorted STBY:SEND STBY:REC	DC current meter			Filter	VR2	Set to 2.3A.	
23. TX spurious	BAND:21 VFO:250 MODE:SSB MIC,CAR level: Fully counter-clockwise STBY:SEND STBY:REC	RF VTVM	RF	Common terminal of rotary switch	RF	VR1	Adjust for minimum.	
	BAND:14 MIC input: AG 1.5kHz, 7mV MODE:SSB STBY:SEND 1)Adjust MIC GAIN control until RF power becomes 50 W(S type),5W (V type). 2)Change AG frequency to 300Hz and 2.7kHz alternately. MODE:SSB and REV	Power meter, Synchro- scope, AG			CAR	TC1 (SSB) TC2 (REV)	Adjust TC1 and TC2 so that RF power is equal at AG frequency 300Hz and 2.7 kHz.	Within -6dB at AG frequency 400Hz and 2.6kHz respect to 1.5kHz signal level.
24. SSB carrier point								
25. Carrier suppression Note: This adjustment should be done after completing the SSB carrier point adjustment (or check) in item 24.	BAND:14 MODE:CW↔SSB,REV STBY:SEND MIC:No input STBY:REC	Power meter, Oscillo- scope		ANT	AF-GEN	VR5 TC2	Adjust VR5 and TC2 alternately for minimum output.	Carrier better than 40dB down from output signal.
	MODE:SSB MIC input: AG 1kHz,10mV PROC: ON↔OFF	AF VTVM	Processor	TP1	Processor	VR2	Adjust for equal level.	Approx. 150mV
26. Speech processor								
27. Side tone	MODE:CW AF GAIN: 12:00 KEY:Plug a key and operate.	AF VTVM, KEY		SP	AF-GEN	VR4	Set to 0.63V/8Ω.	

ADJUSTMENTS

▼ PLL UNIT (X50-1700-00)



▼ CAR UNIT (X50-1500-00)



TEST AND ALIGNMENT SET-UP

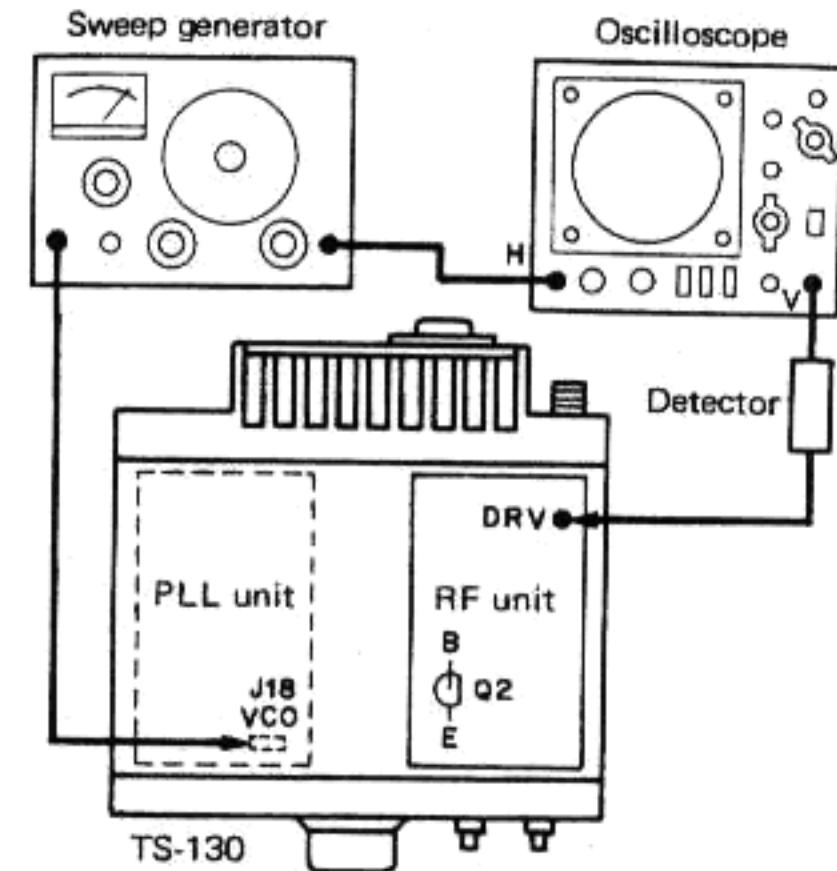


Fig. 4 7. TX BPF (RX BPF)

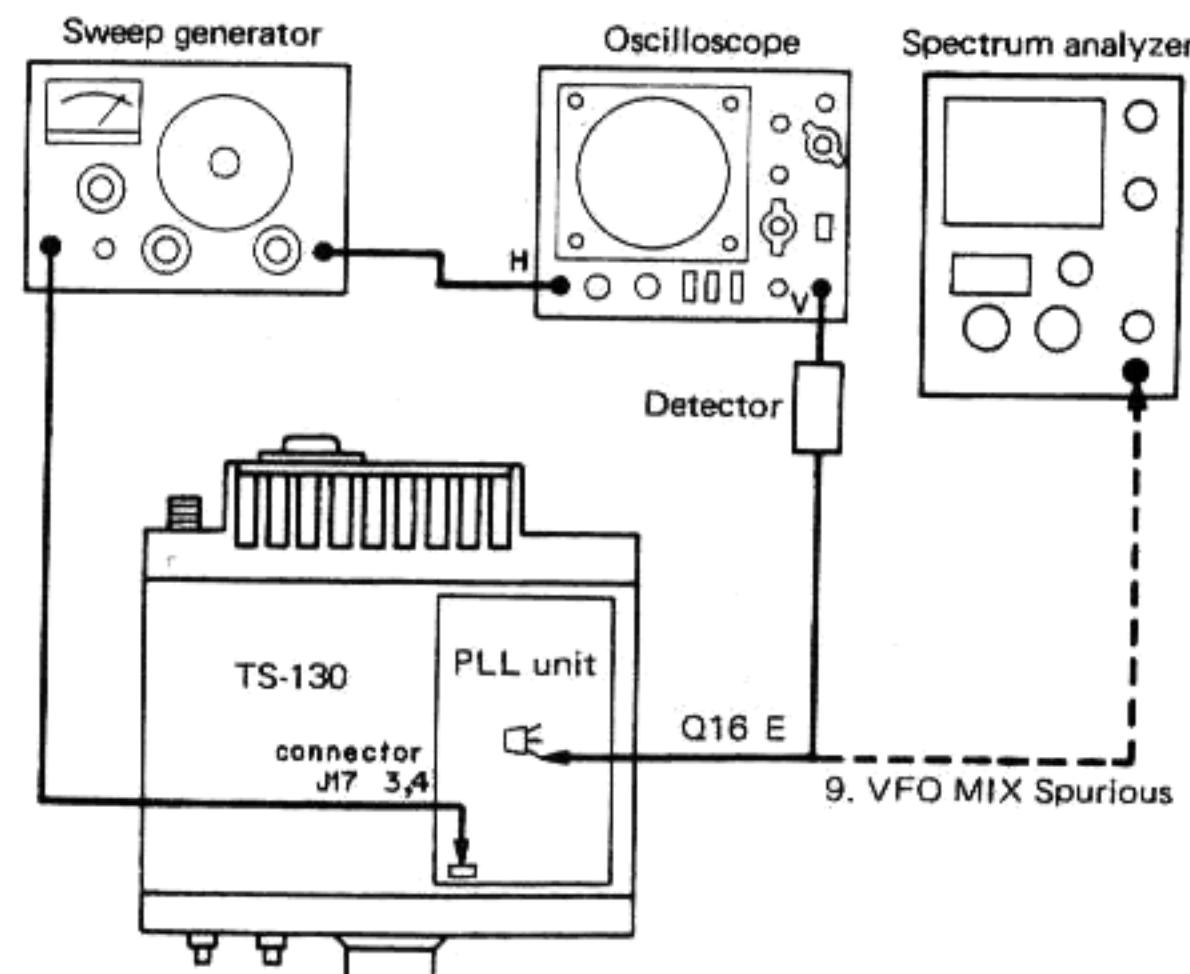


Fig. 5 8. PLL BPF-A,B,C
9. VFO MIX spurious (Disconnect Sweep generator and Oscilloscope)

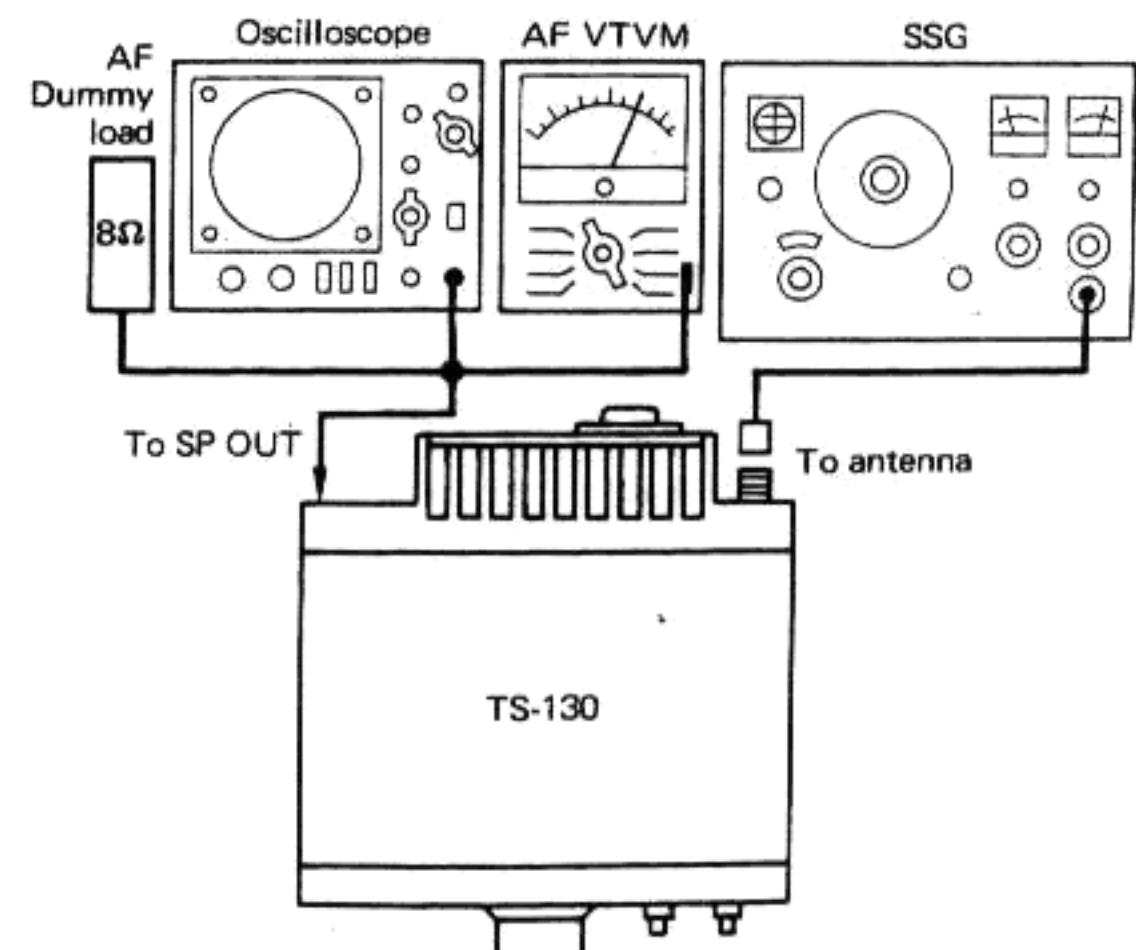


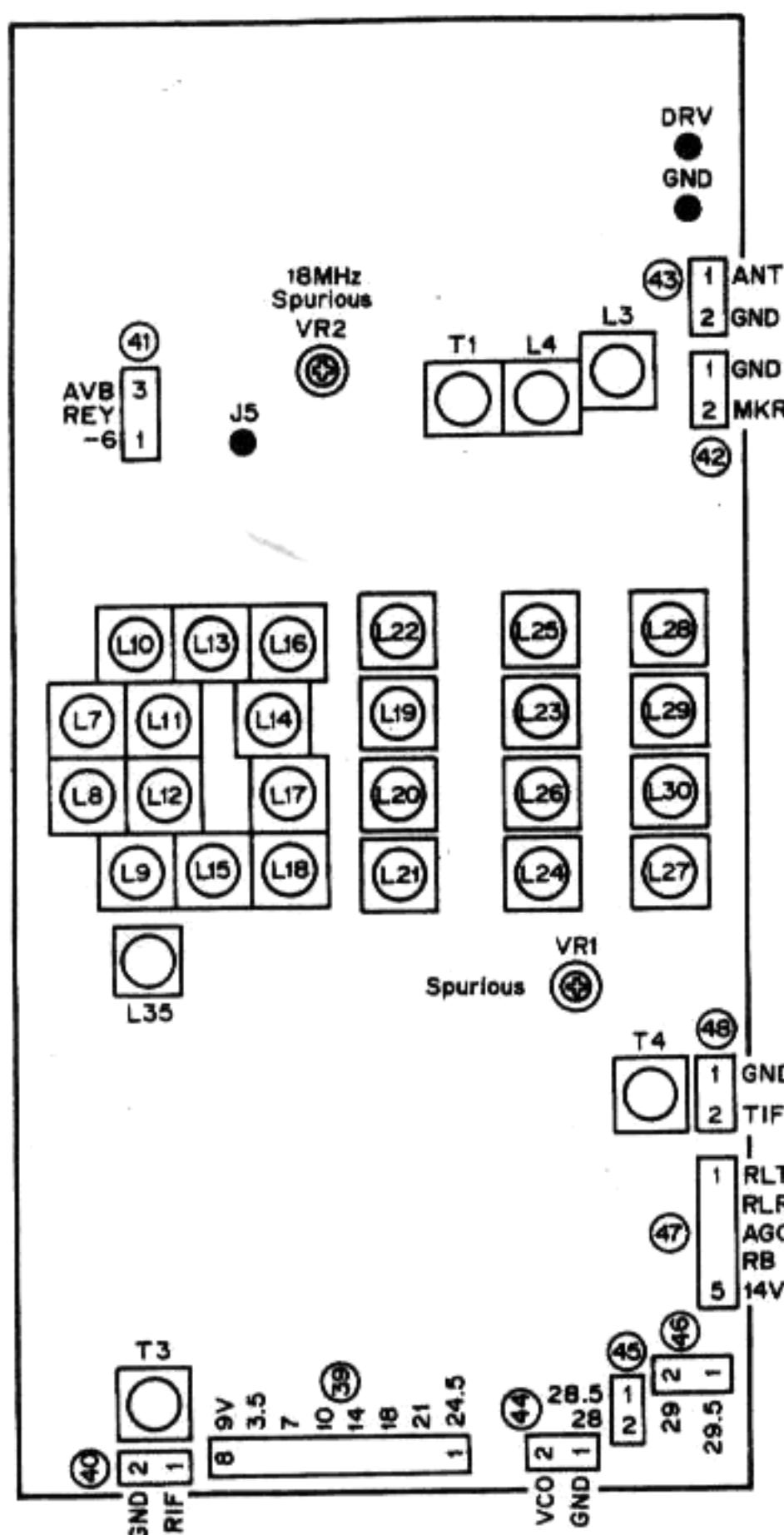
Fig. 6 11. IF AMP, 12. IF trap

ADJUSTMENTS

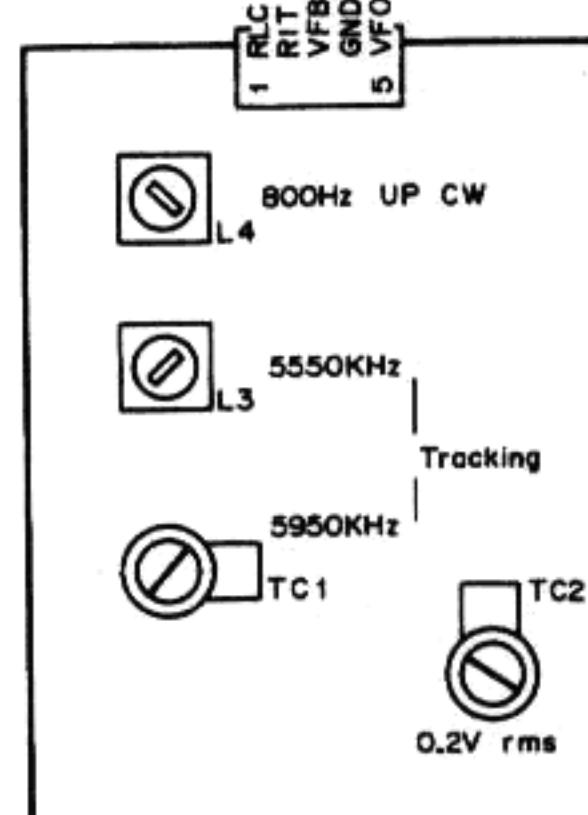
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PC BOARD ALIGNMENT

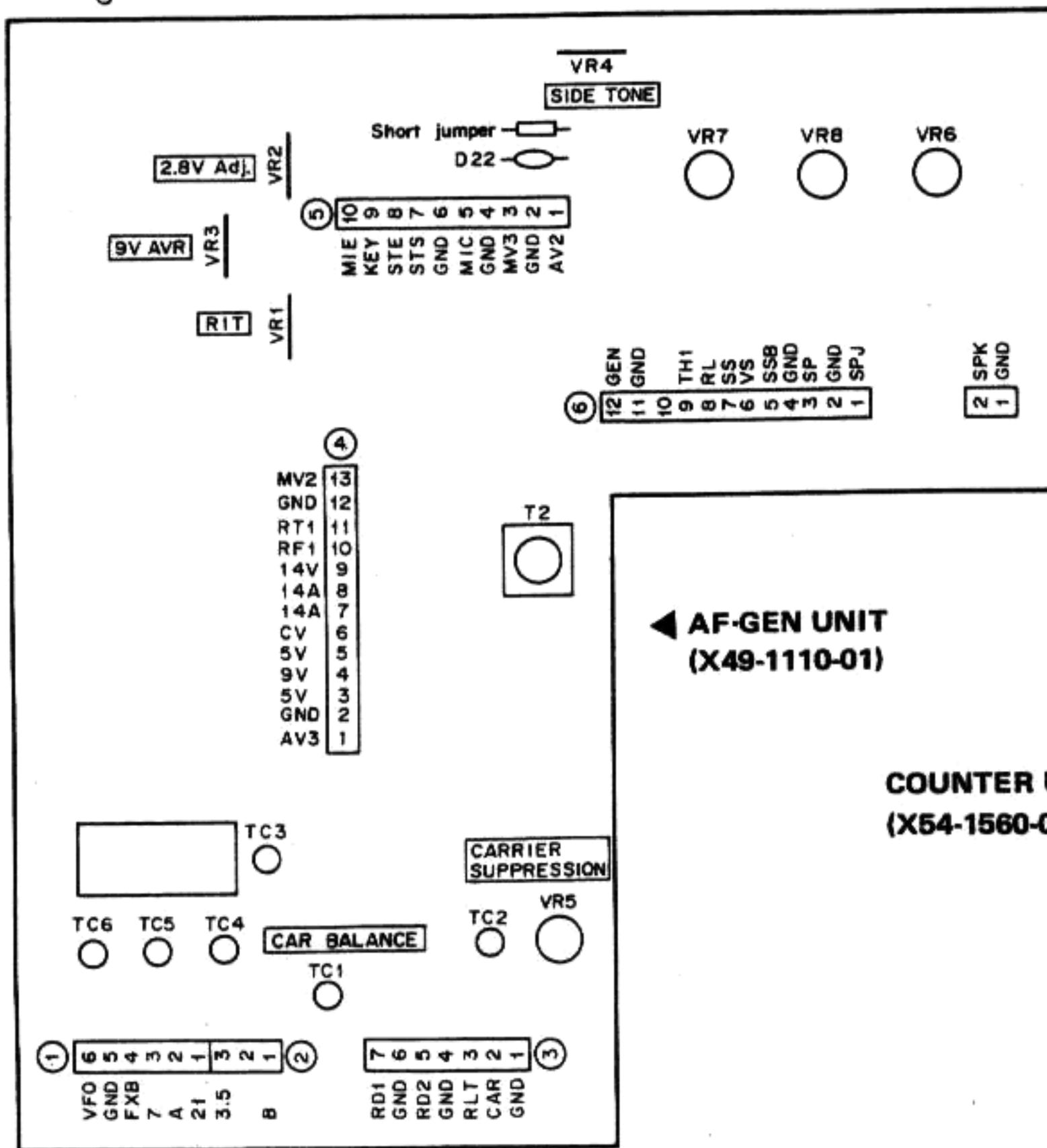
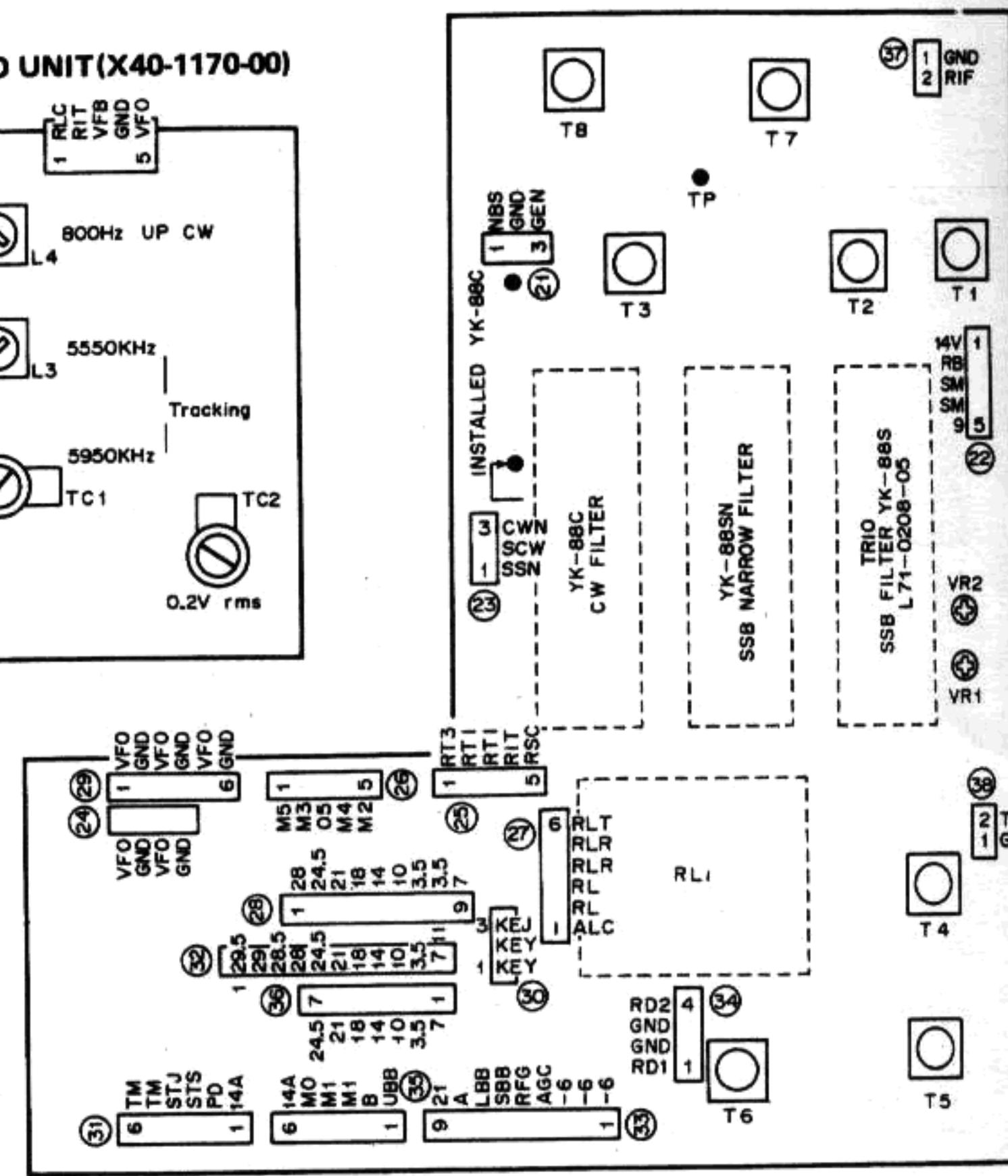
▼ RF UNIT (X44-1380-00)



▼ VFO UNIT(X40-1170-00)

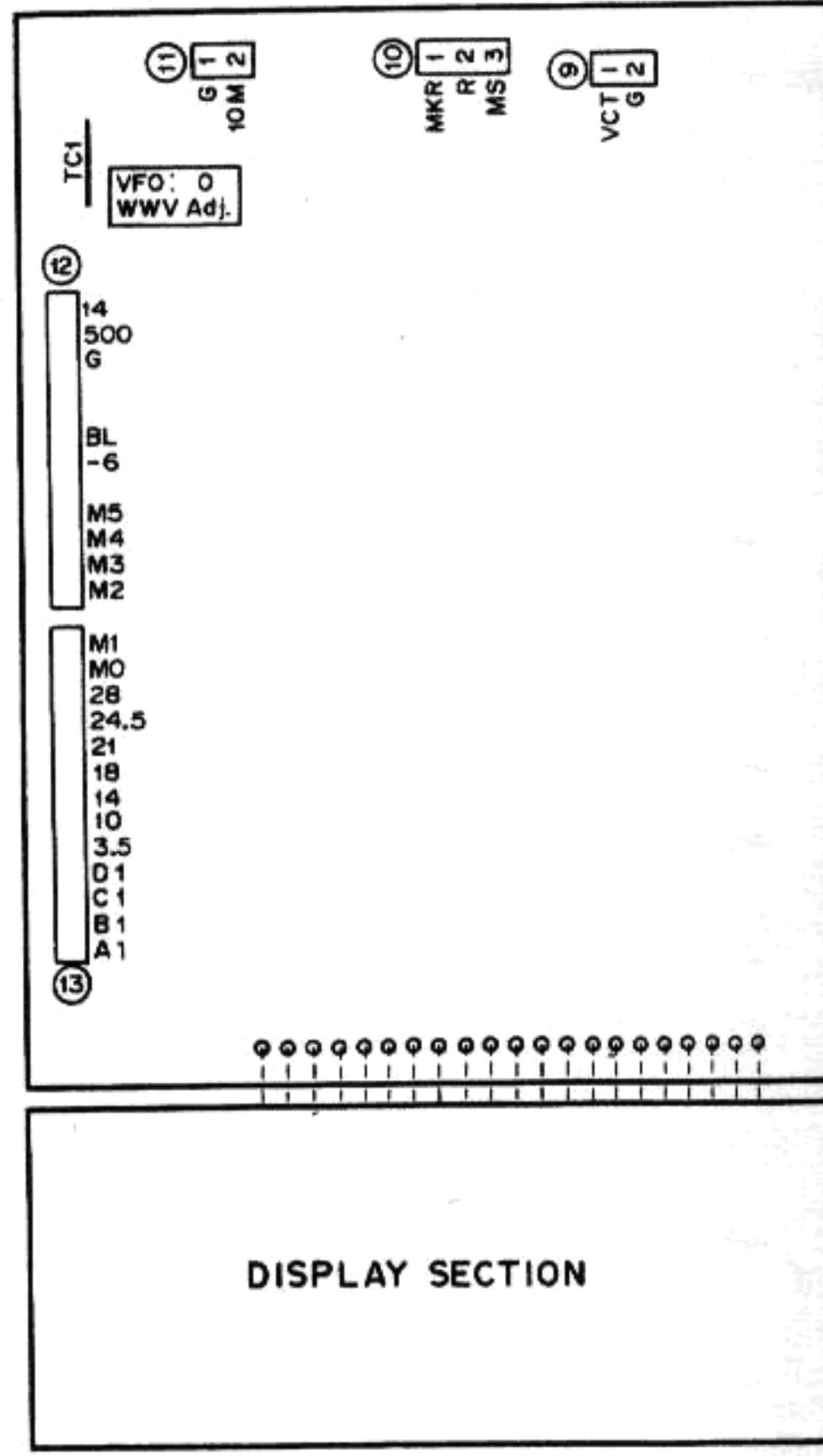


▼ IF UNIT (X48-1300-00)



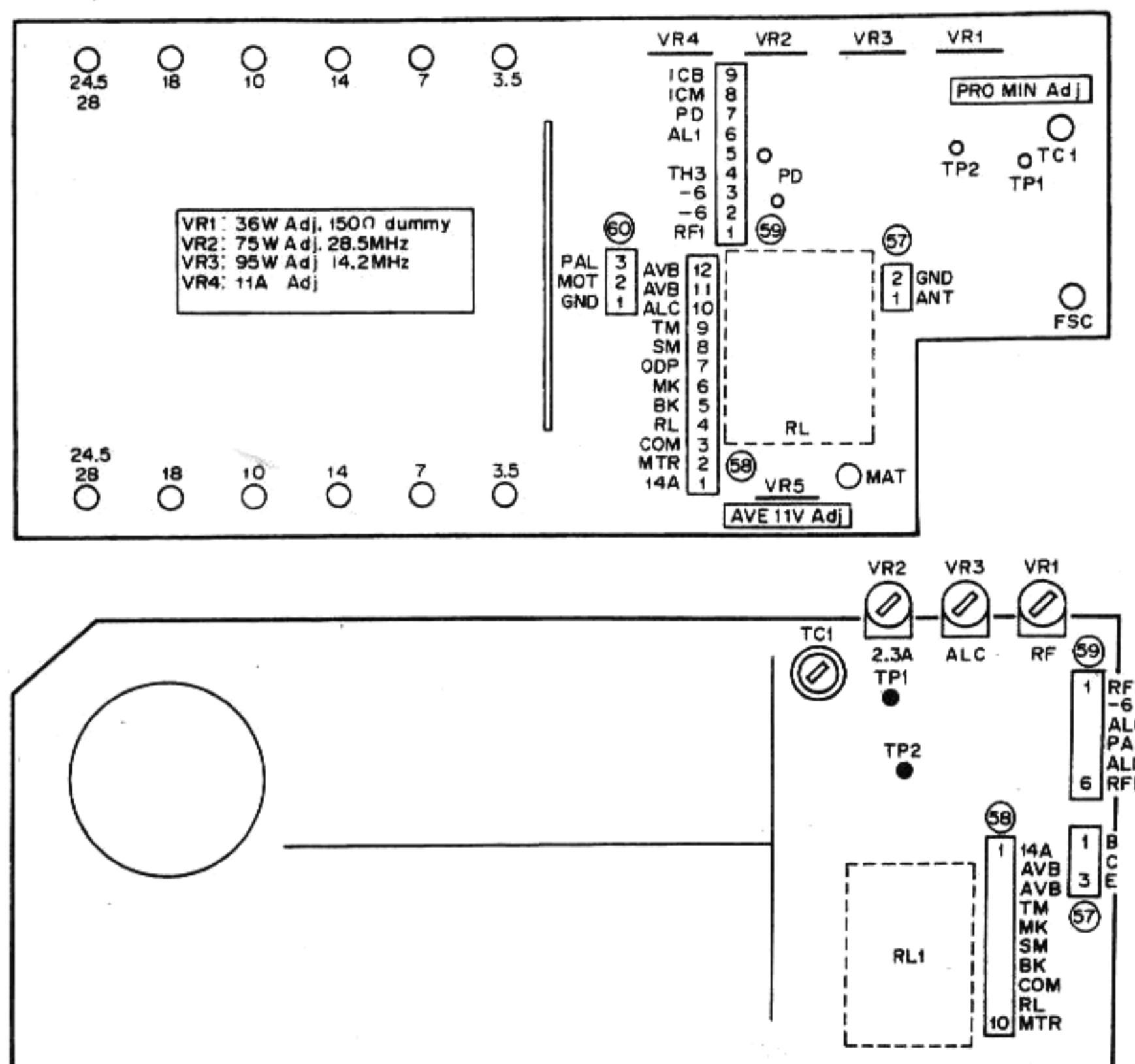
**◀ AF-GEN UNIT
(X49-1110-01)**

COUNTER UNIT ►
(X54-1560-00)



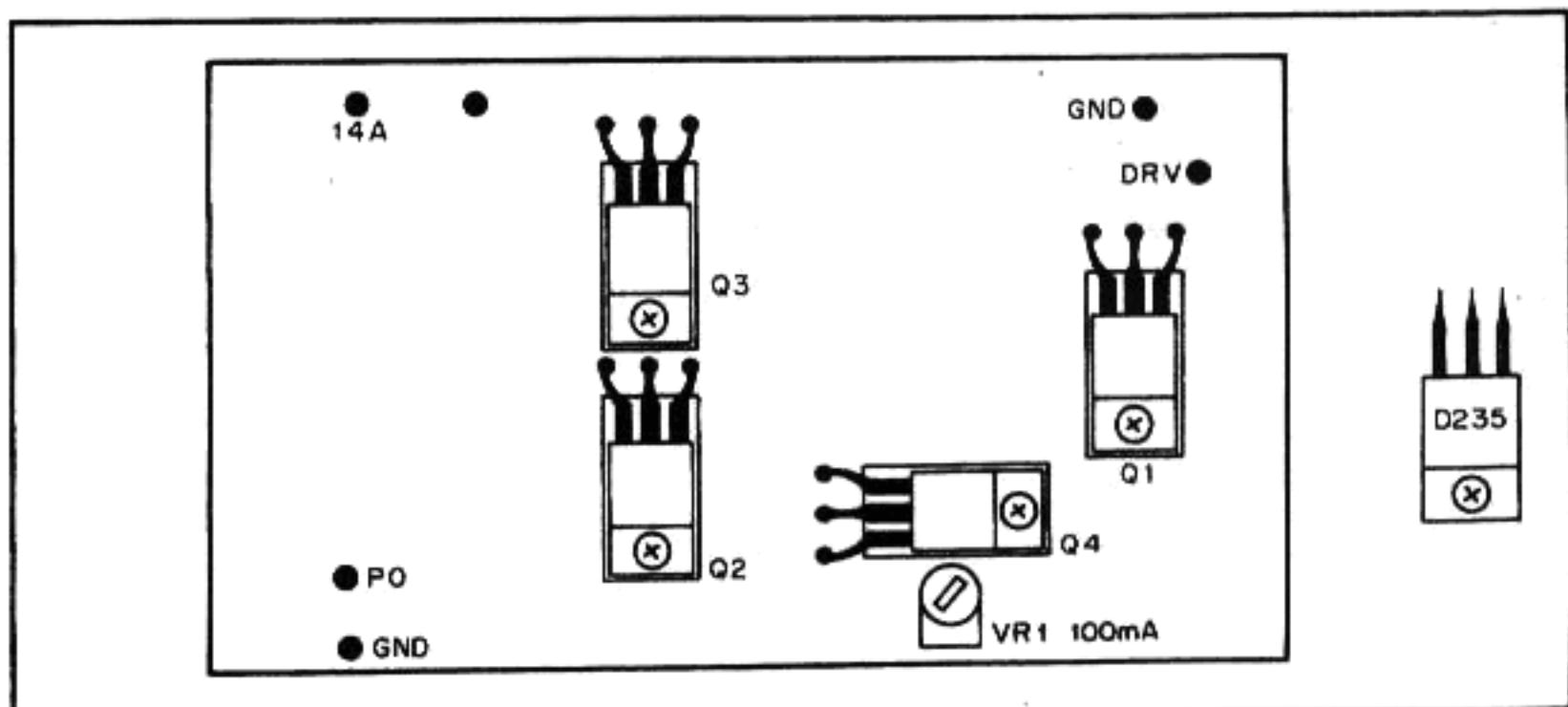
ADJUSTMENTS

▼ FILTER UNIT (X51-1240-00) S TYPE

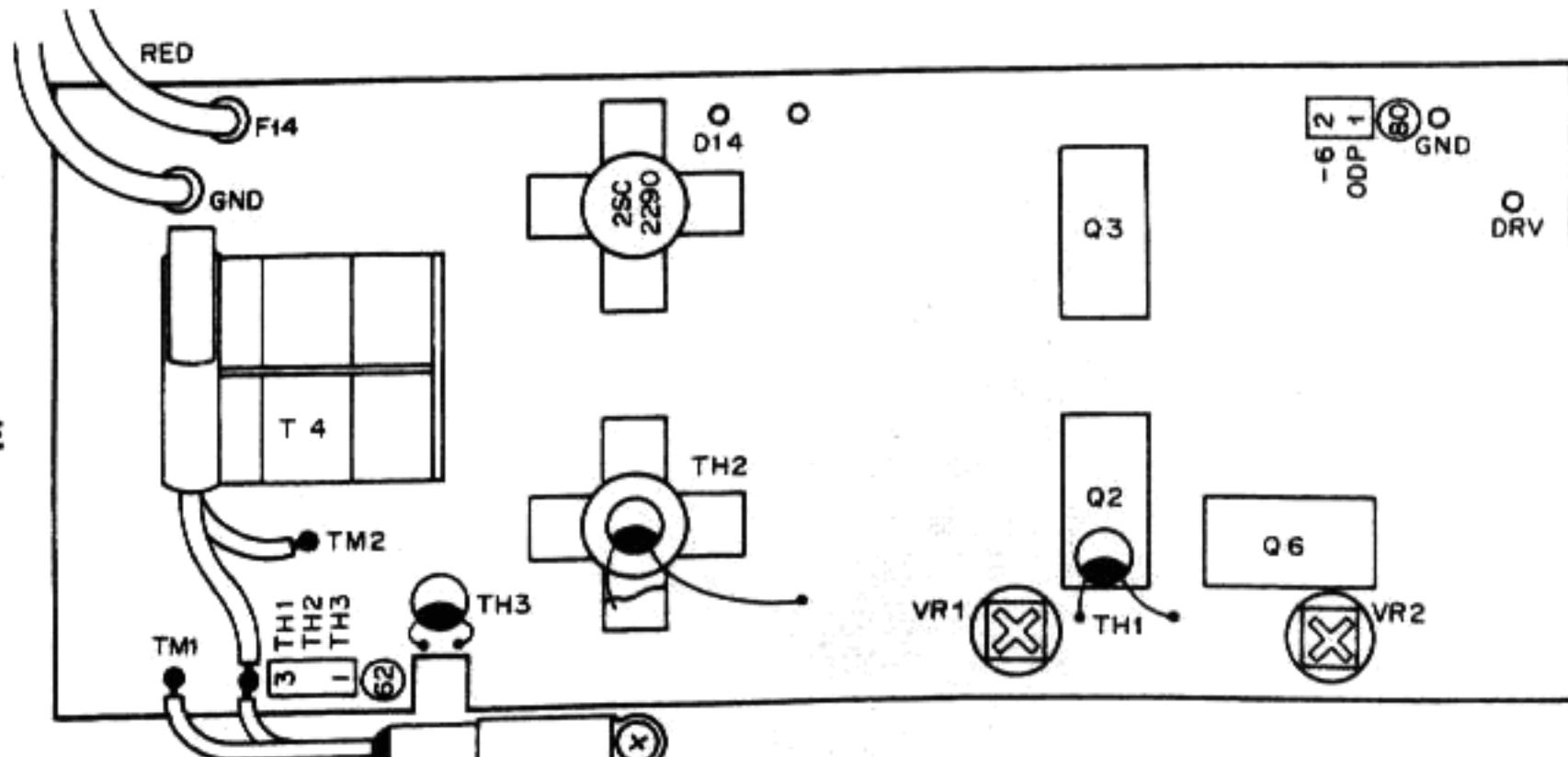


**◀ FILTER UNIT
(X51-1250-00) V TYPE**

FINAL UNIT ►
(X56-1300-00) V TYPE



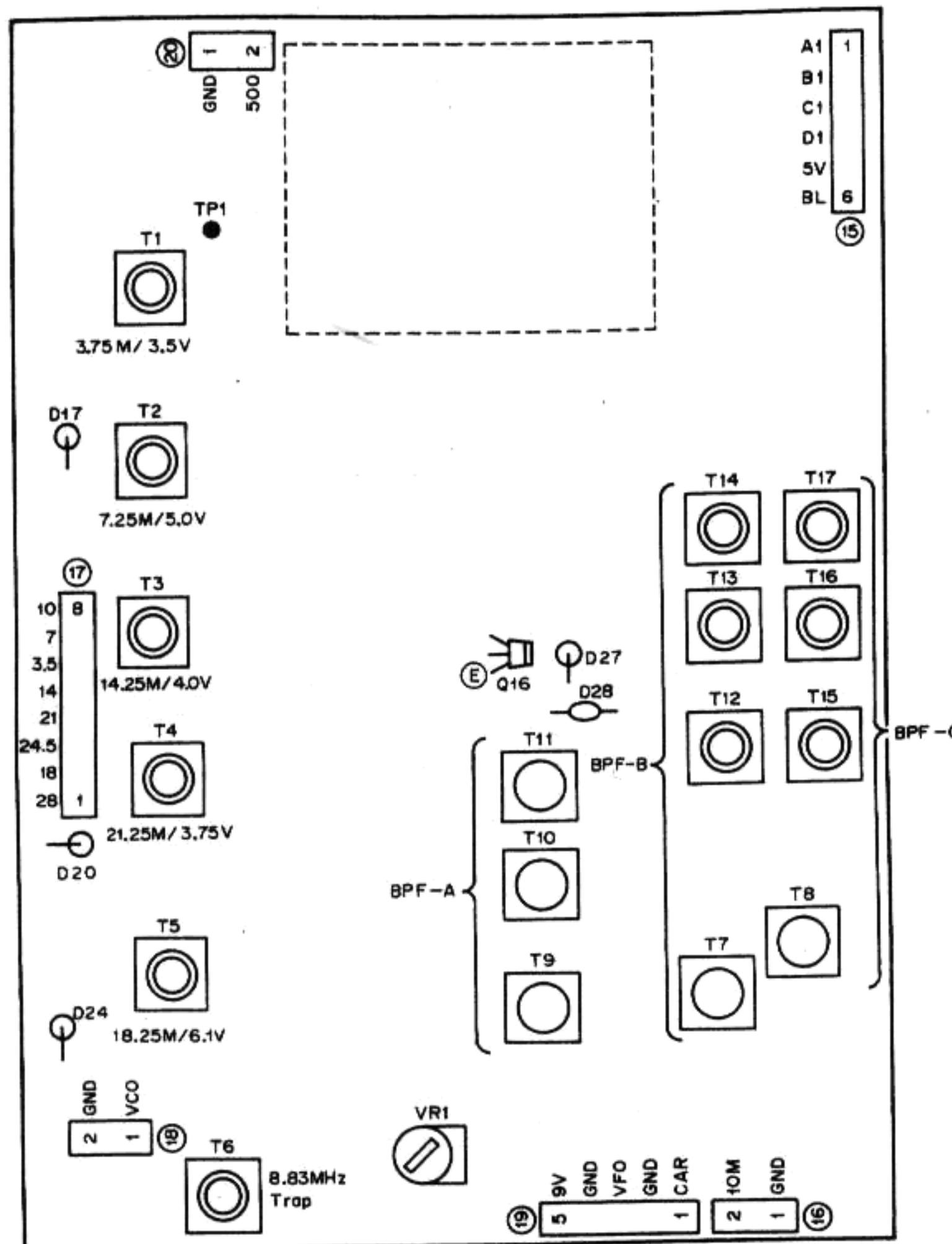
FINAL UNIT ►
(X56-1350-00) S TYPE



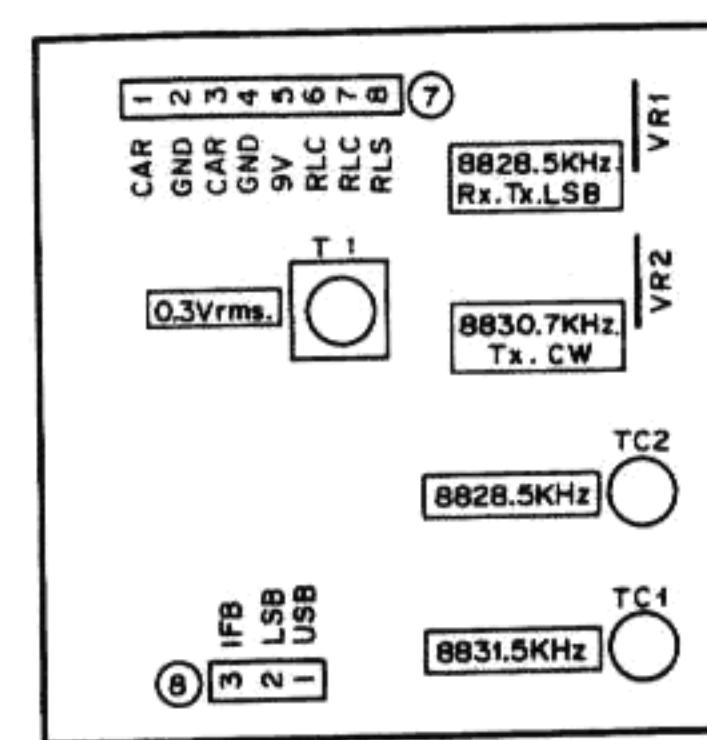
TS-130SV

ADJUSTMENTS

▼ PLL UNIT (X50-1700-00)



▼ CAR UNIT (X50-1500-00)



TEST AND ALIGNMENT SET-UP

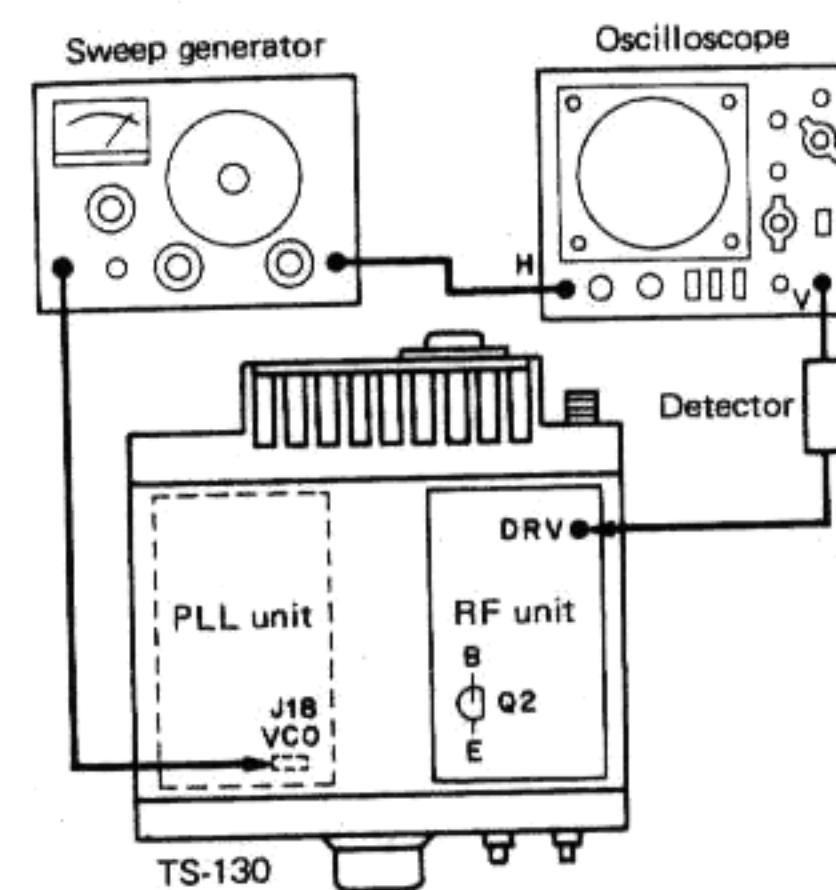


Fig. 4 7. TX BPF (RX BPF)

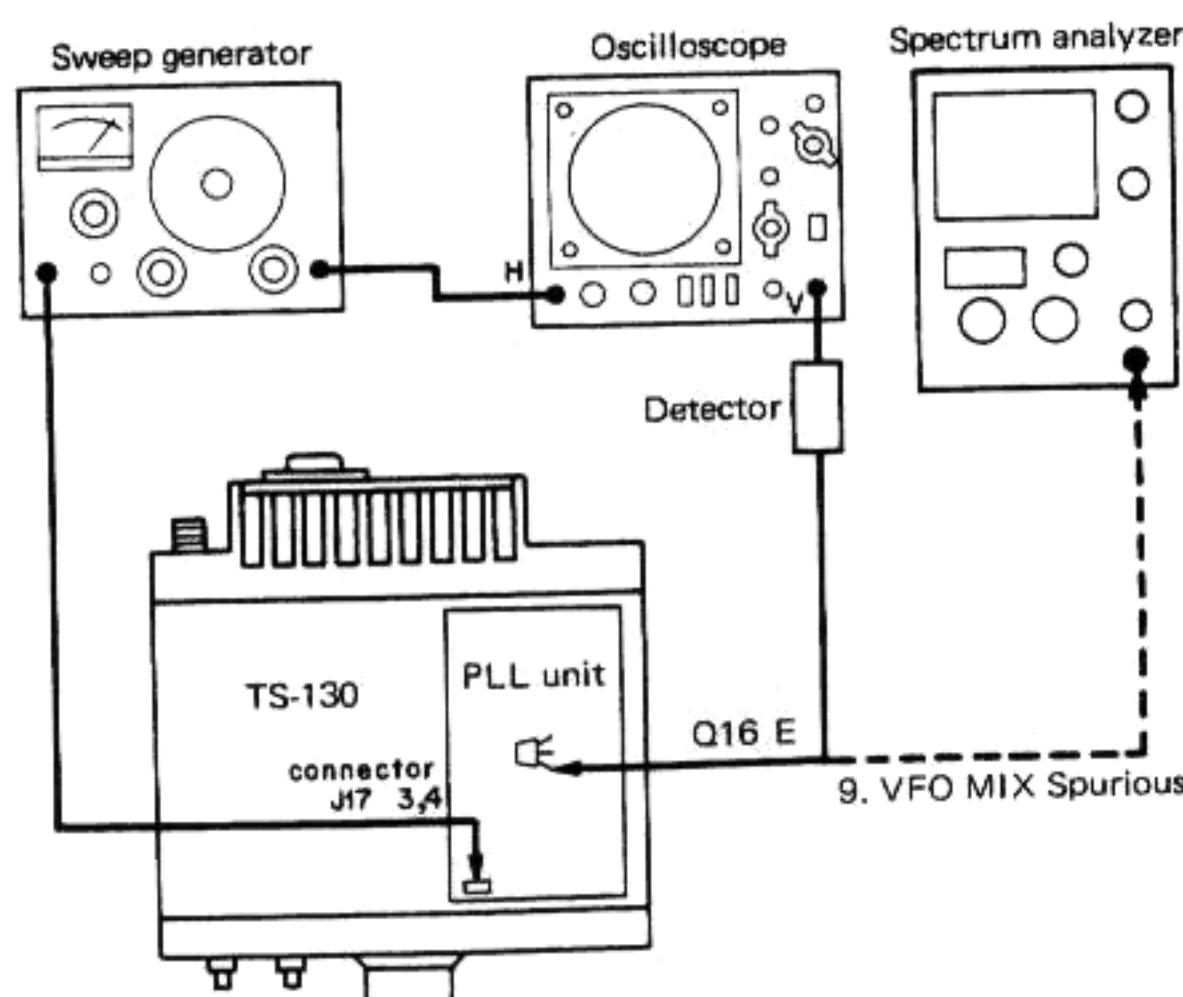


Fig. 5 8. PLL BPF-A,B,C
9. VFO MIX spurious (Disconnect Sweep generator and Oscilloscope)

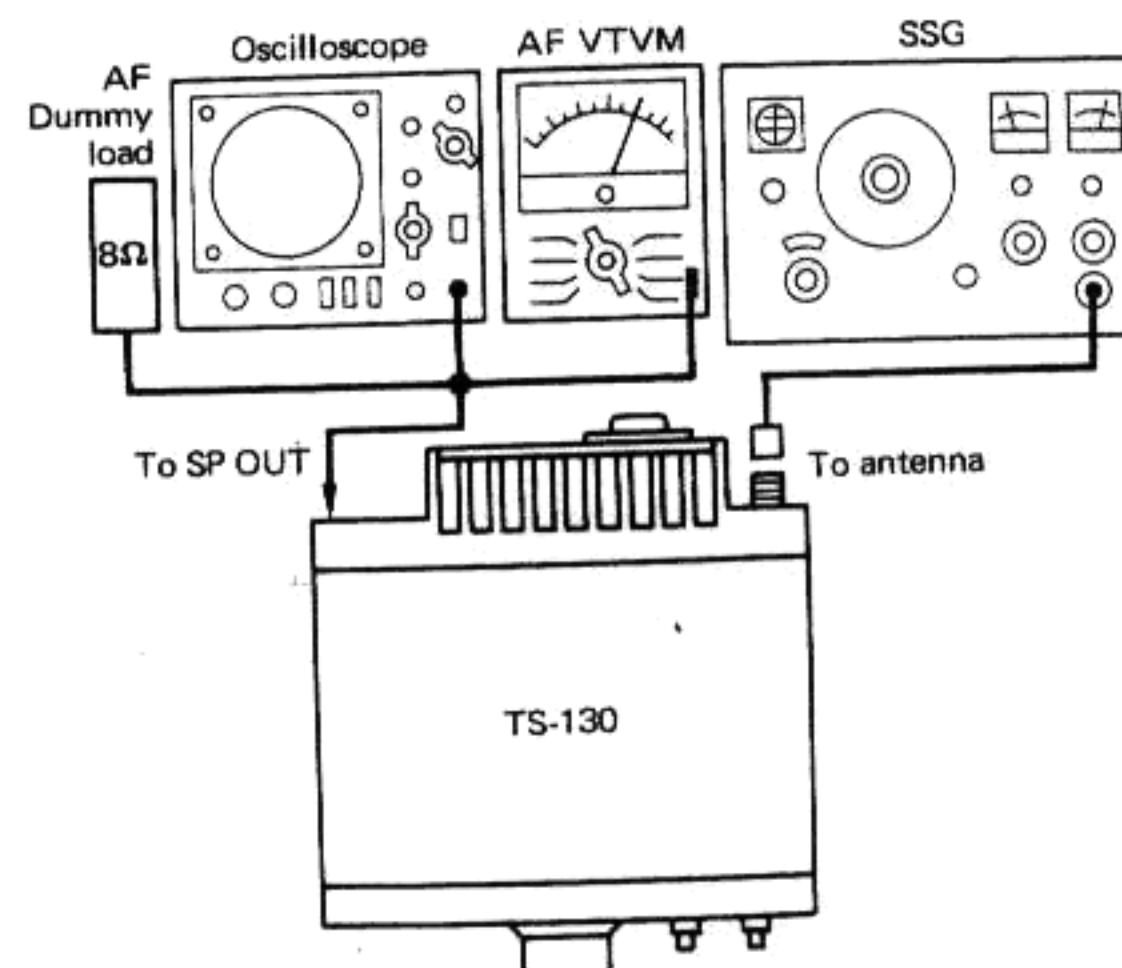
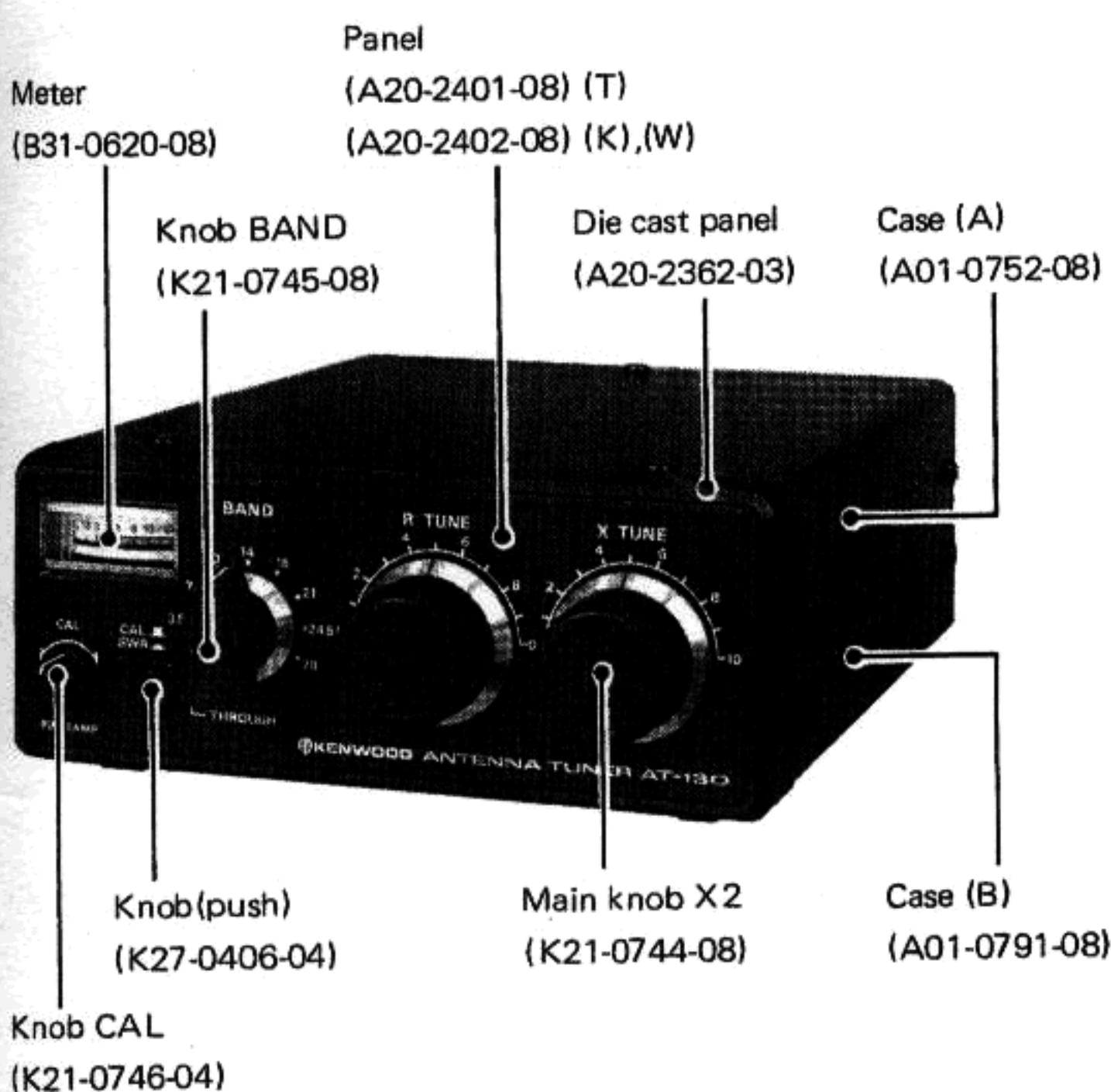


Fig. 6 11. IF AMP, 12. IF trap

AT-130

OUTSIDE VIEW



SPECIFICATIONS

1. Antenna Coupler

Frequency range 8 amateur bands from 3.5 to 29.7 MHz
Input impedance 50Ω
Output impedance 20 to 300Ω , unbalanced.
Through power 150W max. (3.5 MHz band, 120W)
Insertion loss Less than 0.5dB at optimum match.

2. SWR Meter

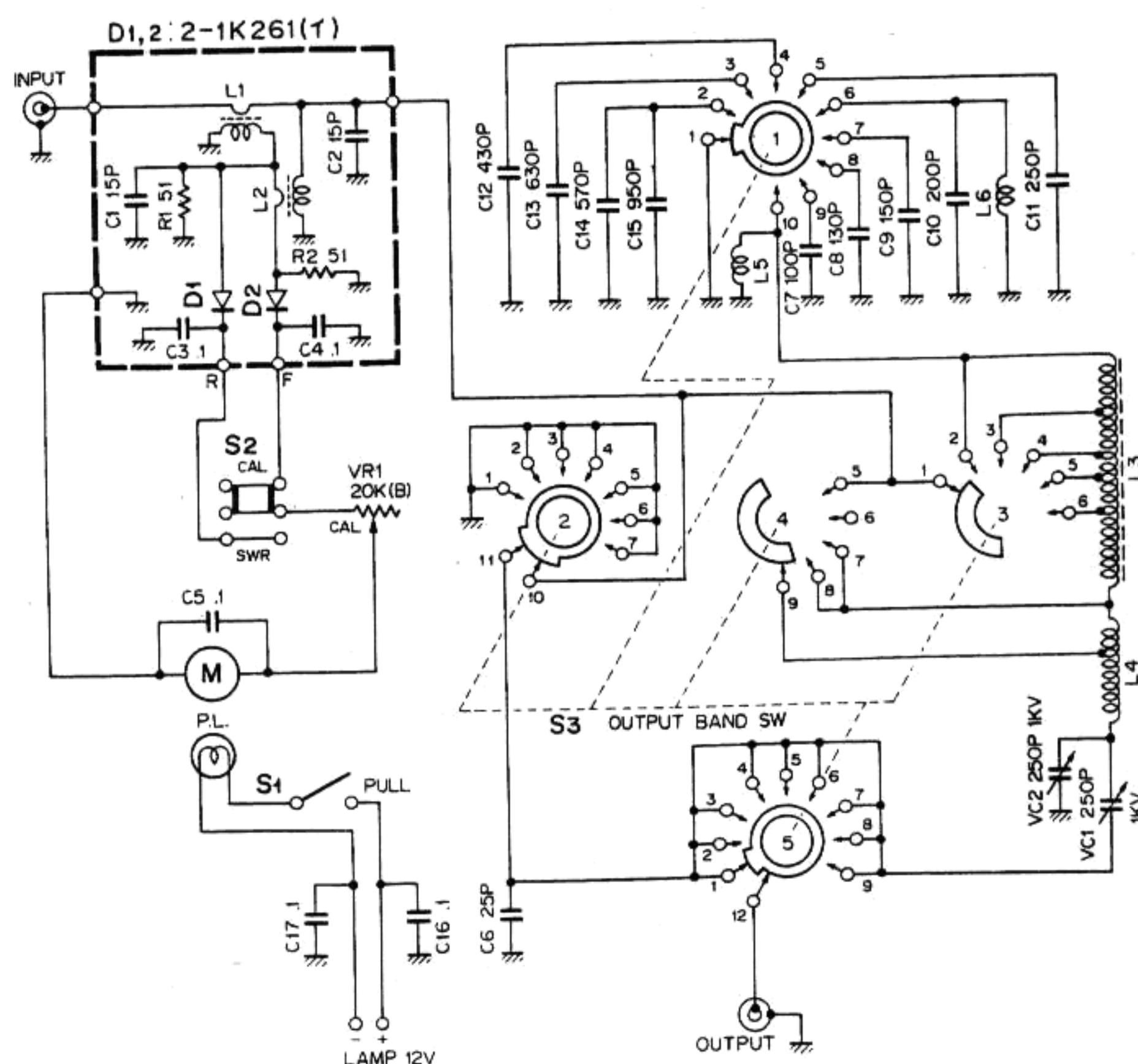
Frequency range 3.5 to 29.7MHz
Max. power 150W
Measurable range 1.0:1 to 10:1
Min. power required 2W

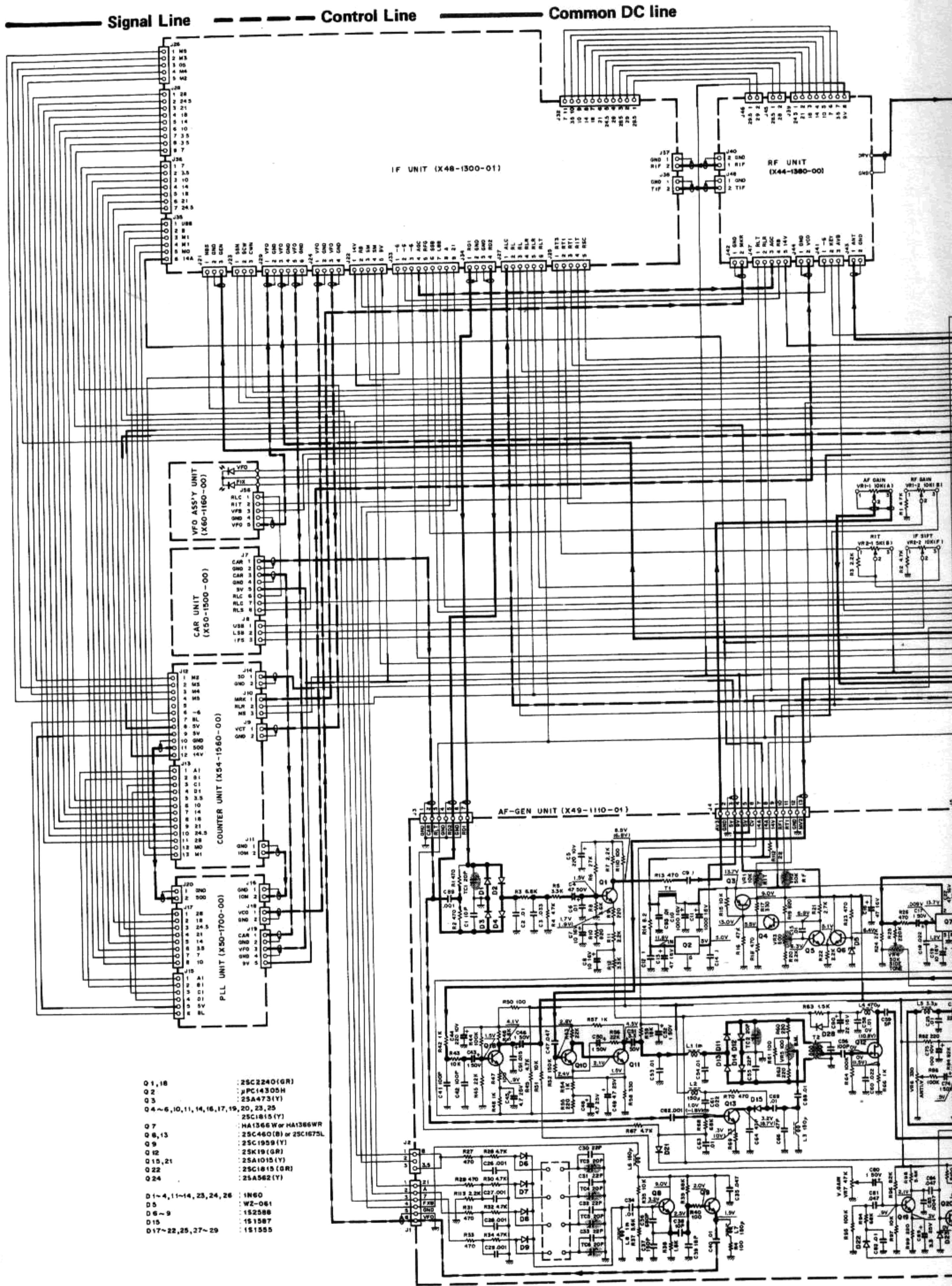
3. General

INPUT Connector UHF type (50Ω)
ANT Connector UHF type (50Ω)
GND Wing nut and STUD.
Dimensions H. 60mm (2-3/8")
W. 152mm (6")
D. 159mm (6-1/4")
Weight 1.6kg (3.5 lbs) approx.

NOTE: The circuit and ratings may change without notice due to developments in technology.

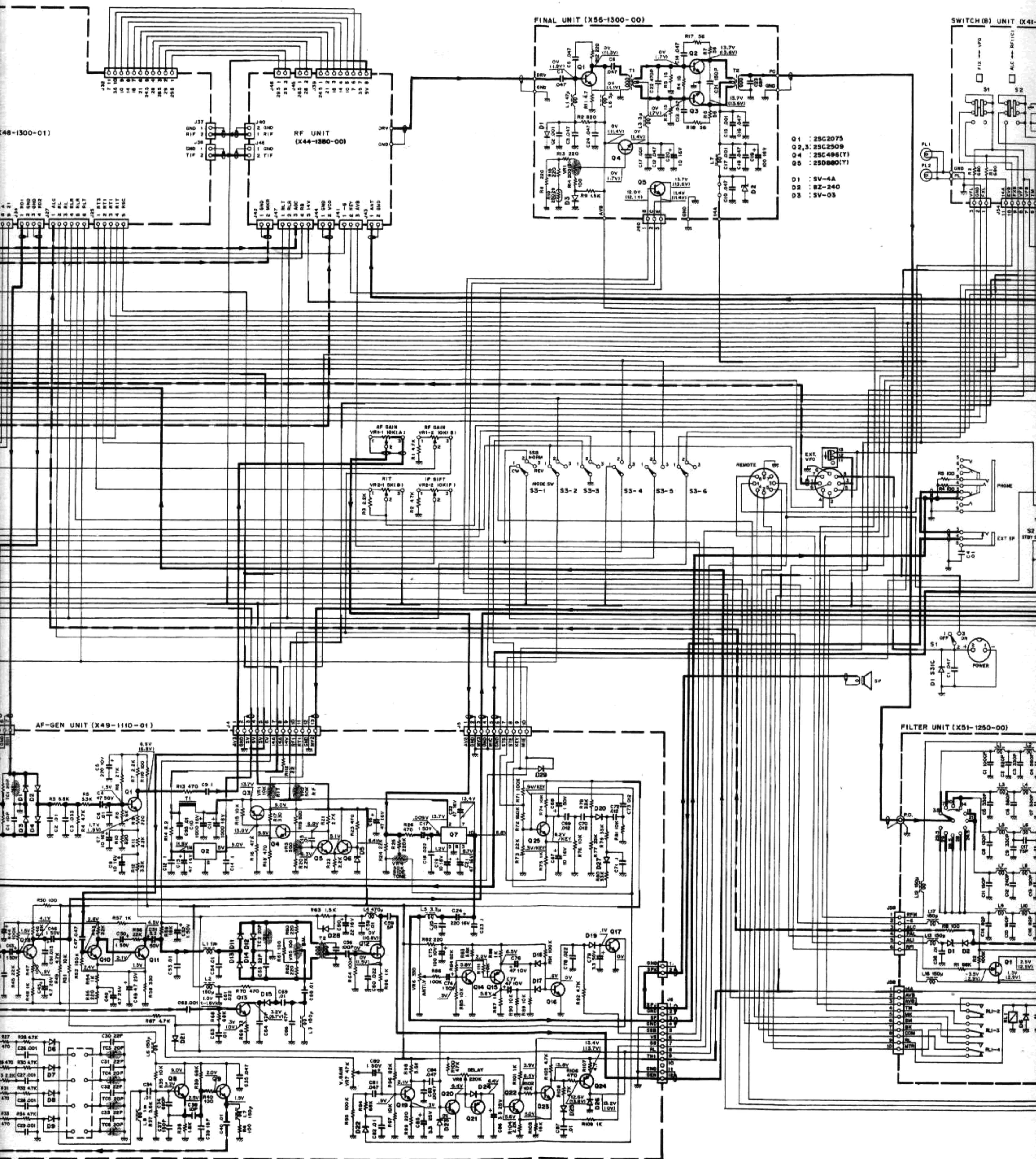
SCHEMATIC DIAGRAM





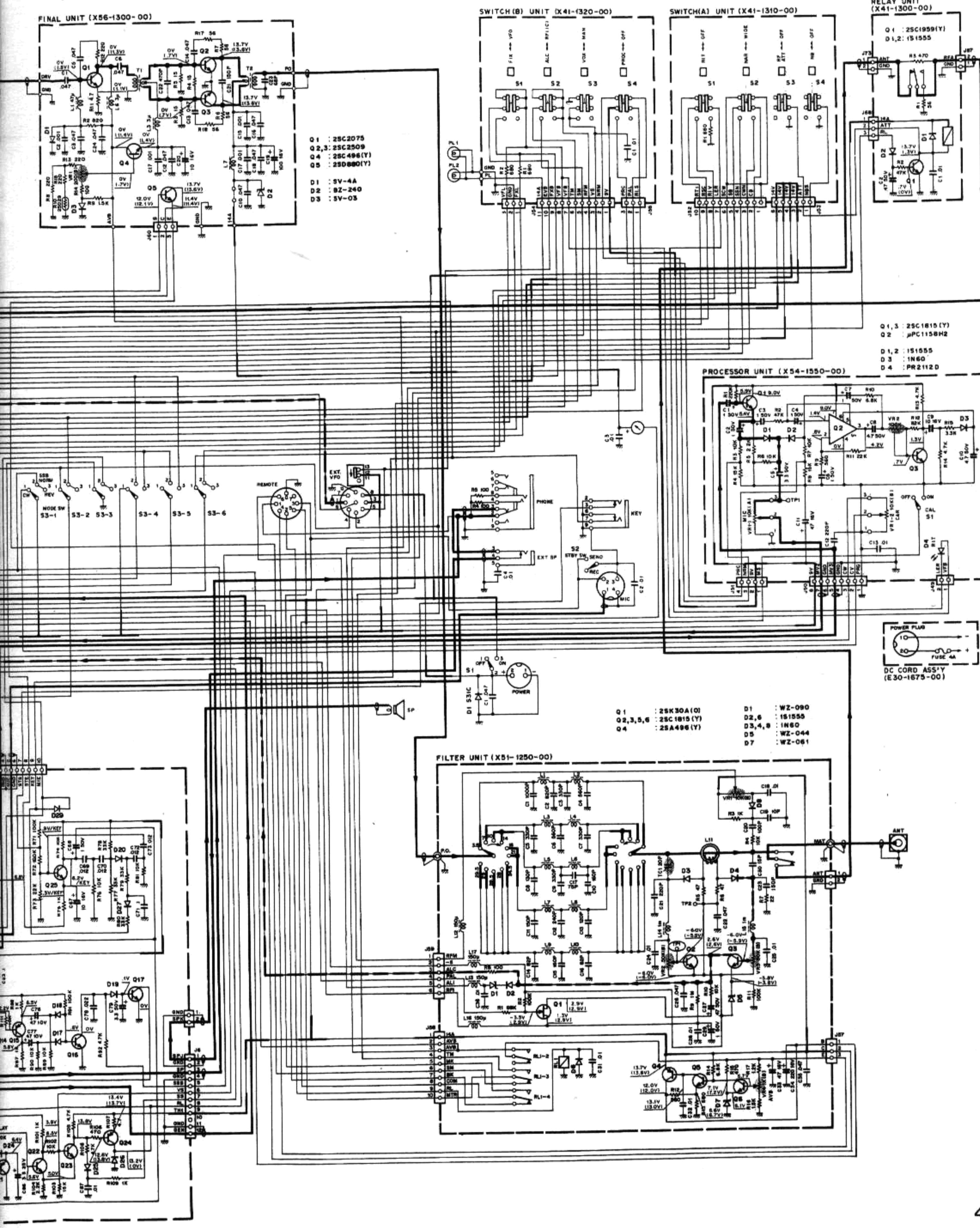
SCHEMATIC DIAGRAM (V) TYPE

Common DC line



C DIAGRAM (V) TYPE

Voltage measurement conditions
f=14.25MHz, MODE SSB, RX no signal, () : in TX



AT-130 PARTS LIST

*: New parts

Ref.No.	Parts No.	Description	Re-marks
GENERAL			
	A01-0752-08	Case (A)	★
	A01-0791-08	Case (B)	★
	A20-2362-03	Die cast panel	
	A20-2401-08	Panel	(T)
	A20-2402-08	Panel	(K),(W)
	B31-0620-08	Meter	★
	B46-0058-00	Warranty card	(K)
	B50-2764-08	Operating manual	(K),(W)
	B50-2765-08	Operating manual	(T) ★
VC1,2	C02-0014-08	Variable capacitor 250pF 1kV	
C6	CM93B2H250J	MC 25pF 500V	
C7	CM93B2H101J	MC 100pF 500V	
C8	CM93B2H131J	MC 130pF 500V	
C9	CM93B2H151J	MC 150pF 500V	
C10	CM93B2H201J	MC 200pF 500V	
C11	CM93B2H251J	MC 250pF 500V	
C12	CM93B2H431J	MC 430pF 500V	
C13	CM93B2H631J	MC 630pF 500V	
C14	CM93B2H571J	MC 570pF 500V	
C15	CM93B2H951J	MC 950pF 500V	
	D23-0061-04	Bearing	
	E04-0102-05	UHF type receptacle	
	E08-0203-25	2P socket	
	E09-0203-25	2P plug	
	E23-0015-04	Earth lug	
	H01-2726-08	Carton case	(T)
	H01-2727-08	Carton case	(K),(W)
	H12-0461-08	Cushion	★
	J02-0069-05	Foot	
	J29-0402-08	Angle	
	J42-0401-04	Knob bush	
	K21-0744-08	Main knob	
	K21-0745-08	Knob BAND	
	K21-0746-04	Knob CAL	
	K27-0406-04	Knob Push	
L3	L34-2003-08	Tuning coil	★
L4	L34-2002-08	Tuning coil	★
L5,6	L34-0849-08	Coil	
	N09-0630-08	Wing screw	★
	N14-0509-05	Wing nut GND	★
	N19-0620-08	Nylon washer	★
VR1	R05-3406-08	Pot. 20kΩ (B) CAL	
S1	S40-2403-05	Push switch	Lamp
S3	S01-5405-08	Rotary switch	BAND
	X41-1280-00	Detector unit	★

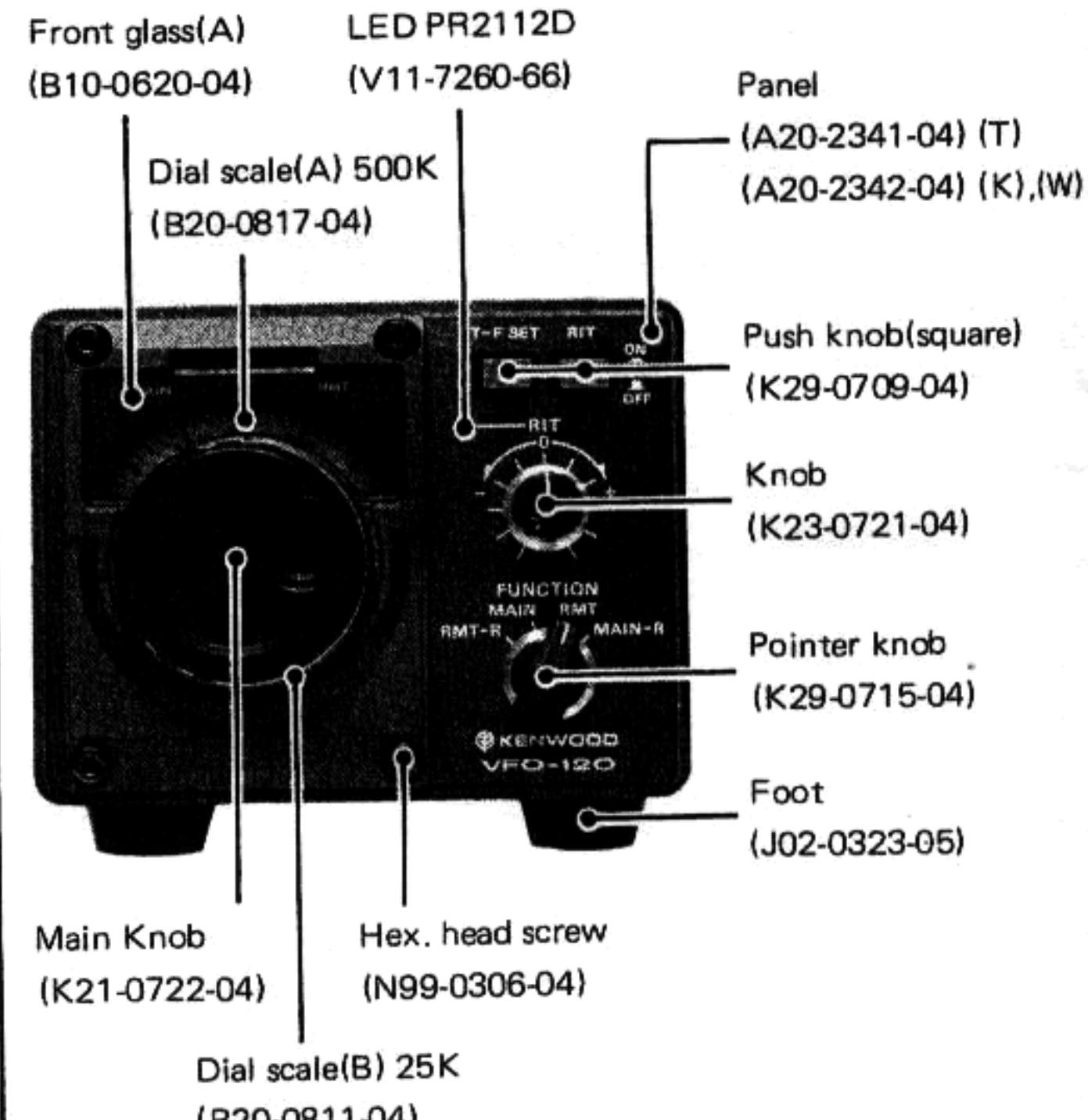
Ref.No.	Parts No.	Description	Re-marks
DETECTOR UNIT (X41-1280-00)			
C1,2	CM93B2H150J	MC 15pF 500V	
L1,2	L39-0403-08	Pick up coil	
D1,2	V11-7763-26	Diode 2-1K261	

VFO-120 SPECIFICATIONS

Oscillator frequency	5.50~6.00MHz
Oscillator circuit	Clapp
Output voltage	0.2V ±1dB(across 470-ohm load)
Frequency stability	Within 100Hz per 30 minutes after 3 minutes warm-up (at room temperature).
Solid-state complement	FET : 2 Transistor : 2 Diode : 6
Power source	From TS-120/TS-130
Dimensions	123(4-7/8)W X 96(3-13/16) H-X 235(9-1/4) D mm (inches)
Weight	2.5kg(5.5lbs)

NOTE: The circuit and ratings may change without notice due to developments in technology

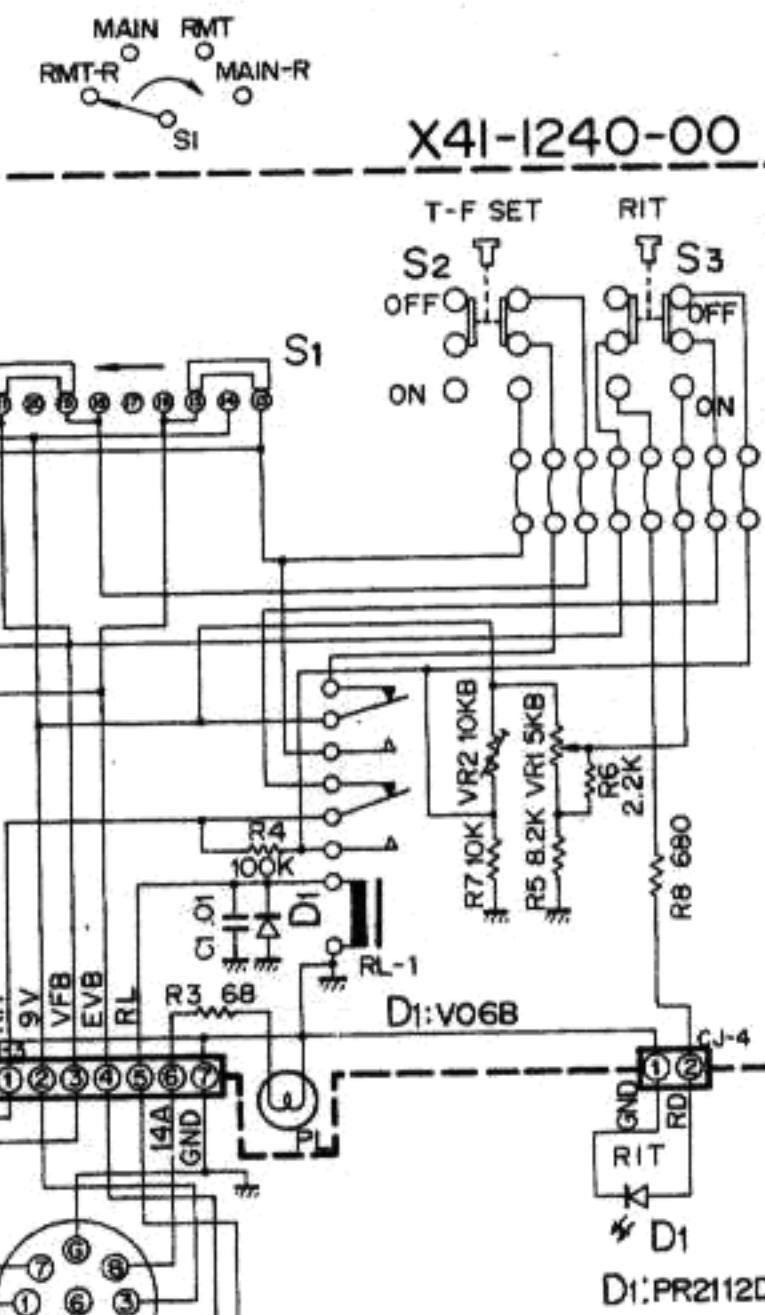
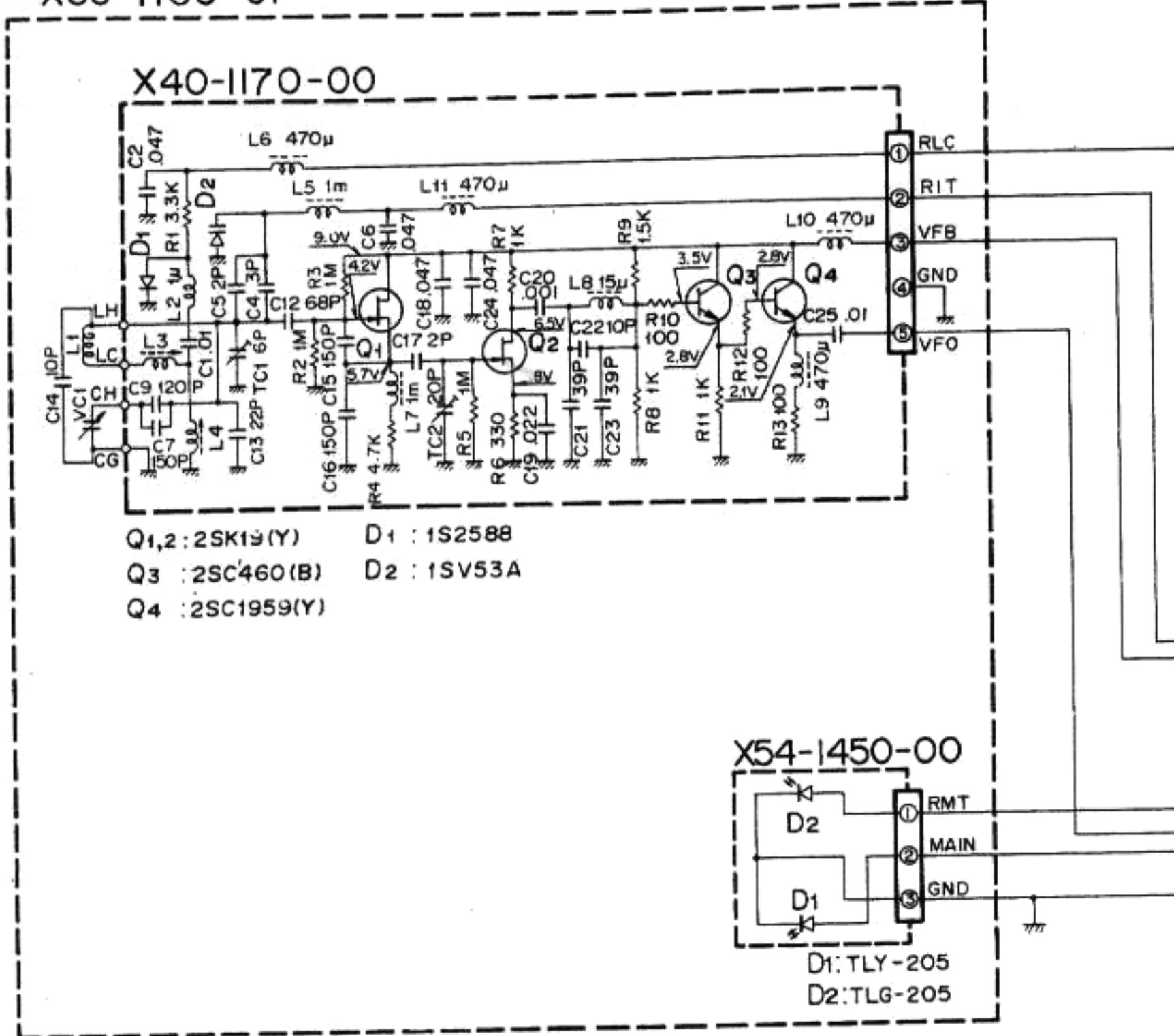
VFO-120 OUTSIDE VIEW



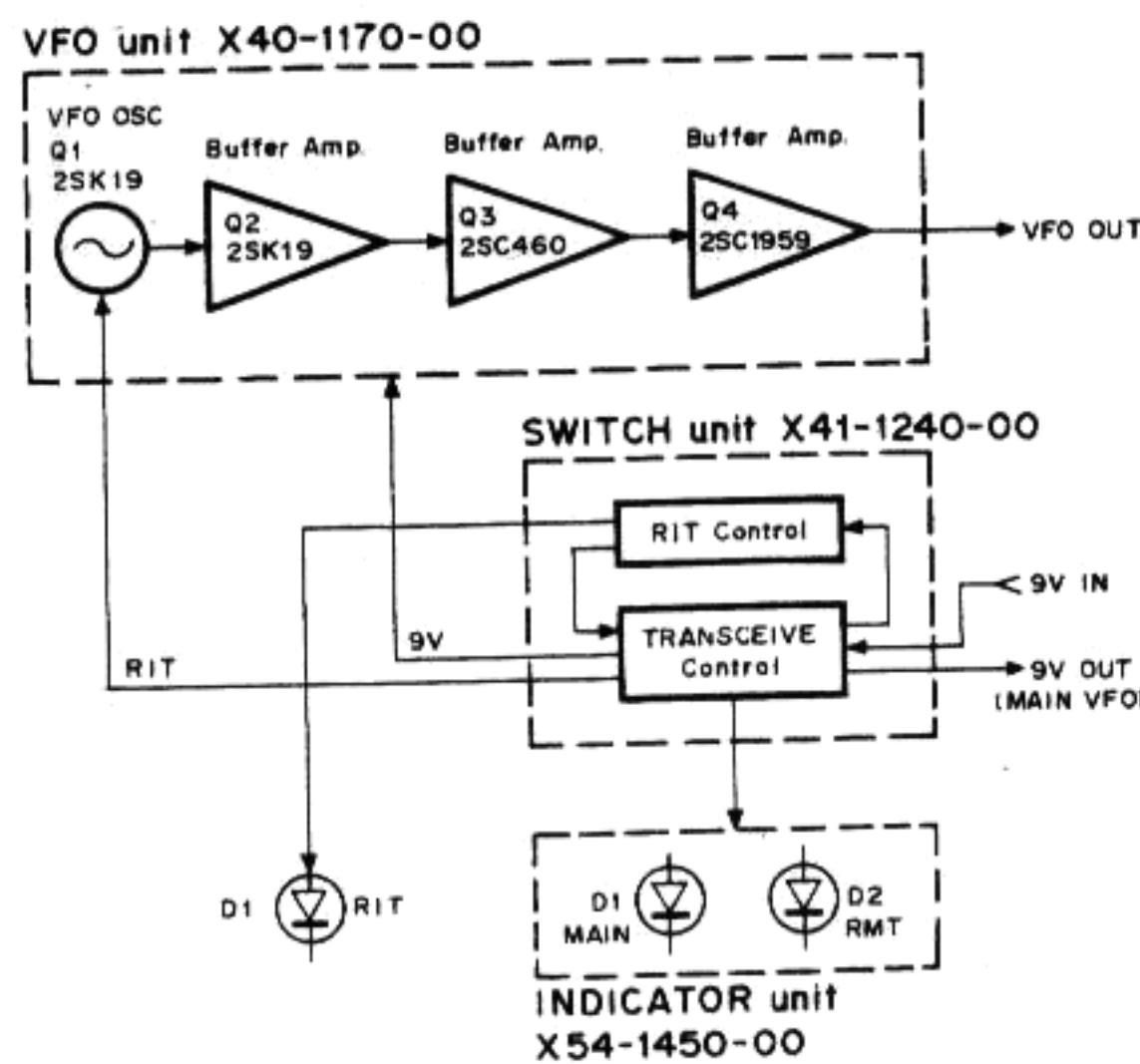
VFO-120

SCHEMATIC DIAGRAM

X60-1160-01



BLOCK DIAGRAM

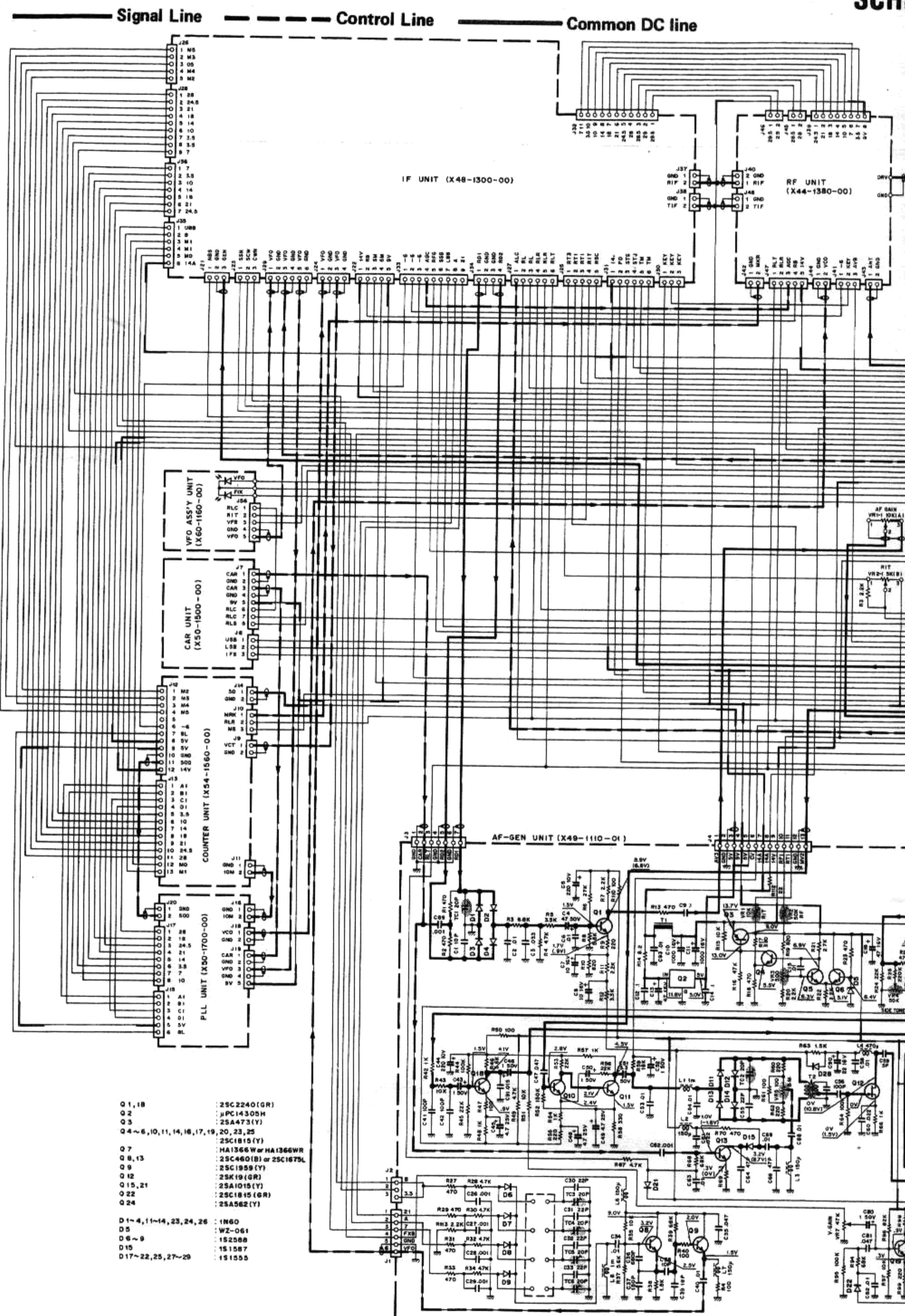


PARTS LIST

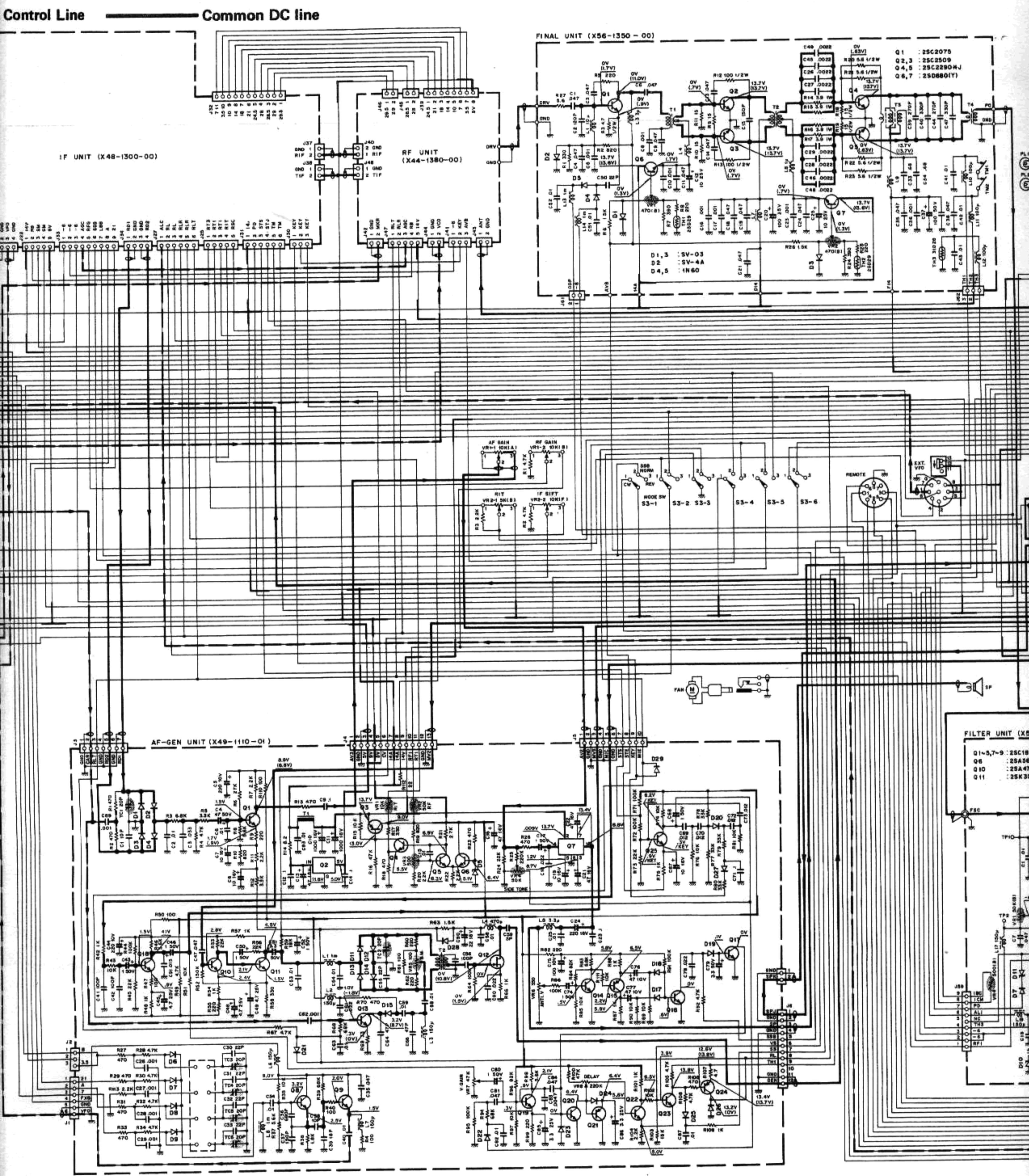
*: New parts

Ref.No.	Parts No.	Description	Remarks
GENERAL			
A01-0739-03	Case(A) upper		
A01-0740-03	Case(B) lower		
A20-2341-04	Panel	(T)	
A20-2342-04	Panel	(K),(W)	
B39-0407-04	Spacer for foot		
B46-0058-00	Warranty card	(K)	
B50-2633-10	Operating manual	(K),(W)	
B50-2634-10	Operating manual	(T)	
E02-0107-05	Diode socket		
E06-0852-05	8P DIN socket		
E30-1623-05	Earth cable		
E30-1628-15	VFO cable		
E31-0482-15	Connector with lead		
G09-0405-05	Spring		
H01-2609-04	Carton case (inside)	(K),(W)	
H01-2610-04	Carton case (inside)	(T)	
H10-2513-02	Packing fixture (F)		
H10-2514-02	Packing fixture (R)		
H12-0445-04	Cushion		
H20-1407-03	Protective cover		
H25-0117-04	Accessories bag 80X250		

SCHEM



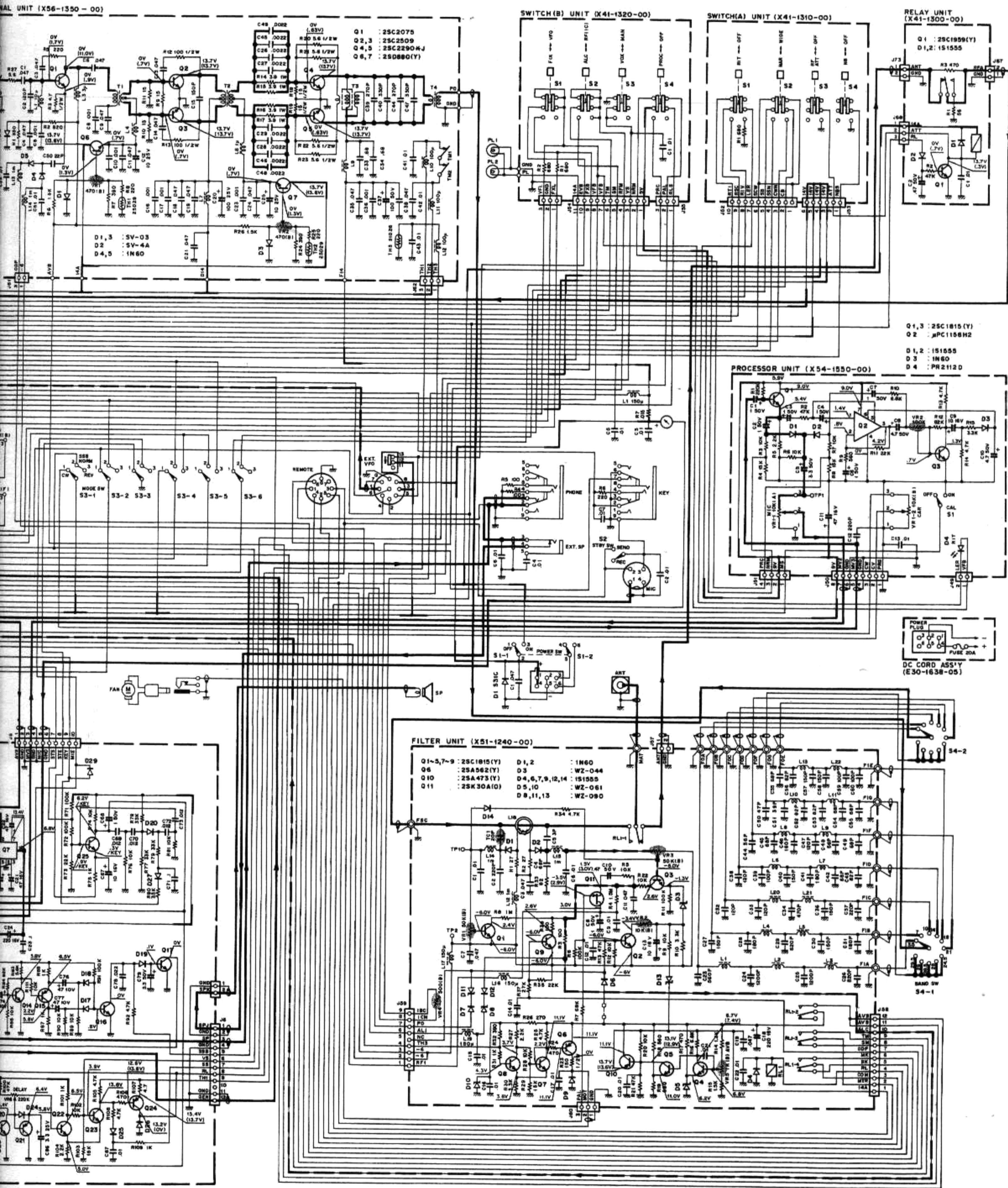
SCHEMATIC DIAGRAM (S) TYPE



STATIC DIAGRAM (S) TYPE

Voltage measurement conditions

f=14.25MHz, MODE SSB, RX no signal. () : in TX



TS-130SV

VFO-120

Ref.No.	Parts No.	Description	Re-marks	Ref.No.	Parts No.	Description	Re-marks
VFO UNIT (X40-1170-00)							
	J02-0323-05	Foot		C2	C91-0456-05	C 0.047μF 25V	
	J02-0409-04	Assistance foot		C4	CC45RG1H030C	C 3pF ±0.25pF	
	J61-0019-05	Vinyle tie		C5	CC45PG1H020C	C 2pF ±0.25pF	
	K23-0721-04	Knob RIT		C6	C91-0456-05	C 0.047μF 25V	
	K29-0709-04	Push knob (square)		C7	CC45LG1H151J	C 150pF	
	K29-0715-04	Pointer knob FUNCTION		C9	CC45LG1H121J	C 120pF	
	N14-0509-05	Wing nut		C12	CC45LG1H680J	C 68pF	
	N99-0306-04	Hex. head screw (VFO M4X10)		C13	CC45LG1H220J	C 22pF	
D1	V11-7260-66	LED PR2112D RIT		C14	CC45CG1H100D	C 10pF ±0.5pF	
	X41-1240-00	Switch unit		C15,16	CC45LG1H151J	C 150pF	
	X60-1160-01	VFO ass'y unit	☆	C17	CC45CH1H020C	C 2pF ±0.25pF	
				C18	C91-0456-05	C 0.047μF 25V	
				C21	CC45SL1H390J	C 38pF	
				C22	CC45CH1H100D	C 10pF ±0.5pF	
				C23	CC45SL1H390J	C 39pF	
				C24	C91-0456-05	C 0.047μF 25V	
					C02-0019-05	Variable capacitor	☆
SWITCH UNIT (X41-1240-00)							
	B30-0818-05	Pilot lamp		TC1	C05-0009-15	Ceramic trimmer	6pF
CJ-1	E40-0373-05	Mini connect wafer	3P	TC2	C05-0013-15	Ceramic trimmer	20pF
CJ-3	E40-0774-05	Mini connect wafer	7P				
CJ-4	E40-0274-05	Mini connect wafer	2P				
VR1	R01-2404-05	Pot. 5kΩ (B) RIT			D40-0614-05	Dial mechanism ass'y	☆
VR2	R12-3025-05	Pot. 10kΩ (B)			E40-0674-05	Mini connect wafer	5P
S1	S29-1410-05	Slide rotary switch		L1	L32-0628-05	OSC coil	☆
S2	S40-2409-15	Push switch T-F SET		L2	L33-0025-05	Choke coil 1μH	☆
S3	S40-2404-05	Push switch RIT		L3	L32-0629-05	OSC coil (C)	☆
RL1	S51-2408-05	Relay G2V-2		L4	L32-0609-05	OSC coil (B)	
D1	V11-0219-05	Diode V06B		L5	L40-1021-03	Ferri-inductor 1mH	
				L6	L40-4711-03	Ferri-inductor 470μH	
				L7	L40-1021-03	Ferri-inductor 1mH	
				L8	L40-1501-03	Ferri-inductor 15μH	
				L9~11	L40-4711-03	Ferri-inductor 470μH	
					R92-0150-05	Short jumper	
VFO ASS'Y UNIT (X60-1160-01)							
	B01-0621-04	Dial escutcheon		Q1,2	V09-0011-05	FET 2SK19(Y)	
	B08-4301-04	Dial back board		Q3	V03-0079-05	TR 2SC460(B)	
	B10-0620-04	Front glass (A) MAIN·RMT	☆	Q4	V03-1959-06	TR 2SC1959(Y)	
	B20-0811-04	Dial scale (B) 25K					
	B20-0817-04	Dial scale (A) 500K	☆	D1	V11-0414-05	Diode 1S2588	
	B42-1645-04	Seal bottom		D2	V11-4161-36	Varicap diode 1SV53A	
	B42-1671-04	Seal top					
	G01-0840-04	Coil spring					
	K21-0722-04	Main knob					
	N19-0608-04	Washer Main knob		INDICATOR UNIT (X54-1450-00)			
	X40-1170-00	VFO unit		D1	V11-3163-16	LED TLY-205 MAIN	
	X54-1450-00	Indicator unit		D2	V11-3162-86	LED TLG-205 RMT	

BLOCK DIAGRAM

