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KENWOOD

SERVICE MANUAL

Model TL-120



LINEAR AMPLIFIER

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SPECIFICATIONS

Transmit Frequency Range:	3.5 MHz ~ 29.7 MHz
Exciter Power:	10W
Collector Input:	3.5 MHz ~ 21 MHz, 160W 28 MHz, 140W
Input, Output Impedance:	50Ω
Power Supply:	DC 12 ~ 16V (13.8V)
Power Consumption:	15A (DC 13.8V)
Semiconductor Complement:	
Transistors:	20
Diodes:	22
Dimensions:	123 (123) Wide x 97 (107) High x 235 (265) Deep Values in parenthesis include protrusions.
Weight:	2.3 kg

NOTE:

Specifications are subject to change for improvements.

CIRCUIT DESCRIPTION

Power Reduction Circuit against Mis-matched Load

When the load impedance is other than 50Ω ($VSWR > 1$), the ALC circuit tries to keep the travelling wave level at the rated level so that the power transistors are not overdriven. In such a case, the power loss and amplifier deterioration increases eventually leading to breakdown. To prevent this, the reflected wave is detected and used to regulate down the amplifier driving power. The power amplifier operates then as if the supply voltage is lowered. The circuit is designed so that the travelling wave level is decreased to about 35W when a load of 150Ω is connected ($VSWR=3$).

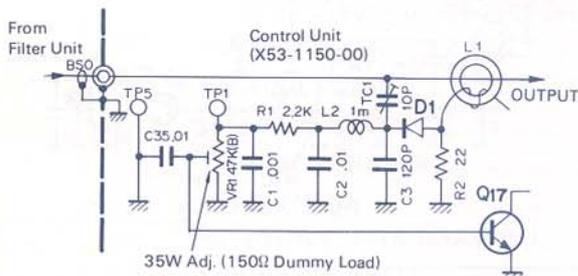


Fig. 3 Power reduction circuit against mis-matched load

Power Reduction Circuit against Supply Voltage Drop

If the supply voltage drops, the maximum allowable amplitude of the collector voltage of the power transistors is lowered. However, the ALC circuit operates to keep the rated output power, resulting in overdrive of the power

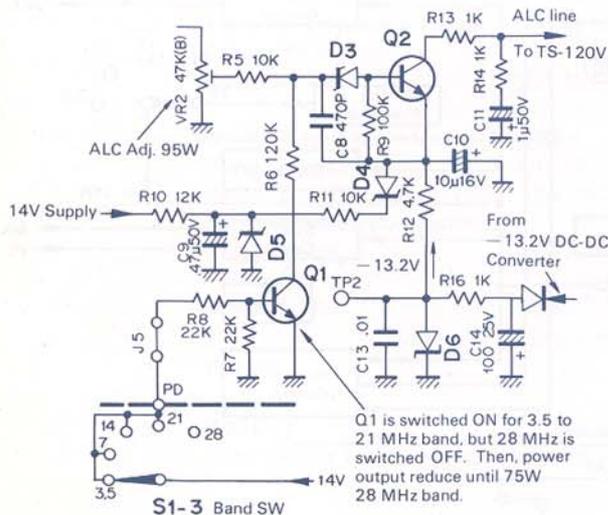
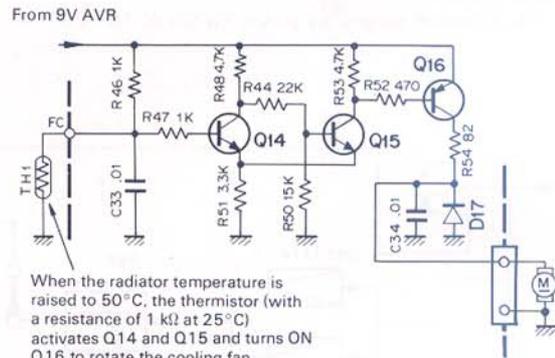


Fig. 4 Power reduction circuit against supply voltage drop and power reduction circuit for 28 MHz

amplifier. This, increase in distortion causes unstable operation of the amplifier. To prevent this, the ALC threshold level is regulated by the supply voltage so that the limited power level by ALC is reduced when the supply voltage drops. When the supply voltage rises, the limited power level by ALC also increases, and, a circuit which is provided keeps the output power constant if the supply voltage exceeds about 14V.

Radiator Temperature Control Fan Circuit

A thermistor is mounted on the radiator for power amplifier control of the cooling fan. (The circuit is the same as that used for TS-120S.) Even if the LINEAR switch is turned to set the linear amplifier in a standby state, the cooling fan continues to operate until the radiator temperature drops to a certain level.



When the radiator temperature is raised to 50°C , the thermistor (with a resistance of $1\text{ k}\Omega$ at 25°C) activates Q14 and Q15 and turns ON Q16 to rotate the cooling fan.

Fig. 5 Radiator temperature detecting type cooling fan control circuit

Erraneous BAND Switch Setting Protection Circuit

The power amplifier is a push-pull broad-band amplifier which has no tuning circuit. Therefore, higher harmonic components must be suppressed by some other means. For this purpose, a LPF is provided for each band and the LPF used is selected by the BAND switch. The input impedance of LPF viewed from the power amplifier varies greatly at frequencies higher than the cut-off frequency even if the 50Ω load is connected to the output.

If the exciter frequency exceeds the LPF cut-off frequency, i.e. the band setting of TS-120V is different from that of TL-120, the power amplifier load is greatly mis-matched, and results in an abnormal operation of the power transistors. To prevent this, a reflected wave detection circuit is provided between the power amplifier and LPF. This circuit actuates the protection circuit when it detects a reflected wave from an incorrect band setting.

CIRCUIT DESCRIPTION/SEMICONDUCTOR DATA

The protection circuit places TL-120 on standby and is directly connected to the antenna.

To release the protection circuit, set the exciter to receive and the BAND switch of TL-120 to the same band as the exciter. Set the LINEAR switch to the STBY position. After the PROTECTION Indicator goes off, switch from LINEAR to OPERATE. This protection circuit functions only when the exciter frequency is higher than the LPF cut-off frequency (band setting of TL-120 < band setting of TS-120V). When band setting of TL-120 > band setting of TS-120V, the input impedance of LPF matches with the power amplifier, and the protection circuit is inoperative. However, higher harmonic components may pass through LPF, resulting in deterioration of the transmitted signal quality. When a problem occurs in the antenna system and VSWR increases greatly, this protection circuit may cut in before the power reduction mismatched protection circuit.

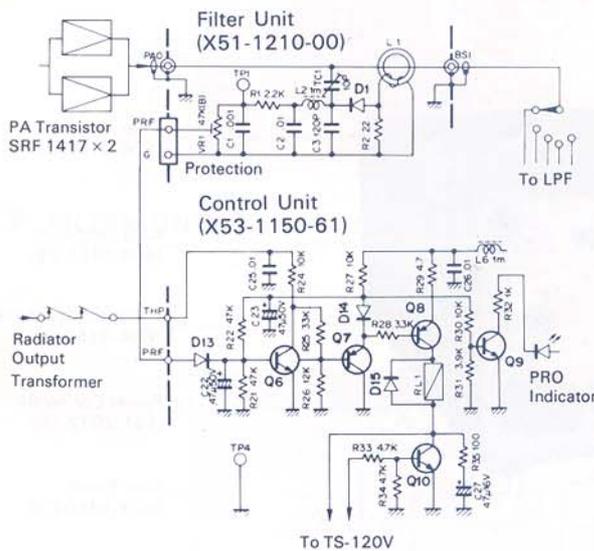


Fig. 6 Erroneous BAND switch setting protection circuit, Radiator and output transformer overheat protection circuits

Radiator and Output Transformer Overheat Protection

In the normal operation, the cooling fan prevents the power transistor temperature from rising greatly. However, if the ventilation is not sufficient, transmission is continuous, or if the cooling fan circuit mal functions, this temperature may rise steeply. As a precaution, two overheat protection circuits are provided. One is a thermostat which detects and opens when the temperature of the radiator exceeds 90°C. The other also a thermostat connects the output transformer and opens when the temperature exceeds 170°C. When one of these thermostats opens, TL-120 is brought into STBY and TS-120V is connected directly to the antenna. If

any of these protection circuits operate, set the LINEAR switch to the STBY position, take countermeasures to cool the instrument until the PROTECTION indicator goes off. (Protection will not be released unless the LINEAR switch is set to the STBY).

Collector Current Measuring Terminals

A 15 mΩ shunt resistor is provided in the collector power supply circuit of the power transistors. Measuring terminals are connected to the both ends of the resistor. The collector current is found by measuring the voltage across the resistor. As a correction circuit is provided, a precise value can be obtained. The conversion rate is 10A/0.1V.

Semiconductor Data

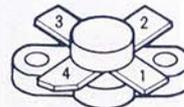
SRF 1714 V08-1011-06 (Q1, 2 on the PA Unit)

Application: RF band power amplifier

Absolute Maximum Ratings (TA = 25°C)

Item	V _{CEO}	V _{CBO}	V _{EB0}	I _c	P _D	T _{stg}	R _{θJC}
Value	25V	45V	4.0V	20A	250W	-65 ~ 200°C	0.7° C/W

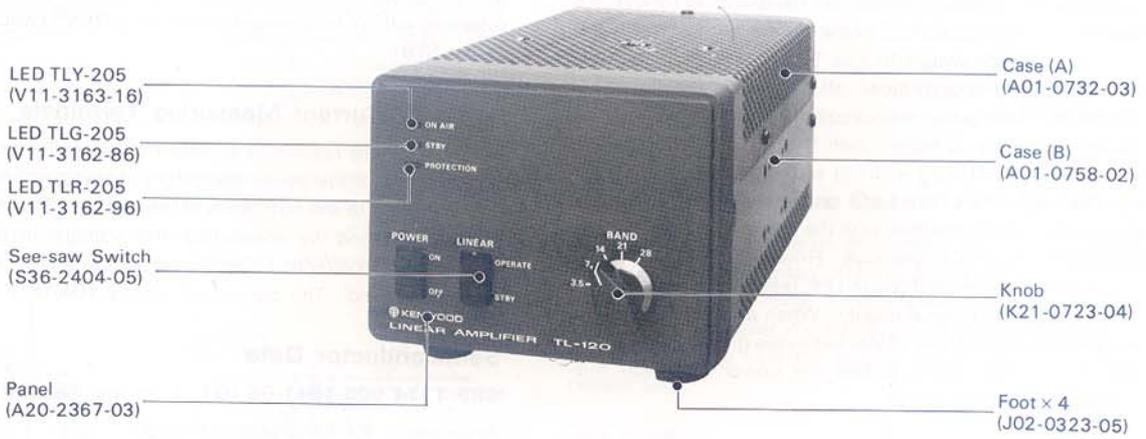
Color	h _{FE}	
	Minimum	Maximum
Red	20	32
Orange	28	42
Yellow	38	52
Green	48	63
Blue	57	78
Violet	72	93
Black	87	108
Brown	100	120



1. EMITTER
2. BASE
3. EMITTER
4. COLLECTOR

OUTSIDE VIEWS/INSIDE VIEWS

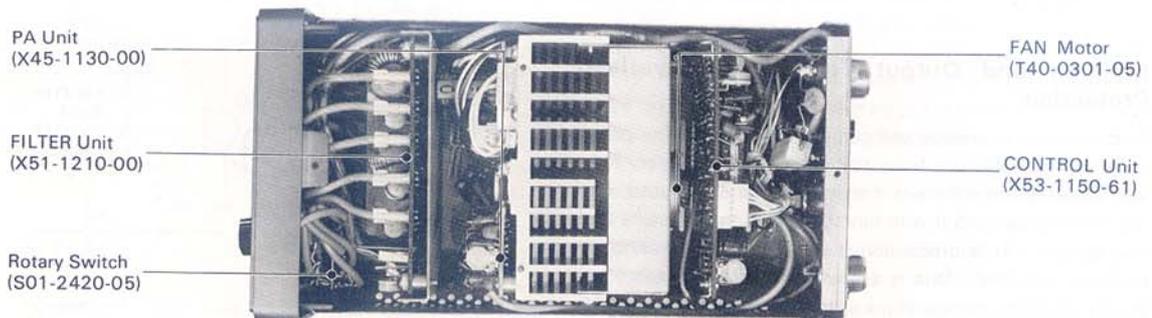
FRONT PANEL



REAR PANEL

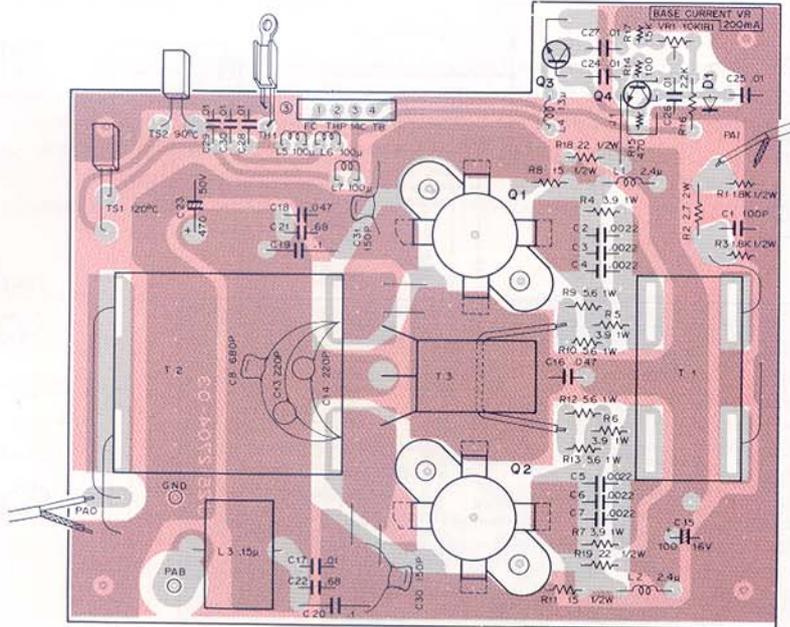


TOP VIEWS



PC BOARD

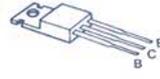
▼ PA UNIT (X45-1130-00)



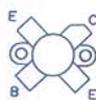
2SC733 (Y)



2SD235 (Y)

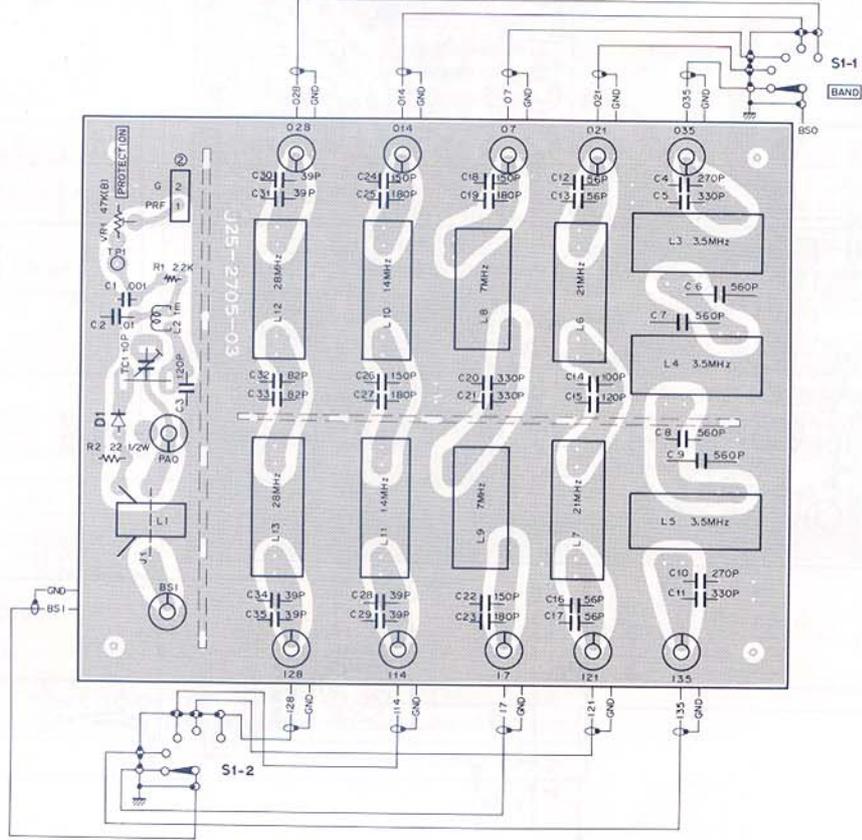


SRF1714



- Q1,2 : SRF1714
- Q3 : 2SD235(Y)
- Q4 : 2SC733(Y)
- D1 : SV-03

▼ FILTER UNIT (X51-1210-00)



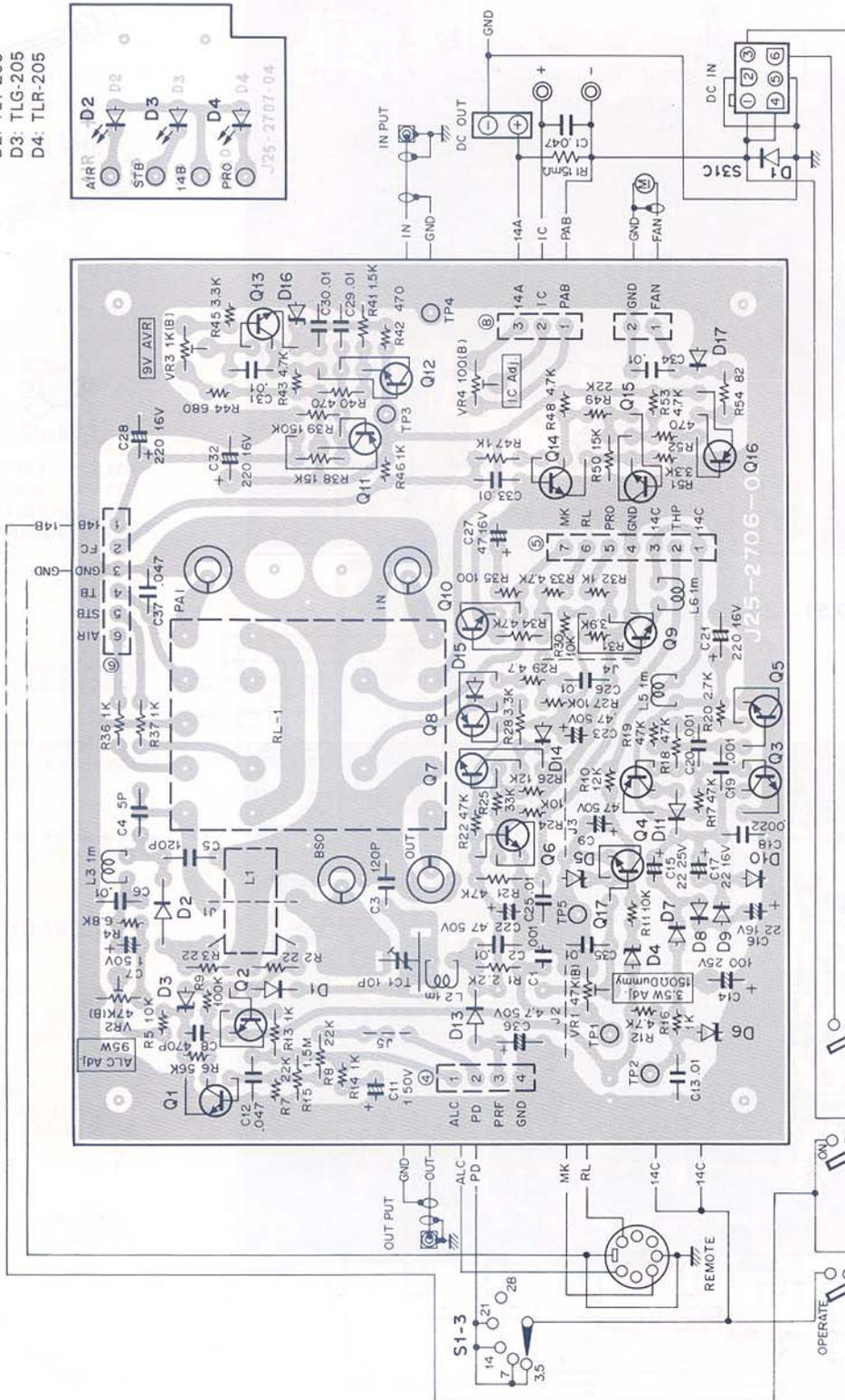
D1: 1N60

PC BOARD

▼ LED PC BOARD (J25-2707-04)

▼ CONTROL UNIT (X53-1150-61)

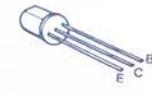
D2: TLY-205
D3: TLG-205
D4: TLR-205



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



2SA562(Y)



2SA496(Y)



- Q1 ~ 3.5 ~ 7.9, 12 ~ 15, 17
- Q4 : 2SC1815(Y)
- Q8, 16 : 2SA1015(Y)
- Q10 : 2SC1959(Y)
- Q11 : 2SA496(Y)
- D1 : 1N60
- D2.7 ~ 11, 13 ~ 15, 17
- D3 : 1S1555
- D4 : XZ-142
- D5 : XZ-162
- D6 : WZ-090
- D16 : XZ-132
- D16 : WZ-061

PARTS LIST

Note 1:

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

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 PC board illustration. Resistors not otherwise detailed are carbon type (1/4 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



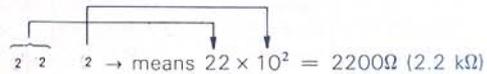
RD14CY

2. Wattage

1/4W → 2E

1/8W → 2B

3. Resistance value



Significant figure

Multiplier

Example: 221 → 220Ω
222 → 2.2 kΩ
223 → 22 kΩ

224 → 220 kΩ
225 → 2.2 MΩ

4. Tolerance

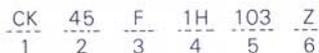
J = ±5% (Gold)

K = ±10% (Silver)

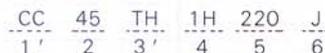
- 1 = Type ceramic, electrolytic, etc.
- 2 = Shape ... round, square, etc.
- 3 = Temp. range
- 3' = Temp. coefficient
- 4 = Voltage rating
- 5 = Value
- 6 = Tolerance

CAPACITORS

Type I



Type II



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 10μF -10~+50 Less than 4.7μF -10~+75

Less than 10 pF

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

5 = Capacitor value

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

3 = CK45F

Ceramic capacitor (Type I) 3

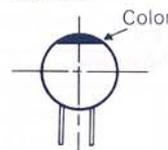
Cord	B	D	E	F
Operating temperature °C	-30 +85	-30 +85	-30 +85	-10 +70

3' = CC4500

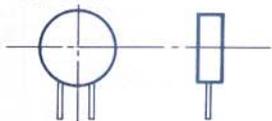
Ceramic capacitor (Type II) temperature coeff. capacitor 1' 3'.

1st word (Color)	CH (Black)	LH (Red)	PH (Orange)	RH (Yellow)	SL (Green)	TH (Blue)	UH (Violet)
ppm/°C	0	-80	-150	-220	-330	-470	-750

CC45.....



CK45



Type II 45

PARTS LIST

GENERAL ☆ New parts

Ref. No.	Parts No.	Description	Re- marks
C1	CK45F1H473Z	Ceramic 0.047 μ F +80%, -20%	
R1	R92-0620-05	Cement resistor 5m Ω	
D1	V11-2163-86	Diode S31C	
D2	V11-3163-16	LED TLY-205	
D3	V11-3162-86	LED TLG-205	
D4	V11-3162-96	LED TLR-205	
S1	S01-2420-05	Rotary switch BAND	☆
S2,3	S36-2404-05	See-Saw switch POWER, MODE	☆
	A01-0732-03	Case (A)	
	A01-0758-02	Case (B)	☆
	A20-2367-03	Panel	☆
	A23-1440-04	Rear panel	☆
	B39-0407-04	Spacer \times 2 for assistance leg	
	B50-2681-00	Operating manual	☆
	E04-0152-05	M type receptacle \times 2 OUTPUT, INPUT	
	E06-0151-05	Chip JACK (Red) Ic terminal	☆
	E06-0102-05	Chip JACK (Black) Ic terminal	☆
	E06-0751-05	7P DIN Socket REMOTE	
	E20-0282-05	2P terminal plate DC13.8V 4A OUT	
	E30-1637-05	Cable	
	E30-1638-05	DC cord	
	E30-1640-05	REMOTE Cable	
	E31-2018-05	Coaxial Cable A BAND	☆
	E31-2022-05	Square Connector	
	F05-2034-05	Fuse (20A) \times 2	
	F09-0405-04	Fan	
	H01-2647-04	Carton	☆
	H10-2513-02	Front packing fixture (F)	
	H10-2514-03	Rear packing fixture (R)	
	H12-0465-04	Cushion	☆
	H20-1407-03	Protective cover	
	H25-0029-04	Protective bag 60 \times 110 mm	
	H25-0112-04	Protective bag 180 \times 250 mm	
	J02-0323-05	Foot \times 4	
	J02-0409-04	Assistance foot	
	J13-0404-05	Fuseholder	
	J19-1317-04	Diodeholder	
	J61-0201-05	Vinyle tie	
	K21-0723-04	Pointer knob BAND SW	
	N09-0256-05	Earth screw \times 3	
	N14-0509-05	Wing nut GND terminal	
	T40-0301-05	FAN motor	
	X42-1120-10	Coaxial cable ass'y	
	X45-1130-00	PA unit	☆
	X51-1210-00	FILTER unit	☆
	X53-1150-00	CONTROL unit	☆

PA UNIT (X45-1130-00)

Ref. No.	Parts No.	Description	Re- marks
CAPACITOR			
C1	CC45SL2H101J	Ceramic 100pF \pm 5%	
C2~7	CK45D2H222M	Ceramic 0.0022 μ F \pm 20%	
C8	CM93D2H681J	Mica 680pF \pm 5%	
C13,14	CC45SL2H221J	Ceramic 220pF \pm 5%	
C15	CE04W1C101Q	Electrolytic 100 μ F 16W	
C16	C91-0465-05	Ceramic 0.047 μ F 25V	
C17	CK451H103Z	Ceramic 0.01 μ F +80, -20%	
C18	C91-0456-05	Ceramic 0.047 μ F 25V	
C19,20	CK45F1H104Z	Ceramic 0.1 μ F +80, -20%	
C21,22	C91-0448-05	Layer built 0.68 μ F	
C23	CE04W1H471Q	Electrolytic 470 μ F 50WV	
C24~30	CK45F1H103Z	Ceramic 0.01 μ F +80, -20%	
C10,12	NOT USED		
C30,31	CM93D2H151J	Mica 150pF \pm 5%	
RESISTOR/POTENTIO METER			
R2	RS14AB3D2R7J	Metal 2.7 Ω \pm 5% 2W	
R4~7	RS14AB3A3R9J	Metal 3.9 Ω \pm 5% 1W	
R9,10	RS14AB3A5R6J	Metal 5.6 Ω \pm 5% 1W	
R12,13	RS14AB3A5R6J	Metal 5.6 Ω \pm 5% 1W	
R1,3	RC05GF2H ∞ ∞ J	Solid ∞ ∞ Ω \pm 5% 1/2W	
8,11			
R14~17	RD14CB2E ∞ ∞ J	Carbon ∞ ∞ Ω \pm 5% 1/4W	
VR1	R12-3419-05	Semi-fixed resistor 10k Ω (B)	☆
SEMICONDUCTOR			
Q1,2	V08-1011-06	Transistor SRF1714	
Q3	V04-0046-05	Transistor 2SD235(Y)	
Q4	V03-0183-05	Transistor 2SC733(Y)	
D1	V22-0031-05	Diode SV-03	
COIL/TRANSFORMER			
L1,2	L33-0624-05	Choke coil 2.4 μ H	
L3	L33-0622-15	Choke coil B 15 μ H	
L4	L33-0025-05	Choke coil 1.3 μ H	
L5~7	L40-1011-03	Ferri-inductor 100 μ H	
T1	L13-0305-05	Input matching transformer	
T2	L19-0312-05	Output transformer	
T3	L19-0313-15	NF Transformer	
MISCELLANEOUS			
TH1	V11-2260-16	Thermistor STP31L	
TS1	S59-1403-05	Thermostat (insulating type 120 $^{\circ}$ C)	
TS2	S59-1404-05	Thermostat (insulating type 90 $^{\circ}$ C)	
	E31-0451-05	Cable A DC (RED)	
	E31-0452-05	Cable B DC (BLACK)	
	F20-0078-05	Insulating mica	
	F29-0014-05	Insulating washer	
	J31-0510-04	Spacer \times 4	

PARTS LIST

FILTER UNIT (X51-1210000)

Ref. No	Parts No.	Description	Re- marks
CAPACITOR			
C3	CC45CH1H121J	Ceramic 120pF ±5%	
C4	CC45SL2H271J	Ceramic 270pF ±5%	
C5	CC45SL2H331J	Ceramic 330pF ±5%	
C6	CC45SL2H561J	Ceramic 560pF ±5%	
C7	CC45SL2H561J	Ceramic 560pF ±5%	
C8	CC45SL2H561J	Ceramic 560pF ±5%	
C9	CC45SL2H561J	Ceramic 560pF ±5%	
C10	CC45SL2H271J	Ceramic 270pF ±5%	
C11	CC45SL2H331J	Ceramic 330pF ±5%	
C12.13	CC45SL2H560J	Ceramic 56pF ±5%	
C14	CC45SL2H101J	Ceramic 100pF ±5%	
C15	CC45SL2H121J	Ceramic 120pF ±5%	
C16.17	CC45SL2H560J	Ceramic 56pF ±5%	
C18	CC45SL2H151J	Ceramic 150pF ±5%	
C19	CC45SL2H181J	Ceramic 180pF ±5%	
C21.21	CC45SL2H331J	Ceramic 330pF ±5%	
C22	CC45SL2H151J	Ceramic 150pF ±5%	
C23	CC45SL2H181J	Ceramic 180pF ±5%	
C24	CC45SL2H151J	Ceramic 150pF ±5%	
C25	CC45SL2H181J	Ceramic 180pF ±5%	
C26	CC45SL2H151J	Ceramic 150pF ±5%	
C27	CC45SL2H181J	Ceramic 180pF ±5%	
C28~31	CC45SL2H390J	Ceramic 39pF ±5%	
C32.33	CC45SL2H820J	Ceramic 82pF ±5%	
C34.35	CC45SL2H390J	Ceramic 39pF ±5%	
TRIMMER/POTENTIOMETER			
TC1	C05-0042-05	Ceramic trimmer 10pF	
VR1	R12-3054-05	47k!(B) PROTECTION Adj.	
SEMICONDUCTOR/COIL			
D1	V11-0051-05	Diode 1N60	
L1	L39-0406-05	Detector coil	
L2	L40-1021-03	Ferri-inductor 1mH	
L3~5	L34-0896-05	Filter coil (A) 3.5 MHz	
L6.7	L34-0829-05	Filter coil (D) 21 MHz	
L8.9	L34-0827-05	Filter coil (B) 7 MHz	
L10.11	L34-0828-05	Filter coil (C) 14 MHz	
L12.13	L34-0830-05	Filter coil (E) 28 MHz	
MISCELLANEOUS			
	E04-0154-05 E23-0047-05	Coaxial connector × 12 Terminal	☆
	J31-0502-04 J42-0404-05	PC Board color PC Board bush	

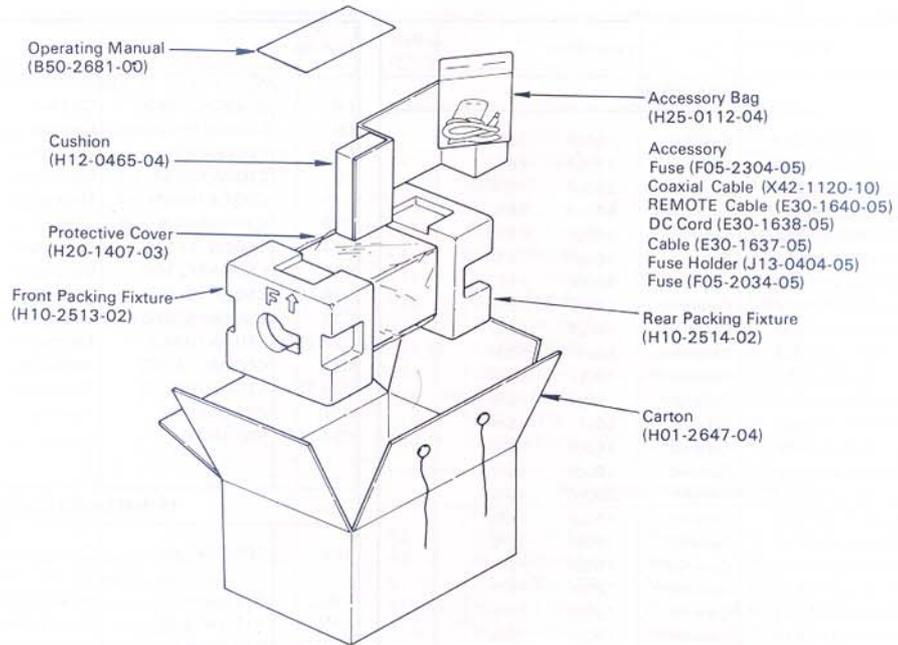
CONTROL UNIT (X53-1150-61)

Ref. No.	Parts No.	Description	Re- marks
CAPACITOR			
C3	CC45CH1H121J	Ceramic 120pF ±5%	

Ref. No	Parts No.	Description	Re- marks
C4	CC45CH2H050C	Ceramic 5pF ±0.25pF	
C5	CC45CH1H121J	Ceramic 120pF ±5%	
C7	CE04W1H010	Electrolytic 1μF 50WV	
C9	CE04W1HR47	Electrolytic 0.47μF 50WV	
C11	CE04W1H010	Electrolytic 1μF 50WV	
C12	C91-0456-05	Ceramic 0.047μF 25V	
C14	CE04W1E101Q	Electrolytic 100μF 25WV	
C15	CE04W1E220Q	Electrolytic 22μF 25WV	
C16.17	CE04W1C220Q	Electrolytic 22μF 16WV	
C21	CE04W1C221Q	Electrolytic 220μF 16WV	
C22.23	CE04W1HR47	Electrolytic 0.47μF 50WV	
C27	CE04W1C470Q	Electrolytic 47μF 16WV	
C28.32	CE04W1C221Q	Electrolytic 220μF 16WV	
C37	C91-0456-05	Ceramic 0.047μF 25V	
C24	NOT USED		
TRIMMER/POTENTIOMETER			
TC1	C05-0042-05	Ceramic trimmer 10pF	
VR1.2	R12-3054-05	47 k!(B) 35W Adj. ALC Adj.	
VR3	R12-1406-05	1 k!(B) 9VAVR Adj.	
VR4	R12-0408-05	100!(B) Ic Adj.	
SEMICONDUCTOR			
Q1~3	V03-1815-06	Transistor 2SC1815(Y)	
Q4	V01-1015-06	Transistor 2SA1015(Y)	
Q5~7	V03-1815-06	Transistor 2SC1815(Y)	
Q8	V01-0032-05	Transistor 2SA562(Y)	
Q9	V03-1815-06	Transistor 2SC1815(Y)	
Q10	V03-1959-06	Transistor 2SC1959(Y)	
Q11	V01-0113-05	Transistor 2SA496(Y)	
Q12~15	V03-1815-06	Transistor 2SC1815(Y)	
Q16	V01-0032-05	Transistor 2SA562(Y)	
Q17	V03-1815-06	Transistor 2SC1815(Y)	
D1	V11-0051-05	Diode 1N60	
D2	V11-0076-05	Diode 1S1555	
D3	V11-4171-06	Zener diode XZ-142	
D4	V11-4172-06	Zener diode XZ-162	
D5	V11-0240-05	Zener diode WZ-090	
D6	V11-4162-16	Zener diode XZ-132	
D7~11	V11-0076-05	Diode 1S1555	
13~15			
D16	V11-0243-05	Zener diode WZ-061	
D17	V11-0076-05	Diode 1S1555	
D12	NOT USED.		
COIL			
L1	L39-0406-05	Detector coil	
L2.3	L40-1021-03	Ferri-inductor 1 mH	
5.6			
MISCELLANEOUS			
RL1	S51-4402-05	Relay	
	E04-0154-05 E23-0047-04	Coaxial connector × 4 Terminal × 5	☆

PACKING/DISASSEMBLY

PACKING



DISASSEMBLY

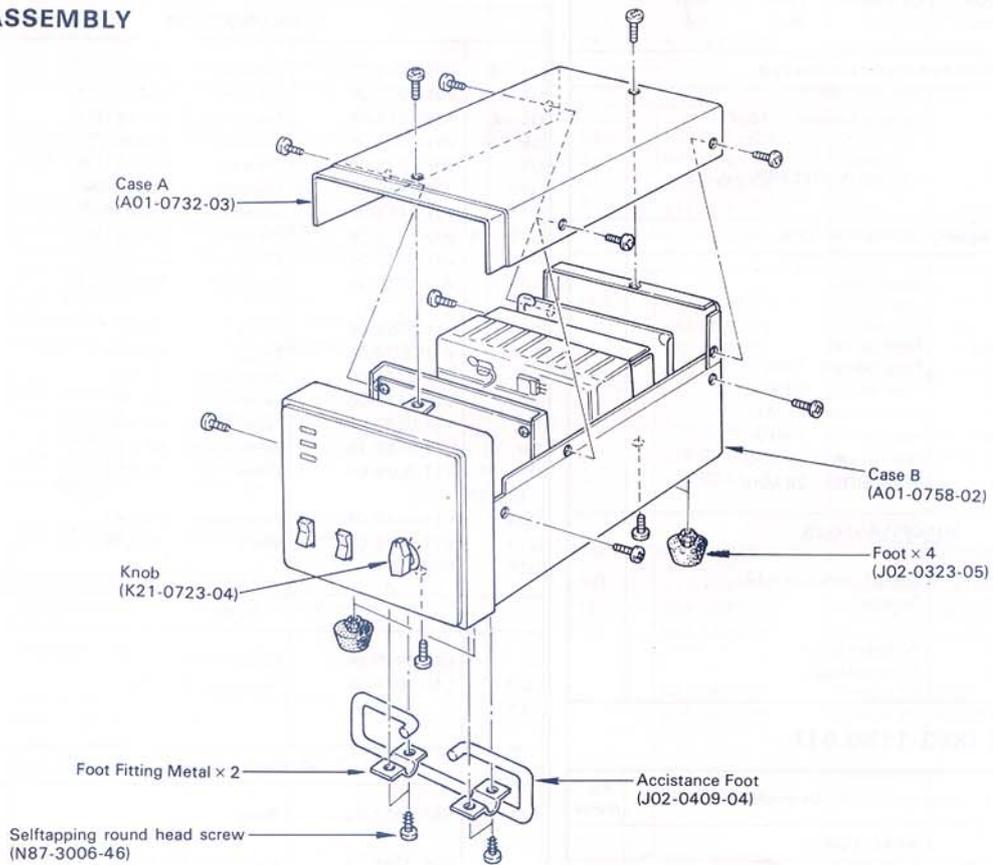


Fig. 7 Case disassembly

DISASSEMBLY

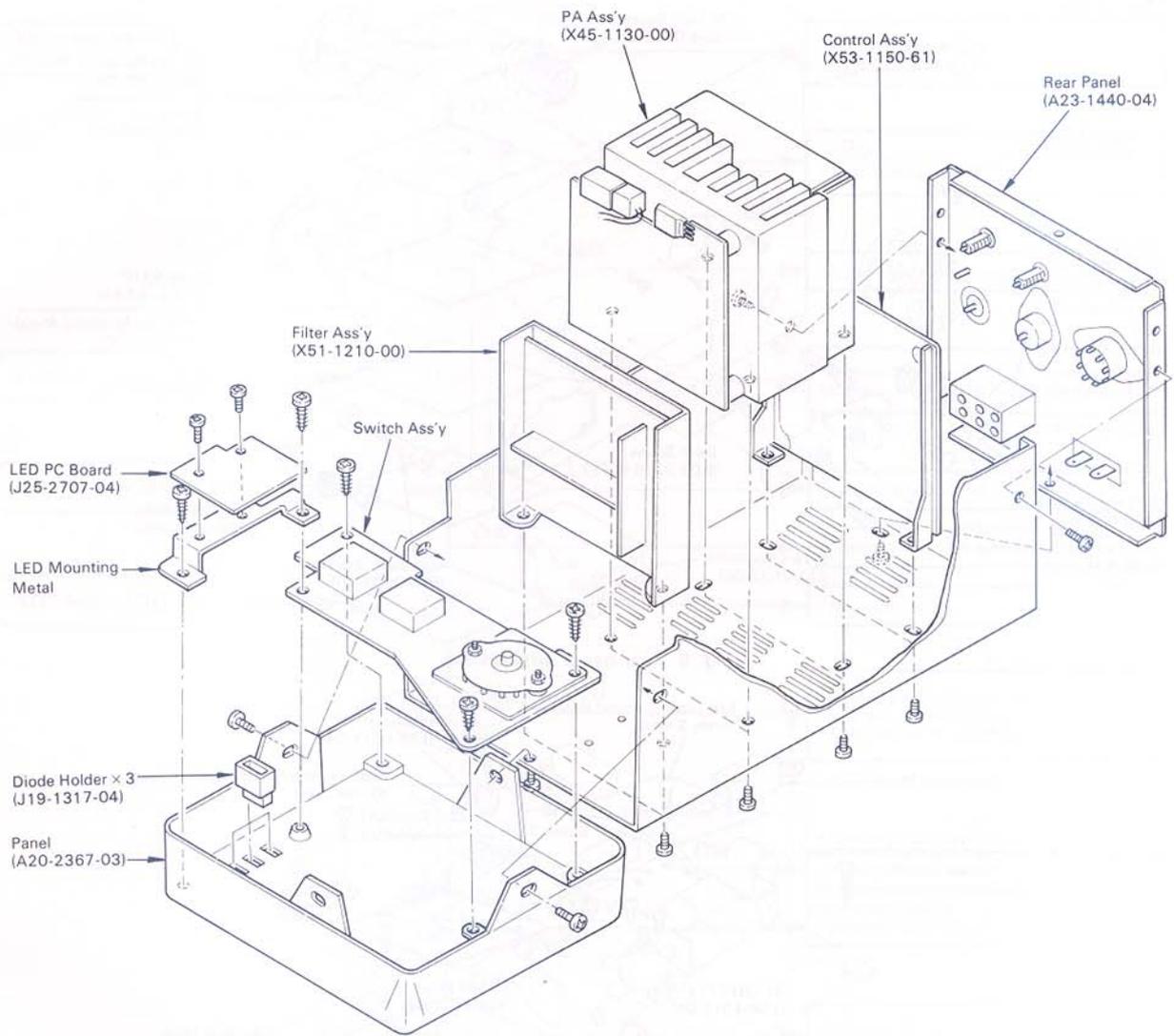


Fig. 8 Frontpanel disassembly/Mounting PC Board

DISASSEMBLY

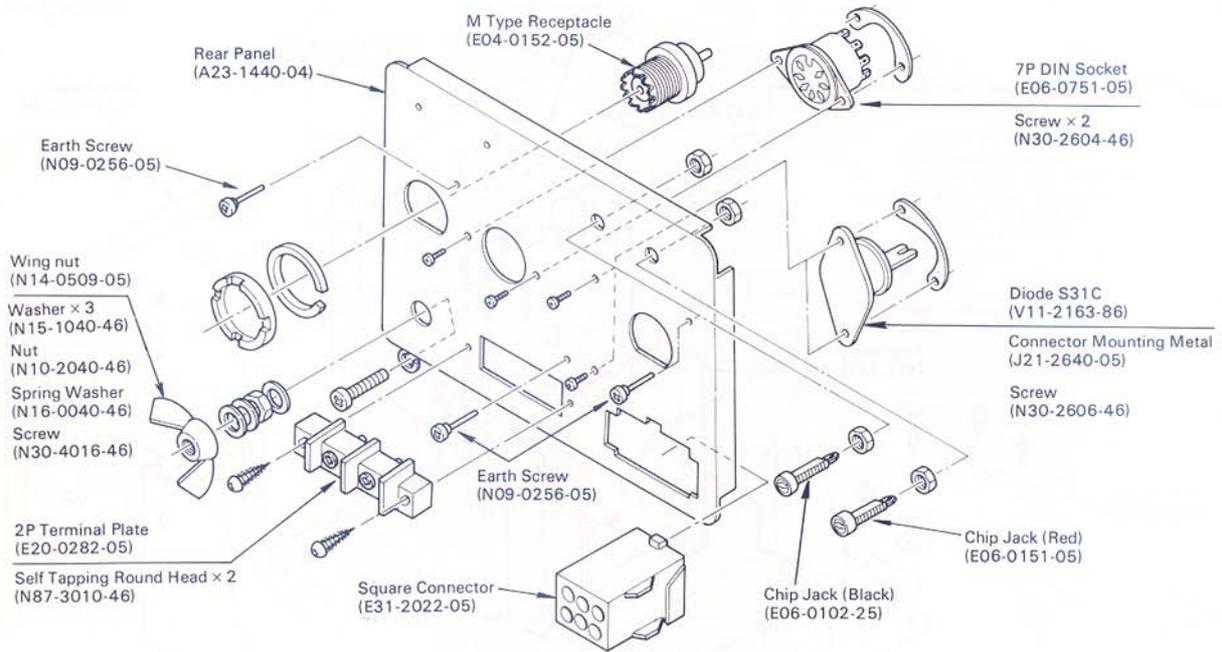


Fig. 9 Rear panel disassembly

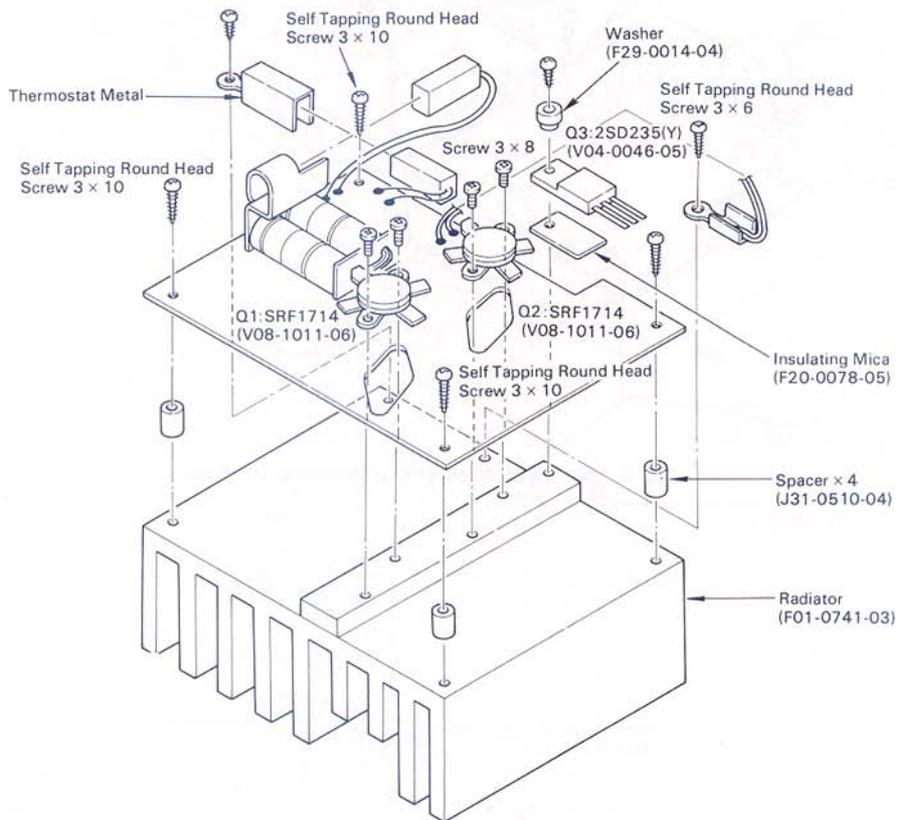
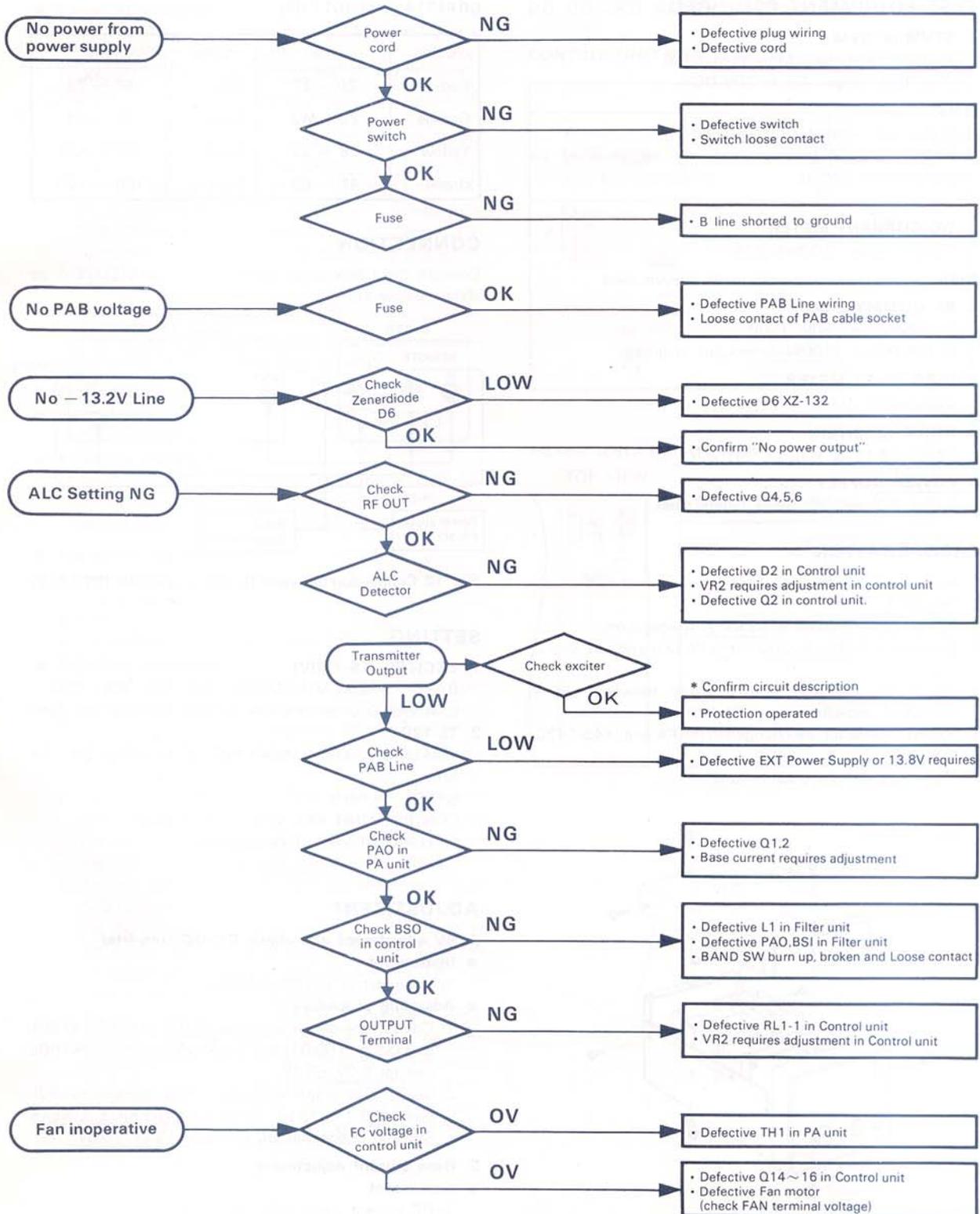


Fig. 10 PA unit disassembly

TROUBLESHOOTING



ADJUSTMENTS

TEST EQUIPMENT REQUIRED

1. STVM or DVM

- 1) Input resistance: More than $1\text{ M}\Omega$
- 2) Voltage range: 1.5 to 20V DC

Note:

High-precision voltmeter maybe used.
However accurate readings can not be obtained for high-impedance circuits.

2. DC CURRENT METER

Current range: 200mA, 20A

Note: High-precision current meter maybe used.

3. RF DUMMY LOAD

- 1) Impedance: 50Ω , 150Ω
- 2) Dissipation: 100W continuous or greater

4. BIRD WATT METER

Dissipation: 100W continuous or greater

5. DRIVE (EXCITER)

Input: 16 to 20 watt ex. TS-120V

6. POWER SUPPLY

13.8V, 20A min. PS-30 or higher class.

PREOPERATION

1. Remove the upper and lower cases as shown below Figure 11.
2. Power supply voltage is 13.8V 20A operation.
3. Disconnect PAB (red wire) in the PA unit and red wire of rear panel.
4. Disconnect the ANT coaxial cable between exciter (TS-120V) and Linear amp (TL-120).
5. If power transistor are changed in the PA unit (X45-1430-00). They must be of the same rank.

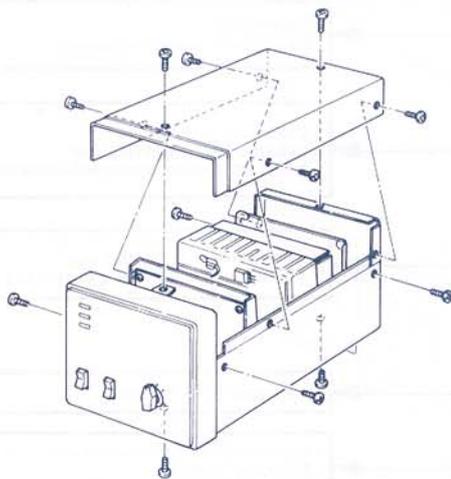


Fig. 11 Case disassembly

SRF1714 (V08-1011-06)

Color	hfe	Color	hfe
Red	20 ~ 32	Blue	57 ~ 78
Orange	28 ~ 42	Violet	72 ~ 93
Yellow	38 ~ 52	Black	87 ~ 108
Green	48 ~ 63	Brown	100 ~ 120

CONNECTION

Connect the Linear amp TL-120 to exciter (TS-120V) as shown below Fig. 12.

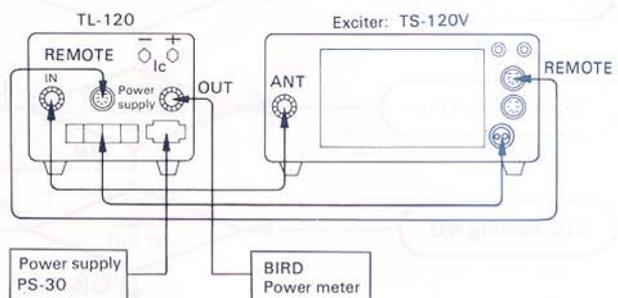


Fig. 12 Connection between TL-120 and exciter (TS-120V)

SETTING

1. EXCITER (TS-120V)

BAND: 14.250 MHz, MODE: CW, STBY SW: REC
CAR VR: Counterclockwise, POWER SW: ON, etc: Free

2. TL-120

POWER SW: OFF, LINEAR SW: STBY, BAND SW: 14 MHz
BAND: 14 MHz
CONTROL UNIT VR1, VR2: Fullclockwise
FILTER UNIT VR1: Fullclockwise

ADJUSTMENT

1. 9V adjustment and check DC-DC converter

● Instrument

- 1) Voltmeter or Digital voltmeter

● Adjusting procedure

- 1) Connect the digital voltmeter to TP3 on the CONTROL unit (X53-1150-61) and adjust VR3 on the CONTROL unit for 9.0V ± 0.1V.
- 2) Connect the digital voltmeter to TP2 on the CONTROL unit (X53-1150-61). Then, turn OPERATE LINEAR SW and check that DC volt is -13.2V ± 0.5V.

2. Base current adjustment

● Instrument

- 1) DC current meter (200 mA, 10A)
- 2) Voltmeter

ADJUSTMENTS

● Adjusting procedure

- 1) Connect the current meter between REDWIRE ⊖ and REARPANEL RED WIRE ⊕ in the PA unit (X45-1130-00). Place STBY SW to SEND on the exciter, and after 15 seconds, adjust VR1 on the PA unit for 200 mA.
- 2) Place STBY SW to REC on the exciter, connect the exciter, ANT terminal TL-120 IN terminal. Then, Connect the voltmeter to Ic terminal on the Linear amp.
- 3) Place STBY SW to SEND on the exciter, and reduce the CAR VR so the current meter reads 10A. Connect the voltmeter to Ic terminal on the rear panel, and adjust VR4 in the CONTROL unit (X53-1150-61) for voltmeter reading of 0.1V. Then, connect the RED WIRE (FINAL) to REDWIRE on the rear panel.
* Must be STBY SW to REC, if connect between REDWIRE and REDWIRE (rear panel).

3. ALC adjustment

● Instruments

- 1) Power meter

● Adjusting procedure

- 1) Exciter CAR VR is FULLCLOCKWISE, place STBY SW to SEND. Adjust VR2 on the CONTROL unit (X53-1150-61) until the RF POWER meter reads 95W.

4. Protection adjustment

● Instrument

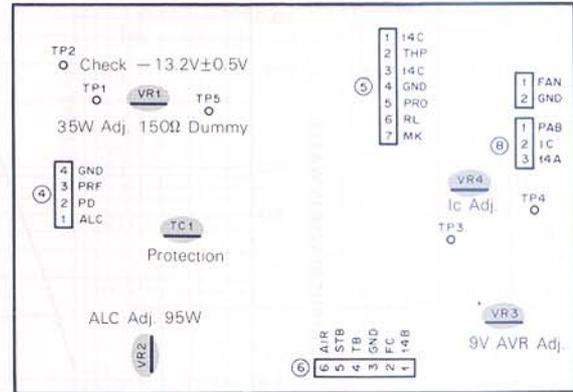
- 1) Power meter
- 2) Voltmeter
- 3) RF dummy load: 150Ω/100W

● Adjusting procedure

- 1) Exciter: 3.750 MHz, TL-120: 21 MHz Band. Turn STBY SW to SEND, maximum output is detained with TL-120. Connect the voltmeter to TP1 on the FILTER unit (X51-1210-00) and adjust TC1 on the FILTER unit for volt reading of dip point.
- 2) Exciter: 14.250 MHz, TL-120: 14 MHz Band, turn STBY SW to SEND. Connect the voltmeter to TP1 on the CONTROL unit (X53-1150-61) and adjust TC1 on the CONTROL unit for volt reading of dip point.
- 3) Exciter: 28.000 MHz, TL-120: 28 MHz Band, Turn STBY SW to SEND, and adjust the CAR LEVEL VR so the ALC meter reads Limit of ALC zone. Turn STBY SW to REC, with the BAND to 21 MHz, turn STBY SW to SEND again, adjust VR1 on the FILTER unit (X51-1210-00) so the PRO indicator lights.
- 4) Exciter: 14.250 MHz, TL-120: 14 MHz Band, connect the BIRD power meter and 150 ohm RF dummy load, then, turn STBY SW to SEND and adjust the CAR LEVEL VR so the ALC meter reads limit of ALC zone, adjust VR1 on the CONTROL unit (X53-1150-61) until the BIRD power meter reads 35W. (FORWARD RF POWER)

PC BOARD ALIGNMENT

CONTROL UNIT (X53-1150-61)



TOP VIEW

FILTER UNIT (X51-1210-00)

TOP VIEW



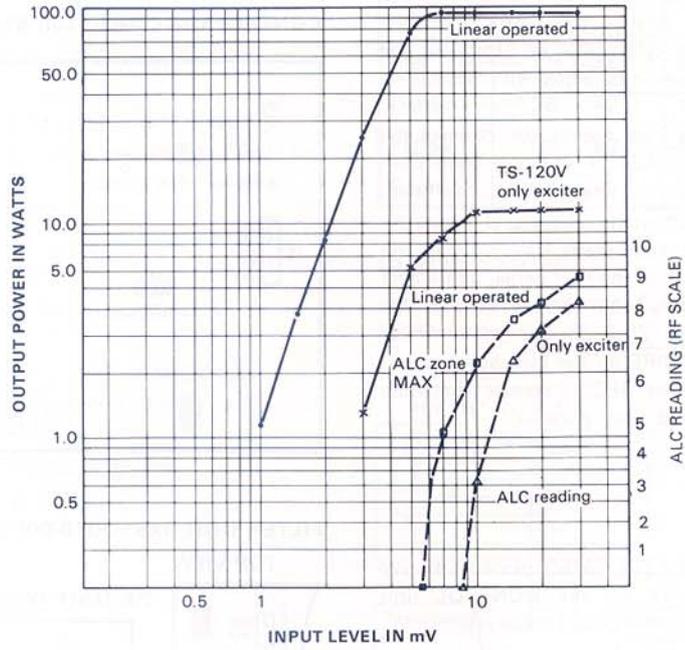
TOP VIEW

PA UNIT (X45-1130-00)



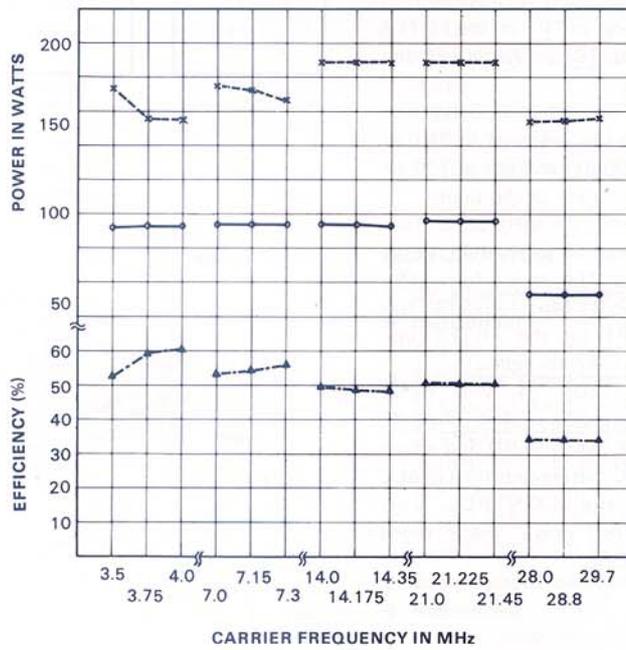
REFERENCE DATA (EXAMPLE)

OUTPUT VS INPUT



SIGNAL FREQ: : 14.170 MHz
 MODE : CW
 MIC GAIN : 9 O'CLOCK
 EXCITER : TS-120V

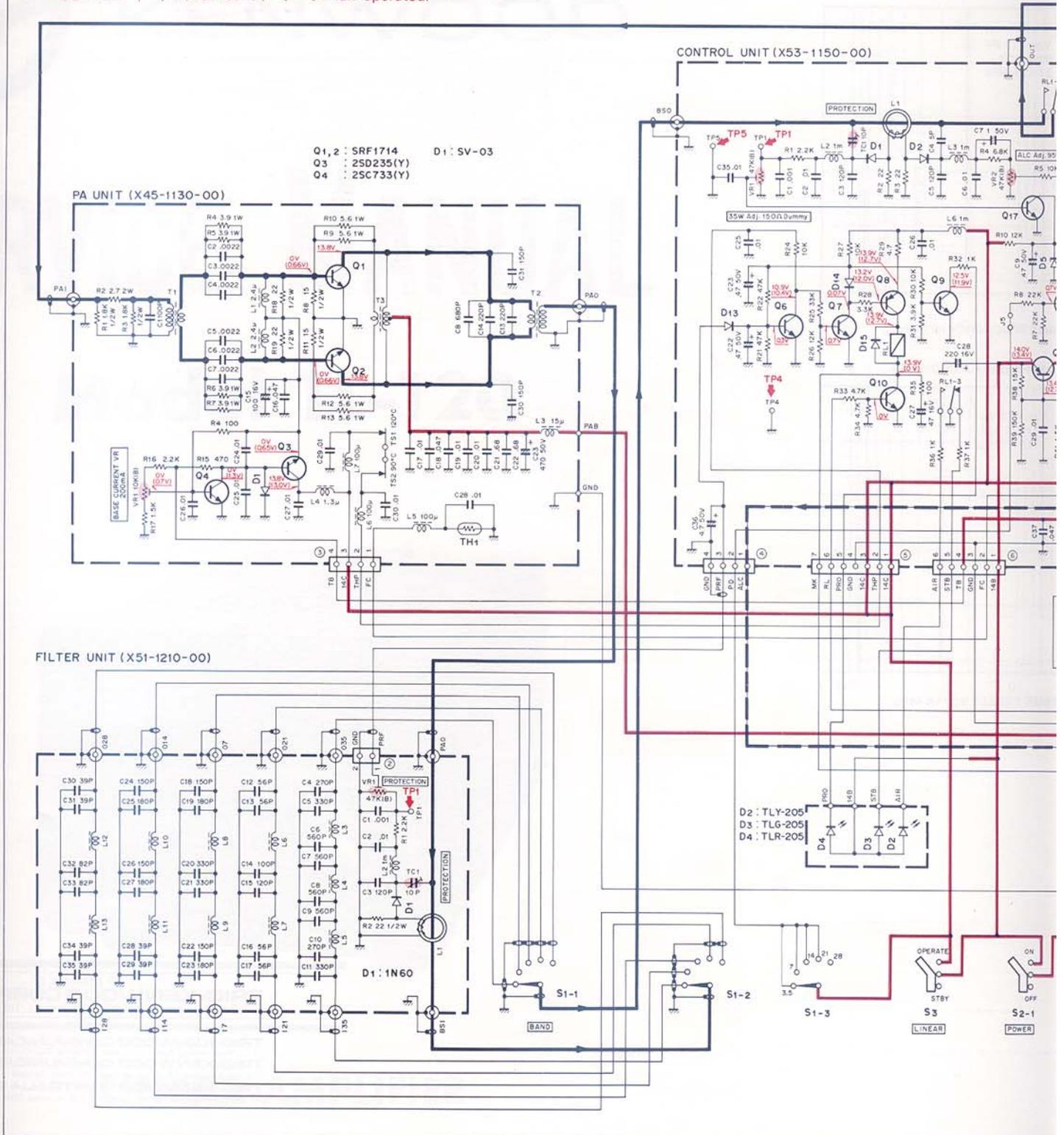
OUTPUT CHARACTERISTIC



SCHEMATIC DIAGRAM

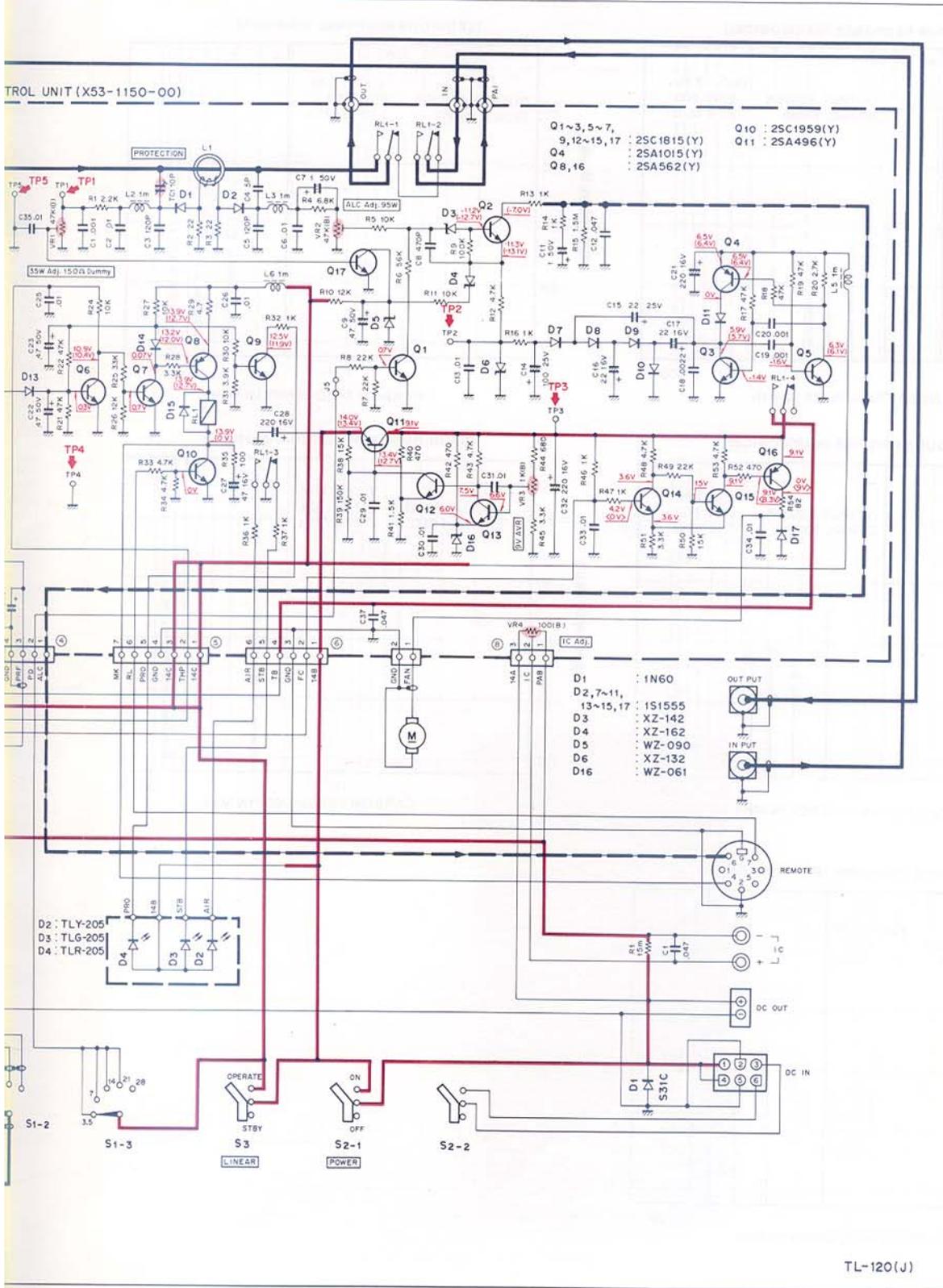
— SIGNAL — CONTROL SIGNAL — COMMON VOLTAGE LINE

VOLTAGE: () transmission, < > fan operated.



MATIC DIAGRAM

■ The circuit and ratings change without notice due to development in technology.



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



- 2SA562 (Y)
- 2SC733 (Y)



- 2SD235 (Y)



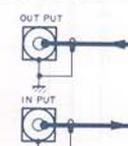
- 2SA496 (Y)



- SRF1714



- D1 : 1N60
- D2, 7~11, 13~15, 17 : 1S1555
- D3 : XZ-142
- D4 : XZ-162
- D5 : WZ-090
- D6 : XZ-132
- D16 : WZ-061



TL-120(J)

REFERENCE DATA (EXAMPLE)

