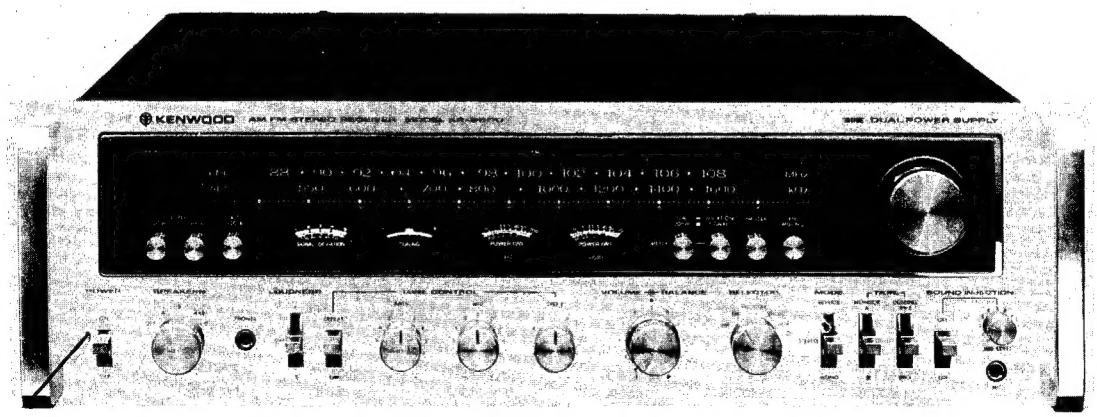
KENWOOD

HI/FI STEREO COMPONENTS

SERVICE MANUAL

KR-9600
(KR-9060)



AM-FM STEREO RECEIVER

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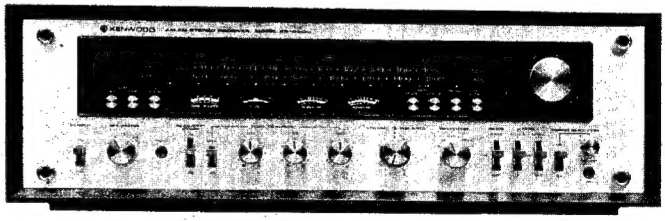
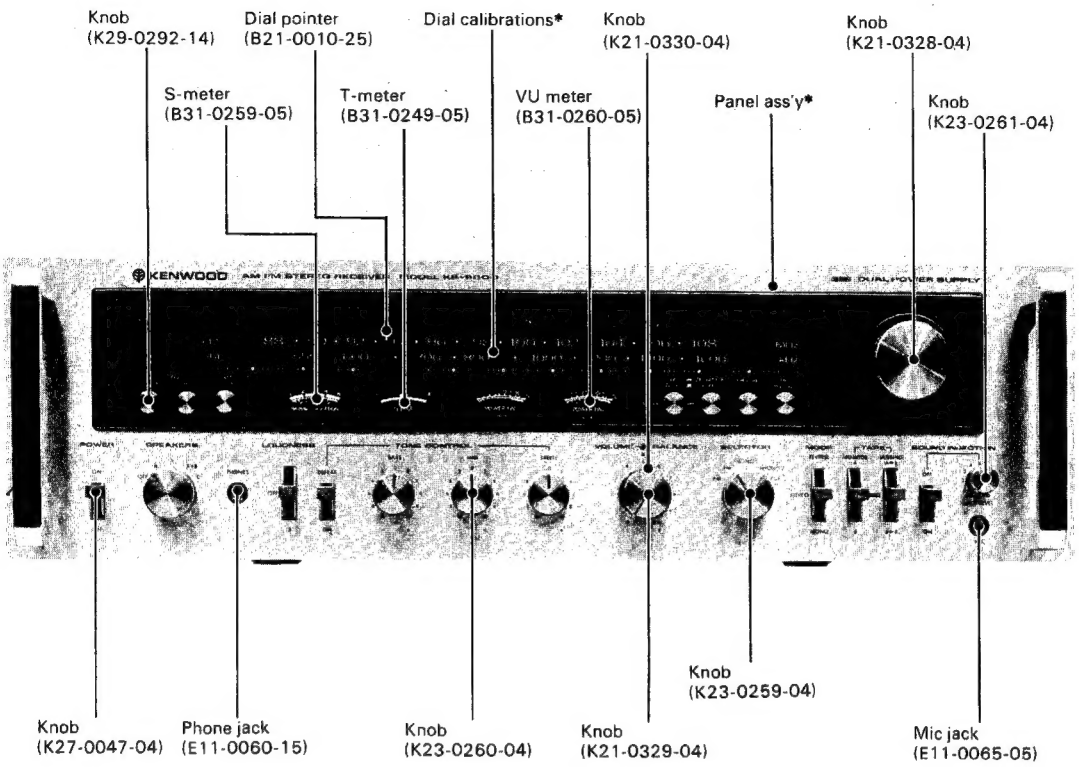
Products for PX (U type) are provided with Cabinet as photo. However, Rings and Cap screws, instead of handle, are mounted on the four corners of the front panel.

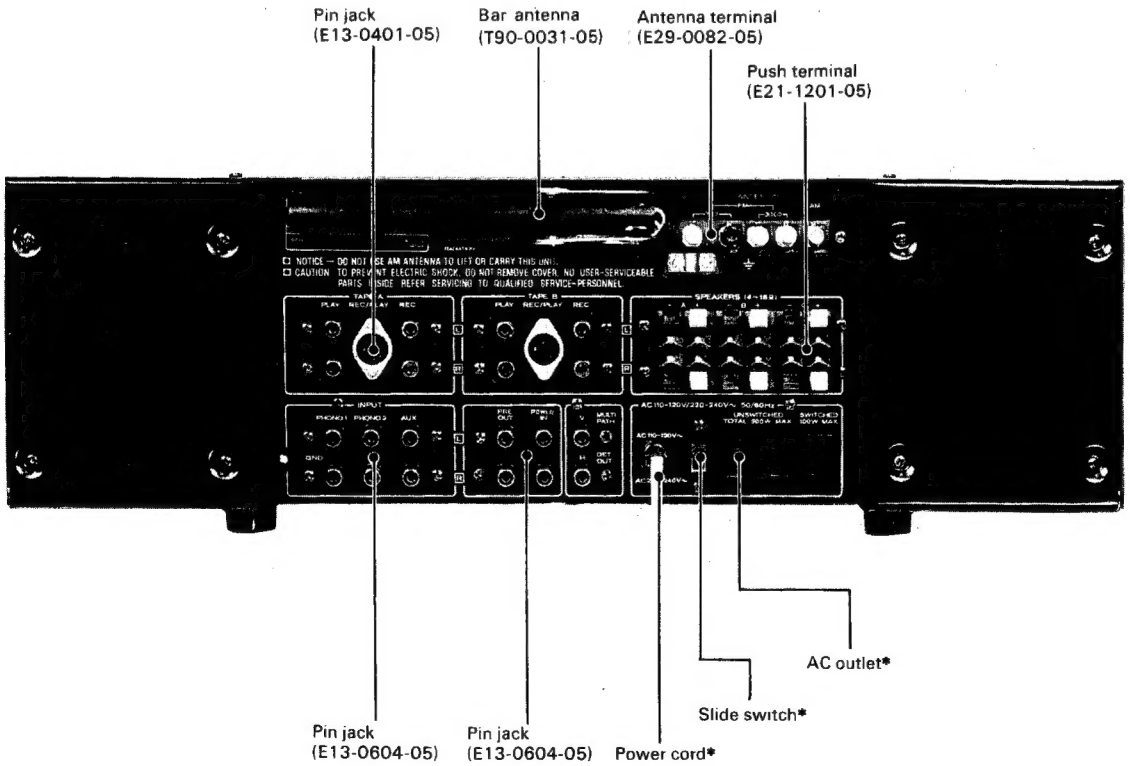


Note:
The products are subject to modification in components and circuits in different countries and regions. This is because each product must be used under the best condition. This manual provides information of modification based on the standard in the U.S., for the convenience of ordering associated components and parts.

U.S.A.	K
Canada	P
PX	U
Australia	X
Europe	W
England	T
Scandinavia	L
General Export	M
Audio Club	M_2 (KR-9060)

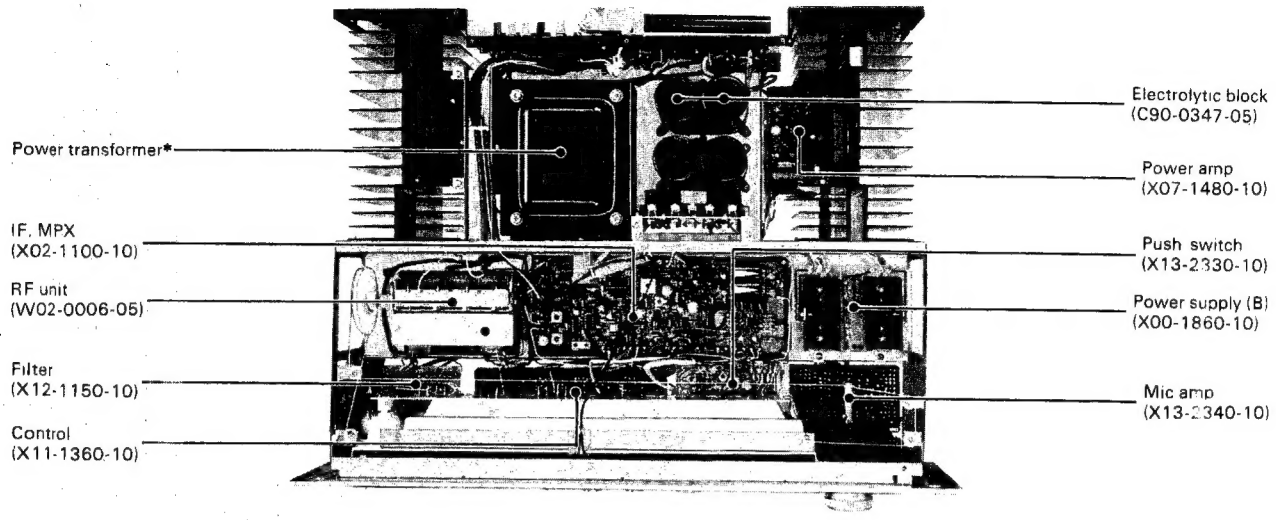
EXTERNAL VIEW



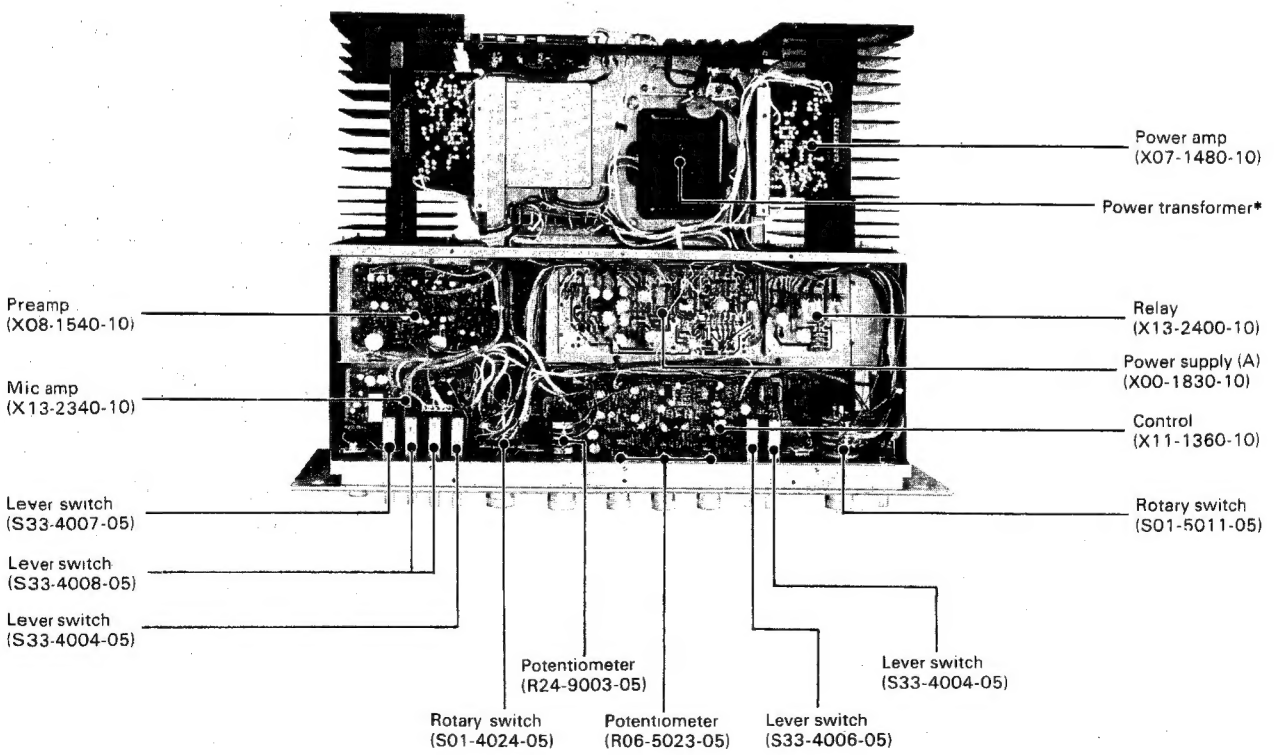


* Refer to Destinations' Parts List.
This product is for W type.

INTERNAL VIEW



If RF unit is found to be defective, it should be replaced with a good one.

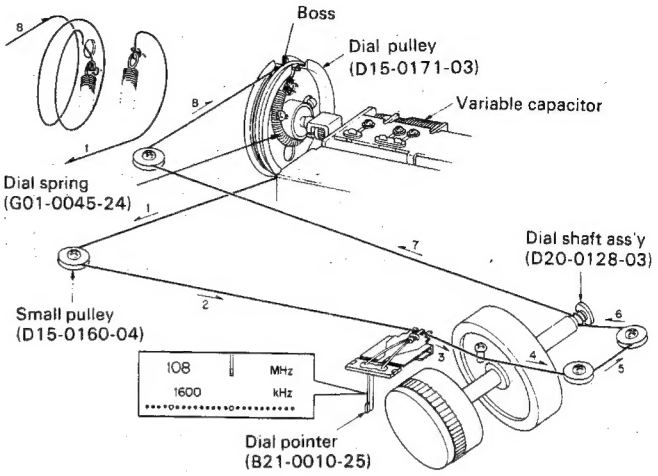


* Refer to Destinations' Parts List.

DIAL CORD STRINGING/BLOCK DIAGRAM

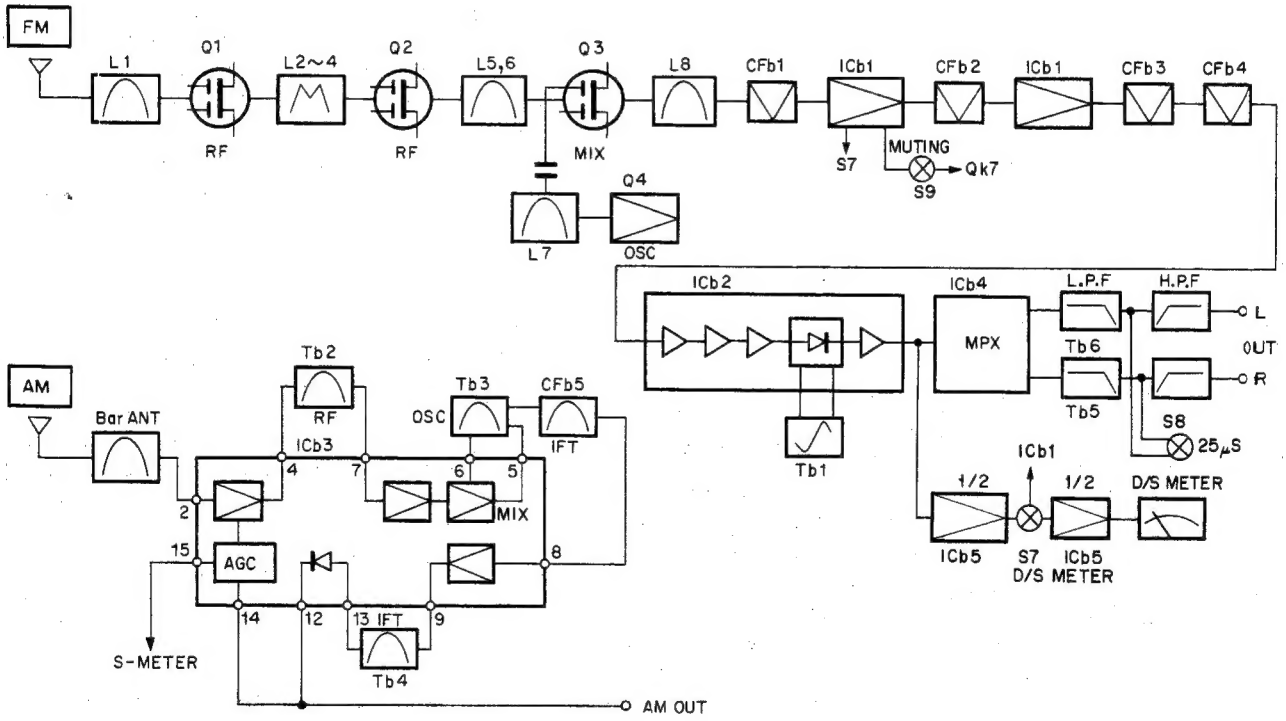
DIAL CORD STRINGING

1. Fully open the variable capacitor.
2. Fix the dial pulley to the shaft of the variable capacitor using 2 screws as shown.
3. Tie the dial cord to the dial spring leaving a 10 cm length part of it.
4. Hook the dial spring on the boss, and wind it half turn clockwise around the dial pulley.
5. Dress the dial cord in the direction of "1" to "6".
6. Wind the dial cord 2 turns around the dial shaft starting from its lower side, then dress it in the direction of "7" to "8".
7. Tie the end of it tightly with remaining a 10 cm dial cord.
8. Remove the dial spring from the boss.
9. Fully open the variable capacitor.
10. Mount the dial pointer as shown in the illustration.

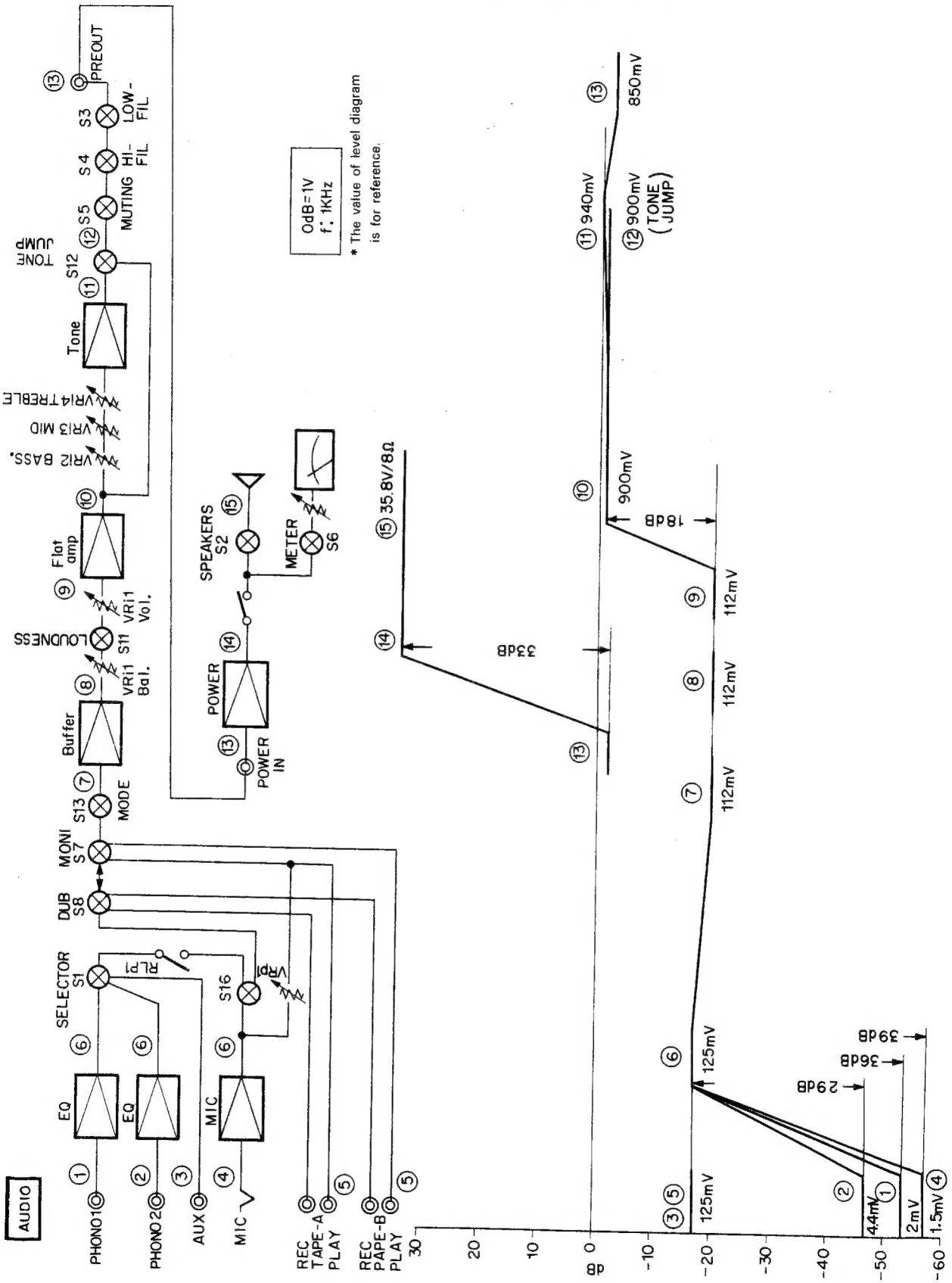


BLOCK DIAGRAM

▼ TUNER



BLOCK DIAGRAM/LEVEL DIAGRAM



CIRCUIT DESCRIPTIONS

RF UNIT

The front end section uses a 5-gang variable capacitor for FM reception and a 3-gang variable capacitor for AM reception. The 3-gang variable capacitor is connected to the bar antenna and the AM section of the IF MPX unit.

The 5-gang variable capacitor is used for the RF section (4-gang) and the local oscillator unit (1-gang). Antenna signals are amplified by Q1 through the single tuned circuit and are applied to the gate of the mixer Q3 via the double tuned circuit and single tuned circuit. The signal from the local oscillator Q4 passes through C21 in the mixer and is fed to the gate, like the antenna signal.

The signal mixed in Q3 passes through IFT (L8) and its 10.7 MHz IF output is fed to the IF unit. The amplifier elements Q1 and Q2 are dual gate MOS FETs having a wide linearity range, while the local oscillator circuit uses dual gate MOS FET having excellent square characteristic.

If this unit is found to be defective, it should be replaced with a good one. In the case when FET or IC is defective, the top plate on the shield case can be opened for repair. In this case, the tracking should be adjusted by the trimmer. **Note that L1 ~ 7 need no adjustment and their cores should not be turned.**

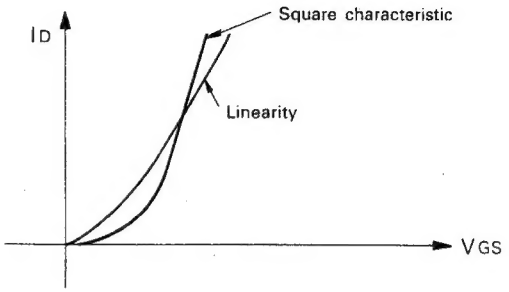


Fig. 2

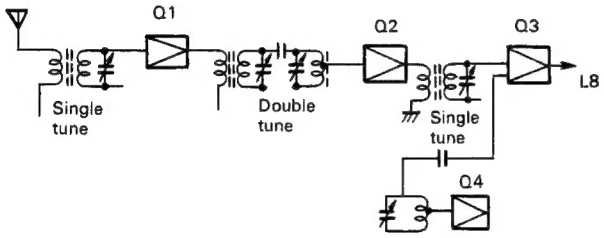


Fig. 1 RF BLOCK DIAGRAM

IF UNIT

The 10.7 MHz signal from the RF unit passes through the ceramic filter having excellent group delay characteristic and is then amplified and limited by ICb1. This signal again passes through the similar circuit and is fed to ICb2 via CFb3 and CFb4 where it is amplified and limited. The signal thus amplified is detected by the quadrature detector and is fed, as a composite signal, to the MPX IC and the deviation meter circuit through the No. 6 pin of ICb2.

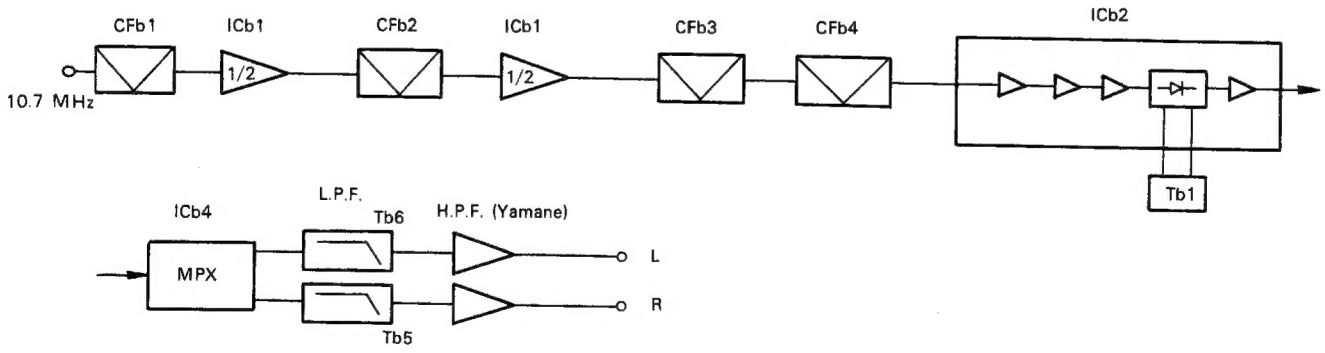


Fig. 3 IF BLOCK DIAGRAM

CIRCUIT DESCRIPTIONS

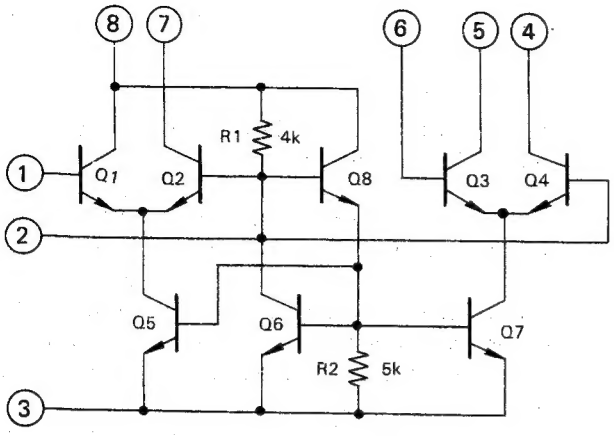


Fig. 4 SCHEMATIC OF LA1222

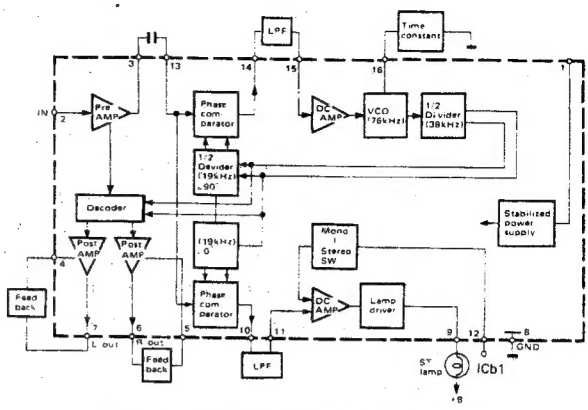


Fig. 6 HA1196 BLOCK DIAGRAM

The IF circuit employs IC HA1137W-05 in which quadrature detector circuit, muting circuit, and meter circuit are incorporated. (See block diagram.)

Quadrature detection is a sort of phase detection. A signal from the thrid IF AMP is directly applied to one side of input circuits of the multiplier of quadrature detector, and another signal is applied to the other side through the phase shifter of Tb1. The variable in phase difference obtained from these two signals is utilized for detection.

The audio signal demodulated by ICb4 passes through the LPF and the Yamane high pass filter, and is led to the selector. A de-emphasis select switch (mounted in other unit) is provided between the LPF and the high pass filter to select 75μs (50μs) or 25μs.

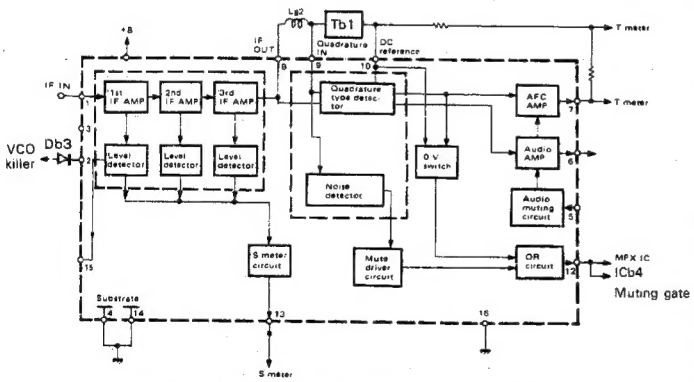


Fig. 5 HA1137W BLOCK DIAGRAM

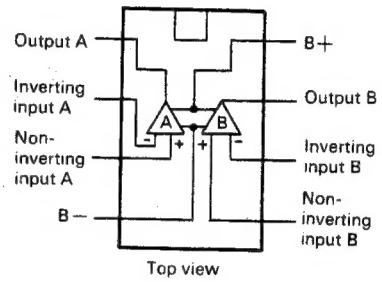


Fig. 7 RC4558D BLOCK DIAGRAM

AUXILIARY CIRCUITS:

S-meter (Signal meter) circuit

The S-meter output is obtained directly from No. 13 pin of ICb2.

T-meter (Tuning meter) circuit

When a tuned frequency is drift from its center, a voltage is produced between the No. 7 pin and No. 10 pin of ICb2. This voltage is used to deflect the meter pointer.

A reed relay is connected to the collector of Qk9. When the relay is off, no signal is fed to the speaker. A voltage is applied to the No. 5 pin of ICb2 to operate the audio muting amplifier ICb2. Since the voltage at the No. 12 pin of ICb2 is applied to the No. 12 pin of ICb4, the signal is forcedly changed into a monaural signal to prevent the stereo lamp being mis-operated.

CIRCUIT DESCRIPTIONS

FM MUTING CIRCUIT

The FM muting circuit employs reed relay of the mic amp. unit as a switching element. The operating voltage for muting is taken out of the muting circuit within the ICb2.

Detection procedure

Intensity of input level is detected from a position where a signal equivalent to the quadrature detection input is obtainable (NOISE DETECTOR). The obtained signal is supplied to the MUTE DRIVER CIRCUIT. On the other hand, DC output (discrimination curve) of the quadrature detector is fed to the 0V SWITCH and output is generated as shown in Fig. 8-(a). This output and above-mentioned input level detecting signal are put in the OR CIRCUIT, thus generating an OR output as shown in Fig. 8-(c).

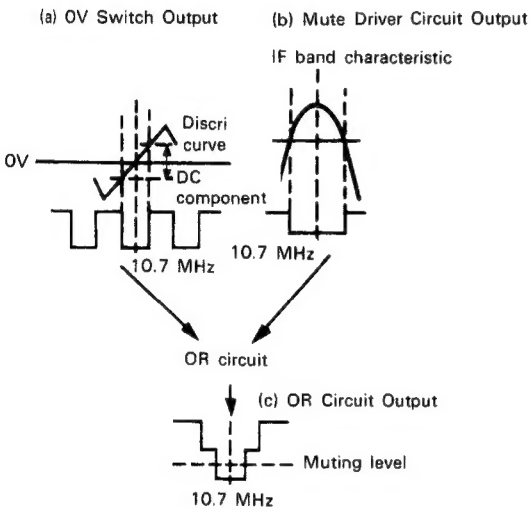


Fig. 8 HA1137W MUTING DETECTION

Namely, when the input signal is weak or deviates from the discrimination curve of the FM detector, operating voltage for muting is generated exceeding the muting level. (The muting start level corresponds to the antenna input below 8μV.) This operating voltage is processed for waveform trimming at the Schmidt circuit of the power supply unit (X00-1830-10) and used it as a trigger signal for ON-OFF switching of Qk9.

Muting start voltage → Qk7: ON → Qk8: OFF → Qk9: OFF

DEVIATION Meter Circuit

The composite signal is amplified by ICb5 and its output is detected by Db2. This signal passes through the meter select switch (S7) and is DC amplified again by ICb5 to drive the meter. When the FM muting switch (S9) is turned to ON, no input signal is fed to ICb5 and, hence the meter pointer is not deflected by interstation noise.

VCO Killer

When a +B voltage is applied to the front end (FM position), the diode Db4 is reversely biased and thus the No. 16 pin is disconnected from the ground. However, in the case of the mode other than FM, the +B voltage disappears, so the No. 16 is grounded through the diode and resistor to prevent VCO being operated, thus the S/N is not degraded.

Similarty, when the No. 2 pin of ICb2 is grounded, the differential amplifier is unbalanced. This reduces the output of the No. 6 pin so that the meter is not operated.

AM UNIT

The RF signal from the bar antenna is fed to the No. 2 pin of ICb3 where it is amplified. This signal is fed from the No. 4 pin and is applied to the No. 7 pin via Tb2 and the tuning circuit with a variable capacitor. The amplified signal is mixed with the signal from the local oscillator composed of Tb3 and a variable capacitor and is converted into IF output by CFb5 so as to be fed to ICb3 where it is amplified. The signal amplified passes through the IFT of Tb4 and is then fed to ICb3, and the detected output is taken out of the No. 12 pin, while the AM S-meter output is taken out of No. 15 pin of ICb3.

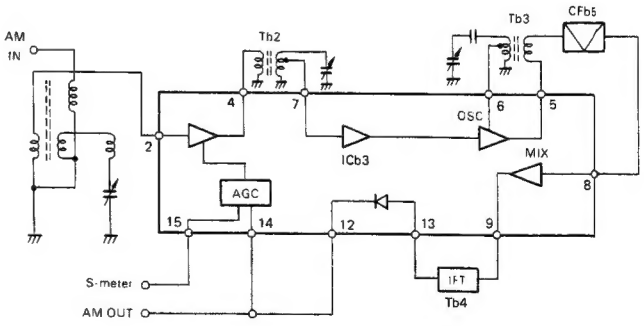


Fig. 9 AM BLOCK DIAGRAM

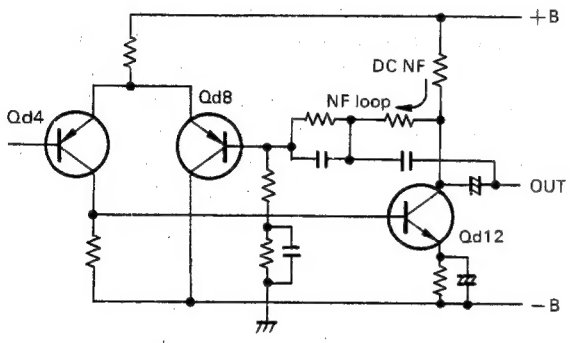
CIRCUIT DESCRIPTIONS

EQUALIZER AMPLIFIER

Equalizer amplifier is used to compensate for frequency response during playback of records or tapes.
The equalizer amplifier of KR-9600 is composed of a transistor differential amplifier and an FET ICL (input capacitorless) differential amplifier.

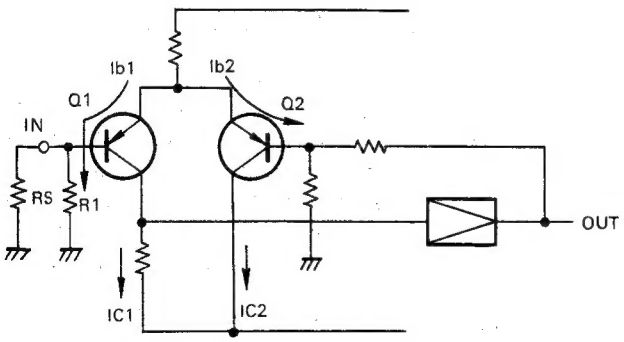
The PHONO 2 circuit of the equalizer circuit is a 2-stage, direct-coupled amplifier using a transistor differential amplifier in the first stage.

The signal to the base of the differential amplifier is fed to the collector and is further fed to the base of the next stage. The output from the collector passes through the NF element in the RIAA circuit and is applied to the base of the transistor opposite the input of the differential amplifier. The use of differential amplifier in the first stage cancels temperature drift and decreases the base voltage to 0V. Thus, the DC output can be decreased to 0V by DC-NFB, minimizing shock noise generated from the selector switch.



PHONO 2 EQUALIZER CIRCUIT

The PHONO 1 circuit uses FET in the first stage. This enables the input to be connected directly with a large input resistance. If a transistor with a coupling capacitor is used instead of FET, the output DC signal is varied by the DC resistance in the signal source. Differential amplifier used is as follows:

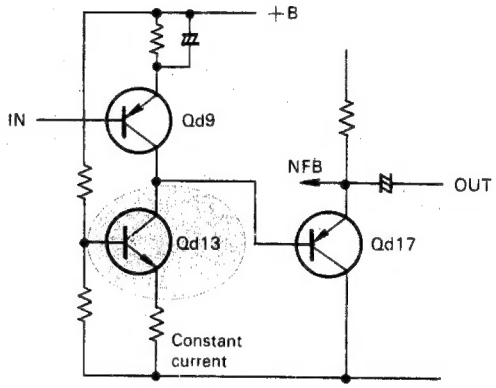


TRANSISTOR ICL CIRCUIT

Referring to the figure, the current IC1 flows into Q1 of the differential amplifier and IC2 into Q2, thus the output DC voltage is 0V due to Ib1 and Ib2 flowing into Q1 and Q2 respectively. If a signal resistance Rs is given to the base of Q1, the base voltage drops from $Eb = Ib1 \times R1$ to $Eb' = R1Rs/R1+Rs \times Ib1$ to produce DC voltage.

If FET is used, the DC voltage at the gate of Q1 is always 0V and is not changed by the resistance given to the input, because FET is operated only by voltage and rejects the flow of bias current. This eliminates distortion and phase difference due to input coupling capacitor.

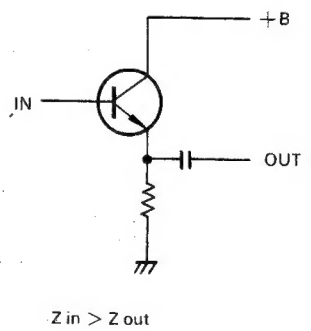
The output from the differential amplifier is amplified by PNP transistor. A high gain is obtained by the transistor in the constant current circuit connected to the PNP transistor. The output is converted through the emitter follower and is fed to the selector so as to be used as the output of the preamplifier.



CONSTANT CURRENT CIRCUIT

FUNCTIONS OF SEPP BUFFER AMPLIFIER

In the emitter follower circuit, the input impedance is high and the output impedance is low. The voltage gain in this circuit is zero and the current gain is "hfe". The circuit is also capable of amplifying power. With a resistor inserted to the emitter, a very high input impedance can be obtained.

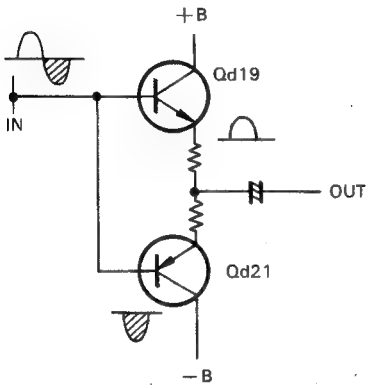


Z in > Z out

EMITTER FOLLOWER CIRCUIT

CIRCUIT DESCRIPTIONS

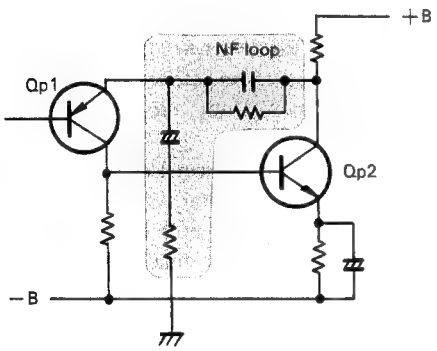
With an input signal applied, NPN (Qd19) is energized by the positive half cycle and PNP (Qd21) energized by the negative half cycle of the signal. Since either one is ON the other is OFF, the transistor in OFF state has an infinity internal resistance, so the emitter resistance of the emitter follower is also infinity in terms of AC.



SEPP CIRCUIT

MIC AMPLIFIER:

This amplifier is composed of 2-stage direct coupled amplifier using PNP and NPN transistors. Microphone signal is fed to the base and the output is obtained from the collector of the second stage. The output partly returns to the emitter of the preceding stage through the NF element. The total gain of the amplifier is about 40 dB.

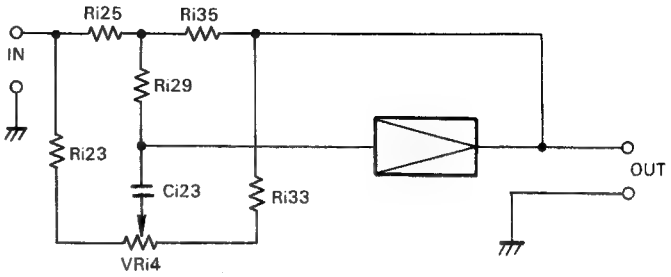


FLAT AMPLIFIER:

The amplifier following the volume control is also 2-stage direct coupled amplifier using PNP and NPN transistors whose gain is about 20 dB.

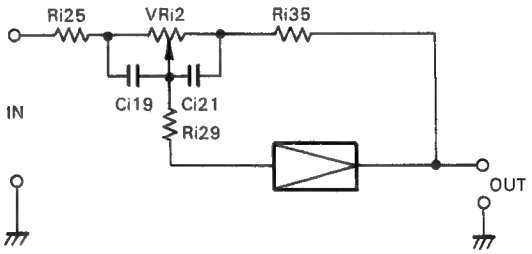
TONE AMP:
HIGH FREQUENCY RANGE:

In the high frequency range, the impedance at Ci19 and Ci21 is regarded as zero and, hence, the following circuit is activated.



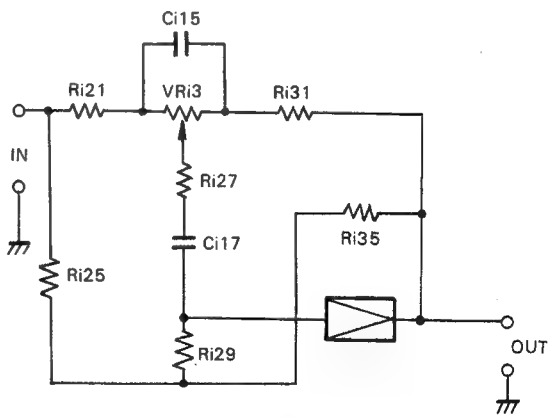
LOW FREQUENCY RANGE:

In the low frequency range, Ci23 has high impedance and, hence, Ri23, Ri33 and VRi4 can be disregarded, and the following circuit is activated.



MID FREQUENCY RANGE:

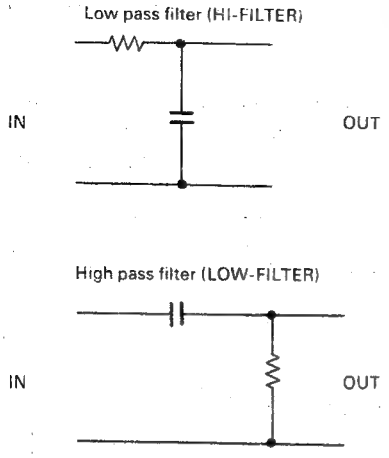
In the mid range, Ci19 and 21 have low impedance and Ci23 have high impedance and, hence Ri23, 33 and VRi4 can be disregarded, and the following circuit is activated.



FILTER

The filter circuit is composed of an RC coupling circuit. The high filter uses a resistor and a capacitor as shown in the figure, while the low filter has a resistor and a capacitor connected in reverse.

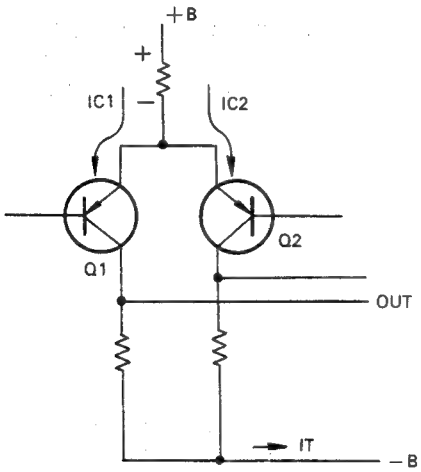
CIRCUIT DESCRIPTIONS



POWER AMPLIFIER:

The power amplifier is a 3-stage differential amplifier using transistors in the first stage. The output is fed to the power pack (Refer to page 34) where it is power amplified. The differential amplifier used is as follows:

An OCL circuitry needs the differential amplifier to maintain the center voltage at zero. The differential amplifier uses transistors with the same characteristics consisting of Q1 and Q2, as shown in the Figure below. When the same bias is applied to Q1 and Q2, the collector currents of Q1 and Q2 are the same, half the total current flowing to Q1 and half to Q2.

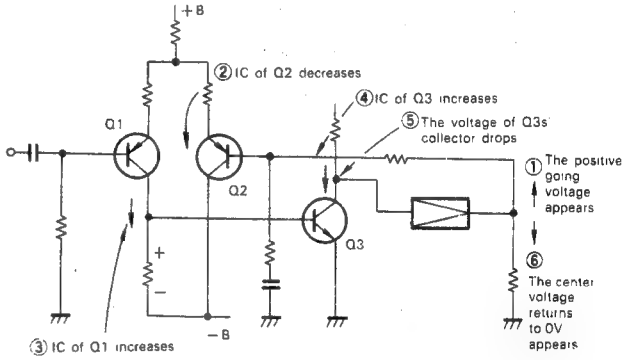


When a negative voltage is applied to the base of Q2, the collector current I_{C2} of Q2 increases and inversely collector current of Q1 or I_{C1} decreases by the same amount that I_{C2} increases. The total current I_T flows continuously at a constant value. On the other hand, when a positive voltage is applied, I_{C2} of Q2 decreases and I_{C1} of Q1 increases. This is the inverse operation of Q1 and Q2.

These operations are a result of the current feedback because collector current flows via the emitter resistor.

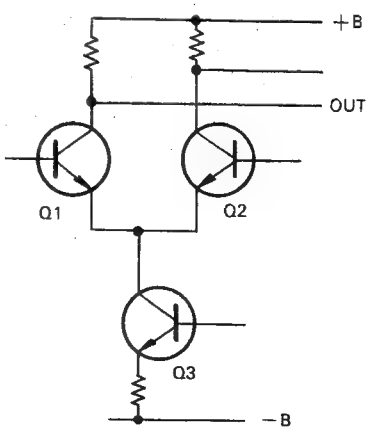
Signals are then supplied to the base of Q1, while Q2 base is grounded. Q1 becomes an emitter common amplifier and Q2 becomes a base common amplifier. The antiphase signal goes to the collectors of Q1 and Q2. When the same signal is supplied to Q1 and Q2 there is no output from the differential amplifier. The foregoing is a description of the basic operation of the circuit. Using such a differential amplifier and by connecting the input to Q1 and connecting the speaker terminal to Q2, the center voltage is always kept the same as the input voltage.

In the differential operating state, the base voltages of Q1 and Q2 are balanced at 0V. If a positive going voltage appears at the output terminal for any reason, this voltage is fed to the base of Q2, and the Q2 collector current decreases, while the Q1 collector current increases. Since a current flows to the load resistor of Q1, the voltage at the base of Q3 becomes high and at the same time the current in the collector of Q3 increases. Thus, the Q3 collector voltage decreases below the level obtained before the current increases, so that the PNP side of the complementary circuit is operated to pull the center voltage from the positive to the negative and set to 0V.



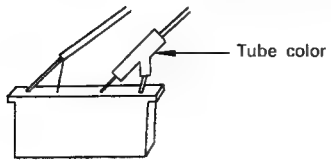
The emitter circuit in the first stage uses transistor (Q3) instead of resistor. In a differential circuit, use of resistor improves the Common Mode Rejectinon Ratio but increases the loss due to resistance, thus requiring high power voltage which is not recommended from the standpoint of ecomony.

The constant current circuit utilizes the internal resistance of transistor instead of using resistor. Since the power voltage if divided and fed to the base, both the base and collector current become constant and thus the Common Mode Rejection Ratio can be improved, minimizing the variation of the level at the collector and stabilizing the circuit.

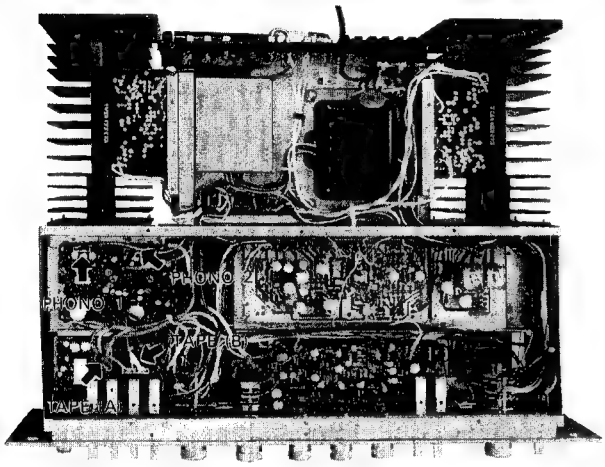


DISASSEMBLY FOR ADJUSTMENT AND REPAIR

COLOR CODE OF MINI-CONNECTOR

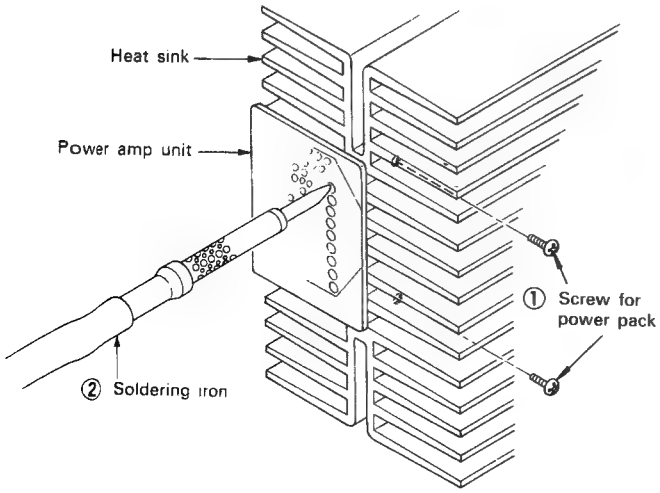


	Tube Color	Parts No.
PHONO 1	RED	E31-0047-05
PHONO 2	BLUE	E31-0048-05
TAPE (A)	RED	E31-0050-05
TAPE (B)	GREEN	E31-0057-05



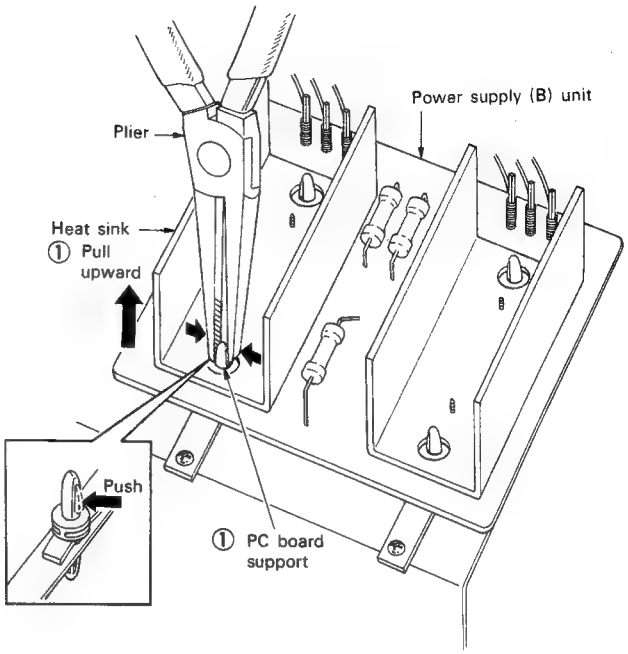
1. Replacing or reparing power pack

① Remove 2 screws, fix the power pack to heat sink.
② Remove all the solder from all terminals of the power pack from PC board by heating.
③ Replace it with new one.



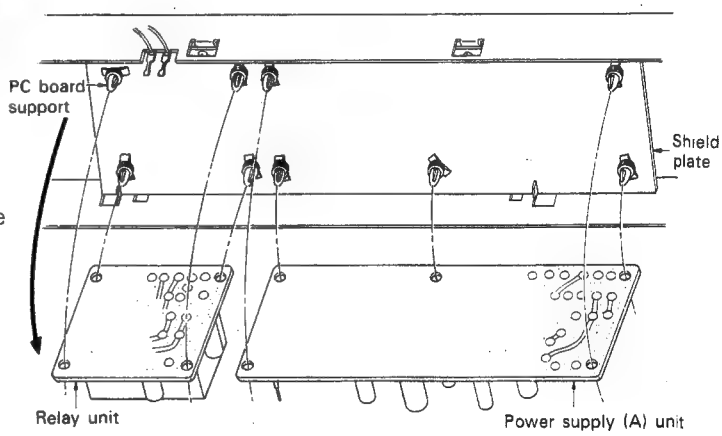
2. Replacing or repairing power supply (B) unit

① While pushing the projection of PC board support by plier, pull the unit upward.



3. Replacing relay unit and power supply (A) unit

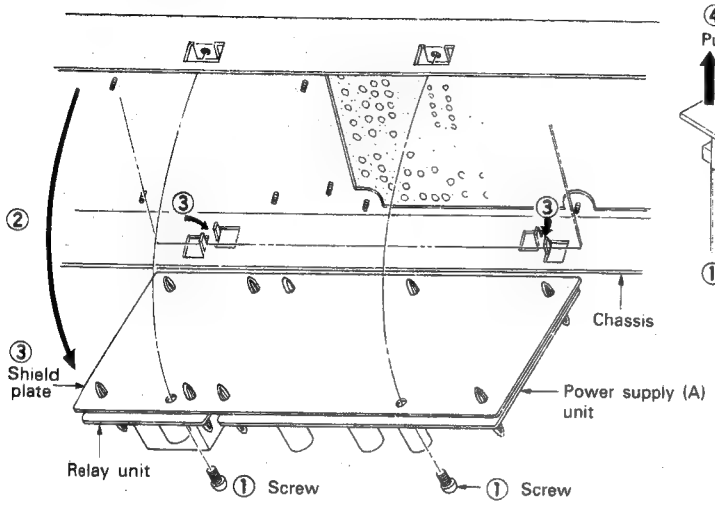
① While pushing the projection of PC board support by plier, similarly, as power supply (B).



DISASSEMBLY FOR ADJUSTMENT AND REPAIR

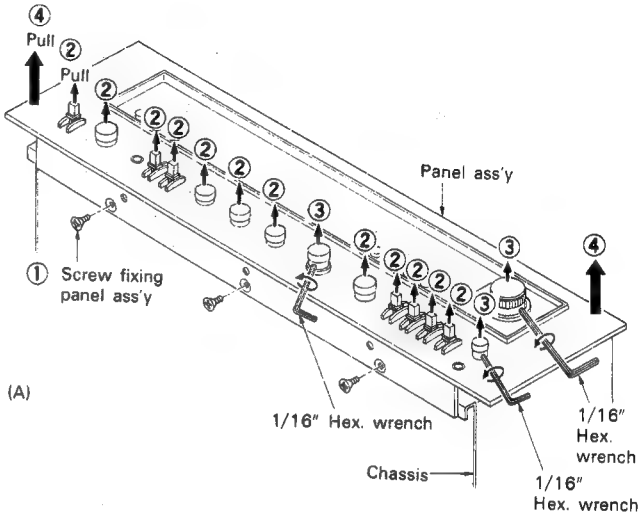
4. Reparing tuner unit from back side.

① Remove 2 screws, fix the shield plate to chassis.
② Turn unit.
③ When repair is over, note that the shield plate should be not fixed to chassis without hooking it to the projection of chassis.



5. Replacing or repairing mic amp and control unit.

① Remove 3 screws, fix panel ass'y.
② Pull knobs except volume, mic, and tuning.
③ Remove setscrew of volume, mic, and tuning knob by hex. wrench. (1/16")
④ Pull panel ass'y upward.

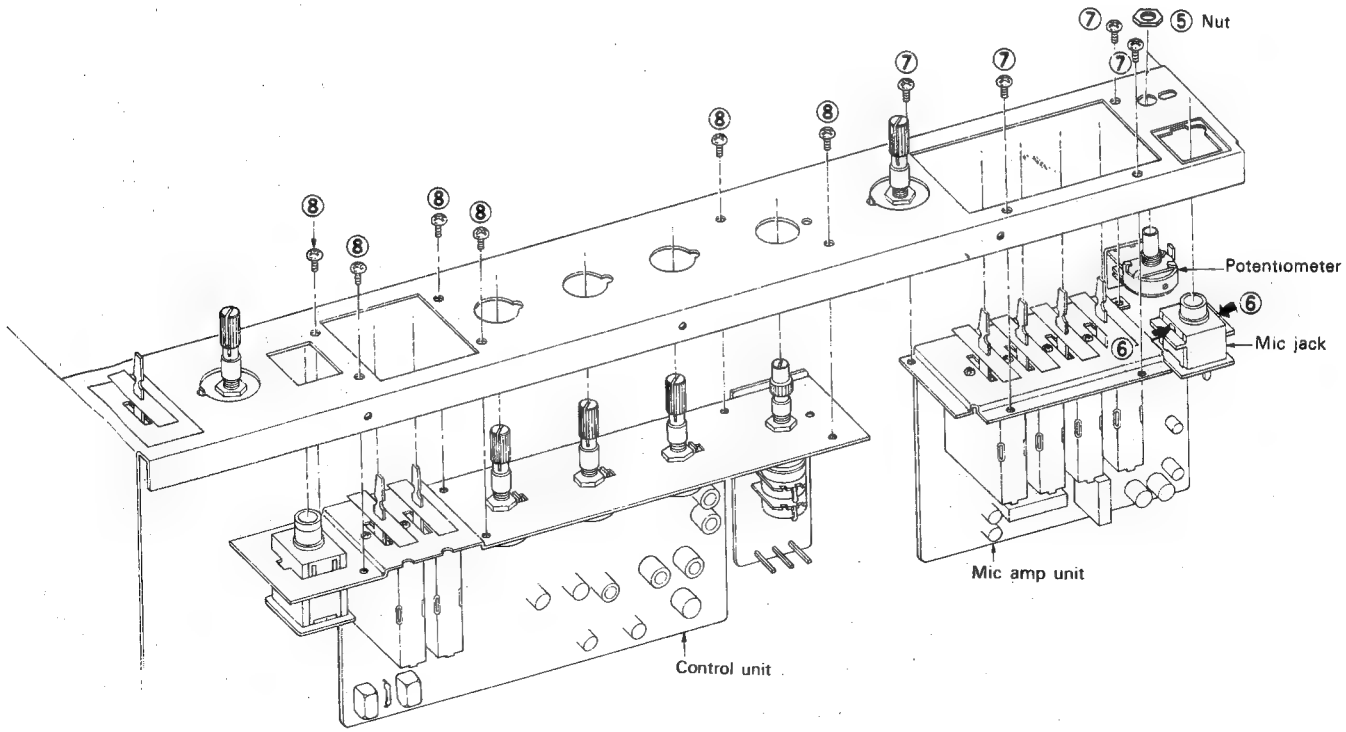


5-1 With mic amp

⑤ Remove the nut for potentiometer.
⑥ While pushing the metal projection of mic jack, push it down.
⑦ Remove 4 screws, fix switch mounting hardware.

5-2 With control unit

⑧ Remove 6 screws, fix switch mounting hardware.



☆: new parts

Ref. No.	U.S.A. (K)	Canada (P)	PX (U)	Europe (W)	Scandinavia (L)	England (T)	KR-9060 (M_2)	General Export (M)	Description
—	A01-0309-12	A01-0309-12	A01-0312-02	A01-0309-12	A01-0309-12	A01-0309-12	A01-0309-12	A01-0309-12	Case ☆
—	—	—	A03-0219-02	—	—	—	—	—	Cabinet ☆
—	A20-1116-02	A20-1116-02	A20-1116-02	A20-1116-02	A20-1116-02	A20-1118-02	A20-1126-02	A20-1116-02	Panel ass'y ☆
—	A23-0723-02	A23-0723-02	A23-0724-02	A23-0726-02	A23-0726-02	A23-0725-02	A23-0737-02	A23-0724-02	Rear panel ☆
—	—	—	B09-0013-04	—	—	—	—	—	Ring × 4 ☆
—	B20-0393-03	B20-0393-03	B20-0396-03	B20-0393-03	B20-0393-03	B20-0393-03	B20-0393-03	B20-0393-03	Dial calibrations ☆
—	B46-0056-00	B46-0055-10	B46-0050-00	—	—	B46-0060-00	—	—	Warranty card
—	—	—	B46-0051-00	—	—	—	—	—	Warranty card
—	B50-1579-00	B50-1582-00	B50-1581-00	B50-1579-00	B50-1579-00	B50-1580-00	B50-1603-00	B50-1579-00	Instruction manual ☆
—	—	—	B59-0018-00	—	—	—	—	—	KENWOOD service stations' list
C1,2	C91-0001-05	C91-0001-05	C91-0023-05	—	—	—	C91-0023-05	C91-0023-05	Ceramic 0.01μF 250WV
C1~3	—	—	—	CK45F3D 103PMU	CK45F3D 103PMU	CK45F3D 103PMU	—	—	Ceramic 0.01μF 2KWV
—	—	—	D32-0075-04	D32-0075-04	D32-0075-04	—	D32-0075-04	D32-0075-04	Switch stopper (Power voltage selector)
—	E08-0225-05	E08-0225-05	E08-0225-05	—	—	—	E08-0225-05	E08-0225-05	AC outlet × 3
—	E30-0181-05	E30-0181-05	E30-0545-05	E30-0580-05	E30-0292-05	040-0306-05	E30-0545-05	E30-0545-05	Power cord
F1	F05-1032-05	F05-1032-05	—	—	—	—	—	—	Fuse (10A)
F1,2	—	—	F05-5022-05	—	—	—	F05-5022-05	F05-5022-05	Fuse (5A) × 2
F1,2	—	—	—	F05-5024-05	F05-5024-05	F05-5024-05 × 1	—	—	Fuse (5A) × 2
—	H01-1663-04	H01-1664-04	H01-1667-04	H01-1664-04	H01-1664-04	H01-1665-04	H01-1666-04	H01-1663-04	Carton case ☆
—	H09-0086-04	H09-0086-04	—	H09-0086-04	H09-0086-04	H09-0086-04	H09-0086-04	H09-0086-04	Handle carton case
—	H10-1475-02	H10-1475-02	—	H10-1475-02	H10-1475-02	H10-1475-02	H10-1475-02	H10-1475-02	Polystyrene foamed fixture (L)
—	H10-1476-02	H10-1476-02	—	H10-1476-02	H10-1476-02	H10-1476-02	H10-1476-02	H10-1476-02	Polystyrene foamed fixture (R)
—	—	—	H10-1477-02	—	—	—	—	—	Polystyrene foamed fixture × 2
—	J02-0073-04	J02-0049-14	—	J02-0049-14	J02-0049-14	J02-0049-14	J02-0049-14	J02-0049-14	Leg × 4
—	J13-0040-05	J13-0040-05	—	—	—	J13-0027-05	—	—	Fuse holder
—	—	—	J13-0040-05	J13-0027-05	J13-0027-05	—	J13-0040-05	J13-0040-05	Fuse holder × 2
—	J41-0034-05	J41-0034-05	J41-0034-05	J41-0033-05	J41-0033-05	J41-0024-15	J41-0034-05	J41-0034-05	Power cord bushing
—	K01-0064-05	K01-0064-05	—	K01-0064-05	K01-0064-05	K01-0064-05	K01-0064-05	K01-0064-05	Handle × 2 ☆
—	L01-1261-05	L01-1268-05	L01-1265-05	L01-1266-05	L01-1266-05	L01-1267-05	L01-1265-05	L01-1265-05	Power transformer ☆
—	—	—	N09-0289-05	—	—	—	—	—	Cap screw × 4 ☆
—	N99-0019-05	N99-0019-05	—	N99-0019-05	N99-0019-05	N99-0019-05	N99-0019-05	N99-0019-05	Wrench set and dress screw
—	—	—	N99-0020-05	—	—	—	—	—	Wrench set ☆
R1	RC05GF2H225K	RC05GF2H225K	—	—	—	—	—	—	Carbon 2.2 MΩ ±10% 1/2W
S3	S33-2018-05☆	S33-2018-05☆	S33-2020-05☆	S33-2013-05	S33-2013-05	S33-2013-05	S33-2020-05☆	S33-2020-05☆	Lever switch (POWER)
S17	—	—	S31-2001-05	S31-2001-05	S31-2001-05	—	S31-2001-05	S31-2001-05	Slide switch (power voltage selector)
—	X00-1840-10	X00-1840-10	X00-1840-81	X00-1840-61	X00-1840-61	X00-1840-61	X00-1840-81	X00-1840-81	Power supply unit ☆
—	**X90-1270-10**	**X90-1270-10**	**X90-1270-81**	**X90-1270-61**	**X90-1270-61**	**X90-1270-61**	**X90-1270-10**	**X90-1270-10**	**Tuner ass'y ☆**

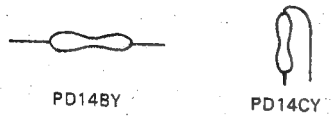
PARTS LIST

Note:

Resistors except the special ones (example: cement, metal film, etc.) are not mentioned in PARTS LIST. Resistors not mentioned mean that they are carbon ones (1/4 or 1/8W). You should give an order for the carbon resistors according to the ways described as follows:

A carbon resistor's part number is; example PD14BY 2E 222J

1. Kinds of the carbon resistor



PD14BY PD14CY

2. Wattage

1/4W → 2E

1/8W → 2B

3. Resistance value

② ② ② → means $22 \times 10^2 = 2200\Omega$ (2.2kΩ)

Significant figure Multiplier

Example:

221 → 220Ω

222 → 2.2kΩ

223 → 22kΩ

224 → 220kΩ

225 → 2.2MΩ

4. Torelance

J = ±5% (Gold color)

K = ±10% (Silver color)

Ref. No.	Parts No.	Description	Remarks
		CAPACITOR	
C4,5	C90-0347-05	Pair electrolytic 10,000μF 80WV	☆
C6~8	CK45F1H473Z	Ceramic 0.047μF +80%−20%	
C9,10	CE04W1H010	Electrolytic 1μF 50WV	
		MISCELLANEOUS	
—	B03-0122-02	Dress plate	☆
—	B07-0154-25	Escutcheon	
—	B07-0199-03	Pushbutton switch ring (3 key)	☆
—	B07-0200-03	Pushbutton switch ring (4 key)	☆
—	B07-0202-04	Lever switch escutcheon (A) × 4	☆
—	B07-0203-04	Lever switch escutcheon (B) × 3	☆
—	B10-0219-03	Front glass	☆
—	B21-0010-25	Dial pointer	
—	B31-0249-05	T-meter	
—	B31-0259-05	S-meter	☆
—	B31-0260-05	VU meter	☆
—	B42-0009-04	Passed sticker	
—	B42-0473-24	Serial number sticker	
—	D19-0050-14	Plate for pushbutton switch × 7	
—	E13-0401-05	Pin jack (4P) with DIN connector socket × 2	
—	E13-0604-05	Pin jack (6P) × 2	
—	E21-1201-05	Push terminal (SPEAKER)	
—	E29-0082-05	Antenna terminal	
—	E30-0593-05	Audio cord × 2	☆
—	E31-0047-05	Mini-connector (Phono 1)	☆
—	E31-0048-05	Mini-connector (Phono 2)	☆
—	E31-0050-05	Mini-connector (Tape A)	☆
—	E31-0051-05	Mini-connector (Tape B)	☆
—	G01-0312-04	Pushbutton switch spring × 7	
—	G01-0356-04	Dial pointer spring	
—	G10-0015-04	Dust sheet × 7	
—	J12-0010-04	Short pin plug × 2	
—	K21-0328-04	Knob (TUNING)	☆
—	K21-0329-04	Knob (VOLUME)	☆
—	K21-0330-04	Knob (BALANCE)	☆
—	K23-0259-04	Knob (SPEAKERS, SELECTOR)	☆
—	K23-0260-04	Knob (TONE) × 3	☆
—	K23-0261-04	Knob (MIC MIXING)	☆
—	K27-0047-04	Knob (Lever switch) × 7	☆
—	K29-0292-14	Knob (Pushbutton switch) × 7	☆
—	L19-0009-05	Balun transformer	
L1	L40-1092-44	Inductor 1μH	
—	N08-0128-25	GND terminal	
—	T90-0031-05	Bar antenna	
—	T90-0202-05	FM antenna	
—	X07-1480-10	Power amp × 2	☆

TUNER ASS'Y (X90-1270-10, -61 AND -81)

Ref. No.	Parts No.	Description	Remarks
		CAPACITOR	
C11	CE04W1A100EL	Electrolytic 10μF 10WV	
		RESISTOR	
R10,11	RN14AB3D681K	Metal 680Ω ±10% 2W	
		COIL	
L2	L40-1021-43	Inductor	
		SWITCH	
S1	S01-4024-05	Rotary (SELECTOR)	☆
S2	S01-5011-05	Rotary (SPEAKER)	☆
		MISCELLANEOUS	
—	A70-0105-05	Pilot lamp ass'y	☆
	B30-0075-05	Pilot lamp (8V, 300 mA) × 6	
	B30-0077-05	Pilot lamp (8V, 50 mA) × 9	

PARTS LIST

* If this unit is found to be defective, it should be replaced with a good one.

Ref. No.	Parts No.	Description	Re-marks
–	B30-0068-05	Pilot lamp (8V, 200mA, meter) × 4	
–	D15-0160-04	Small pulley × 4	
–	D15-0171-03	Dial pulley	☆
–	D20-0128-03	Dial shaft ass'y.	
	(G01-0045-24)	Dial spring	
–	E11-0060-15	Phone jack	
–	E11-0065-05	Mic jack	
–	J90-0082-04	Dial pointer rail	☆
–	W02-0006-05	FM front end unit*	☆
–	X00-1830-10	Power supply (A) unit	☆
–	X00-1860-10	Power supply (B) unit	☆
–	X02-1100-10	IF, MPX. unit	☆
–	X08-1540-10	Preamp unit	☆
–	X11-1360-10	Control unit	☆
–	X12-1150-10	Filter unit	☆
–	X13-2330-10	Pushbutton switch unit (X90-1270-10)and(X90-1270-81)	☆
–	X13-2330-11	Pushbutton switch unit (X90-1270-61)	☆
–	X13-2340-10	Mic amp unit	☆
–	X13-2400-10	Relay unit	☆

POWER SUPPLY (A) (X00-1830-10)

Ref. No.	Parts No.	Description	Re-marks
		CAPACITOR	
Ck1	CE04W1J101EL	Electrolytic 100μF 63WV	
Ck2	CK45F1H103Z	Ceramic 0.01μF +80%−20%	
Ck3	CE04W1H101EL	Electrolytic 100μF 50WV	
Ck4	CK45F1H103Z	Ceramic 0.01μF +80%−20%	
Ck5	CE04W1C221EL	Electrolytic 220μF 16WV	
Ck6	CE04W1H101EL	Electrolytic 100μF 50WV	
Ck7	CE04W1C221EL	Electrolytic 220μF 16WV	
Ck8	CE04W1C101EL	Electrolytic 100μF 16WV	
Ck9	CE04W1H010EL	Electrolytic 1μF 50WV	
Ck10	CK45F1H103Z	Ceramic 0.01μF +80%−20%	
Ck11	CE04W1H4R7MBR	Electrolytic 4.7μF 50WV	
Ck12	CE04W1V470MBR	Electrolytic 47μF 35WV	
Ck13	CE04W1H101EL	Electrolytic 100μF 50WV	
Ck14	CE04W1C221EL	Electrolytic 220μF 16WV	
Ck16	CE04W1V470MBR	Electrolytic 47μF 35WV	
Ck18	CE04W1V470MBR	Electrolytic 47μF 35WV	
Ck20	CE04W1A221EL	Electrolytic 220μF 10WV	
Ck21	CE04W2A470EL	Electrolytic 47μF 100WV	
Ck22	CE04W1C471EL	Electrolytic 470μF 16WV	
		RESISTOR	
Rk1	RN14AB3D182JB MA	Metal film 1.8kΩ ±5% 2W	
Rk13	RN14AB3A562JB MA	Metal film 5.6kΩ ±5% 1W	
Rk18	RN14AB3D391JB MA	Metal film 390Ω ±5% 2W	
Rk48	PD14BY2E101JB	Carbon 100Ω ±5% 1/4W	
		SEMICONDUCTOR	
Qk2	V03-0270-05	Transistor 2SC945 (Q)	
Qk3	V03-0467-05	Transistor 2SC1567 (R) or (S)	
Qk5,6	V01-0084-05	Transistor 2SA733 (R) or (Q)	
Qk7,8	V03-0270-05	Transistor 2SC945 (Q)	
Qk9	V01-0084-05	Transistor 2SA733 (R) or (Q)	
Qk10	V03-0270-05	Transistor 2SC945 (Q)	
Qk11	V01-0084-05	Transistor 2SA733 (R) or (Q)	
Qk12,13	V03-0270-05	Transistor 2SC945 (Q)	
Qk14	V01-0119-05	Transistor 2SA743A (B) or (C)	
Qk15	V01-0207-05	Transistor 2SA809 (B) or (G)	
Dk1	V11-0451-05	Zener diode EQA01-35R	
Dk2	V11-0254-05	Zener diode YZ-140	
Dk3	V11-0271-05	Diode 1S2076	
Dk4	V11-0254-05	Zener diode YZ-140	
Dk6～13	V11-0271-05	Diode 1S2076	
Dk14	V11-0219-05	Diode V06B	

POWER SUPPLY (X00-1840-10, -61 AND -81)

Ref. No.	Parts No.	Description	Re-marks
		CAPACITOR	
Cz1～8	C91-0032-05	Film 0.1μF 200WV	☆
		SEMICONDUCTOR	
Dz1,2	V11-0415-05	Diode M4C-5	
		MISCELLANEOUS	
Fz1,2	F05-6024-05	Fuse (6A) (X00-1840-10)	
Fz3	F05-4021-05	Fuse (4A) (X00-1840-10)	
Fz4,5	F05-6024-05	Fuse (6A) (X00-1840-10)	
Fz1,2	F05-5024-05	Fuse (5A) (X00-1840-61)	
Fz3	F05-4024-05	Fuse (4A) (X00-1840-61)	
Fz4,5	F05-5024-05	Fuse (5A) (X00-1840-61)	
Fz1,2	F05-6021-05	Fuse (6A) (X00-1840-81)	
Fz3	F05-4022-05	Fuse (4A) (X00-1840-81)	
Fz4,5	F05-6021-05	Fuse (6A) (X00-1840-81)	
–	J13-0052-05	Fuse clip × 10	

POWER SUPPLY (B) (X00-1860-10)

Ref. No.	Parts No.	Description	Re-marks
		RESISTOR	
Rr1,2	RN14AB3D121JB MA	Metal film 120Ω ±5% 2W	
Rr3	RN14AB3F820JB MA	Metal film 82Ω ±5% 3W	
Rr4	RN14AB3F121JB MA	Metal film 120Ω ±5% 3W	
		SEMICONDUCTOR	
Qr1	V03-0344-05	Transistor 2SC1419 (B) or (C) or	
	V04-0042-05	Transistor 2SD234 (O)	
Qr2	V01-0114-05	Transistor 2SA755 (C)	

IF, MPX (X02-1100-10)

Ref. No.	Parts No.	Description	Re-marks
		CAPACITOR	
Cb1～5	CK45F1H103Z	Ceramic 0.01μF +80%−20%	

PARTS LIST

Ref. No.	Parts No.	Description	Re-marks
Cb6	CC45SL1H101K	Ceramic 100pF ±10%	
Cb7	CS15E1E010M	Tantalum 1μF 25WV	
Cb8	CK45F1H103Z	Ceramic 0.01μF +80%−20%	
Cb9	CS15E1C2R2M	Tantalum 2.2μF 16WV	
Cb10	CK45F1H103Z	Ceramic 0.01μF +80%−20%	
Cb11	CK45F1H473Z	Ceramic 0.047μF +80%−20%	
Cb12	CE04W1C221	Electrolytic 220μF 16WV	
Cb13	CK45F1H473Z	Ceramic 0.047μF +80%−20%	
Cb14	CS15E1E010M	Tantalum 1μF 25WV	
Cb15,16	CK45F1H473Z	Ceramic 0.047μF +80%−20%	
Cb17	CE04W1E4R7EL	Electrolytic 4.7μF 25WV	
Cb18	CC45SL1H050C	Ceramic 5pF ±0.25pF	
Cb19,20	CK45F1H103Z	Ceramic 0.01μF +80%−20%	
Cb21	CQ93M1H102M	Mylar 0.001μF ±20%	
Cb22	CK45F1H473Z	Ceramic 0.047μF +80%−20%	
Cb23	CC45SL1H050C	Ceramic 5pF ±0.25pF	
Cb24	CQ09S1H361J	Polystyrene 360pF ±5%	
Cb25	CQ93M1H103M	Mylar 0.01μF ±20%	
Cb26,27	CK45F1H103Z	Ceramic 0.01μF +80%−20%	
Cb28	CE04W1E010EL	Electrolytic 1μF 25WV	
Cb29	CE04W1C100EL	Electrolytic 10μF 16WV	
Cb30	CQ92M1H104MDA	Mylar 0.1μF ±20%	
Cb31,32	C90-0245-05	Ceramic 0.01μF ±20%	
Cb33	CE04W1C101EL	Electrolytic 100μF 16WV	
Cb34	CK45B1H681K	Ceramic 680pF ±10%	
Cb35	CQ93M1H473K	Mylar 0.047μF ±10%	
Cb36	CE04W1C221	Electrolytic 220μF 16WV	
Cb37	CQ09S1H361J	Polystyrene 360pF ±5%	
Cb38	CS15E1E1R5M	Tantalum 1.5μF 25WV	
Cb39	CS15E1E3R3M	Tantalum 3.3μF 25WV	
Cb40	CE04W1E4R7EL	Electrolytic 4.7μF 25WV	
Cb41	CQ92M1H334MDA	Mylar 0.33μF ±20%	
Cb42,43	CE04W1E4R7EL	Electrolytic 4.7μF 25WV	
Cb44	CQ09S1H561G(B)	Polystyrene 560pF ±2%	
Cb45,46	CQ92M1H124KDA	Mylar 0.12μF ±10%	
Cb47	CE04W1E4R7EL	Electolytic 4.7μF 25WV	
Cb48	CQ09S1H561G(B)	Polystyrene 560pF ±2%	
Cb49,50	CQ92M1H124KDA	Mylar 0.12μF ±10%	
Cb51	CE04W1E4R7	Electrolytic 4.7μF 25WV	
Cb52	CQ93M1H102M	Mylar 0.001μF ±20%	
Cb53	CQ92M1H154MDA	Mylar 0.15μF ±20%	
Cb54,55	CK45F1H103Z	Ceramic 0.01μF +80%−20%	
Cb56	CE04W1C100EL	Electrolytic 10μF 16WV	
Cb57	CQ93M1H102M	Mylar 0.001μF ±20%	
Cb58	CQ92M1H104MDA	Mylar 0.1μF ±20%	
Cb59	CC45SL1H150K	Ceramic 15pF ±10%	
Cb60	CE04W1C221EL	Electrolytic 220μF 16WV	
	SEMICONDUCTOR		
ICb1	V30-0215-05	IC LA1222	☆
ICb2	V30-0133-05	IC HA1137W-05	
ICb3	V30-0196-05	IC HA1197	
ICb4	V03-0155-05	IC HA1196	
ICb5	V30-0217-05	IC NJM4558D	☆
ICb6	V30-0217-05	IC NJM4558D (A) or (B)	☆
Db1～4	V11-0271-05	Diode 1S2076 or	
	V11-0076-05	Diode 1S1555	
	COIL/TRANS.		
Tb1	L30-0205-05	FM-IFT	
Tb2	L31-0389-05	AM-RF Coil	☆
Tb3	L32-0205-05	AM-OSC Coil	☆
Tb4	L30-0284-05	AM-IFT	
Tb5,6	L79-0027-05	Low pass filter	
Lb1	L40-1092-44	Inductor (1μH)	
Lb2	L40-1805-62	Inductor (18μH)	
Lb3,4	L40-1512-03	Inductor (150μH)	

Ref. No.	Parts No.	Description	Re-marks
CFb1～4	L72-0034-05	Ceramic filter (10.7 MHz)	
CFb5	L72-0045-05	Ceramic filter (10.7 MHz)	☆
	POTENTIOMETER		
VRb2	R12-3029-05	PC trimmer 30kΩ(B) OUTPUT	
VRb3	R12-4006-05	PC trimmer 50kΩ(B) DEVIATION	
VRb4	R12-3041-05	PC trimmer 10kΩ(B) VCO	
VRb5	R12-5026-05	PC trimmer 220kΩ(B) SEPARATION	
VRb6	R12-5019-05	PC trimmer 100kΩ(B) S-METER	

POWER AMP (X07-1480-10)

Ref. No.	Parts No.	Description	Re-marks
	CAPACITOR		
Ce1	CC45SL1H221K	Ceramic 220pF ±10%	
Ce2	CS15E1C2R2M	Tantalum 2.2μF 16WV	
Ce3	CE04W1A221EL	Electrolytic 220μF 10WV	
Ce4	CC45SL1H060D	Ceramic 6pF ±0.5pF	
Ce5	CC45SL1H101K	Ceramic 100pF ±10%	
Ce6,7	C90-0344-05	Electrolytic 10μF 50WV	
Ce8	CQ93M2A104M	Mylar 0.1μF ±20%	
Ce9,10	CE04W2A3R3EL	Electrolytic 3.3μF 100WV	
Ce11	CE04W1H100EL	Electrolytic 10μF 50WV	
Ce12	CK45F1H103Z	Ceramic 0.01μF +80%−20%	
Ce13	CS15E1C2R2M	Tantalum 2.2μF 16WV	
Ce14	CC45SL1H060D	Ceramic 6pF ±0.5pF	
	RESISTOR		
Re6	PD14BY2E271JBMA	Carbon 270Ω ±5% 1/4W	
Re8,9	PD14BY2E681JBMA	Carbon 680Ω ±5% 1/4W	
Re11	PD14BY2E102JBMA	Carbon 1kΩ ±5% 1/4W	
Re13,14	PD14BY2E910JBMA	Carbon 91Ω ±5% 1/4W	
Re16	RN14AB3H4R7JBMA	Metal film 4.7Ω ±5% 5W	
Re17	RN14AB3D100JBMA	Metal film 10Ω ±5% 2W	
Re18	PD14BY2E682JBMA	Carbon 6.8kΩ ±5% 1/4W	
	SEMICONDUCTOR		
Qe1,2	V03-0271-05	Transistor 2SC1345(D) or (E)	
Qe3～5	V03-0500-05	Transistor 2SC1775(E) or (F)	
Qe6,7	V01-0162-05	Transistor 2SA912 (R) or (S)	
Qe8	V03-0439-05	Transistor 2SC1885 (R) or (S)	
De1,2	V11-0271-05	Diode 1S2076	
De3	V11-0435-05	Zener diode EQA01-24R	
De4	V11-0295-05	Diode W068	
ICe1	V30-0214-05	Power pack TA-200W	
	COIL		
Le1	L39-0080-15	Phase compensation coil	

PARTS LIST

PREAMP (X08-1540-10)

Ref. No.	Parts No.	Description	Remarks
		CAPACITOR	
Cd1,2	CE04W1H3R3MBR	Electrolytic 3.3μF 50WV	
Cd3,4	CE04W1A101EL	Electrolytic 100μF 10WV	
Cd5,6	CE04W1A470EL	Electrolytic 47μF 10WV	
Cd7,8	CC45SL1H270K	Ceramic 27pF ±10%	
Cd9,10	CC45SL1H120K	Ceramic 12pF ±10%	
Cd11～14	CE04W1H2R2MBR	Electrolytic 2.2μF 50WV	
Cd15～18	CQ09S1H242GB	Polystyrene 0.0024μF ±2%	
Cd19～22	CQ09S1H822GB	Polystyrene 0.0082μF ±2%	
Cd23,24	CE04W1A101EL	Electrolytic 100μF 10WV	
Cd25,26	CE04W1A470EL	Electrolytic 47μF 10WV	
Cd27	CE04W1C330EL	Electrolytic 33μF 16WV	
Cd28	CE04W1H3R3EL	Electrolytic 3.3μF 50WV	
Cd31,32	CE04W1A330EL	Electrolytic 33μF 10WV	
Cd33,34	CE04W1V471EL	Electrolytic 470μF 35WV	
Cd35～38	CE04W1H010MBR	Electrolytic 1μF 50WV	
Cd39,40	CC45SL1H270K	Ceramic 27pF ±10%	
Cd41,42	CC45SL1H330K	Ceramic 33pF ±10%	
Cd43,44	CC45SL1H220K	Ceramic 22pF ±10%	
		RESISTOR	
Rd29,30	RN14AB3A272J	Metal film 2.7kΩ ±5% 1W	
Rd41～44	RN14BK2E3162F	Metal film 31.6kΩ ±1% 1/4W	
Rd45,46	RN14BK2E4023F	Metal film 402kΩ ±1% 1/4W	
Rd47,48	RN14BK2E4123F	Metal film 412kΩ ±1% 1/4W	
Rd79,80	PD14BY2E121JB	Carbon 120Ω ±5% 1/4W	
		SEMICONDUCTOR	
Qd1,2	V09-0096-05	FET 2SK68A(M)	
Qd3,4	V01-0146-05	Transistor 2SA640(E)	
Qd5,6	V09-0095-05	FET 2SK68A(K)	
Qd7,8	V01-0146-05	Transistor 2SA640(E)	
Qd9,10	V01-0152-05	Transistor 2SA750(1) (E) or (F)	
Qd11,12	V03-0424-05	Transistor 2SC1400(E) or (U)	
Qd13,14	V03-0447-05	Transistor 2SC1681(BL) or (GR)	
Qd17,18	V01-0199-05	Transistor 2SA899(B) or (V)	
Qd19,20	V03-0447-05	Transistor 2SC1681(BL) or (GR)	
Qd21,22	V01-0190-05	Transistor 2SA841(BL) or (GR)	
		MISCELLANEOUS	
—	E40-0370-05	Mini-connector (3P) × 2	

CONTROL (X11-1360-10)

Ref. No.	Parts No.	Description	Remarks
		CAPACITOR	
Ci1,2	C91-0033-05	Film 1μF 100WV	☆
Ci3,4	CS15E1C3R3M	Tantalum 3.3μF 16WV	
Ci5,6	CE04W1A101EL	Electrolytic 100μF 10WV	
Ci7,8	CC45SL1H270K	Ceramic 27pF ±10%	
Ci9,10	CC45SL1H040C	Ceramic 4pF ±0.25pF	
Ci11,12	CE04W1A101EL	Electrolytic 100μF 10WV	
Ci13,14	CE04W1E100MBR	Electrolytic 10μF 25WV	
Ci15,16	CQ93M1H682K	Mylar 0.0068μF ±10%	
Ci17,18	CQ93M1H103K	Mylar 0.01μF ±10%	
Ci19～22	CQ93M1H183K	Mylar 0.018μF ±10%	
Ci23,24	CQ93M1H272K	Mylar 0.0027μF ±10%	
Ci25,26	CC45SL1H331K	Ceramic 330pF ±10%	
Ci27,28	CE04W1H010MBR	Electrolytic 1μF 50WV	
Ci29,30	CE04W1A101EL	Electrolytic 100μF 10WV	
Ci31,32	CE04W1H2R2MBR	Electrolytic 2.2μF 50WV	
Ci33,34	CE04W1E100MBR	Electrolytic 10μF 25WV	
Ci35,36	CE04W1A101EL	Electrolytic 100μF 10WV	
Ci37,38	CE04W1E100MBR	Electrolytic 10μF 25WV	
Ci39	CE04W1E101EL	Electrolytic 100μF 25WV	
Ci40	CE04W1V101EL	Electrolytic 100μF 35WV	
Ci41	CE04W1E101EL	Electrolytic 100μF 25WV	
		RESISTOR	
Ri65,66	PD14BY2E102JB	Carbon 1kΩ ±5% 1/4W	
		SEMICONDUCTOR	
Qi1,2	V01-0190-05	Transistor 2SA841(GR) or (BL)	
Qi3,4	V03-0447-05	Transistor 2SC1681(BL)	
Qi5～8	V01-0190-05	Transistor 2SA841(BL)	
Qi9,10	V01-0146-05	Transistor 2SA640(E) or (F)	
		POTENTIOMETER	
VRi1	R24-9003-05	Potentiometer 100kΩ MN 100kΩ(B) VOLUME, BALANCE	☆
VRi2～4	R06-5023-05	Potentiometer 100kΩ(B) TONE	☆
		SWITCH	
S11	S33-4004-05	Lever (LOUDNESS)	
S12	S33-4006-05	Lever (TONE JUMP)	

FILTER (X12-1150-10)

Ref. No.	Parts No.	Description	Remarks
		CAPACITOR	
Cs1,2	CQ93M1H822K	Mylar 0.0082μF ±10%	
Cs3,4	CQ93M1H123K	Mylar 0.012μF ±10%	
		SWITCH	
S3～5	S42-2008-05	Pushbutton (3 key) (AF MUTING, HI-FIL, LOW-FIL)	

SWITCH (X13-2330-10 AND -11)

Ref. No.	Parts No.	Description	Remarks
		CAPACITOR	
Ch1,2	CE04W1A101	Electrolytic 100μF 10WV	
Ch3,4	CQ09S1H122GB	Polystyrene 0.0012μF ±2% (X13-2330-10)	
	CQ09S1H621GB	Polystyrene 620pF ±2% (X13-2330-11)	
Ch5	CE04W0J221	Electrolytic 220μF 6.3WV	
Ch6～9	CK45F1H103Z	Ceramic 0.01μF +80% −20%	
		RESISTOR	
Rh1,2	RN14AB3D102J	Metal 1kΩ ±5% 2W	
		SEMICONDUCTOR	
Dh1,2	V11-0400-05	Diode 1N34A	
Dh3,4	V11-0051-05	Diode 1N60IFT	
Dh5,6	V11-0271-05	Diode 1S2076	
Dh7,8	V11-0400-05	Diode 1N34A	
THh1,2	V22-0020-05	Thermister SDT-35	
		POTENTIOMETER	
VRh1,2	R12-1021-05	PC trimmer 1kΩ(B) POWER METER	

PARTS LIST

Ref. No.	Parts No.	Description	Re-marks
		SWITCH	
S6~9	S42-4007-05	Pushbutton (4 key) POWER METER, D/S METER, FM MUTING, FM 25μS	☆

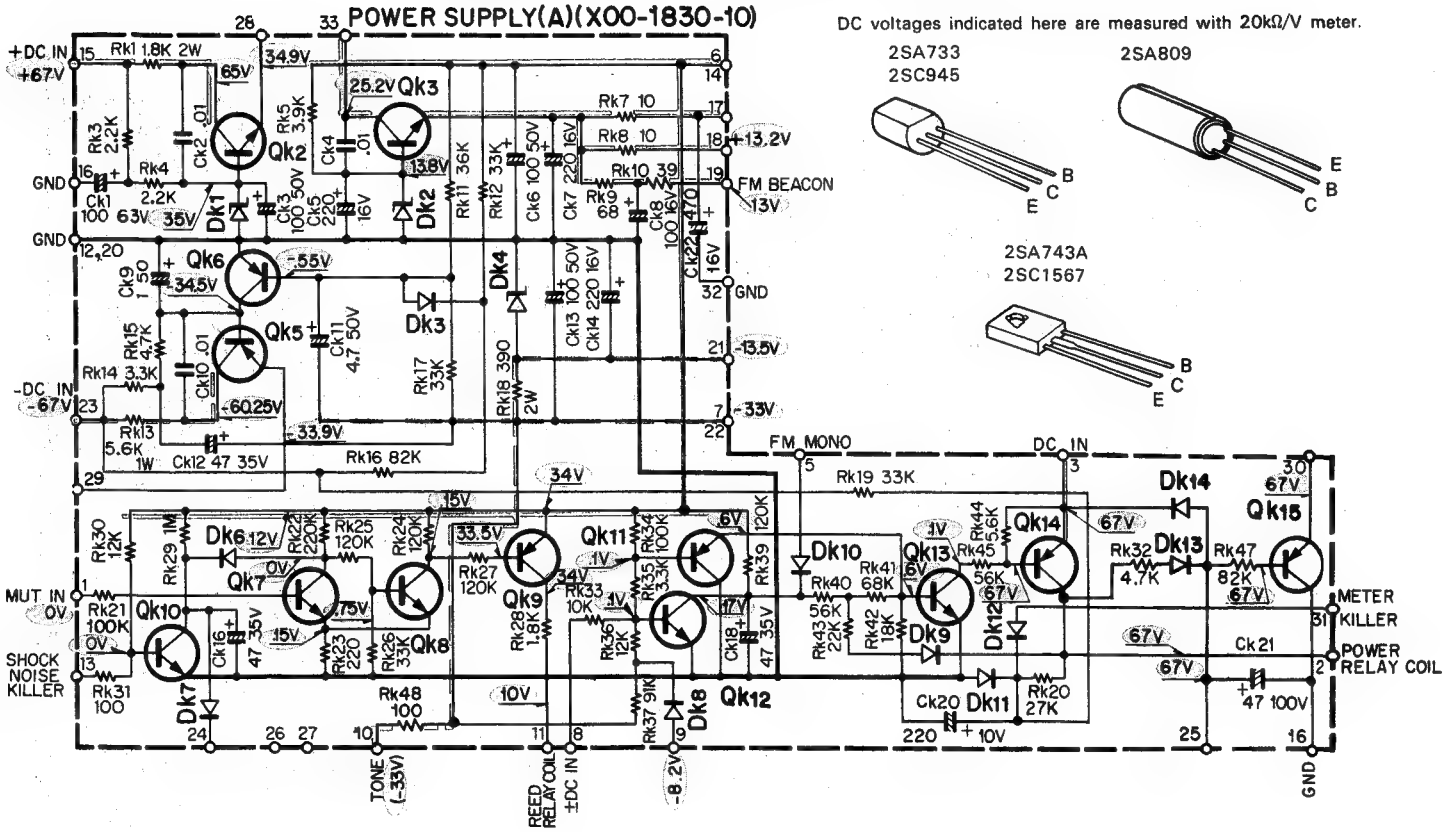
MIC AMP (X13-2340-10)

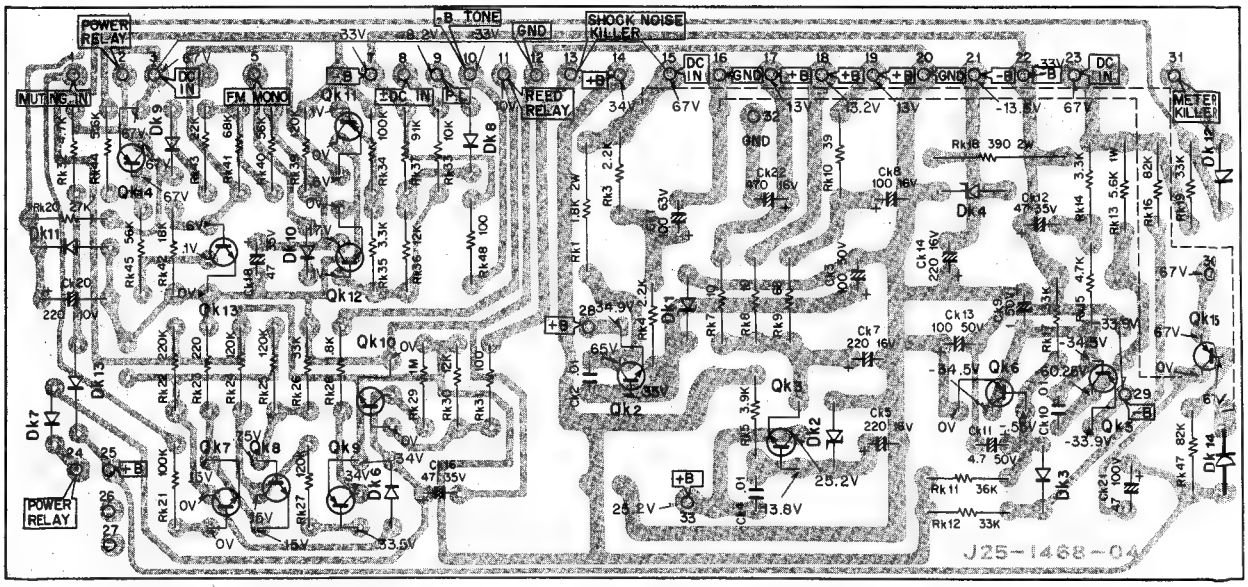
Ref. No.	Parts No.	Description	Re-marks
		CAPACITOR	
Cp1	CC45SL1H221K	Ceramic 220pF ±10%	
Cp2	CE04W1H010EL	Electrolytic 1μF 50WV	
Cp4	CE04W1E100EL	Electrolytic 10μF 25WV	
Cp5	CK45D1H102M	Ceramic 0.001μF ±20%	
Cp6	CC45SL1H470K	Ceramic 47pF ±10%	
Cp7	CE04W1A470EL	Electrolytic 47μF 10WV	
Cp8~10	CE04W1H010EL	Electrolytic 1μF 50WV	
Cp13,14	CE04W1H010EL	Electrolytic 1μF 50WV	
Cp15,16	CE04W1V101EL	Electrolytic 100μF 35WV	
		RESISTOR	
Rp27,28	PD14BY2E151JB	Carbon 150Ω ±5% 1/4W	
		SEMICONDUCTOR	
Qp1	V01-0152-05	Transistor 2SA750 (1) (E) or (F)	
Qp2	V03-0458-05	Transistor 2SC1439 (G) or (B)	
Qp3,4	V03-0424-05	Transistor 2SC1400 (U) or (E)	
Dp1	V11-0271-05	Diode 1S2076	
		POTENTIOMETER	
VRp1	R06-5024-05	Potentiometer 100kΩ (B) dual (MIC MIXING)	☆
		SWITCH/RELAY	
S7,8	S33-4008-05	Lever (DUB, MONITOR)	☆
S13	S33-4004-05	Lever (MODE)	
S16	S33-4007-05	Lever (SOUND INJ.)	☆
RLp1	S51-2033-05	Reed relay	
		MISCELLANEOUS	
—	E40-0570-05	Mini-connector × 2	

RELAY (X13-2400-10)

Ref. No.	Parts No.	Description	Re-marks
		CAPACITOR	
Cq1	CE04W1C101NP	Non-pole electrolytic 100μF 16WV	
Cq2	CE04W1C471	Electrolytic 470μF 16WV	
Cq4	CQ93M1H104M	Mylar 0.1μF ±20%	
		RESISTOR	
Rq1	RC05GF2H391J	Carbon 390Ω ±5% 1/2W	
Rq5	RC05GF2H681J	Carbon 680Ω ±5% 1/2W	
		SEMICONDUCTOR	
Dq1,2	V11-0219-05	Diode V06B	
		RELAY	
Lq1,2	S51-4030-05	Relay	

POWER SUPPLY (A) (X00-1830-10)

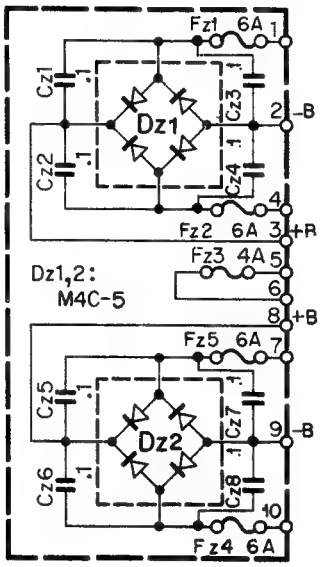




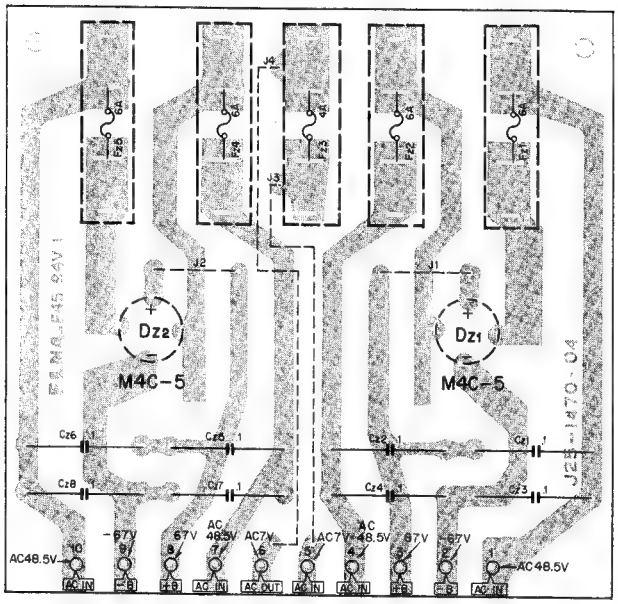
Qk2,7,8,10,12,13: 2SC945(Q), Qk3: 2SC1567(R) or (S), Qk5,6,9,11: 2SA733(R) or (Q), Qk14: 2SA743A(B) or (C), Qk15: 2SA809(B) or (G), Dk1: EQA01-35R, Dk2,4: YZ-140, Dk3,6～13: 1S2076, Dk14: V06B

POWER SUPPLY (X00-1840-10) AND (X00-1860-10)

▼ POWER SUPPLY (X00-1840-10)

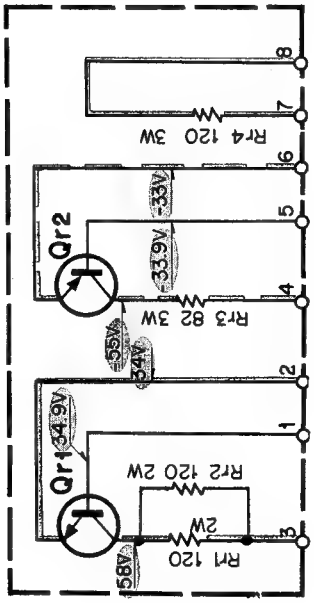


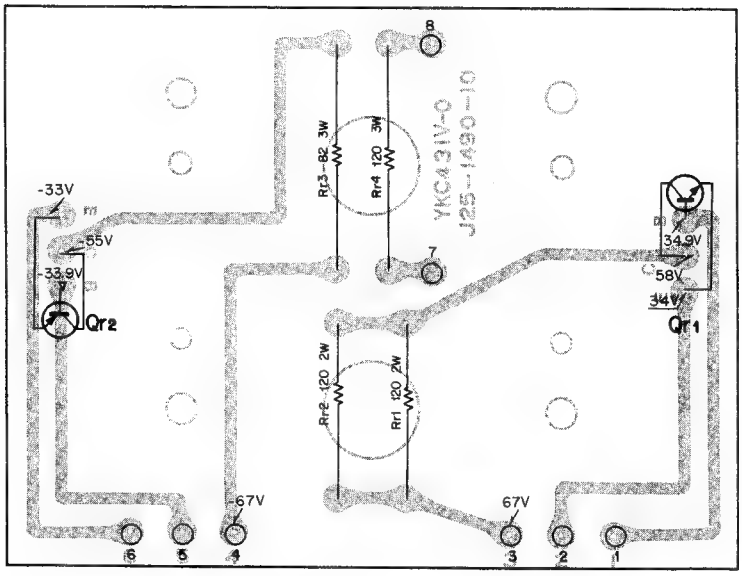
DC voltages indicated here are measured with 20kΩ/V meter.



Dz, 2: M4C-5

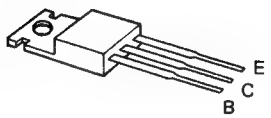
▼ POWER SUPPLY (B) (X00-1860-10)



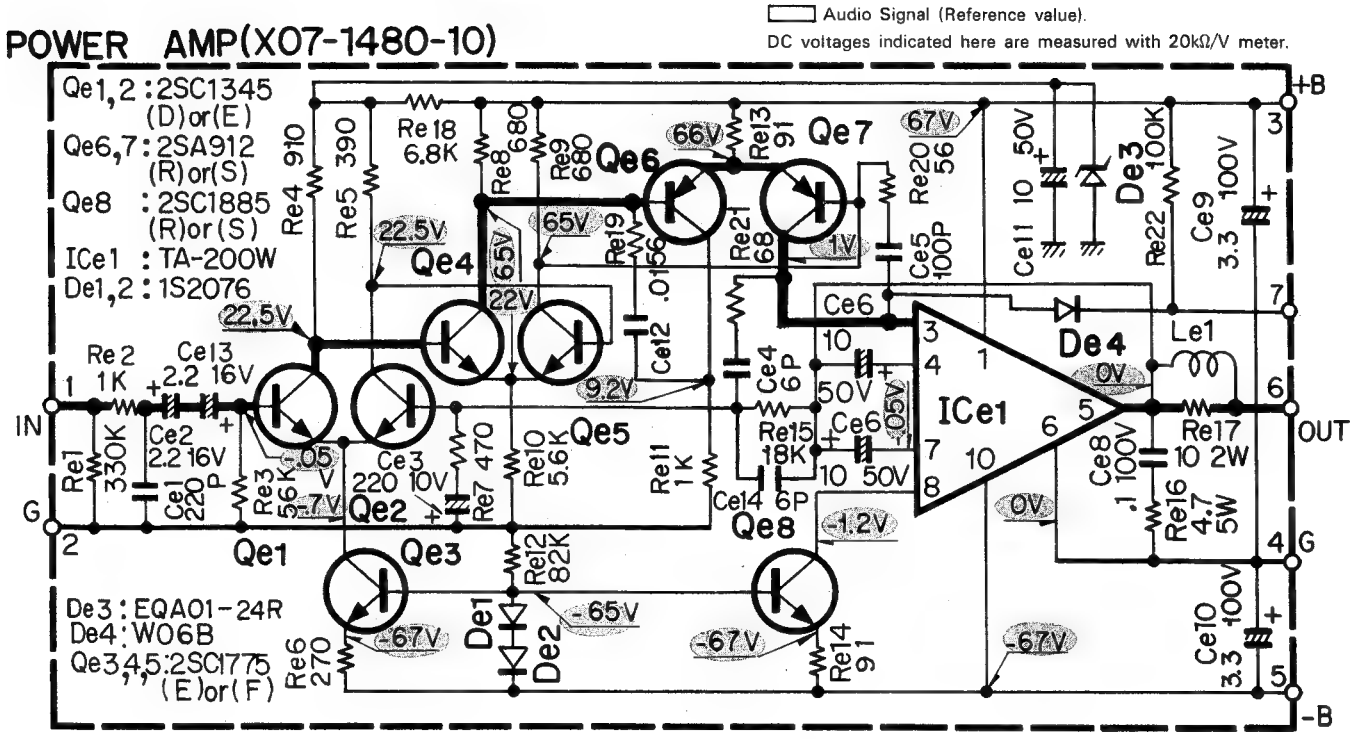


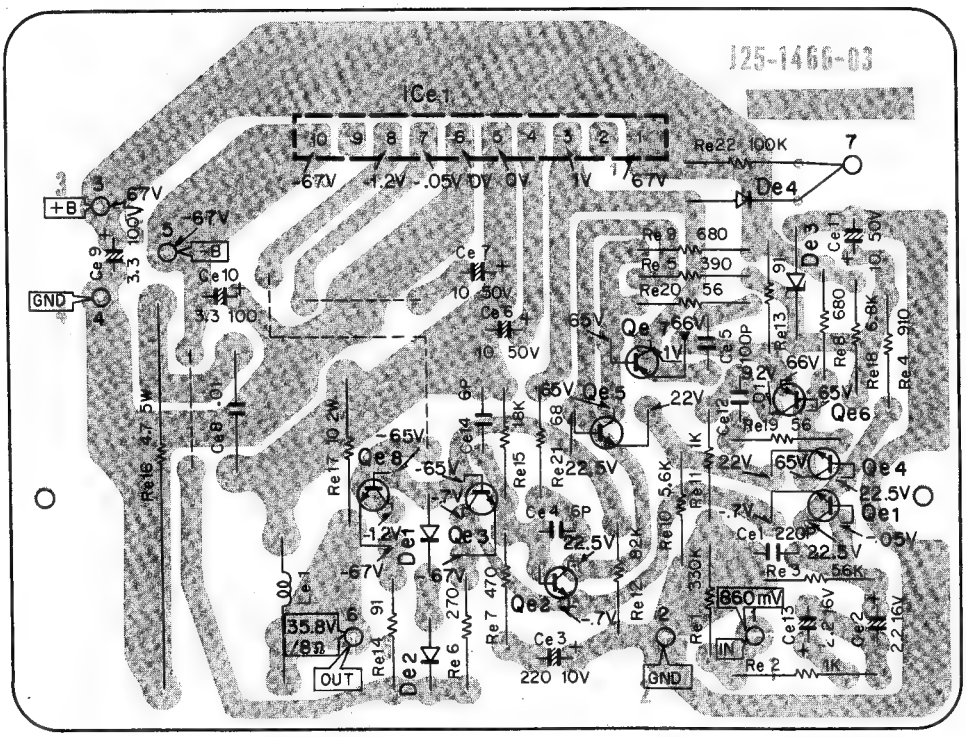
Qr1. 2SC1419(B) or (C) or 2SD234(O), Qr2: 2SA755(C)

2SA755
2SC1419



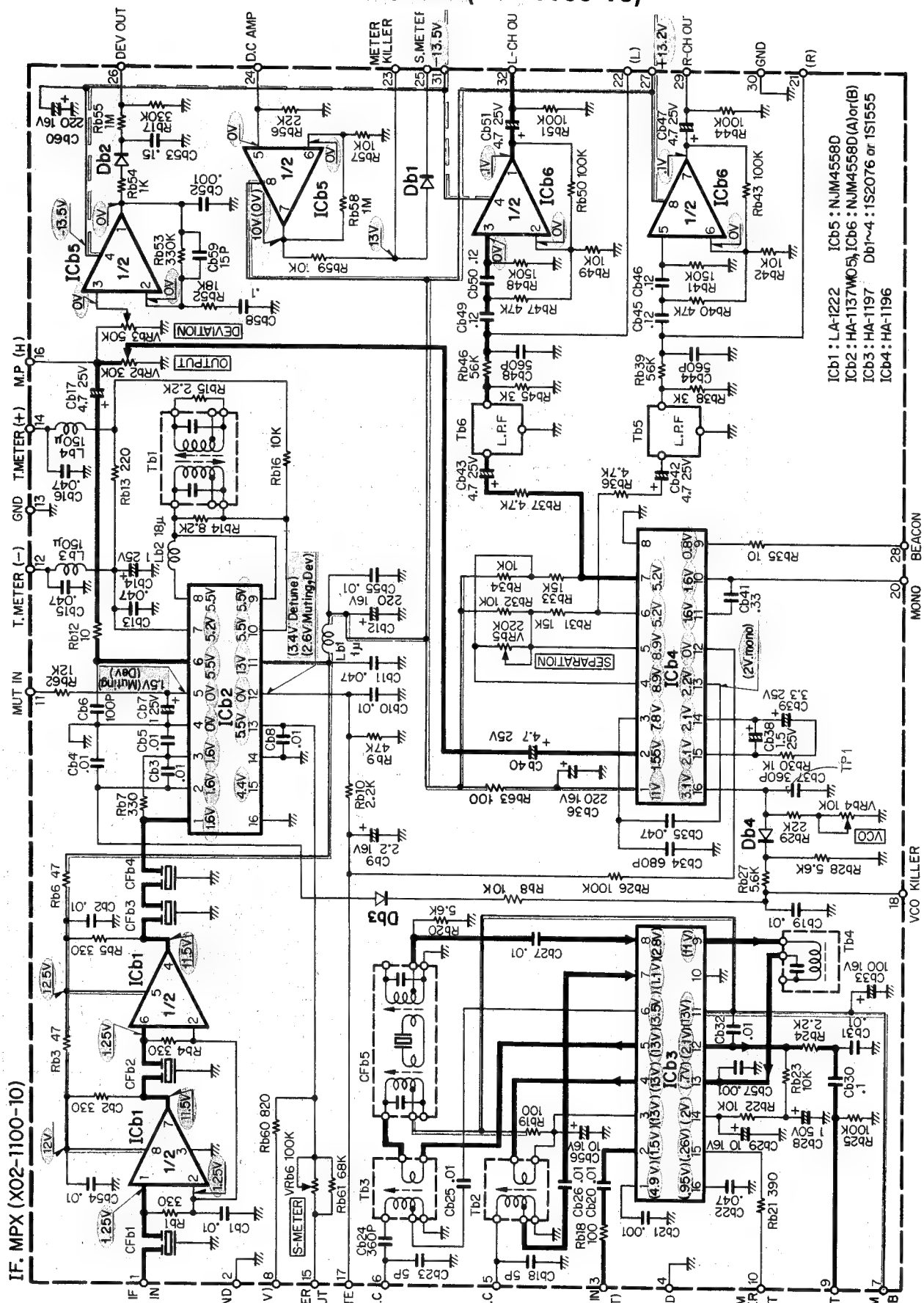
POWER (X07-1480-10)



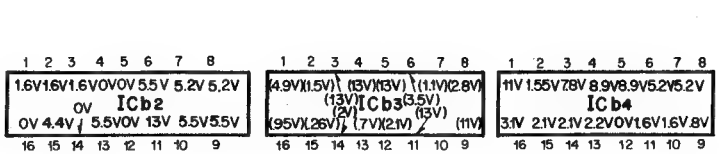


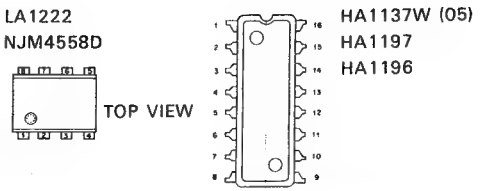
Qe1,2: 2SC1345(D) or (E), Qe3～5: 2SC1775(E) or (F), Qe6,7: 2SA912(R) or (S), Qe8: 2SC1885(R) or (S), ICe1: TA-200W, De1,2: 1S2076, De3: EQA01-24R, De4: W06B

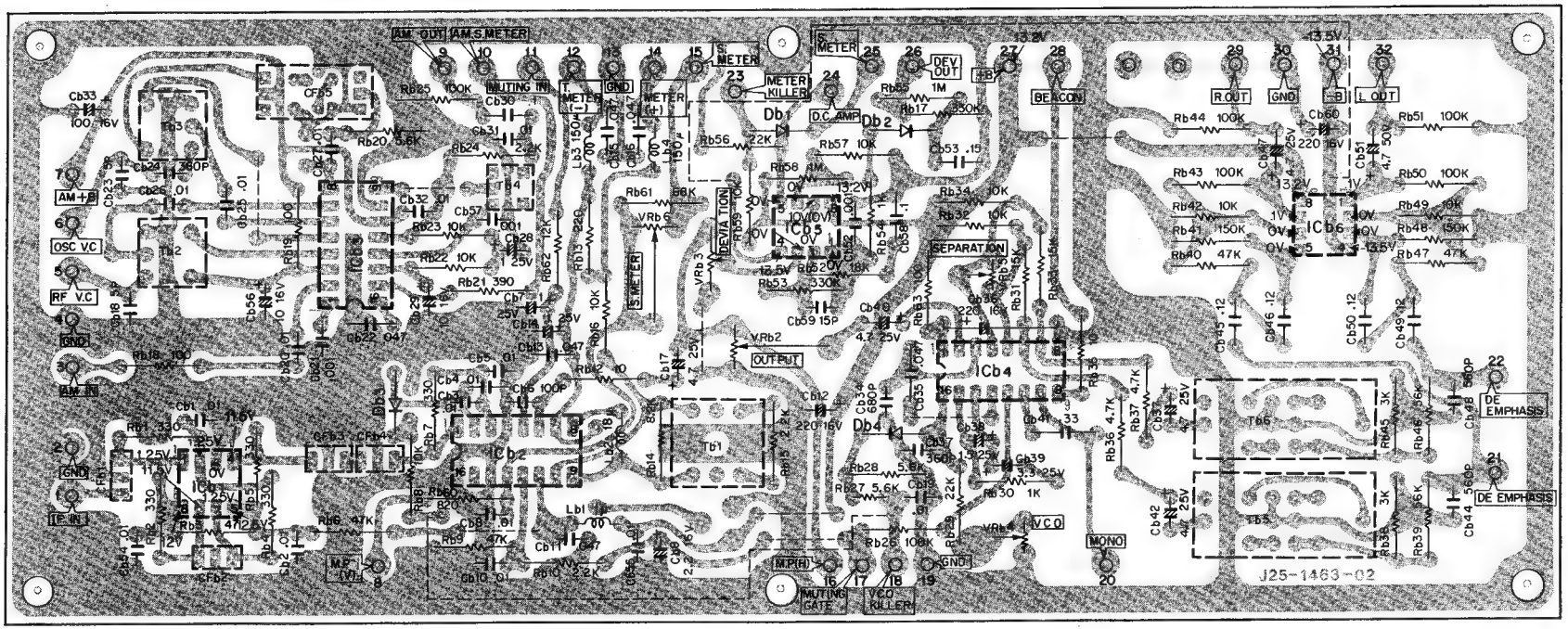
IF.MPX (X02-1100-10)



IF, MPX (X02-1100-10)

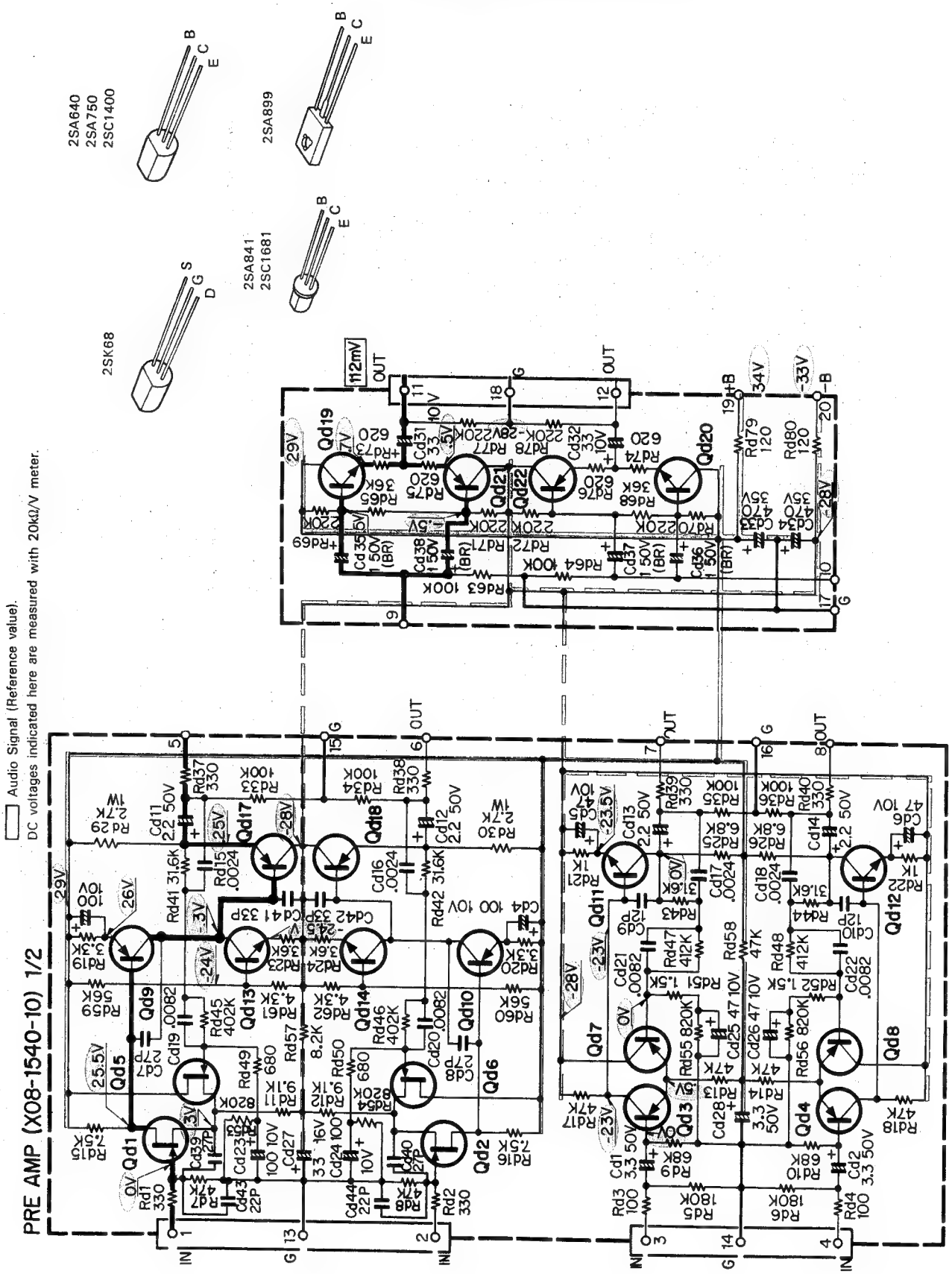




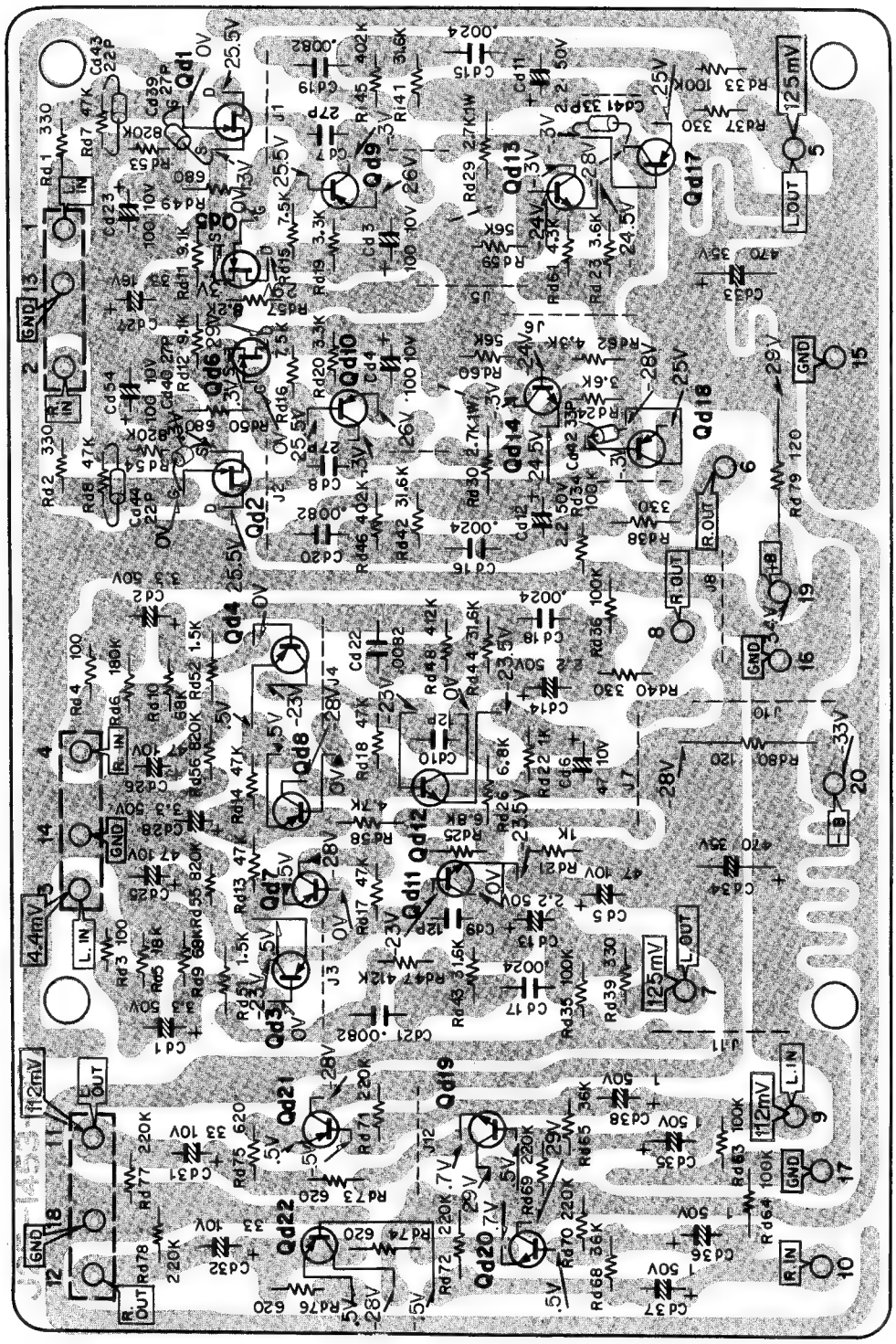


ICb1: LA1222, ICb2: HA1137W-05, ICb3: HA1197, ICb4: HA1196, ICb5: NJM4558D, ICb6: NJM4558D(A) or (B), Db1～4: 1S2076 or 1S1555

PRE AMP (X08-1540-10)

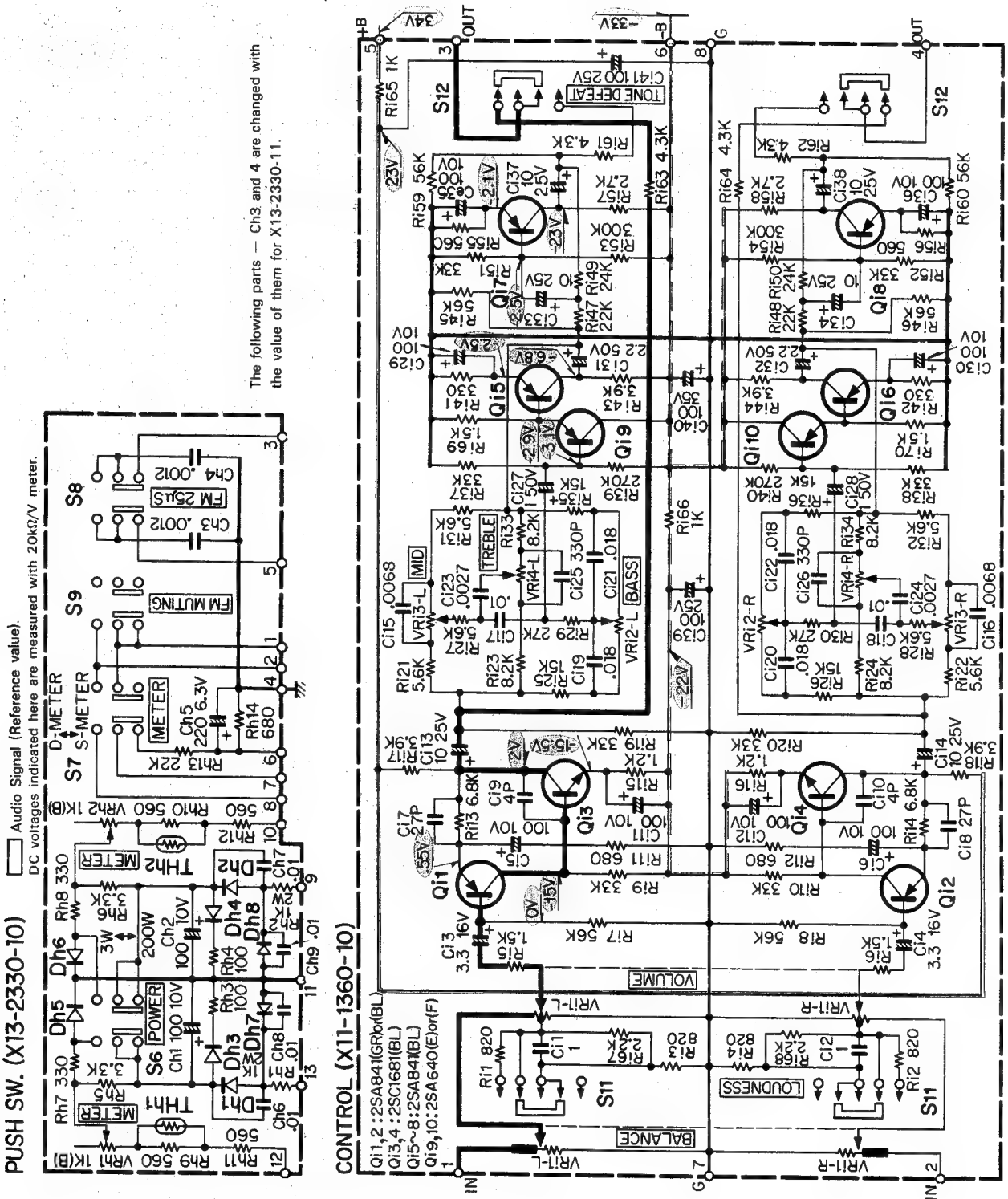


PREAMP (X08-1540-10)

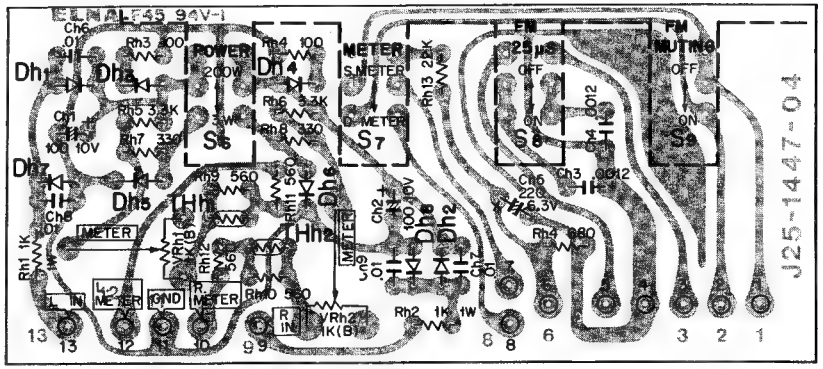


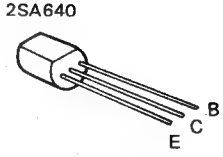
Qd1,2: 2SK68A(M), Qd3,4,7,8: 2SA640(E), Qd5,6: 2SK68A(K), Qd9,10: 2SA750(1)(E) or (U), Qd11,12: 2SC1400(E) or (U), Qd13,14,19,20: 2SC1681(BL) or (GR), Qd17,18: 2SA899(B) or (V), Qd21,22: 2SA841(BL) or (GR)

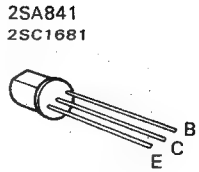
CONTROL (X11-1360-10)/PUSH SW (X13-2330-10)



▼ PUSH SW (X13-2330-10)

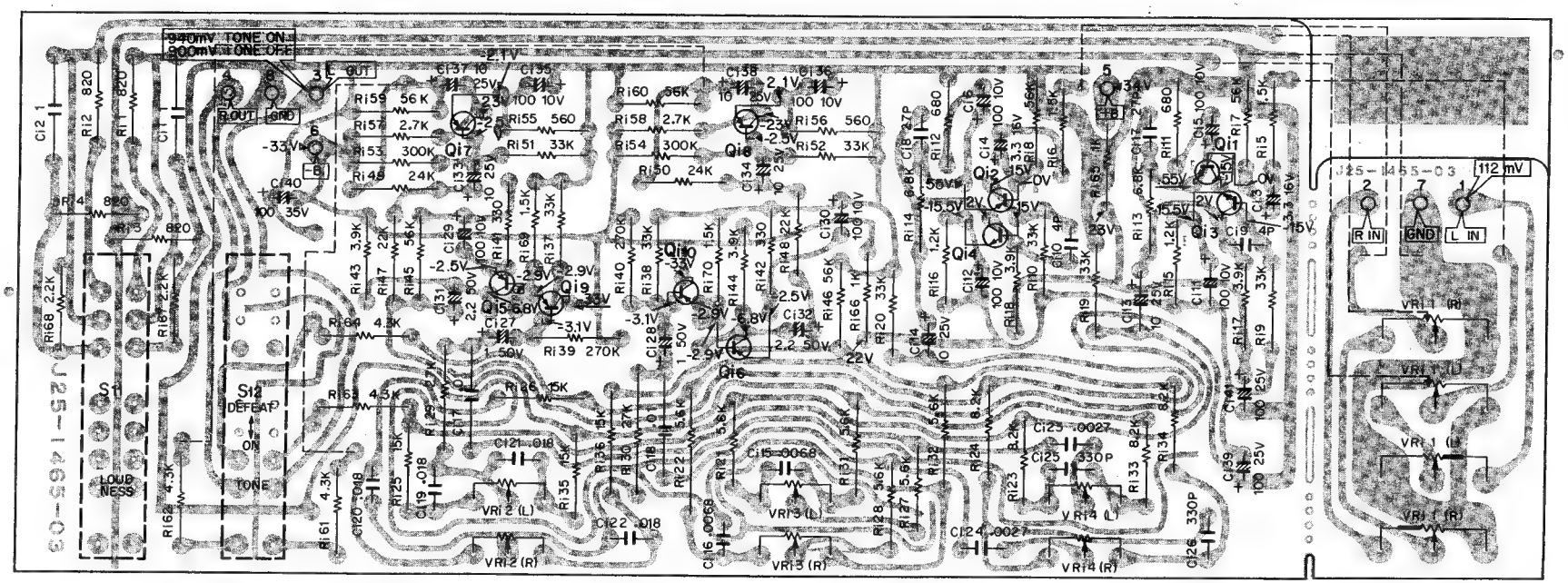






Dh1,2,7,8: 1N34A, Dh3,4: 1N60IFT, Dh5,6: 1S2076, THh1,2: SDT-35

▼ CONTROL (X11-1360-10)

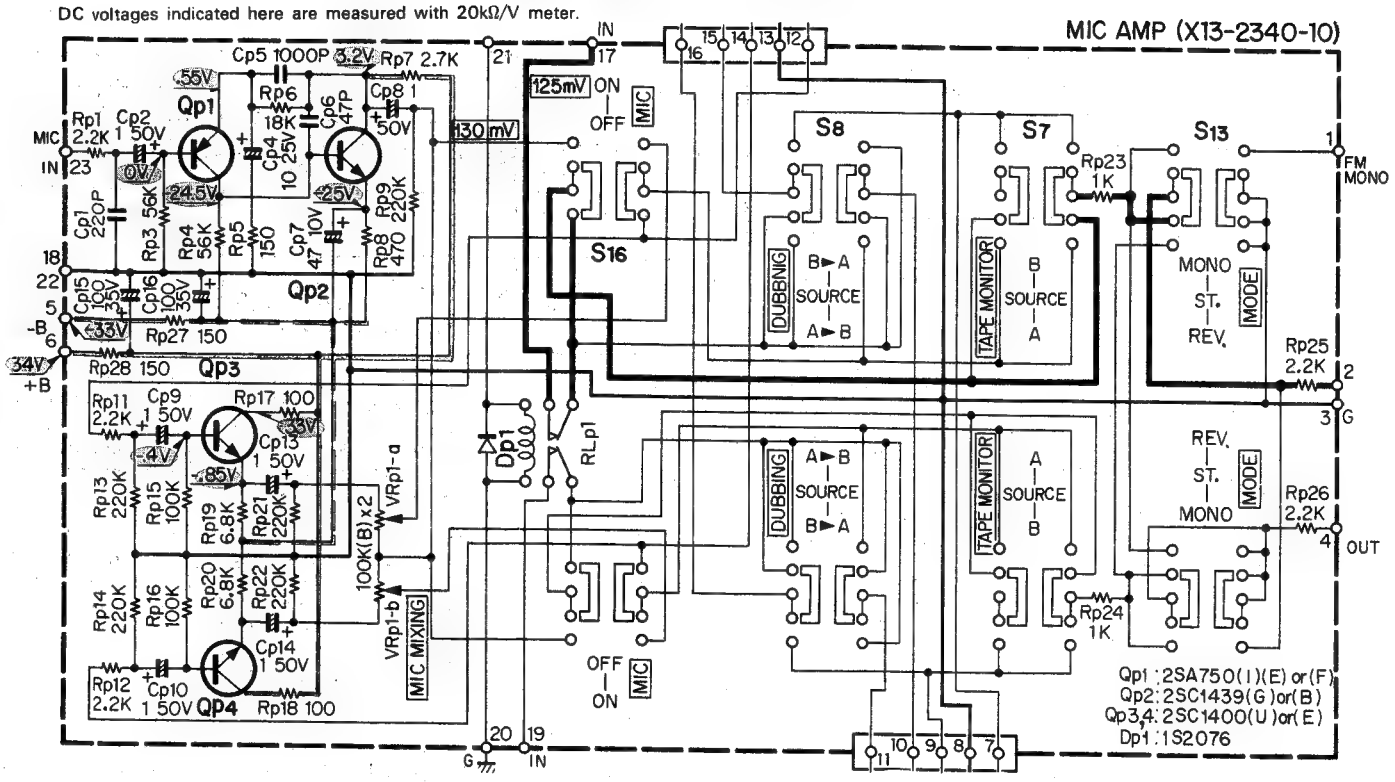


Qi1,2: 2SA841(GR) or (BL), Qi3,4: 2SC1681(BL), Qi5～8: 2SA841(BL), Qi9,10: 2SA640(E) or (F)

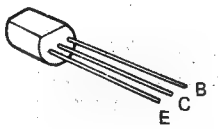
CONTROL (X11-1360-10)/PUSH SW (X13-2330-10)

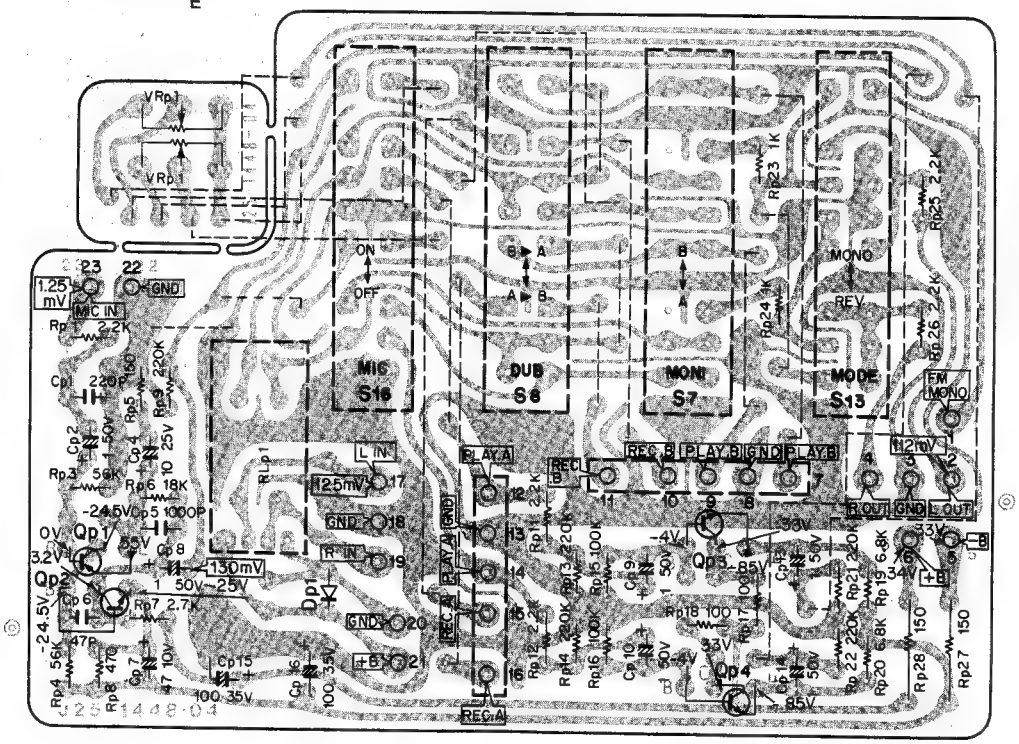
MIC AMP (X13-2340-10)

Audio Signal (Reference value).
DC voltages indicated here are measured with 20kΩ/V meter.



2SA750
2SC1400
2SC1439

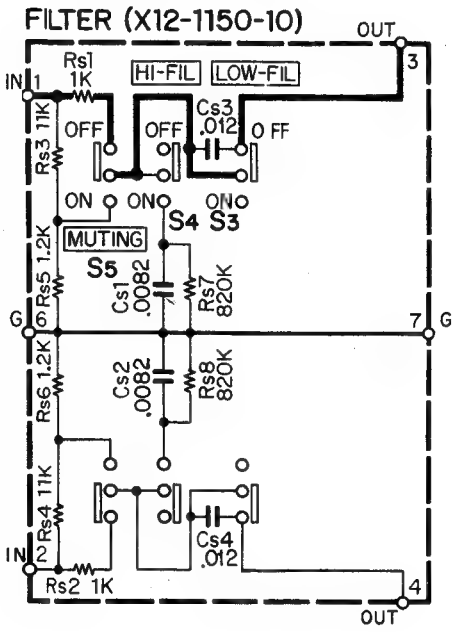




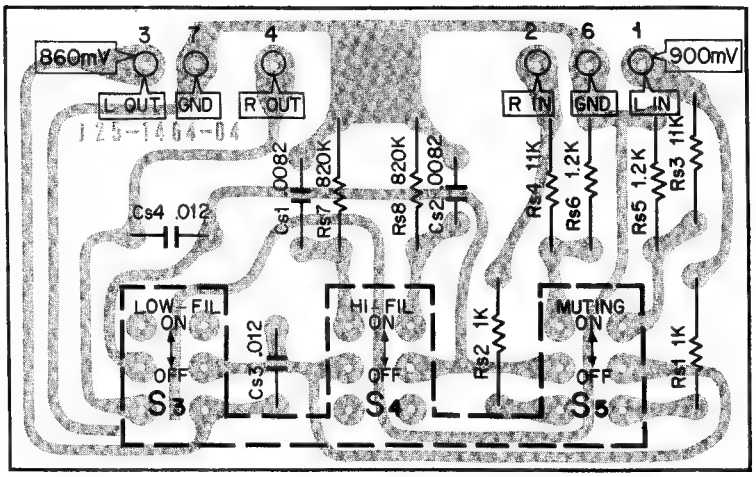
Qp1: 2SA750(I) (E) or (F), Qp2: 2SC1439(G) or (B), Qp3,4: 2SC1400(U) or (E), Dp1: 1S2076

FILTER (X12-1150-10) / RELAY (X13-2400-10)

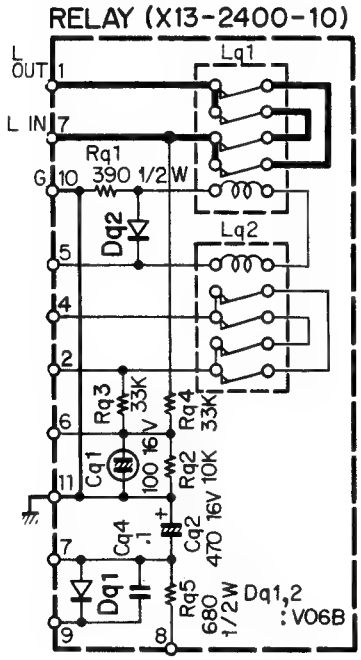
▼ FILTER (X12-1150-10)

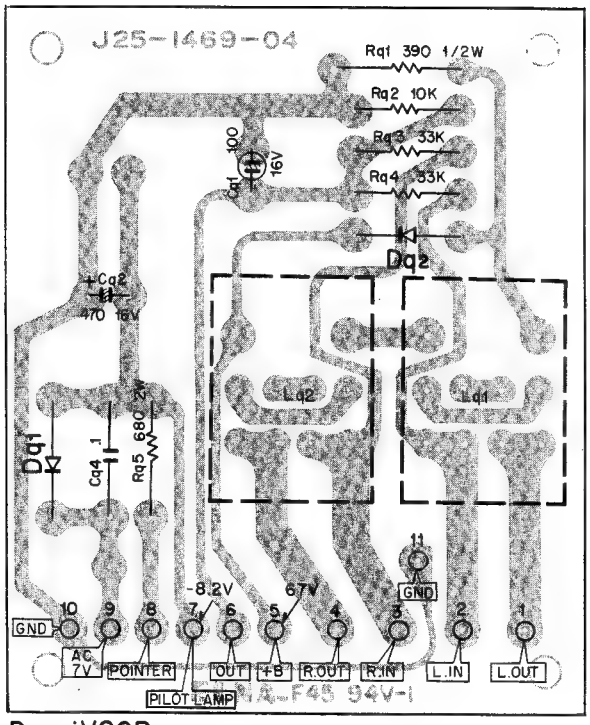


Audio Signal (Reference value).
DC voltages indicated here are measured with 20kΩ/V meter.



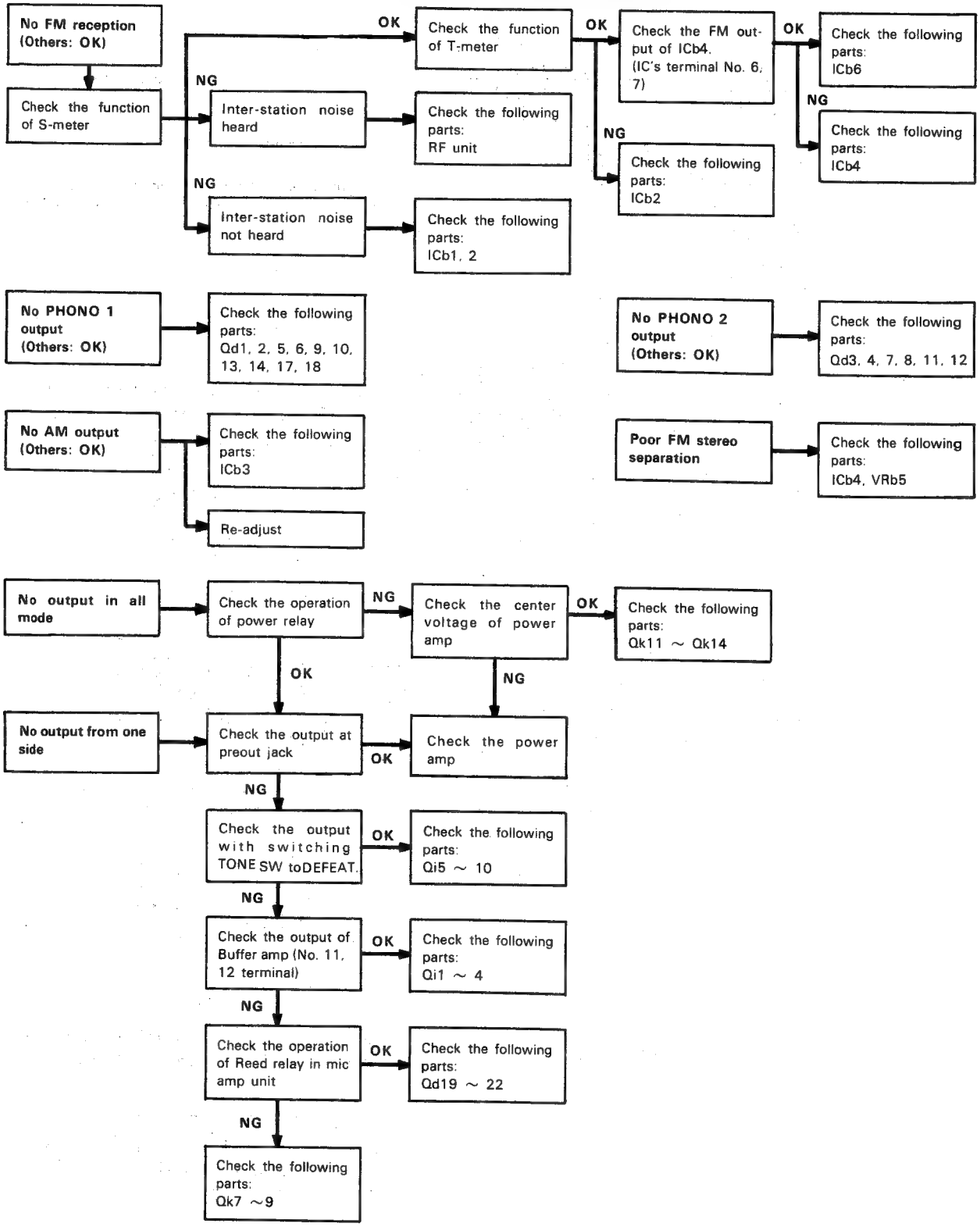
▼ RELAY (X13-2400-10)





Dq1,2: V06B

TROUBLESHOOTING

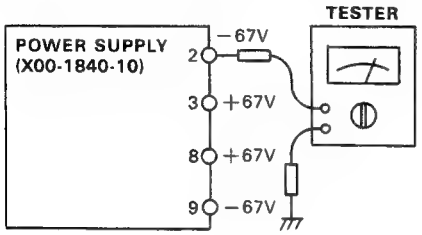


HINTS FOR FINDING THE TROUBLED UNIT

In case of searching trouble points for Audio Section, it is easy to find the troubled unit in this receiver as follows.

CHECK METHOD

Check every terminal of power supply (X00-1840-10) referring to schematic and PC board illustrations.



NG

CHECK POINTS

1. Fuse (10A)
2. Power transformer
3. Power switch (S3)
4. Electrolytic block

Check every terminal of power supply (X00-1830-10) referring to schematic and PC board illustrations.

OK

Check the supplied voltage for each unit, referring to schematic and PC board illustratiots.

OK

NG

Protection relay operates after a few seconds when power is on.

Power relay in RELAY unit (X13-2400-10)

OK

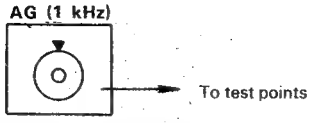
Prepare the following test equipments

1. Audio generator
2. Oscilloscope
3. Dummy load (100 watts or more)
4. Solid state voltmeter
5. Distortion meter

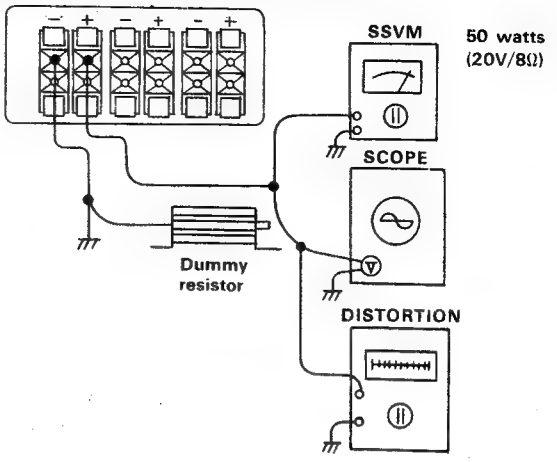
Connect the test equipments as follows.

Caution: Do not mis-connection and mis-operation, because power output is high value at speaker terminal.

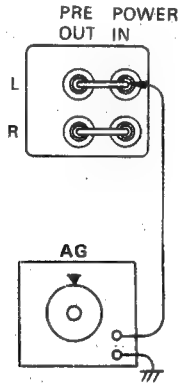
HINTS FOR FINDING THE TROUBLED UNIT



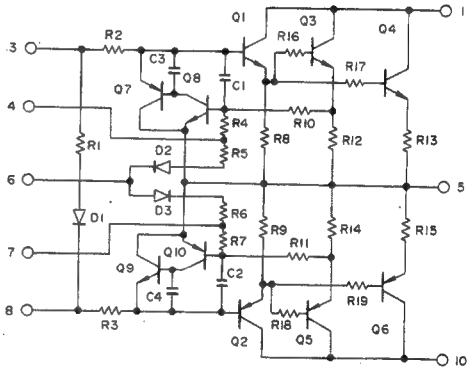
When changing the test point, set the AG output level knob to minimum position.



Check the output (50 watts) when supplying the test signal (1 kHz) of 530 mV for power in jack.

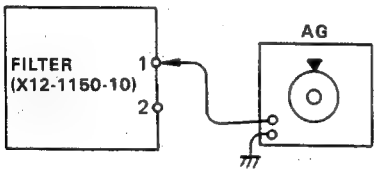


NG ⇨ Power amp unit (X07-1480-10)



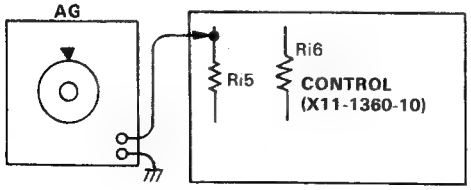
TA-200W INTERNAL CIRCUIT

Check the output when supplying the test signal of 550 mV for #1 or 2 in FILTER unit (X12-1150-10).



NG ⇨ FILTER unit (X12-1150-10)

With switching S12 to TONE "defeat", check the output when supplying the test signal or 76 mV for Ri5 or 6.



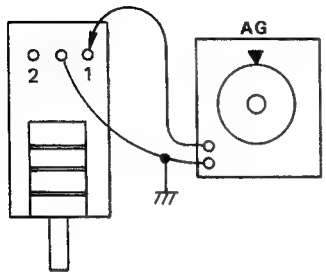
NG ⇨ Qi1, 3 or 2, 4
S12 (TONE)

With switching S12 to TONE "on", check the output when supplying the test signal of 80 mV for Ri5 or 6.

NG ⇨ Qi5, 7, 9 or 6, 8, 10
VRi2, 3, 4 and C, R elements

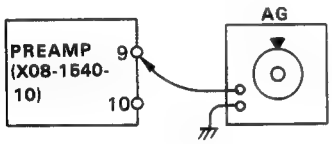
HINTS FOR FINDING THE TROUBLED UNIT

With turning Vri1 VOLUME to maximum and BALANCE to center, check the output when supplying the test signal of 80 mV for #1 or 2 in control unit (X11-1360-10).



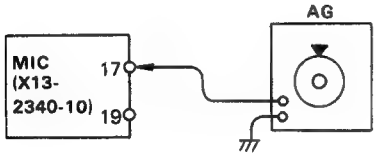
NG ⇨ Potentiometer (VRi1)

With turning VRi1 to as the above setting, check the output when supplying the test signal of 88 mV for #9 or 10 in preamp (X08-1540-10).



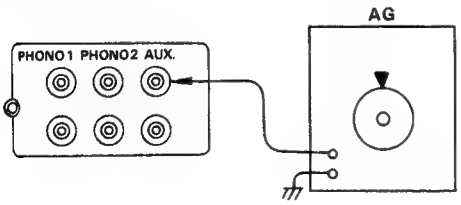
NG ⇨ Buffer amp in preamp (X08-1540-10)

With turning Vri1 to the above setting, check the output when supplying the test signal of 90 mV for #17 or 19 in mic amp (X13-2340-10).



NG ⇨ RLp1
S7, 8
S13
S16

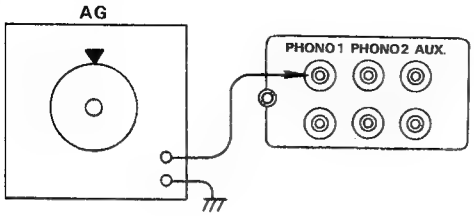
With switching selector to AUX jack, check the output when supplying the test signal of 90 mV for AUX jack.



NG ⇨ Pin jack
selector
wiring

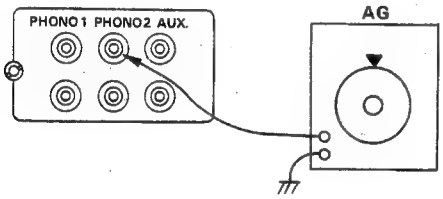
HINTS FOR FINDING THE TROUBLED UNIT

With switching selector to phono 1, check the output when supplying the test signal of 1.3 mV for phono 1 jack.



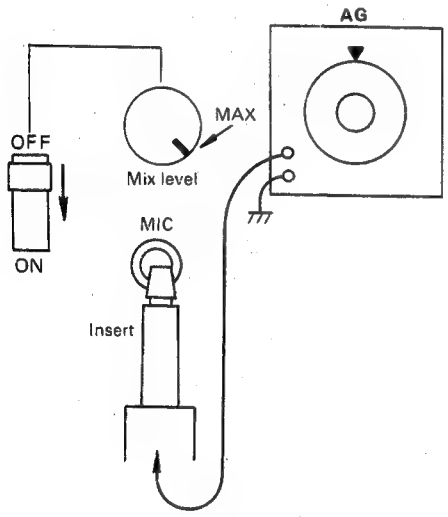
NG ⇨ Qd1, 5, 9, 13, 17 or 2, 6, 10, 14, 18

With switching selector to phono 2, check the output when supplying the test signal of 3 mV for phono 2 jack.



NG ⇨ Qd3, 7, 11 or 4, 8, 12

With switching SOUND INJ. to ON and turning MIX LEVEL to max, check the output when supplying the test signal of 0.9 mV for mic jack.



NG ⇨ Qp1, 2

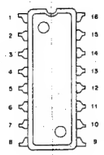
SEMICONDUCTOR NAME	SUBSTITUTIONS
(X00-1830-10)	
2SA733 (R) or (Q)	2SA673, 2SA673A, 2SA640
2SA743A (B) or (C)	2SA850 (D) or (E)
2SA809 (B) or (G)	2SA899
2SC945 (Q)	2SC1345, 2SC1000
2SC1567 (R) ro (S)	2SC1384 (R) or (Q)
EQA01-35R	
YZ-140	–
1S2076	1S1555
V06B	–
(X00-1840-10)	
M4C-5	–
(X00-1860-10)	
2SA755 (C)	2SA489
2SC1419 (B) or (C)	2SD234 (O)
(X02-1100-10)	
LA1222	
HA-1137W-05	–
HA-1196	–
HA-1197	–
NJM4558D	RC4558T, NJM4558T
NJM4558D (A) or (B)	RC4558T (A) or (B), NJM4558T (A) or (B)
1S2076	1S1555
(X07-1480-10)	
2SA912 (R) or (S)	2SA899 (B) or (V), 2SA809, 2SA810
2SC1345 (D) or (E)	2SC1000, 2SC1416
2SC1775 (E) or (F) –	
2SC1885 (R) or (S)	2SC1904 (B) or (V), 2SC1451, 2SC1452, 2SC1628
1S2076	1S1555
W06B	–
EQA01-24R	–
(X08-1540-10)	
2SA640 (E)	2SA620WL (4) or (5), 2SA 763WL
2SA750 (I) (E) or (F)	2SA620WLH, 2SA841 (BL) or (GR)
2SA841 (BL) or (GR)	2SA872, 2SA750 (I)
2SA899 (B) or (V)	–
2SC1400 (E) or (U)	2SC1222, 2SC1775
2SC1681 (BL) or (GR)	2SC1400, 2SC1775
2SK68A (M)	–
2SK68A (K)	–
(X11-1360-10)	
2SA640 (E) or (F)	2SA620WL (4) or (5), 2SA763WL, 2SA841
2SA841 (BL)	2SA640 (E), 2SA750 (I)
2SA841 (BL) or (GR)	2SA640 (E) or (F), 2SA750 (I)
2SC1681 (BL)	2SC1345 (E), 2SC1222, 2SC1400
(X13-2330-10)	
1N34A	–
1N60IFT	–
1S2076	1S1555
SDT-35	–
(X13-2340-10)	
2SA750 (I) (E) or (F)	2SA620WLH, 2SA872
2SC1400 (E) or (F)	2SC1775
2SC1439 (G) or (B)	2SC1904, 2SC1885
1S2076	1S1555
(X13-2400-10)	
V06B	–

SCHEMATIC DIAGRAM (1)

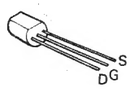
LA-1222
NJM4558D

Top View

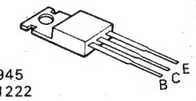
HA-1137W
HA-1196
HA-1197



2SK68

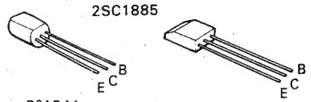


2SA489
2SA755
2SC1419
2SD234



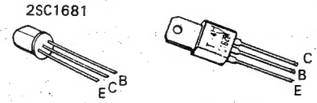
2SA640 2SC945
2SA733 2SC1222
2SA750 2SC1384
2SA763 2SC1400
2SA872 2SC1439
2SA912 2SC1775
2SC1885

2SC1345



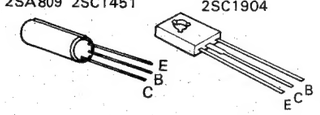
2SA841
2SC1000
2SC1681

2SC1628



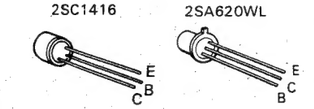
2SA743A
2SA899
2SC1567
2SC1904

2SA810 2SC1452
2SA809 2SC1451



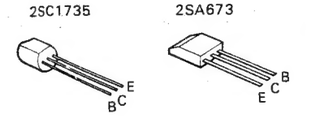
2SC1416

2SA620WL



2SC1735

2SA673



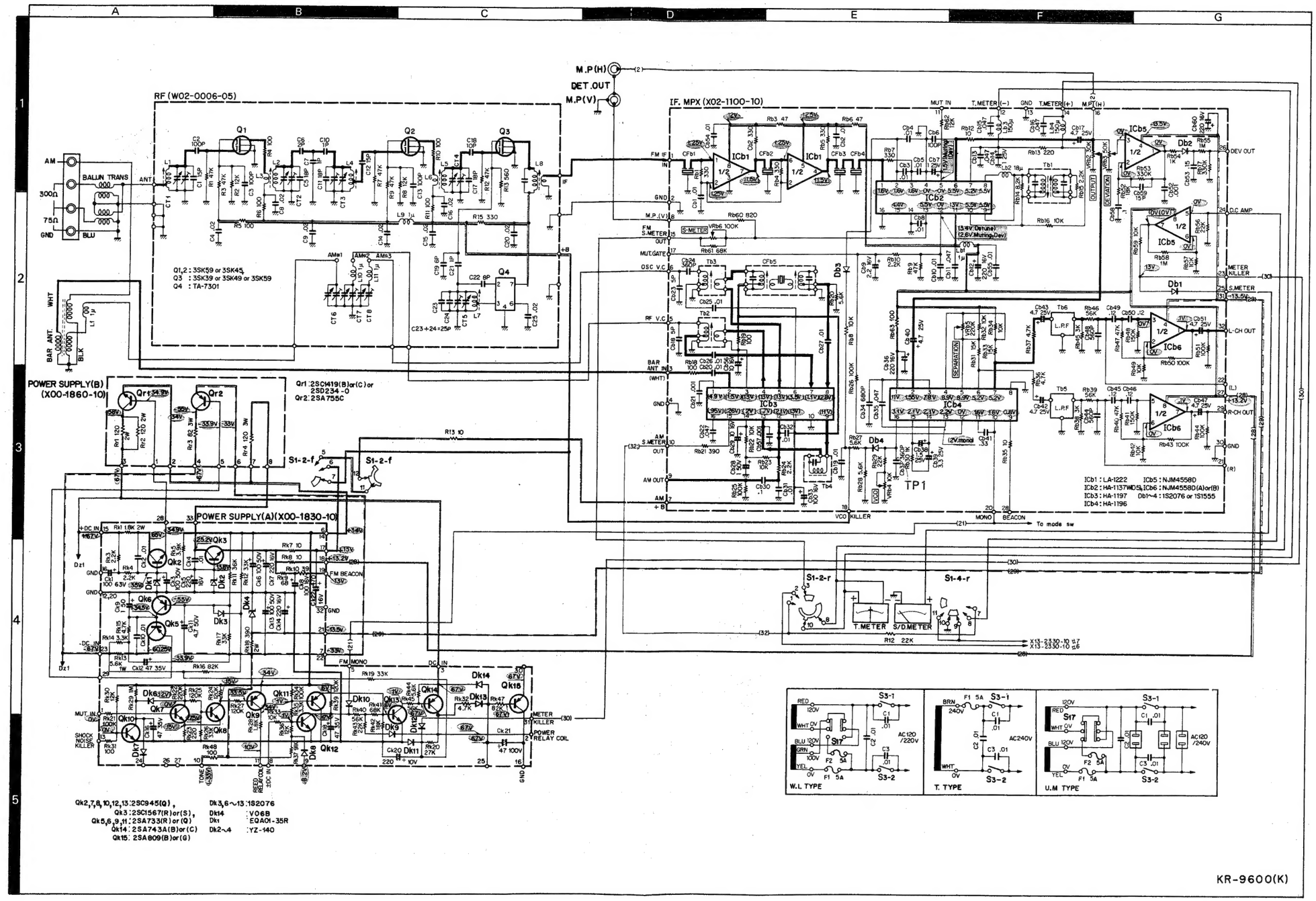
Audio signal (Reference value).

← DC voltage at no signal (Reference value)*

* DC voltages indicated here are measured with 20kΩ/V meter.

KENW-03557 / DRUCK 1

SCHEMATIC DIAGRAM (2)



DC voltages are measured at FM stereo reception except ( ).
( ) voltages are measured at AM reception.

DC voltages indicated here are measured with 20kΩ/V meter.

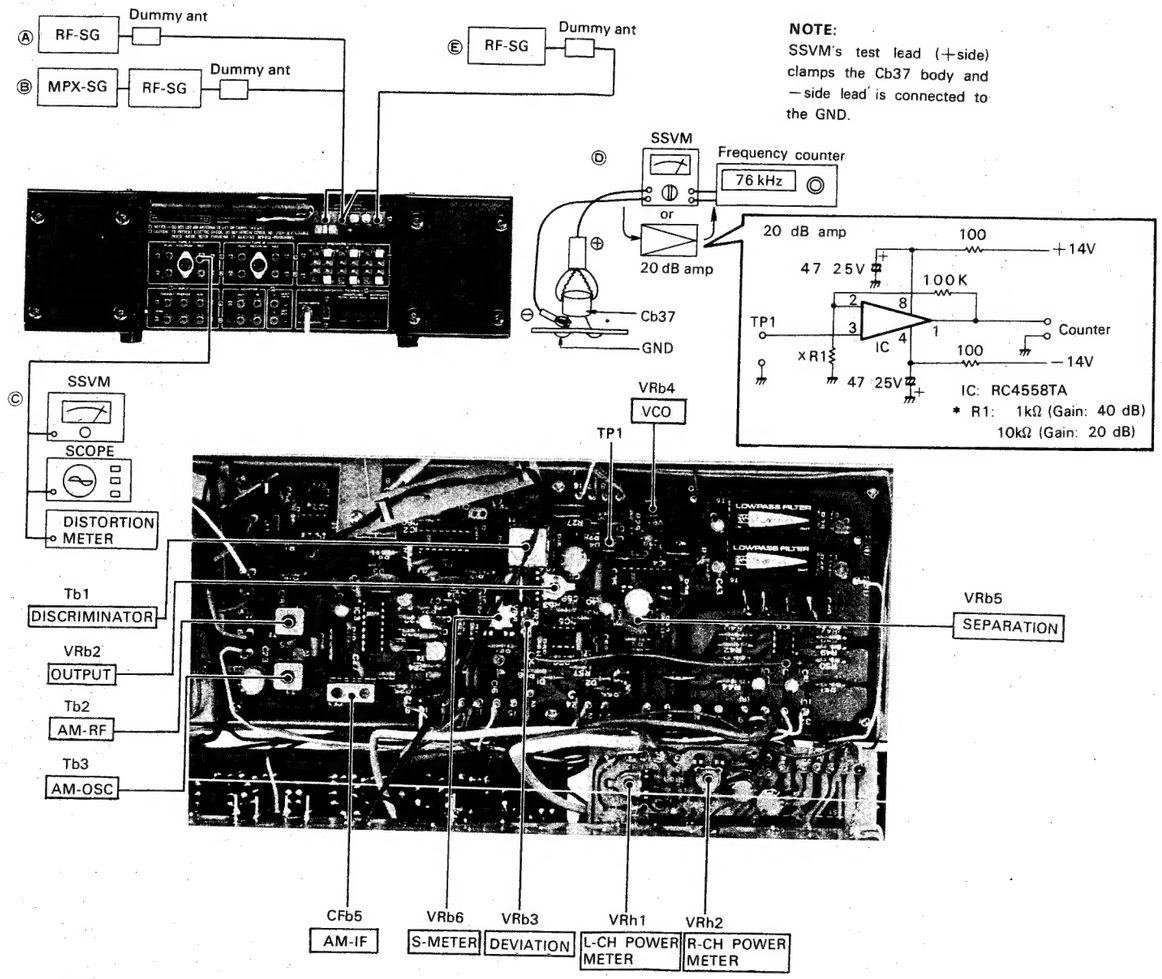
ADJUSTMENTS

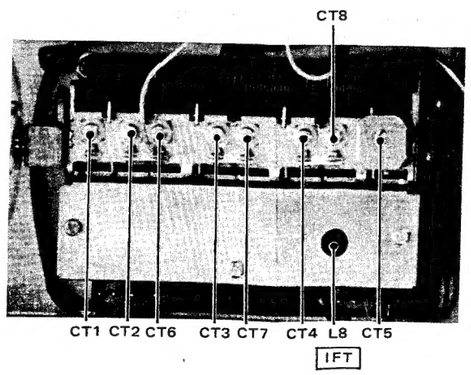
Notes:

* **As for the specifications of Test Equipment, see page 40.**
* RF-SG is set to the lowest response possible on oscilloscope.
* The output level of RF-SG is made a 6 dB drop by the dummy ant.
* The input level 60 dB means 66 dB reading on RF-SG.
* Repeat TRACKING adjustment several times and confirm the reception of broadcasting.
* Test point is shown in the schematic diagram.

NO.	ALIGNMENT	TEST EQUIPMENT CONNECTION	TEST EQUIPMENT SETTING	RECEIVER SETTING	OUTPUT INDICATOR	ADJUSTMENT	REMARKS
FM SECTION							
1	IF	Ⓐ	95 MHz (60 dB) 1 kHz (Mod) 75 kHz (Dev)	95 MHz	Ⓒ	L8	Maximum deflection
2	IF	—	—	—	T-meter	Tb1 (bottom)	Make the pointer position in the center of the meter
3	IF	Ⓐ	95 MHz (60 dB) 1 kHz (Mod) 75 kHz (Dev.)	95 MHz	Ⓒ	Tb1 (top)	Maximum deflection and minimum distortion
4	TRACKING	Ⓐ	90 MHz 1 kHz (Mod) 75 kHz (Dev)	90 MHz	Ⓒ	L1 ~ 7*	Maximum deflection
5	TRACKING	Ⓐ	105 MHz 1 kHz (Mod) 75 kHz (Dev)	105 MHz	Ⓒ	—	Maximum deflection
6	OUTPUT	Ⓐ	95 MHz 1 kHz (Mod) 75 kHz (Dev) 60 dB (Input)	95 MHz	Ⓒ	VRb2	Confirm output voltage is 700 mV
7	S-METER	Ⓐ	95 MHz 0 (Dev) 60 dB	95 MHz	S-meter	VRb6	Make the pointer indication "5" digit
8	VCO	Ⓐ	95 MHz 0 (Dev) 60 dB	95 MHz	Ⓓ	VRb4	Counter indicates 76 kHz
9	SEPARATION	Ⓑ	95 MHz 1 kHz (Mod) 68.25 kHz (Dev) L or R (Select) 60 dB (Input)	95 MHz	Ⓒ	VRb5	Minimum cross-talk (Maximum separation)
10	DISTORTION	Ⓑ	95 MHz 1 kHz (Mod) 68.25 kHz (Dev) L (Select) 60 dB (Input)	95 MHz	Ⓒ	L8	Minimum distortion
11	DEVIATION METER	Ⓐ	95 MHz 1 kHz (Mod) 75 kHz (Dev) 60 dB	95 MHz	D-meter	VRb3	100% deflection
AM SECTION							
1	IF	Ⓔ	1,000 kHz 400 Hz, 30% (Mod) 100 dB	1,000 kHz	Ⓒ	CFb5	Maximum deflection
2	TRACKING	Ⓔ	600 kHz 400 Hz, 30% (Mod) 100 dB	600 kHz	Ⓒ	Tb2. 3 Bar antenna	Maximum deflection
3	TRACKING	Ⓔ	1,400 kHz 400 Hz, 30% (Mod) 100 dB	1,400 kHz	Ⓒ	CT6 ~ 8	Maximum deflection
AUDIO SECTION							
1	POWER METER	AG output to AUX jack	1 kHz 2.5 mV or so	AUX position	Power meter to 200W position	VRh1 or 2	Meter indicates 160W (35.8V/8Ω).

* If RF unit is found to be defective, it should be replaced with new one. Also referring to Circuit Description on page 7





ADJUSTMENTS/SPECIFICATIONS

TEST EQUIPMENT AND ITS SPECIFICATIONS

STANDARD SIGNAL GENERATOR (RF-SG)

Ranges:	90 MHz～108 MHz (FM) 500 kHz～1600 kHz (AM)
Modulation frequency:	1 kHz, 400 Hz or external input (input level 2V or less)
Deviation:	0～75 kHz (FM)
Modulation:	0～30%
Output:	100 mV or more
Distortion:	0.5% or less

SOLID STATE VOLT METER (SSVM)

Ranges:	0.3 mV～300V (full scale)
Frequency response:	5 Hz～500 kHz
Impedance:	1 MΩ or more

OSCILLOSCOPE (SCOPE)

Ranges:	DC～10 MHz
Sensitivity:	20 mV/cm
Impedance:	1 MΩ or more

MULTIPLEX SIGNAL GENERATOR (MPX-SG)

Modulation frequency:	1 kHz or external input (input level: 5V or less)
Separation:	60 dB or more
S/N:	85 dB or more
Preemphasis:	50μS, 75μS, and 25μS

DISTORTION METER

Ranges:	0.1% (full scale)
Sensitivity:	100 mV or more

FREQUENCY COUNTER (COUNTER)

Frequency response:	10 Hz～1 MHz
Sensitivity:	50 mV or more
Impedance:	1 MΩ or more

AUDIO SIGNAL GENERATOR (AG)

Ranges:	5 Hz～500 kHz
Waveform:	Sine wave
Output:	10V r.m.s.
Distortion:	0.3% or less

FM TUNER SECTION (IHF)

Usable Sensitivity:	8.7 dBf (1.5μV)
50 dB Quieting Sensitivity:	14.1 dBf (2.8μV) (Mono) 36.1 dBf (35μV) (Stereo)
Signal to Noise Ratio at 65 dBf:	75 dB (Mono) 70 dB (Stereo)
T.H. Distortion at 65 dBf:	0.15% (Mono) 0.2% (Stereo)
Frequency Response:	20 Hz to 15,000 Hz +0 dB, −1.5 dB
Capture Ratio:	1.3 dB
Alternate Channel Selectivity:	83 dB
Spurious Response Ratio:	115 dB
Image Response Ratio:	100 dB
IF Response Ratio (Balanced):	115 dB
AM Suppression Ratio:	60 dB
Stereo Separation:	45 dB at 1,000 Hz, 35 dB from 50 Hz to 10,000 Hz
Subcarrier Product Ratio:	65 dB
Antenna Impedance:	300Ω balanced and 75Ω unbalanced
FM Frequency Range:	88 MHz to 108 MHz

AM TUNER SECTION

Usable Sensitivity (IHF):	10μV
Signal to Noise Ratio:	50 dB
Image Rejection:	70 dB
Selectivity (IHF):	35 dB
IF Rejection:	75 dB

POWER AMPLIFIER SECTION

160W per channel minimum RMS at 8Ω or 200W per channel, minimum RMS at 4Ω from 20 Hz to 20,000 Hz with no more than 0.08% total harmonic distortion.

Dynamic Power Output:	750W (4Ω)
Total Harmonic Distortion:	0.08% at rated power into 8Ω 0.05% at 1W power into 8Ω
Intermodulation Distortion:	0.08% at rated power into 8Ω
(60 Hz: 7 kHz = 4 : 1)	0.05% at 1W power into 8Ω
Power Bandwidth:	5 Hz to 50,000 Hz
Damping Factor:	55 at 8Ω
Input Sensitivity/Impedance:	1V/50kΩ
Speaker Impedance:	Accept 4Ω to 16Ω

PRE AMPLIFIER SECTION

Input Sensitivity/Impedance/Signal to Noise Ratio (IHF A CURVE)	
Phono 1:	2.5 mV/50kΩ/76 dB
Phono 2:	5.0 mV/50kΩ/80 dB
Aux:	150 mV/50kΩ/95 dB
Tape:	150 mV/50kΩ/95 dB
Mic:	1.5 mV/50kΩ/65 dB
Maximum Input Level	
Phono 1:	500 mV (rms) T.H.D. 0.08% at 1,000 Hz
Output Level/Impedance	
Tape REC (Pin):	150 mV/100Ω
(Din):	30 mV/80kΩ
Pre out:	1V/5.3kΩ
Frequency Response	
Phono 1:	RIAA standard curve +0.2 dB, −0.2 dB
Aux and Tape:	20 Hz to 40,000 Hz $^{+0}_{-1}$ dB
Mic:	100 Hz to 8,000 Hz $^{+0}_{-3}$ dB
Tape Control	
Base:	±10 dB at 100 Hz
Mid:	±10 dB at 800 Hz
Treble:	±8 dB at 10,000 Hz
Loudness Control (−30 dB):	(1) +3 dB at 100 Hz, (2) +6 dB at 100 Hz
Low Filter:	−9 dB at 100 Hz
High Filter:	−9 dB at 10 kHz

GENERAL

Power Requirement:	AC 60Hz, 120V (U.S.A. and Canada) or AC 50/60 Hz 110 ～ 120V, 220 ～ 240V switchable
Power Consumption:	820W at full power
AC Outlet:	Switched 1, Unswitched 2
Dimensions:	W 22-27/32″ (580 mm) H 6-21/32″ (169 mm) D 16-17/32″ (420 mm)
Weight (Net):	52.9 lbs (24.0 kg)

U TYPE

Dimension:	W 23-15/16″ (608 mm) H 7-11/16″ (195 mm) D 17-1/8″ (435 mm)
Weight (Net):	57.8 lbs (26.2 kg)
(Gross):	63.3 lbs (28.7 kg)

KENW-03557 / DRUCK 4