

KENWOOD
HI/FI STEREO COMPONENTS

SERVICE MANUAL

**MODEL ELEVEN II
(KR-10000II)**



AM-FM STEREO RECEIVER

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Note 1.

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 (1/4W 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 222 J

1. Kinds of the carbon resistor



PD14BY

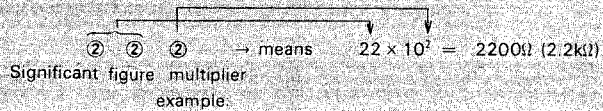


PD14CY

2. Wattage

1/4W → 2E
1/8W → 2B

3. Resistance value

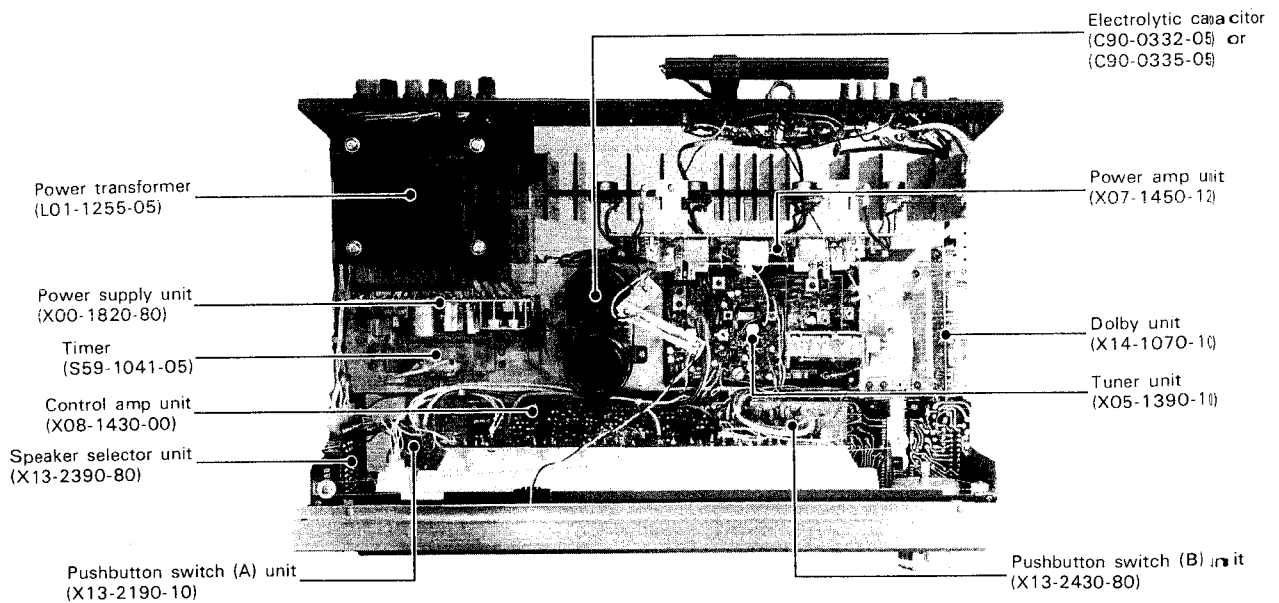
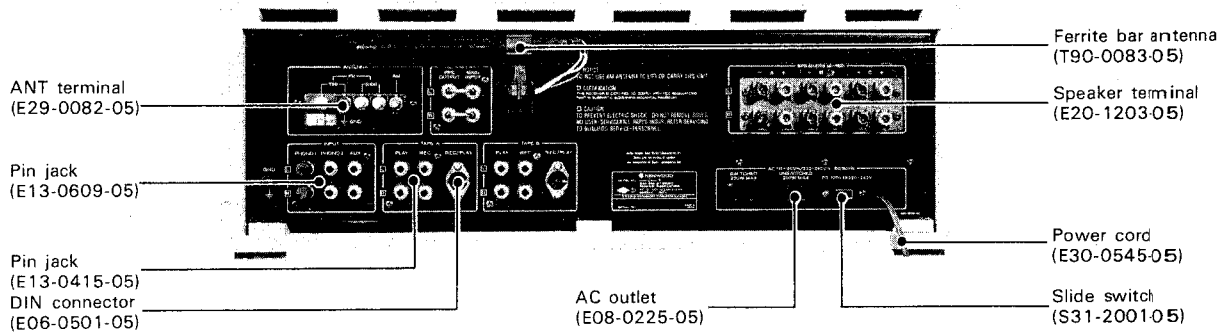
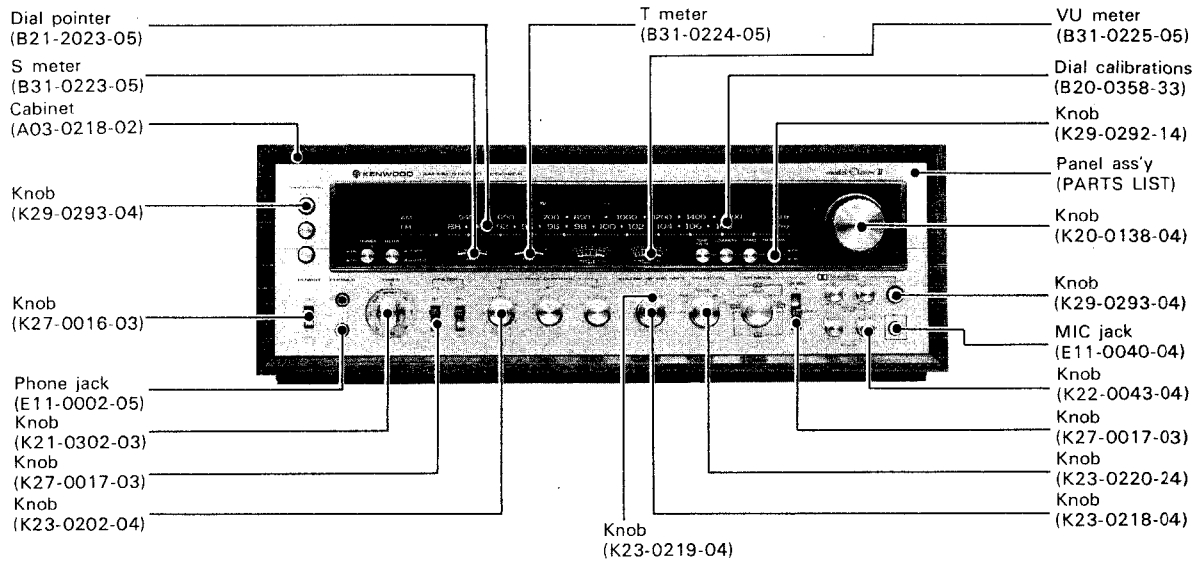


example:
221 → 220Ω
222 → 2.2kΩ
223 → 22kΩ
224 → 220kΩ
225 → 2.2MΩ

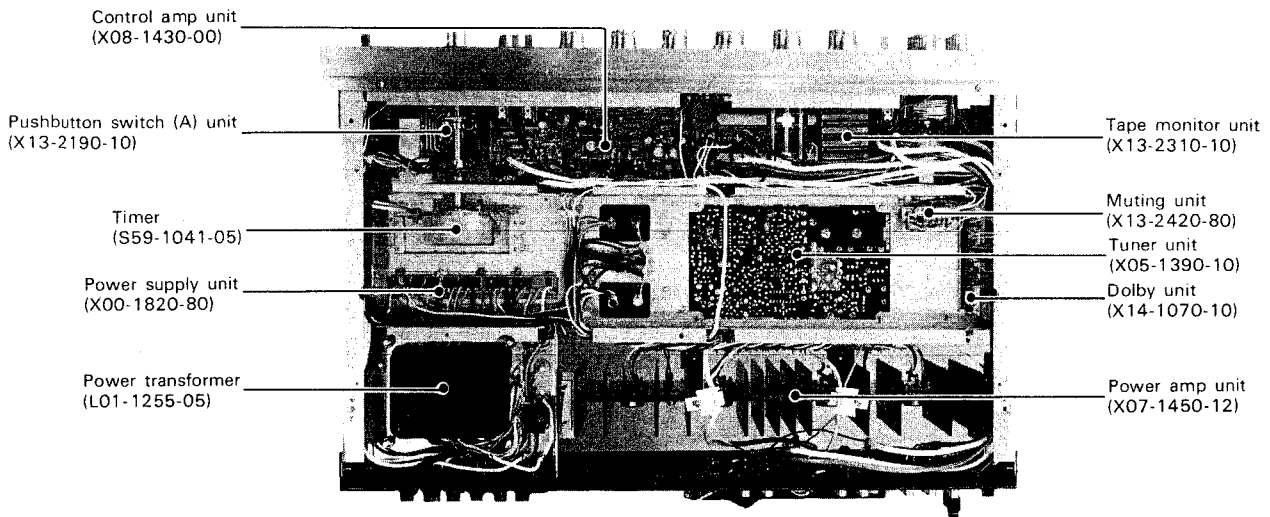
4. Tolerance

J = ±5% (Gold color)
K = ±10% (Silver color)

EXTERNAL & TOP VIEW

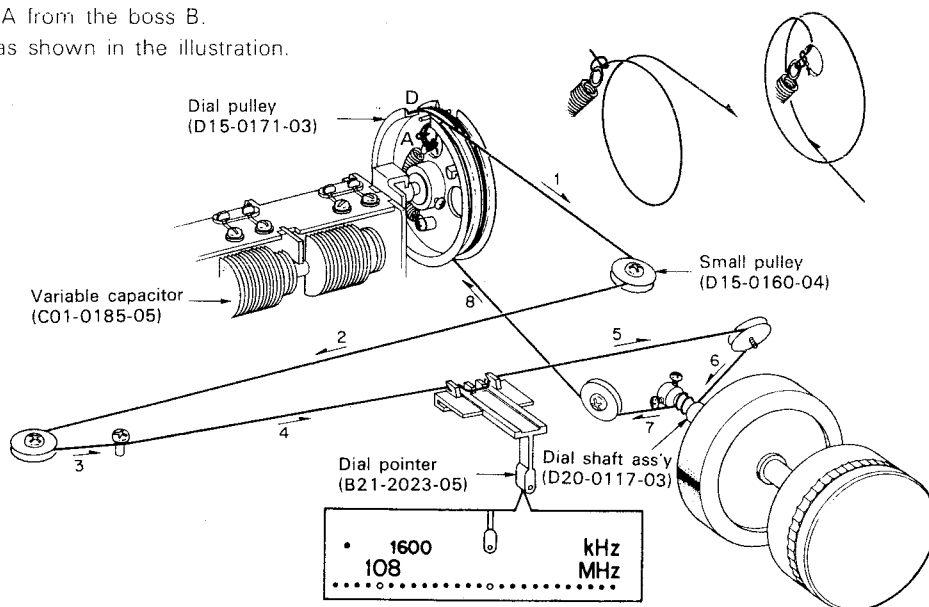


BOTTOM VIEW/DIAL CORD STRINGING

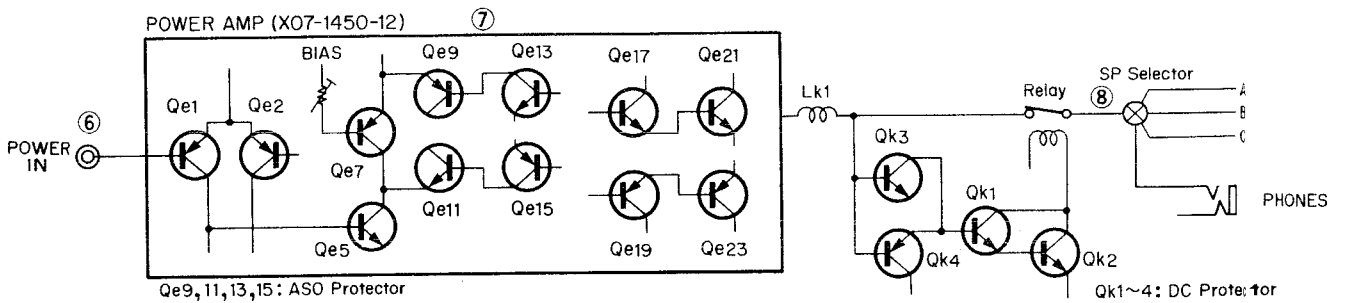
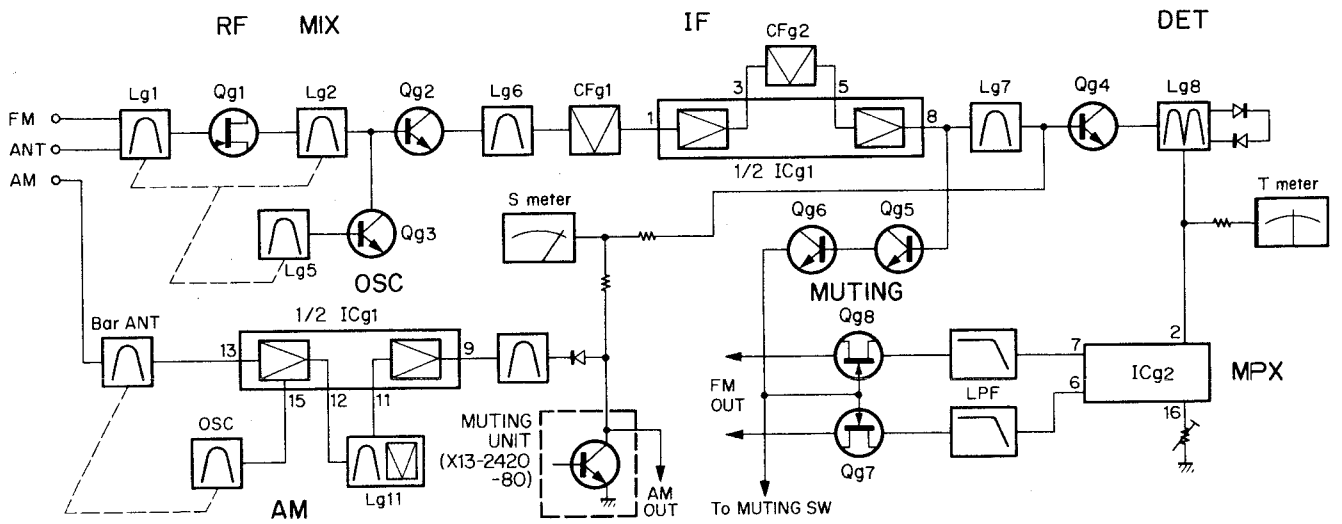
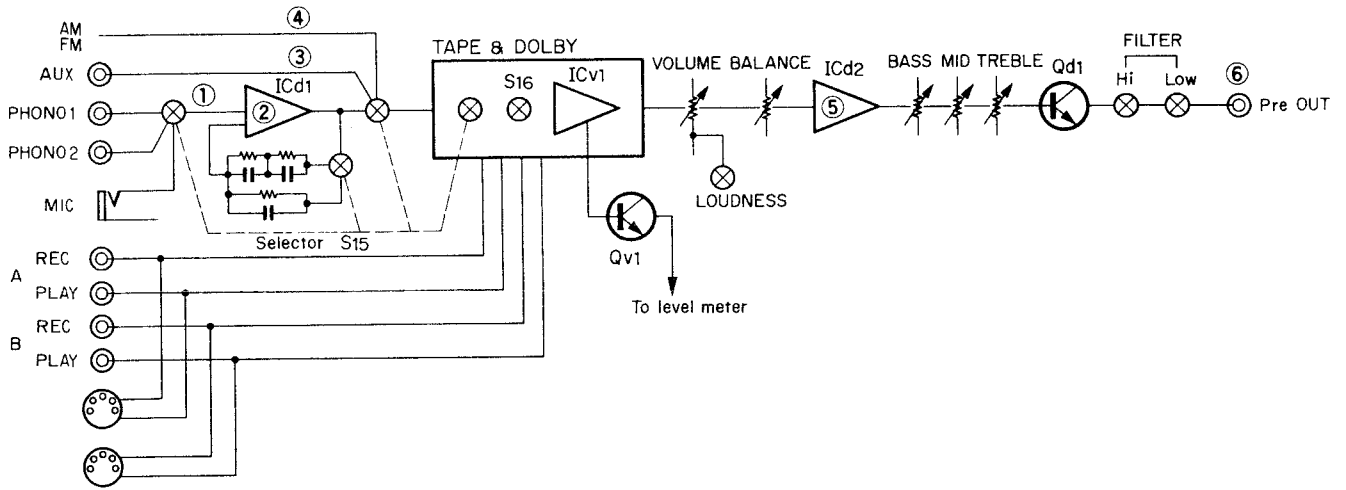


DIAL CORD STRINGING

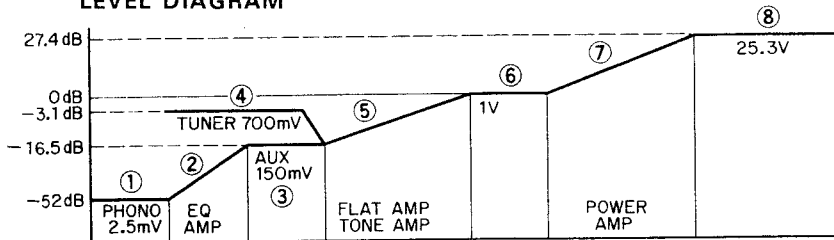
1. Fully open the variable capacitor.
2. Fix the dial pulley to the shaft of the variable capacitor using 2 screws as shown.
3. Tie the dial cord to the dial spring A leaving a 10 cm length part of it.
4. Hook the dial spring A on the boss B and wind it 1 turn clockwise around the dial pulley.
5. Dress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



BLOCK DIAGRAM/LEVEL DIAGRAM



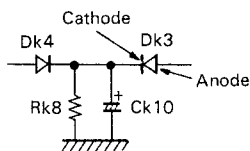
LEVEL DIAGRAM



CIRCUIT DESCRIPTIONS

POWER SUPPLY (X00-1820-80)

- * This unit is composed of a power stabilizer and DC protection circuit.
Dk1 and Dk2 are rectifier diodes from which DC+51V and DC-51V are obtained. The +51V is stabilized by Dk7 (zener diode) and Qk5. This voltage is divided by resistors so that +33.6V is fed to the control unit, +13.8V to the tuner unit, +21V to the push SW (B) unit and +21V to the Dolby unit.
- * Rk1 and Rk2 are resistors for the dimmer circuit. When the dimmer switch S7 is ON, AC 7.5V is fed to the lamp through Rk1 and 2, thus the lamp becomes dark.
- * Dk3, Dk4, Rk8 and Ck10 are used to prevent shock noise. In the steady state after the power is ON, the voltage at the "+" side of Ck10 is about 34V. The voltage at the cathode of Dk4 is higher than the anode voltage and Dk4 is in cut off state. When the power is OFF, Ck10 is discharged and the voltage at the "+" side of Ck10 (equal to Dk4 cathode voltage) becomes lower than the Dk4 anode voltage, by which Dk4 is energized. As a result, the Qk1 base voltage becomes 0V so Qk1 and Qk2 are set to OFF, while the relay is cut off. This prevents the shock noise, generated when the power is turned off, from being fed to the speaker.



DC protection:

When the center voltage (normal: 0V) of the power amplifier is deviated to the plus or minus side, the relay is turned off to protect the speaker.

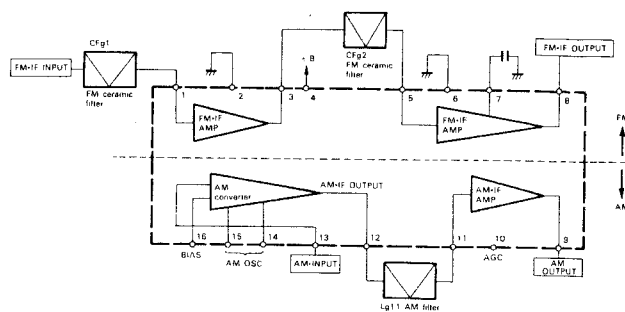
When the power amplifier is normal, the No. 21 terminal (L) and No. 20 terminal (R) of X00-1820-80 are held at 0V.

1. When the voltage at the terminal 19 or 21 is deviated to the "+" side more than 5V, Qk3 is turned to ON by +DC voltage. Qk1 and Qk2 are set to OFF and the relay GND line is released and thus the relay is also turned off.
2. When the voltage at the terminal 19 or 21 is deviated to the "-" side more than 5V, Qk4 is turned to ON by -DC voltage. Qk1 and Qk2 are set to OFF and the relay GND line is released and thus the relay is also turned off.

TUNER (X05-1390-10)

FM TUNER

FM signal is amplified by Qg1 and mixed at Qg2 with the local oscillator output from Qg3 so as to be converted to 10.7 MHz IF signal. The IF signal selected at Lg6 and CFg1 is fed to ICg1. ICg1 is an IC AN217BB for AM/FM use.



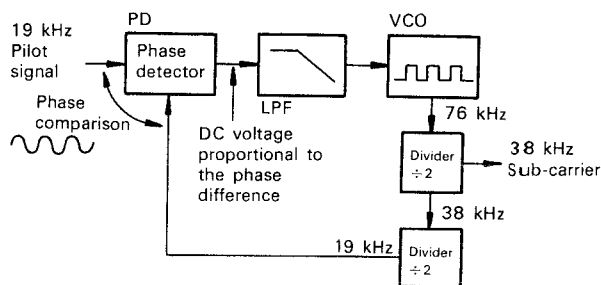
ICg1 AN-217BB

The IF signal is amplified by Qg4 and FM detected by Lg8, Dg5 and Dg6. The signal thus detected is a stereo composite signal (if stereo signal is received), which is fed to ICg2 HA1196 where it is MPX demodulated.

Operation of HA1196

The MPX circuit uses PLL IC HA1196 (See the block diagram).

The PLL is composed of a phase detector (PD), a low pass filter (LPF) and a voltage controlled oscillator (VCO), forming an electronic closed loop servo system.



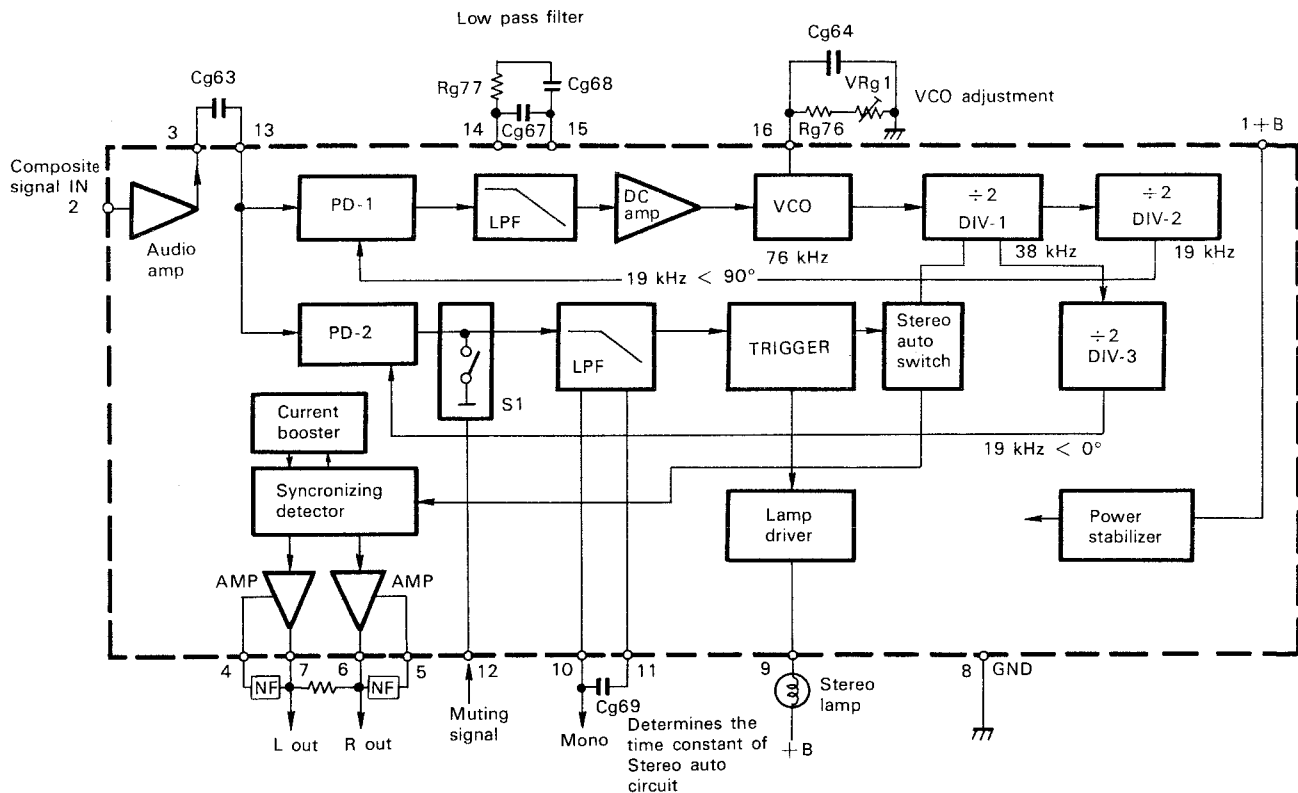
PLL IC FUNDAMENTAL BLOCK DIAGRAM

As shown in the figure, a 76 kHz square wave signal is produced in VCO, which is divided into 19 kHz through the 2-step divider and its phase is compared with that of the 19 kHz pilot signal by PD.

If there is a difference between these phases, a DC voltage corresponding to the phase difference is developed and is fed to VCO through LPF and DC amplifier, as a DC control voltage. With this DC voltage, VCO is controlled so that the output is in phase with the pilot signal.

Thus, a 38 kHz sub-carrier phase locked in the 19 kHz pilot signal is obtained to prevent the deterioration of separation due to phase deviation.

CIRCUIT DESCRIPTIONS



HA1196 BLOCK DIAGRAM

Description of block diagram:

The stereo composite signal is fed to the terminal 2. It is partly applied to the synchronizing detector through the audio amplifier and to PD-1 through Cg63. When the control voltage is absent, VCO is set in a free run oscillating state at about 76 kHz. The output of VCO is divided into 19 kHz by the dividers DIV-1 and DIV-2, and its phase is compared with the phase of the 19 kHz pilot signal by PD-1. In practical application, a multiplier is used as a phase detector to produce an output proportional to the product of 2 input signals (19 kHz pilot signal and 19 kHz VCO). This output, after its unwanted component is removed by LPF is amplified by the DC amplifier and is fed to VCO as a control voltage. With this voltage, VCO oscillates a signal 4 times the frequency of the pilot signal.

The 38 kHz signal obtained by VCO is fed, as a switching signal, to the synchronizing detector circuit through the stereo auto switch. Since the 38 kHz signal is an ideal square wave signal, it does not include even number harmonics and it will not produce a beat with SCA signal (67 ± 7 kHz), thus eliminating the need for SCA filter.

When a monaural signal or a weak stereo signal is received, the stereo auto switch cuts off the 38 kHz signal to prevent the deterioration of S/N of demodulated audio signal.

Functions of stereo auto switch:

The output of DIV-1 is partly fed to DIV-3 and is divided into 19 kHz. It is then fed to the one side of the input of PD-2. The 19 kHz signal of DIV-3 is phase locked by the 19 kHz pilot signal during stereo reception, so that a DC voltage proportional to the amplitude of the pilot signal is developed in the PD output.

In monaural broadcast, there is no pilot signal and therefore no voltage is developed. Also, in stereo broadcast, if the signal is weak, it does not reach the trigger level so the following functions are not effected.

The DC signal is fed to the trigger circuit and when its level is above the predetermined threshold, the stereo switch turns on to send the 38 kHz switching signal to the synchronizing detector and the stereo lamp lights.

The above operation is the same as that of HA1196. The HA1196 is improved in the following points:

1. When an input of positive going voltage above a certain level is applied to the terminal 12, the signal line for the lamps is earthed to disable the trigger circuit.
2. A current booster is provided on the synchronizing detector to minimize distortion.
3. An amplifier is provided after the synchronizing detector. The signal demodulated to L and R signals is outputted through LPF (Lg14, Lg15) and switching FET Qg7 and Qg8.

CIRCUIT DESCRIPTIONS

Auxiliary circuit:

* Muting (S12 ON)

When FM signal is received at more than 8 dB ~ 20 dB ANT input level, Qg5 is set to ON and Qg6 is set to OFF by the 10.7 MHz output from Dg4 and Dg3. When Qg5 is ON, the collector voltage is about 0.4V, so that S1 of ICg2 is open. The gating circuit consisting of Qg7 and Qg8 is driven and Qg7 and Qg8 are turned to ON, and thus the signal line is connected.

When FM signal is not received, the 10.7 MHz signal does not appear at the terminal 8 of ICg1 so no detected output is obtained from Dg3 and Dg4. As a result, Qg5 is set to OFF and Qg6 is set to ON.

Accordingly, a collector voltage of Qg5 becomes 10.5V and S1 is shorted. Hence, the trigger circuit is not operated to prevent the misoperation of the lamp. Qg7 and Qg8 are set to OFF and the output is cut off.

When S12 is OFF, the +B voltage is applied to the gating circuit Qg7 and Qg8, thus Qg7 and Qg8 are set to ON.

When S11 is at MONO position, the terminal 11 of ICg2 is earthed by S11 and the trigger circuit is inoperative, while the stereo auto switch is open to prevent the misoperation of the lamp and the deterioration of S/N of the demodulated audio signal.

In FM mode, Dg 9 is OFF. In other modes, the FM +B voltage is not applied to the anode of Dg9, thus Dg9 is set to ON, the terminal 16 is earthed and VCO stops oscillating. Dg1 and Dg2 are the detector diodes for the S meter.

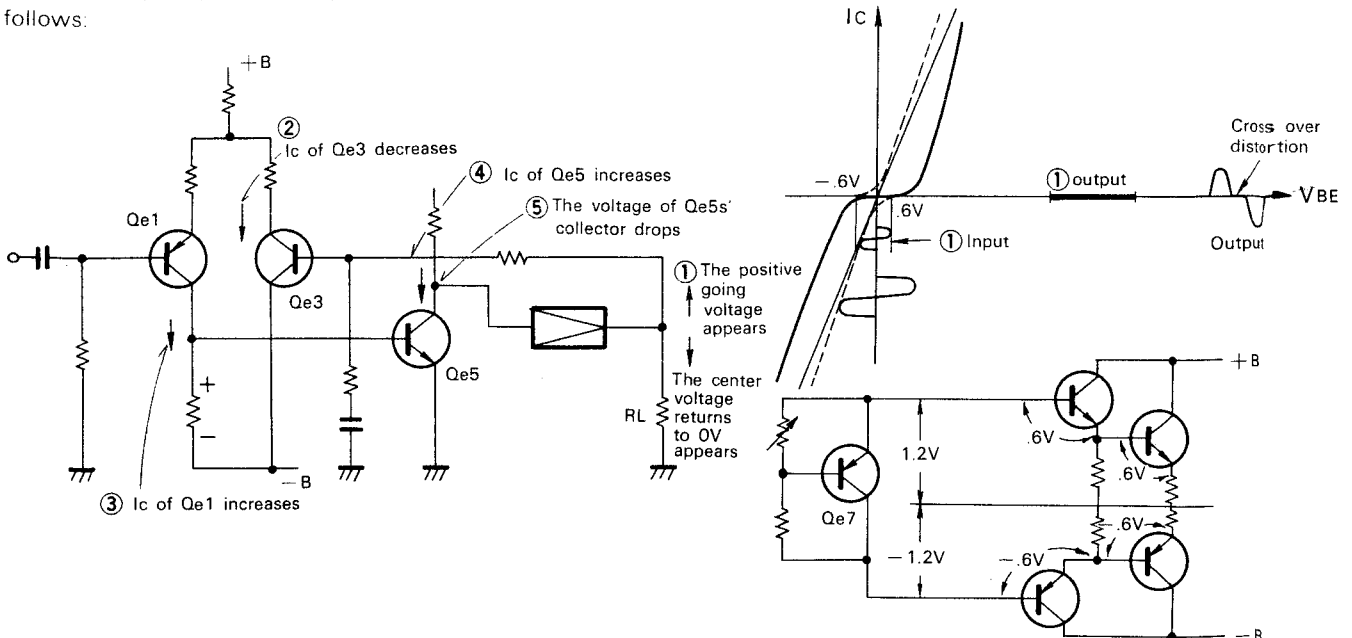
AM TUNER

AM signal is converted to IF signal by ICg1 and is detected by Dg8 to produce AM output.

POWER AMP (X07-1450-12)

Differential Operation

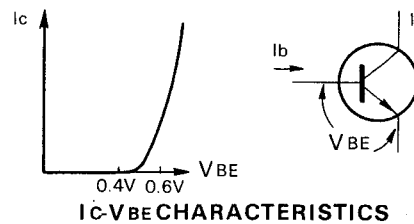
A differential amplifier is used to maintain the output terminal at 0V. The principle of the operation of this circuit is as follows:



In the differential operating state, the base voltages of Qe1 and Qe3 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 Qe3 and the Qe3 collector current decreases, while the Qe1 collector current increases. Since a current flows to the load resistor of Qe1, the voltage at the base of Qe5 becomes high and at the same time the current in the collector of Qe5 increases. Thus, the Qe5 collector voltage decreases below the level obtained before the current increases, so that the minus side of the complementary circuit is operated to pull the center voltage from the positive to the negative and set to 0V.

Bias Circuit

To operate a transistor, the base needs to be biased, or else no output is produced from the transistor. If the base is improperly biased, the output signal is distorted.



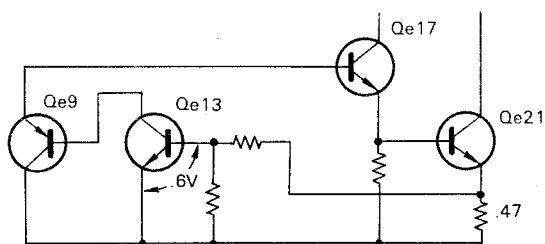
All the currents in the complementary and final circuits of the power amplifier can be adjusted at one point.

If a signal is applied without giving a bias current, no collector current flows and therefore no output is produced if the signal level is less than 0.6V; even if the signal level is more than 0.6V, the output signal is distorted. For this reason, the V_{BE} - I_c characteristic is shifted as shown by the dotted line when the bias current is applied to eliminate crossover distortion in the output. This is accomplished by the transistor Qe7. The circuit of Qe7 is a feedback circuit to maintain VCE constant at all times.

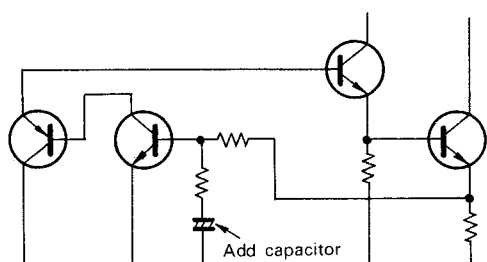
CIRCUIT DESCRIPTIONS

ASO Limiter

If the output terminal is shorted or the load resistance is too low (overload condition), an excessive current flows into the final transistors of the power amplifier with resultant damage. To prevent such a trouble, a limiter circuit is provided.



CURRENT LIMITER CIRCUIT



ASO LIMITER CIRCUIT

A simplified limiter circuit is shown in the illustration. The functions of the limiter circuit is as follows:

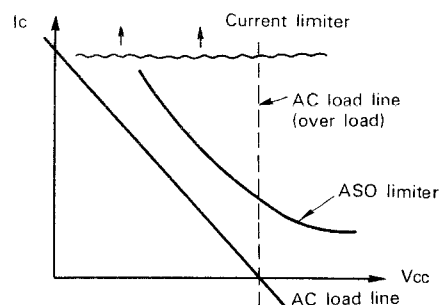
If a large current I_c flows into the transistors for any reason (short-circuit or overload), a voltage is applied to the base of Qe13. This voltage is generated through the emitter resistor of the power transistor, which is divided (determines limiter level) by resistors and is applied to the base of Qe13. Qe13 is turned ON when the base voltage is more than 0.6V ($V_{BE} = 0.6V$), operating the limiter.

The current limiter repeats ON/OFF operation but does not remove the heat generation or overload condition. In case of a short-circuit, the feedback becomes zero and the gain increases up to the bare gain. So even a signal of small level is driven at a full power, causing the transistors to be heated. In normal operation, the limiter is also activated with a large input of music, causing the amplifier to operate improperly. This problem can be solved by improving the reliability of ASO zone. As shown in the figure, a capacitor C is inserted to provide a time constant in the circuit so that the limiter is not activated during normal operation.

The transistor Qe9 connected to the collector of Qe13 has a function of diode. If Qe9 is not provided, the circuit between the collector and base of Qe13 is forward biased by the base voltage of Qe17 and therefore the limiter is activated.

The diode De5 inserted in the base of Qe13 is used to prevent the limiter being activated when the center voltage is negative, and the base current flows due to the forward biased circuit between the base and emitter of Qe13.

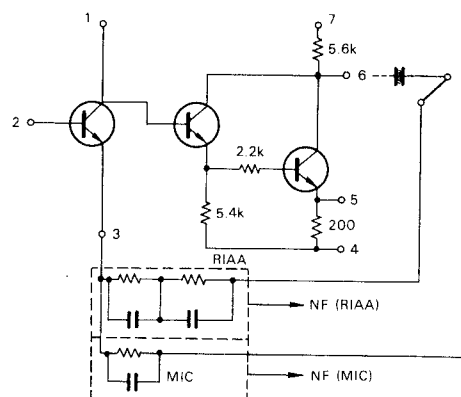
Normally, the emitter of Qe13 is set to the center (0V); however, arrangement is made as shown in the figure so that both operate even when an overcurrent flows into either side. The operation is such that Ce23 is charged as a large I_c flows into Qe23 and the emitter of Qe13 is pulled toward negative to turn Qe13 to ON.



CONTROL AMP (X08-1430-00)

Preamplifier and tone circuit:

The preamplifier uses ICs. It is a direct-coupled amplifier.



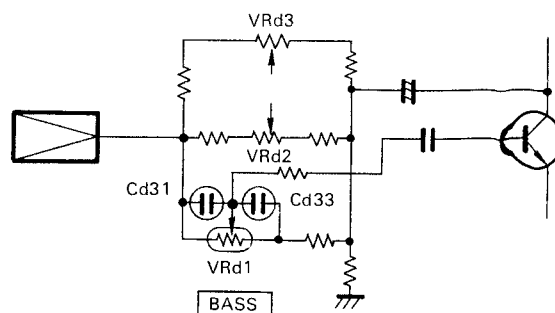
The amplified signal is applied to the TAPE MONITOR unit. The signal applied to the TAPE MONITOR unit returns to the preamplifier and is again fed to IC.

The IC circuit is also a direct-coupled circuit and functions as a flat amplifier. The gain is 20 dB and the signal is fed to the tone circuit.

The tone circuit is a triple control circuit. The circuits for low, medium and high frequency ranges are as follows

Low frequency range:

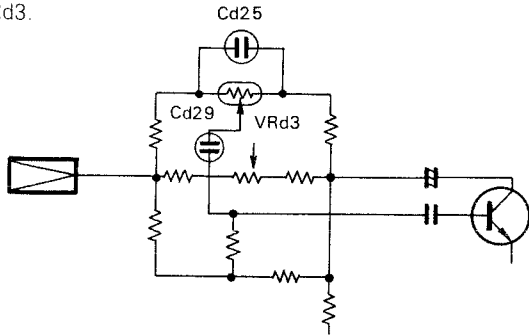
The low frequency curve is determined by Cd31, C133 and VRd1.



CIRCUIT DESCRIPTIONS

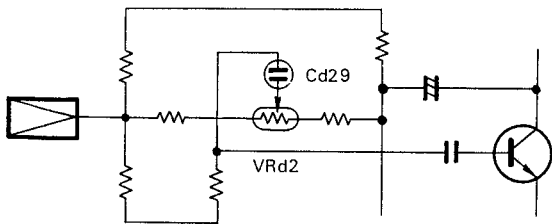
Medium frequency range:

The medium frequency curve is determined by Cd25, Cd29 and VRd3.



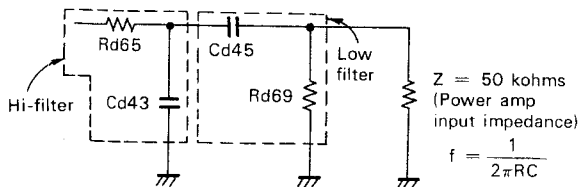
High frequency range:

The high frequency curve is determined by Cd29 and VRd2.



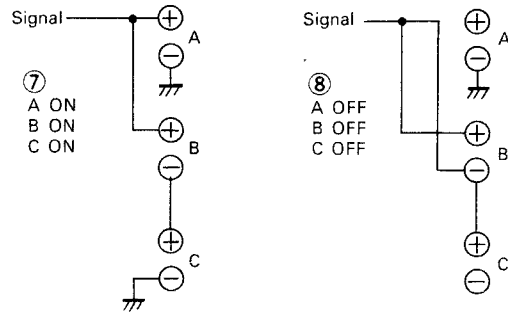
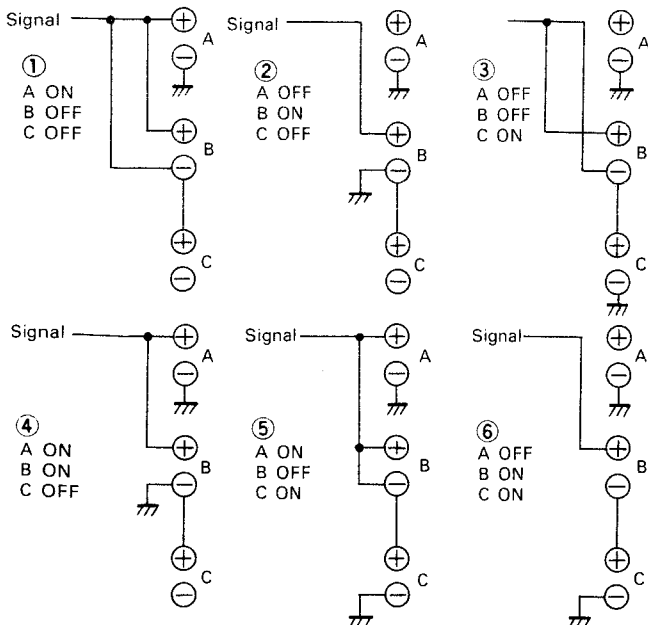
Filter

S13 and S14 are a low filter and a high filter respectively. Each filter is composed of 1-stage CR circuit with damping characteristic of 6 dB/oct.



SPEAKER SELECTOR (X13-2390-80)

There are 8 conditions of the speaker connection.

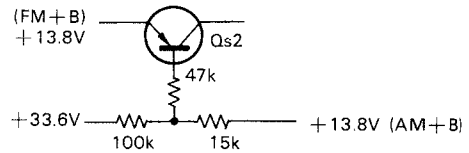


MUTING (X13-2420-80)

Qs2 is ON-OFF circuit for FM+B voltage. The +B voltage (+13.8V) selected by S20 is led to the emitter of Qs2. In FM mode, the Qs2 base voltage is lower than the emitter voltage and hence Qs2 is ON and FM+B is supplied to the tuner unit.

It should be noted that a voltage is applied to both the AM and FM circuits at the same time while S20 is being switched from FM to AM, causing the circuits to be operated with resultant noise.

When S20 is switched from FM to AM, voltages of FM+B and AM+B are applied to Qs2. The Qs2 base voltage is pulled toward "+" and therefore Qs2 is set to OFF. As a result, the FM+B line is cut off to stop FM operation. Thus, the resultant noise above mentioned is eliminated.



Function of Qs1: (Prevention of AM shock noise)

When the power SW is ON, the voltage at the terminal 3 is a few volts until the relay is turned to ON, while Qs1 is also ON and AM signal is earthed. In the steady state after the power is ON, the Qs1 base is pulled toward the "-" by the -5.1V at the terminal 4, so Qs1 is set to OFF and AM signal is released from the earthed condition.

When the power SW S2 (S2b) is OFF, the voltage of 33.6V at the terminal 6 pulls the base of Qs1 toward "+", thus Qs1 is set to ON and AM signal is earthed. In this way, the shock noise can be eliminated.

PUSH SWITCH (B) (X13-2430-80)

A 400 Hz oscillator circuit is included for Dolby operation. A 400 Hz signal is generated by the T type bridge oscillator circuit consisting of Qq1 and Qq2. When S9 is set to OFF, the center point of Rq10 and Rq6 is earthed through the shock noise prevention resistor Rq16 (4.7k) to stop the oscillation.

CIRCUIT DESCRIPTIONS

DOLBY (X14-1070-10)

Dolby NR Circuit Using Monolithic IC

This model uses a monolithic IC NE545B in the Dolby NR circuit to improve the stability and reliability.

1. Dolbyized recording

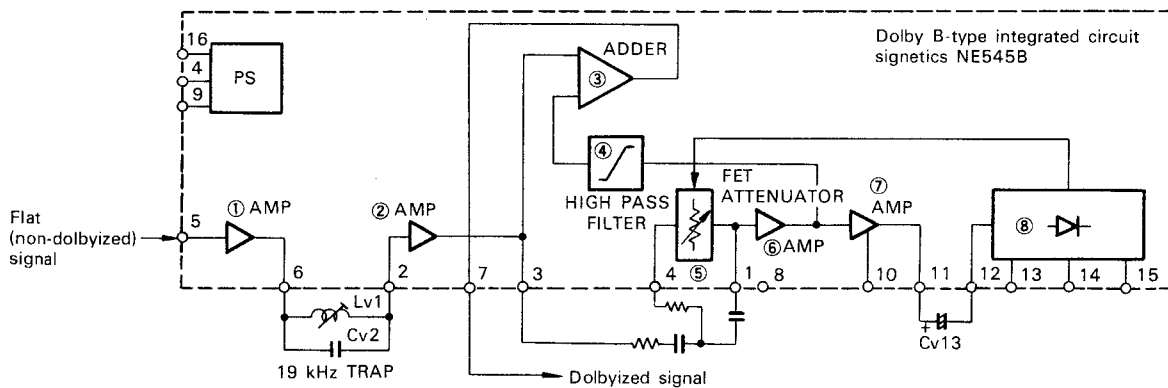
The incoming flat signal is applied to No. 5 pin of IC and is amplified by Amp ②. A part of signal is directly fed to the input of Amp ③ while the rest of the signal (addition signal) is fed to the input of Amp ③ through the high pass filter ④. These two signals are added together in Amp ③ and delivered from No. 7 pin as a recording output (Dolbyized signal). In this case, the rectified voltage of Amp ⑦'s output signal controls the FET attenuator, thus the amount of addition is increased as the signal level becomes lower.

2. Dolbyized source playback

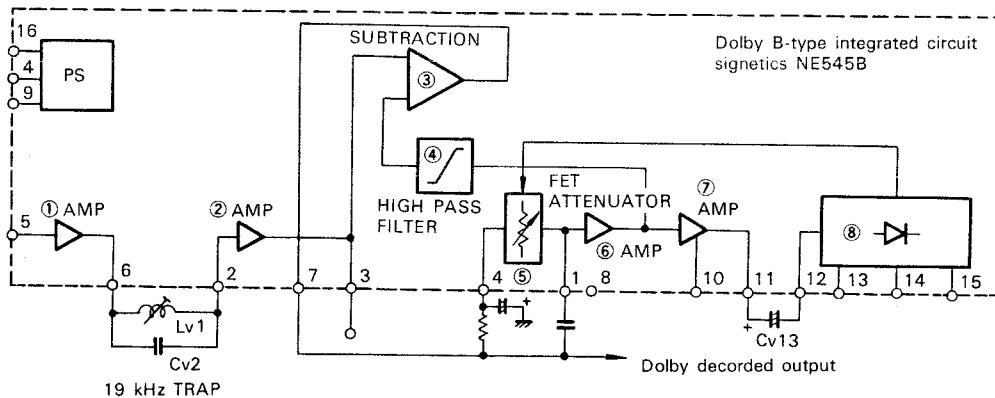
The Dolbyized incoming signal is applied to No. 5 pin of IC and is amplified by Amp ②. This signal is directly fed to the input of Amp ③ while the signal (subtraction signal) passing through the high pass filter ④ is fed to the other input of Amp ③.

The addition and subtraction signals are in opposite phase to each other. In this case, these two signals are subtracted in Amp ③ and a normal output signal is delivered up from No. 7 pin.

DOLBYIZED RECORDING

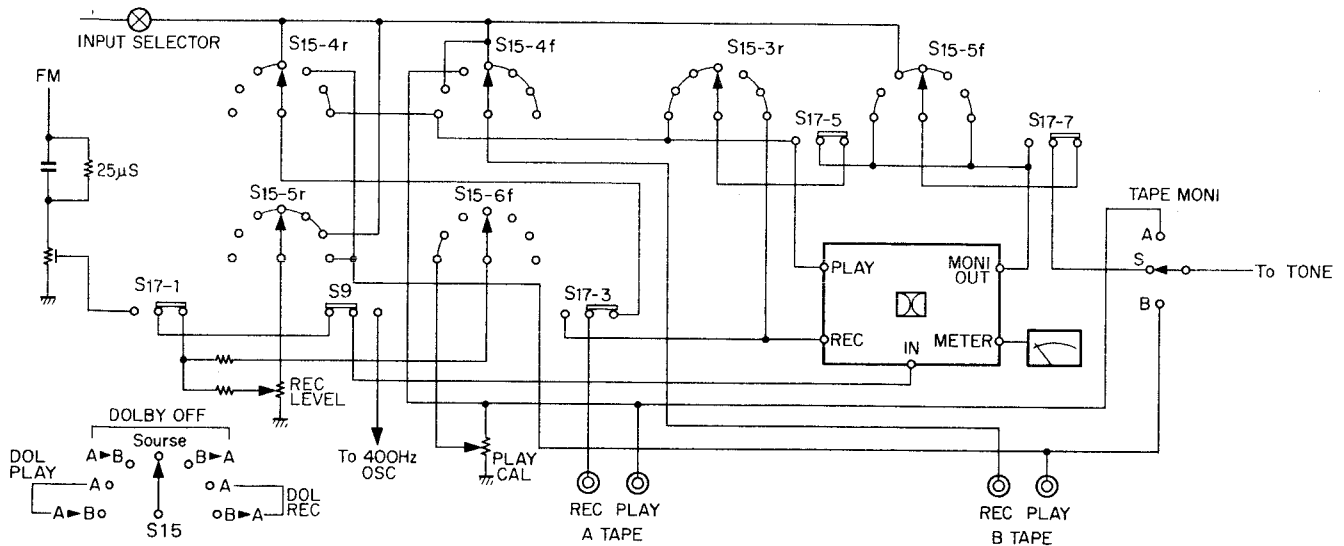


DOLBYIZED SOURCE PLAYBACK

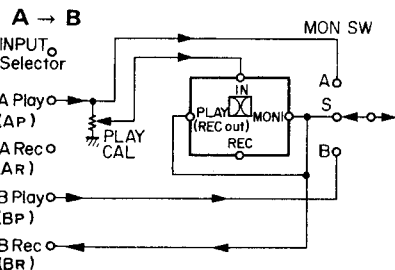


CIRCUIT DESCRIPTIONS

DOLBY NR CIRCUIT CONNECTION DIAGRAM SELECTED BY S15.

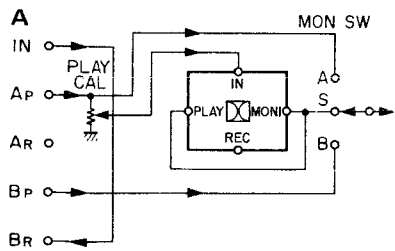


① DOLBY on



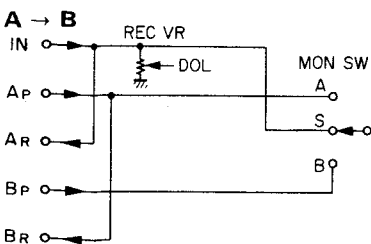
- Dolbized signal from AP is decoded and fed to BR.
- No output at AR

② DOLBY ON



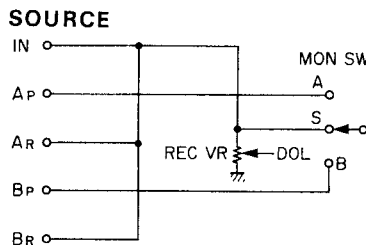
- Dolbized signal from AP is decoded.
- No output at AR.
- The signal selected by INPUT SELECTOR comes out at BR.

③ DOLBY off



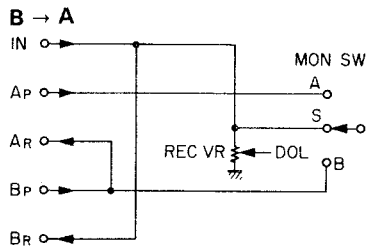
- Dubbing (AP → BR)
- DOL operation is only VU meter.

④ DOLBY off



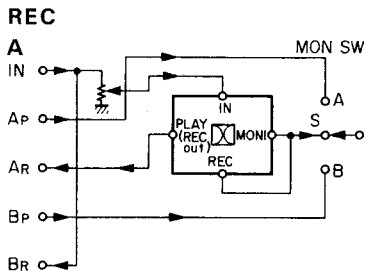
- Normal TAPE circuit
- DOL operation is only VU meter.

⑤ DOLBY off



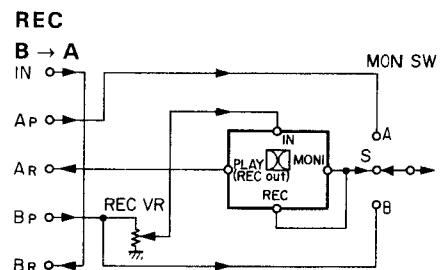
- Dubbing (BP → AR)
- DOL operation is only VU meter.

⑥ DOLBY on



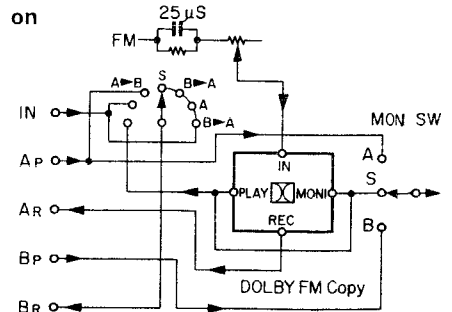
- Signal from INPUT SELECTOR is dolbized and fed to AR.
- The signal at BR is not dolbized.
- When MON SW is at S position, non-dolbized signal comes out from the circuit.

⑦ DOLBY on



- Signal from Bp is dolbized and fed to AR.
- Signal from INPUT SELECTOR comes out at BR.
- When MON SW is S position, signal from Bp comes out from the circuit.

⑧ DOLBY FM SW



- The circuit is for DOLBY FM reproduction.
- DOLBY FM copy signal comes out at AR.

	Signal at BR
DOLBY ON A→B	FM dolbized signal
DOLBY OFF A→B	Input signal of AP
OTHER POSITION	Signal selected by INPUT SELECTOR except AM

PARTS LIST

MODEL ELEVEN II: U-type (PX), M-type (General Export)

KR-10000 II: M₂-type (Audio Club)

☆: New parts

TOTAL

Ref. No.	Parts No.	Description	Re- marks
CAPACITOR			
C4~7	CK45F1H103Z	Ceramic 0.01 μ F +80% -20%	
RESISTOR			
R1~4	PD14BY2E104J	Carbon 100k Ω \pm 5% 1/4W	
R5~8	PD14BY2E394J	Carbon 390k Ω \pm 5% 1/4W	
SWITCH			
S3	S31-2001-05	Slide	
MISCELLANEOUS			
—	A03-0218-02	Cabinet	☆
—	A20-1114-03	Panel ass'y	☆U, M
—	A20-1128-03	Panel ass'y	☆ M ₂
—	B03-0124-02	Dress board	☆
—	B07-0111-04	Push SW ring \times 4	
—	B07-0154-25	Escutcheon	
—	B07-0200-03	Push SW ring for 4-ganged potentiometer	
—	B07-0201-03	Push SW ring for dual potentiometer	☆
—	B10-0191-13	Front glass	
—	B20-0358-33	Dial calibrations	
—	B21-2023-05	Dial pointer (LED)	
—	B31-0223-05	S meter	
—	B31-0224-05	T meter	
—	B31-0225-05	VU meter	
—	B42-0009-04	Passed sticker	
—	B46-0050-00	Warranty card	U
—	B46-0051-00	Warranty card	U
—	B50-1583-00	Instruction manual	☆U, M
—	B50-1605-00	Instruction manual	☆ M ₂
—	B59-0018-00	KENWOOD service stations' list	
—	D15-0171-03	Dial pulley	
—	D19-0050-14	Holding plate \times 6	
—	D32-0075-04	Switch stopper	
—	E06-0501-05	DIN connector \times 2	
—	E08-0225-05	AC outlet \times 2	
—	E13-0415-05	Pin jack 4P (TAPE, PRE-MAIN AMP) \times 3	
—	E13-0609-05	Pin jack 6P (INPUT)	
—	E20-1203-05	Speaker terminal 12P (SP)	
—	E22-0216-05	Lug-type terminal strips (101)	
—	E22-0421-05	Lug-type terminal strips (040)	
—	E29-0082-05	ANT terminal	
—	E30-0222-05	Feeder cord with terminal	
—	E30-0545-05	Power cord	
—	E31-0057-05	Mini-connector for power amp 4P	☆
—	E31-0058-05	Mini-connector for power amp 4P (L)	☆
—	E31-0059-05	Mini-connector for power amp 4P (R)	☆
—	E31-0060-05	Mini-connector for speaker 6P	☆
—	E31-0061-05	Mini-connector for speaker 6P	☆
—	F05-3022-05	Fuse 3A	
—	F05-6021-05	Fuse 6A	
—	G01-0045-24	Dial spring	
—	G01-0312-04	Spring for push SW knob \times 6	
—	G01-0356-04	Spring for dial pointer	
—	H01-1668-04	Carton case	☆ U
—	H01-1669-04	Carton case	☆ M

Ref. No.	Parts No.	Description	Re- marks
—	H01-1670-04	Carton case	☆ M ₂
—	H10-1478-02	Polystyrene foamed fixture \times 2	☆
—	H20-0373-14	Polyethylene cover	U, M ₂
—	H20-0429-04	Polyethylene cover	M
—	H25-0078-00	Instruction bag	
—	H40-0004-04	Anti-rust paper	
—	J12-0010-04	Shorted pin \times 2	
—	J13-0040-05	Fuse holder \times 2	
—	J19-0306-05	Lead holder	
—	J30-0028-04	PC board holder \times 3	
—	J41-0034-05	Power cord bushing	
—	J42-0075-04	Small bushing for dial pointer	
—	K20-0138-04	Knob (TUNING)	
—	K21-0302-03	Knob (TIMER)	
—	K22-0043-04	Knob (DOLBY VOLUME) \times 4	
—	K23-0202-24	Knob (TONE) \times 3	
—	K23-0218-04	Knob (VOLUME)	
—	K23-0219-04	Knob (BALANCE)	
—	K23-0220-24	Knob (SELECTOR) \times 2	
—	K27-0016-03	Knob (POWER)	
—	K27-0017-03	Knob (LEVER) \times 3	
—	K29-0292-14	Knob (PUSH ϕ 12) \times 6	
—	K29-0293-04	Knob (PUSH ϕ 11) \times 4	☆
—	L01-1255-05	Power transformer	☆
—	N08-0128-25	GND screw	
—	R90-0097-05	Spark killer	
—	T90-0083-05	Ferrite bar antenna	
—	T90-0202-05	FM indoor antenna	
—	X07-1450-12	Power amp unit	☆
—	X13-2390-80	Speaker selector unit	☆
—	X13-2420-80	Muting unit	☆
—	X90-1280-80	Tuner ass'y	☆

TUNER ASS'Y (X90-1280-80)

Ref. No.	Parts No.	Description	Re- marks
CAPACITOR			
C1	C90-0023-05	Ceramic 0.01 μ F 250WV	
C2, 3	C90-0332-05 or C90-0335-05	Electrolytic 12.000 μ F \times 2 63WV	
POTENTIOMETER			
VR1~4	R01-5013-05	100k Ω (A) REC LEVEL, PLAY, PAUSE	
SWITCH			
S1	S59-1041-05	Timer	
S2	S37-2002-15	Lever (POWER)	
MISCELLANEOUS			
—	A30-0103-15	Dial board	
—	A70-0090-05	Lamp ass'y	
—	B30-0064-15	Pilot lamp 8V 50mA \times 3	
—	B30-0068-05	Meter 8V 200mA \times 4	
—	D15-0160-04	Small pulley \times 4	
—	D20-0117-03	Dial shaft ass'y	
—	D21-0436-03	Timer shaft	☆
—	D22-0032-04	Coupling	☆

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
—	E11-0002-04	Phone jack × 2	
—	E11-0040-15	Mic jack	
—	J42-0071-04	Small bushing × 4	
—	J61-0023-05	Cord clip	
—	J61-0033-05	Cord clip × 2	
—	J61-0045-05	Combex (70 mm) × 2	
—	J90-0073-03	Dial pointer rail	
—	X00-1820-80	Power supply unit	☆
—	X05-1390-10	Tuner unit	☆
—	X08-1430-00	Control amp unit	
—	X13-2190-10	Pushbutton switch (A) unit	
—	X13-2310-10	TAPE MONITOR unit	☆
—	X13-2430-80	Pushbutton switch (B) unit	☆
—	X14-1070-10	Dolby unit	☆

POWER SUPPLY (X00-1820-80)

Ref. No.	Parts No.	Description	Re- marks
CAPACITOR			
Ck1~4	CK45E2H103P	Ceramic 0.01μF +100%—0%	
Ck5	CE04W1A471	Electrolytic 470μF 10WV	
Ck6	CK45F1H403Z	Ceramic 0.04μF +80%—20%	
Ck7	CE04W1H221	Electrolytic 220μF 50WV	
Ck8,9	CE04W1V221	Electrolytic 220μF 35WV	
Ck10	CE04W1H100	Electrolytic 10μF 50WV	
Ck11	CE04W1A470NP	Non-pole 47μF 10WV electrolytic	
Ck12	CE04W1E470BR	Electrolytic 47μF 25WV	
Ck13~15	CQ93MIH104M	Mylar 0.1μF ±20%	
RESISTOR			
Rk1,2	R92-0111-05	Metal film 0.47Ω ±5% 3W	
Rk3	RC05GF2H391K	Carbon 390Ω ±10% 1/2W	
Rk4,5	RC05GF2H102K	Carbon 1kΩ ±10% 1/2W	
Rk6	RN14AB3A271JB	Metal film 270Ω ±5% 1W	
Rk7	RN14AB3D331JB	Metal film 330Ω ±5% 2W	
Rk8	RN14AB3D122JB	Metal film 1.2kΩ ±5% 2W	
Rk9~17 19,20,23	PD14BY2E000J	Carbon 000Ω ±5% 1/4W	
Rk18	RN14AB3D821JB	Metal film 820Ω ±5% 2W	
Rk21,22	RN14AB3D100JB	Metal film 10Ω ±5% 2W	
SEMICONDUCTOR			
Qk1	V03-0270-05	Transistor 2SC945	
Qk2	V03-0452-05	Transistor 2SC1735	
Qk3	V03-0456-05	Transistor 2SC1222	
Qk4	V01-0146-05	Transistor 2SA640	
Qk5	V03-0343-05	Transistor 2SC1419	
Dk1	V11-0325-05	Diode S5151R	
Dk2	V11-0326-05	Diode S5151	
Dk3	V11-0219-05	Diode V06B	
Dk4	V11-0273-05	Diode 1S2076A	
Dk5,6	V11-0219-05	Diode V06B	
Dk7	V11-0453-05	Zener diode EQA01-33R	
COIL			
Lk1,2	L39-0080-15	Phase compensation coil	
MISCELLANEOUS			
—	F05-4022-05	Fuse 4A	
—	J13-0041-05	Fuse clip × 2	
—	S51-4030-05	Relay	

TUNER (X05-1390-10)

Ref. No.	Parts No.	Description	Re- marks
CAPACITOR			
Cg1	CC45SL1H150K	Ceramic 15pF ±10%	
Cg2	CK45F1H103Z	Ceramic 0.01μF +80%—20%	
Cg3	CC45SL1H150K	Ceramic 15pF ±10%	
Cg4	CC45SL1H070C	Ceramic 7pF ±0.25pF	
Cg5	CC45TH1H020C	Ceramic 2pF ±0.25pF	
Cg6	CC45SL1H221K	Ceramic 220pF ±10%	
Cg7	CK45F1H223Z	Ceramic 0.022μF +80%—20%	
Cg8	CC45RG1H180K	Ceramic 18pF ±10%	
Cg9	CC45PG1H150K	Ceramic 15pF ±10%	
Cg10	CC45SH1H470K	Ceramic 47pF ±10%	
Cg11	CC45SH1H220K	Ceramic 22pF ±10%	
Cg12,13	CK45F1H223Z	Ceramic 0.022μF +80%—20%	
Cg14	CK45F1H103Z	Ceramic 0.01μF +80%—20%	
Cg15	CC45SL1H180K	Ceramic 18pF ±10%	
Cg16,17	CK45F1H223Z	Ceramic 0.022μF +80%—20%	
Cg18	CC45SL1H180K	Ceramic 18pF ±10%	
Cg19	CC45SL1H221K	Ceramic 220pF ±10%	
Cg20	CK45F1H223Z	Ceramic 0.022μF +80%—20%	
Cg21	CC45SL1H331K	Ceramic 330pF ±10%	
Cg22	CQ93M1H102M	Mylar 1000pF ±20%	
Cg23~25	CK45F1H223Z	Ceramic 0.022μF +80%—20%	
Cg26	CE04W1E100	Electrolytic 10μF 25WV	
Cg27,28	CC45SL1H331K	Ceramic 330pF ±10%	
Cg29	CC45SL1H221K	Ceramic 220pF ±10%	
Cg30	CE04W1C221	Electrolytic 220μF 16WV	
Cg41	CC45SL1H180K	Ceramic 18pF ±10%	
Cg42	CQ09S1H361J	Polystyrene 360pF ±5%	
Cg43	CK45F1H223Z	Ceramic 0.022μF +80%—20%	
Cg44	CQ93M1H223M	Mylar 0.022μF ±20%	
Cg45	CQ93M1H103M	Mylar 0.01μF ±20%	
Cg46	CQ93M1H223M	Mylar 0.022μF ±20%	
Cg47	CK45F1H223Z	Ceramic 0.022μF +80%—20%	
Cg48,49	CE04W1H010	Electrolytic 1μF 50WV	
Cg50	C90-0269-05	Ceramic 1μF ±20%	
Cg51	CE04W0J221	Electrolytic 220μF 6.3WV	
Cg60	CK45F1H103Z	Ceramic 0.01μF +80%—20%	
Cg61	CQ93M1H122M	Mylar 0.0012μF ±20%	
Cg62	CE04W1C221	Electrolytic 220μF 16WV	
Cg63	CQ93M1H473M	Mylar 0.047μF ±20%	
Cg64	CQ09S1H361J	Polystyrene 360pF ±5%	
Cg65,66	CE04W1E100	Electrolytic 10μF 25WV	
Cg67	CS15E1C1R5M	Tantalum 1.5μF 16WV	
Cg68	CS15E1C3R3M	Tantalum 3.3μF 16WV	
Cg69	CE04W1HR33LR	Electrolytic 0.33μF 50WV	
Cg70,71	CQ93M1H152J	Mylar 0.0015μF ±5%	
Cg72	CE04W1C4R7	Electrolytic 4.7μF 16WV	
Cg73~78	CE04W1H3R3	Electrolytic 3.3μF 50WV	
Cg79	CE04W1E4R7	Electrolytic 4.7μF 25WV	
RESISTOR			
Rg1~96	PD14BY2B000J or PD14CY2E000J	Carbon 000Ω ±5% 1/8W Carbon 000Ω ±5% 1/4W	
SEMICONDUCTOR			
Qg1	V09-0071-05	FET 2SK55 (D) or (E)	
Qg2	V03-0092-05	Transistor 2SC381 (O)	
Qg3	V03-0357-05	Transistor 2SC1342 (A)	
Qg4	V03-0091-05	Transistor 2SC381 (R)	
Qg5,6	V03-0270-05	Transistor 2SC945	
Qg7,8	V09-0110-05	Transistor 2SK68 (L) or (M)	
ICg1	V30-0093-05	IC AN217BB	
ICg2	V30-0155-05	IC HA1196	
Dg1~4	V11-0051-05	Diode 1N60	
Dg5,6	V11-0271-05	Diode 1S2076 or 1S1555	
Dg7	V21-0006-05	Zener diode DZ-140	

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
Dg8	V11-0051-05	Diode 1N60	
Dg9	V11-0271-05	Diode 1S2076 or 1S1555	
COIL/TRANS/FILTER/INDUCTOR			
Lg1	L31-0361-05	FM ANT coil	
Lg2	L31-0359-05	FM RF coil	
Lg3	L40-1091-41	Ferri-inductor 1 μ H (K)	
Lg4	L40-1092-03	Ferri-inductor 1 μ H (M)	
Lg5	L32-0187-05	FM OSC coil	
Lg6	L30-0282-05	FM IFT	
Lg7	L30-0274-05	FM IFT	
Lg8	L30-0260-15	FM DISCRI coil	
Lg9	L40-1092-03	Ferri-inductor 1 μ H (M)	
Lg10	L32-0186-05	AM OSC coil	
Lg11	L72-0035-05	AM ceramic filter	
Lg12	L30-0283-05	AM DETECT coil	
Lg13	L40-1022-03	Ferri-inductor 1mH (M)	
Lg14	L79-0029-05	Low pass filter	
Lg15	L79-0030-05	Low pass filter	
CFg1,2	L72-0034-05	FM ceramic filter	
POTENTIOMETER			
VRg1	R12-3030-05	PC trimmer 10k Ω	
MISCELLANEOUS			
—	C01-0185-05	Variable capacitor	
CTg1	C05-0055-05	Ceramic trimmer	
CRg1	R90-0104-05	CR parts	

POWER AMP (X07-1450-12)

Ref. No.	Parts No.	Description	Re- marks
CAPACITOR			
Ce1.2	CQ93M1H474M	Mylar 0.47 μ F \pm 20%	
Ce3.4	CC45SL1H101K	Ceramic 100pF \pm 10%	
Ce5.6	CE04W1H010	Electrolytic 1 μ F 50WV	
Ce7.8	CE04W1A470	Electrolytic 47 μ F 10WV	
Ce9.10	CC45SL1H050D	Ceramic 5pF \pm 0.5pF	
Ce11.12	CC45SL1H100D	Ceramic 10pF \pm 0.5pF	
Ce13.14	CE04W1H470	Electrolytic 47 μ F 50WV	
Ce15.16	CE04W0J101	Electrolytic 100 μ F 6.3WV	
Ce17.18	CC45SL1H101K	Ceramic 100pF \pm 10%	
Ce19.20	CE04W1J101	Electrolytic 100 μ F 63WV	
Ce21~24	CE04W1A470	Electrolytic 47 μ F 10WV	
Ce25~28	CC45SL1H101K	Ceramic 100pF \pm 10%	
RESISTOR			
Re1~60	PD14BY2E000J or PD14CY2E000J	Carbon 000 Ω \pm 5% 1/4W	
Re65~68	R92-0111-05	Cement 0.47 Ω \pm 5% 3W	
SEMICONDUCTOR			
Qe1~4	V01-0189-05	Transistor 2SA872 (E)	
Qe5.6	V03-0439-05	Transistor 2SC1885 (Q) or (R)	
Qe7.8	V01-0157-05	Transistor 2SA620WB	
Qe9.10	V01-0084-05	Transistor 2SA733 (Q) or (R)	
Qe11~14	V03-0270-05	Transistor 2SC945 (Q) or (R)	
Qe15.16	V01-0157-05	Transistor 2SA733 (Q) or (R)	
Qe17.18	V03-0468-05	Transistor 2SC1913 (Q) or (R)	
Qe19.20	V01-0188-05	Transistor 2SA913 (Q) or (R)	
Qe21.22	V04-0085-05	Transistor 2SD425	☆
Qe23.24	V02-0063-05	Transistor 2SB555	☆
De1.2	V11-0433-05	Zener diode EQA01-30R	
De3~6	V11-0271-05	Diode 1S2076	
THE1.2	V22-0027-05	Thermister 5TP-41L	

Ref. No.	Parts No.	Description	Re- marks
POTENTIOMETER			
VRe1.2	R12-1007-05	PC trimmer 1k Ω BIAS	
MISCELLANEOUS			
—	E02-0209-05	Transistor socket \times 4	
—	E40-0433-05	Pin ass'y (right angle)	☆
—	E40-0435-05	Pin ass'y (right angle)	☆
—	E40-0470-05	Mini-connector separator (verticality)	☆
—	F20-0066-05	Mica insulating plate	

CONTROL AMP (X08-1430-00)

Ref. No.	Parts No.	Description	Re- marks
CAPACITOR			
Cd1.2	CS15E1A3R3M	Tantalum 3.3 μ F 10WV	
Cd3.4	CE04W0J101	Electrolytic 100 μ F 6.3WV	
Cd5.6	CC45SL1H101K	Ceramic 100pF \pm 10%	
Cd7.8	CE04W1E100	Electrolytic 10 μ F 25WV	
Cd9.10	CQ93M1H822J	Mylar 0.0082 μ F \pm 5%	
Cd11.12	CQ93M1H272J	Mylar 0.0027 μ F \pm 5%	
Cd13.14	CK45D1H391M	Ceramic 390pF \pm 20%	
Cd15.16	CS15E1A3R3M	Tantalum 3.3 μ F 10WV	
Cd17.18	CE04W0J101	Electrolytic 100 μ F 6.3WV	
Cd19.20	CC45SL1H100D	Ceramic 10pF \pm 0.5pF	
Cd21.22	CE04W1E100	Electrolytic 10 μ F 25WV	
Cd23.24	CK45D1H391M	Ceramic 390pF \pm 20%	
Cd25.26	CQ93M1H682K	Mylar 0.0068 μ F \pm 10%	
Cd27.28	CQ93M1H103K	Mylar 0.01 μ F \pm 10%	
Cd29.30	CQ93M1H272K	Mylar 0.0027 μ F \pm 10%	
Cd31~34	CQ93M1H183K	Mylar 0.018 μ F \pm 10%	
Cd35.36	CE04W1E100	Electrolytic 10 μ F 25WV	
Cd37.38	CQ93M1H104M	Electrolytic 0.1 μ F \pm 20%	
Cd39.40	CS15E1E2R2M	Tantalum 2.2 μ F 25WV	
Cd41.42	CE04W1A330	Electrolytic 33 μ F 10WV	
Cd43~46	CQ93M1H473K	Mylar 0.047 μ F \pm 10%	
Cd47	CE04W1E100	Electrolytic 10 μ F 25WV	
Cd48	CS15E1E0R1M	Tantalum 0.1 μ F 25WV	
Cd49.50	CK45D1H561M	Ceramic 560pF \pm 20%	
RESISTOR			
Rd1~75	PD14BY2E000J or PD14CY2E000J	Carbon 000 Ω \pm 5% 1/4W	
SEMICONDUCTOR			
Qd1.2	V03-0408-05	Transistor 2SC1222(U) or 2SC1345(E)	
ICd1~4	V03-0140-05	IC TA7129P	
POTENTIOMETER			
VRd1	R11-9005-05	100k Ω (B) \times 2, 200k Ω (W) VOLUME, BALANCE	
VRd2~4	R06-5013-05	100k Ω (B) \times 2 TONE CONTROL	
SWITCH			
S13.14	S31-2039-05	Lever LOW-FIL, HIGH-FIL	
S20	S29-2018-05	Rotary INPUT SELECTOR	

PUSH SWITCH (A) (X13-2190-10)

Ref. No.	Parts No.	Description	Re- marks
CAPACITOR			
Cp1.2	CS15E1VR47M	Tantalum 0.47 μ F 35WV	

PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
SEMICONDUCTOR			
Dp1.2	V11-0051-05	Diode 1N60	
Dp 3.4	V11-0076-05	Diode 1S1555	
Dp5.6	V11-0051-05	Diode 1N60	
POTENTIOMETER			
VRp 1.2	R12-3030-05	PC trimmer 10k Ω (B)	
SWITCH			
S7.8	S40-2062-15	Pushbutton DIMMER, METER	

TAPE MONITOR (X13-2310-10)

Ref. No.	Parts No.	Description	Re- marks
CAPACITOR			
Cr1.2	CQ93M1H182J	Mylar 0.0018 μ F \pm 5%	
RESISTOR			
Rr1.2	PD14CY2E393J	Carbon 39k Ω \pm 5% 1/4W	
Rr3~8	PD14CY2E104J	Carbon 100k Ω \pm 5% 1/4W	
POTENTIOMETER			
VRr1.2	R12-3014-05	PC trimmer 20k Ω (B)	
SWITCH			
S15	S01-6004-05	Rotary TAPE MONITOR	☆
S16	S32-4007-05	Lever TAPE MONITOR	
S17	S40-0002-05	Pushbutton DOLBY FM	

SPEAKER SELECTOR (X13-2390-80)

Ref. No.	Parts No.	Description	Re- marks
RESISTOR			
Rh1.2	RC05GF2H271K	Carbon 270 Ω \pm 10% 1/2W	
SWITCH			
S4~6	S42-3017-05	Pushbotton SPEAKERS	☆
-	E40-0639-05	Pin connector (symmetry)	☆
-	E40-0640-05	Pin connector (non-symmetry)	☆

MUTING (X13-2420-80)

Ref. No.	Parts No.	Description	Re- marks
RESISTOR			
Rs1~9	PD14BY2E000J	Carbon 000 Ω \pm 5% 1/4W	
SEMICONDUCTOR			
Qs1	V03-0270-05	Transistor 2SC945	
Qs2	V01-0084-05	Transistor 2SA733	

PUSH SWITCH (B) (X13-2430-80)

Ref. No.	Parts No.	Description	Re- marks
CAPACITOR			
Cq1	CE04W1E101	Electrolytic 100 μ F 25WV	
Cq2	CQ93M1H104J	Mylar 0.1 μ F \pm 5%	
Cq3	CQ93M1H153J	Mylar 0.015 μ F \pm 5%	
Cq4	CQ93M1H273J	Mylar 0.027 μ F \pm 5%	

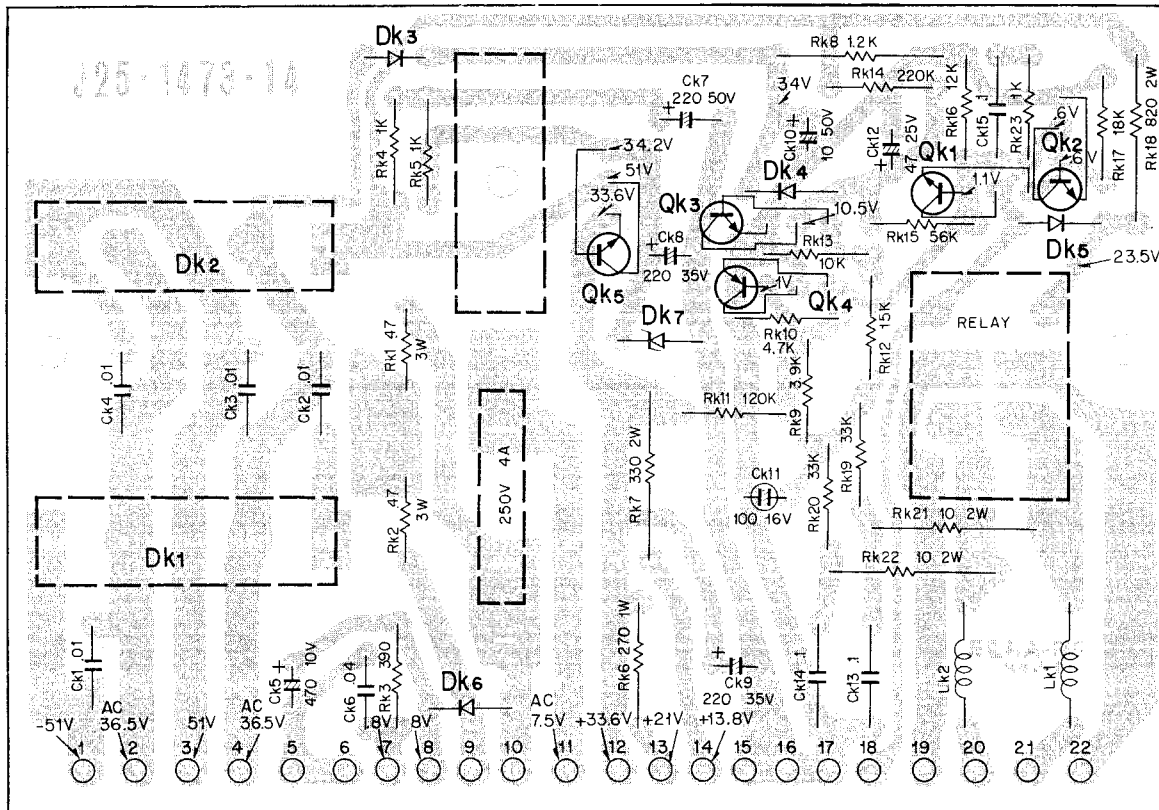
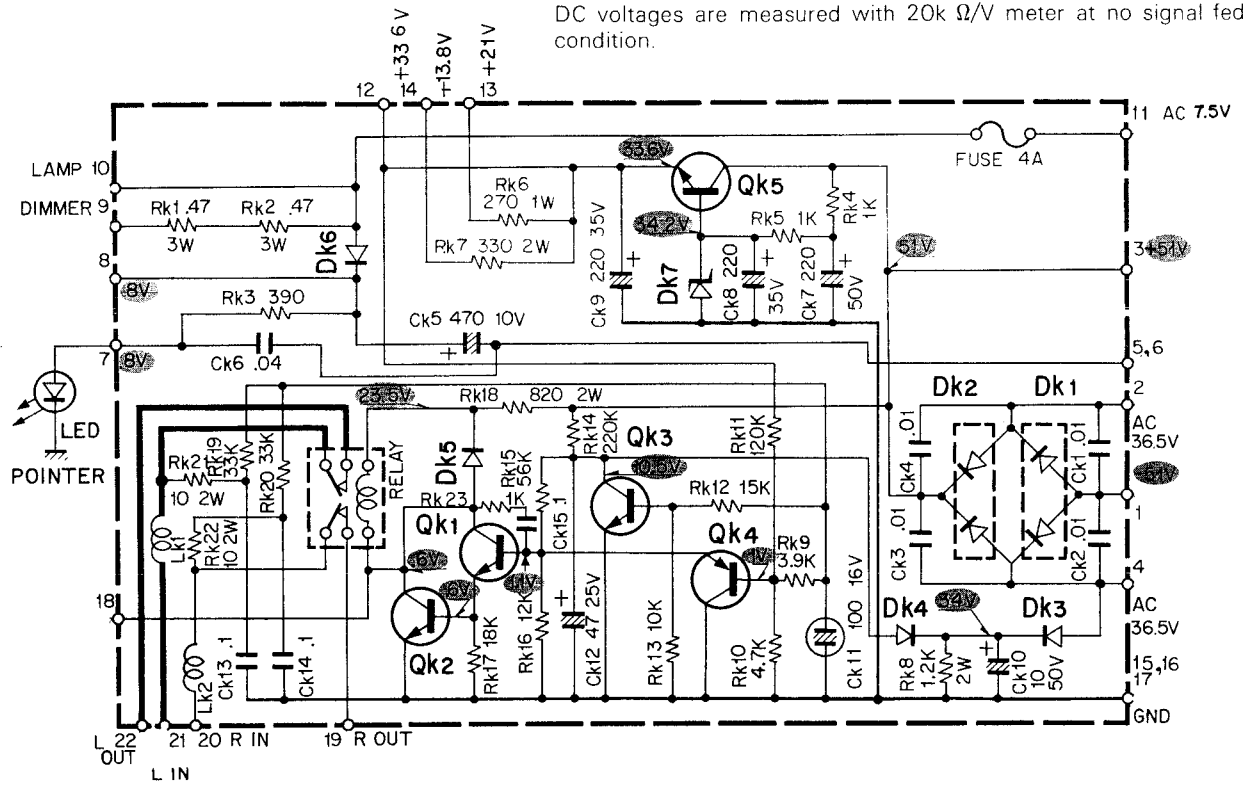
Ref. No.	Parts No.	Description	Re- marks
Cq5	CQ93M1H153J	Mylar 0.015 μ F \pm 5%	
Cq6.7	CQ93M1H273J	Mylar 0.027 μ F \pm 5%	
Cq8.9	CK45D1H471M	Ceramic 470 μ F \pm 20%	
Cq10	CE04W1C100	Electrolytic 10 μ F 16WV	
RESISTOR			
Rq1~8	PD14BY2E000J or	Carbon 000 Ω \pm 5% 1/4W	
10~16	PD14CY2E000J		
SEMICONDUCTOR			
Qq1.2	V03-0271-05	Transistor 2SC1345 (E) or (F)	
POTENTIOMETER			
VRq1	R12-1027-05	PC trimmer 2k Ω (B)	
SWITCH			
S9~12	S40-4019-15	Pushbutton	

DOLBY (X14-1070-10)

Ref. No.	Parts No.	Description	Re- marks
CAPACITOR			
Cv1.2	CS15E1E010M	Tantalum 1 μ F 25WV	
Cv3.4	CQ93M1H272J	Mylar 0.0027 μ F \pm 5%	
Cv5.6	CQ93M1H102J	Mylar 0.001 μ F \pm 5%	
Cv7~10	CE04W1E100	Electrolytic 10 μ F 25WV	
Cv11.12	C91-0004-15	Polyester 0.0056 μ F \pm 2%	
Cv13.14	CE04W1E100	Electrolytic 10 μ F 25WV	
Cv15.16	CQ93M1H334J	Mylar 0.33 μ F \pm 5%	
Cv17.18	CQ93M1H104J	Mylar 0.1 μ F \pm 5%	
Cv19.20	CQ93M1H473J	Mylar 0.047 μ F \pm 5%	
Cv21.22	CE04W1E100	Electrolytic 10 μ F 25WV	
Cv23.24	C91-0005-15	Polyester 0.0047 μ F \pm 2%	
Cv25.26	CE04W1E100	Electrolytic 10 μ F 25WV	
Cv27.28	CE04W1C221	Electrolytic 220 μ F 16WV	
Cv29.30	C91-0003-15	Polyester 0.027 μ F \pm 2%	
Cv31.32	CE04W1E010	Electrolytic 1 μ F 25WV	
Cv33.34	CE04W1E100	Electrolytic 10 μ F 25WV	
Cv35	CE04W1E101	Electrolytic 100 μ F 25WV	
RESISTOR			
Rv1~30	PD14BY2E000J or	Carbon 000 Ω \pm 5% 1/4W	
	PD14CY2E000J		
Rv31	RC05GF2H151K	Carbon 150 Ω \pm 10% 1/2W	
SEMICONDUCTOR			
Qv1.2	V03-0270-05	Transistor 2SC945 (R) or (Q)	
ICv1.2	V30-0139-05	IC NE545B	
Dv1~4	V11-0051-05	Diode 1N60	
POTENTIOMETER			
VRv 1.2	R12-1007-05	PC Trimmer 1k Ω (B)	
INDUCTOR			
Lv1.2	L39-0041-05	Variable	

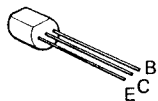
POWER SUPPLY (X00-1820-80)

DC voltages are measured with 20k Ω/V meter at no signal fed condition.

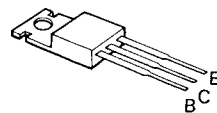


Qk1: 2SC945, Qk2: 2SC1735, Qk3: 2SC1222, Qk4: 2SA640, Qk5: 2SC1419
 Dk1: S5151R, Dk2: S5151, Dk3, 5, 6: V06B, Dk4: 1S2076A, Dk7: EQA01-33R

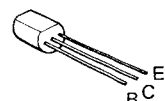
2SA640
 2SC945
 2SC1222



2SC1419

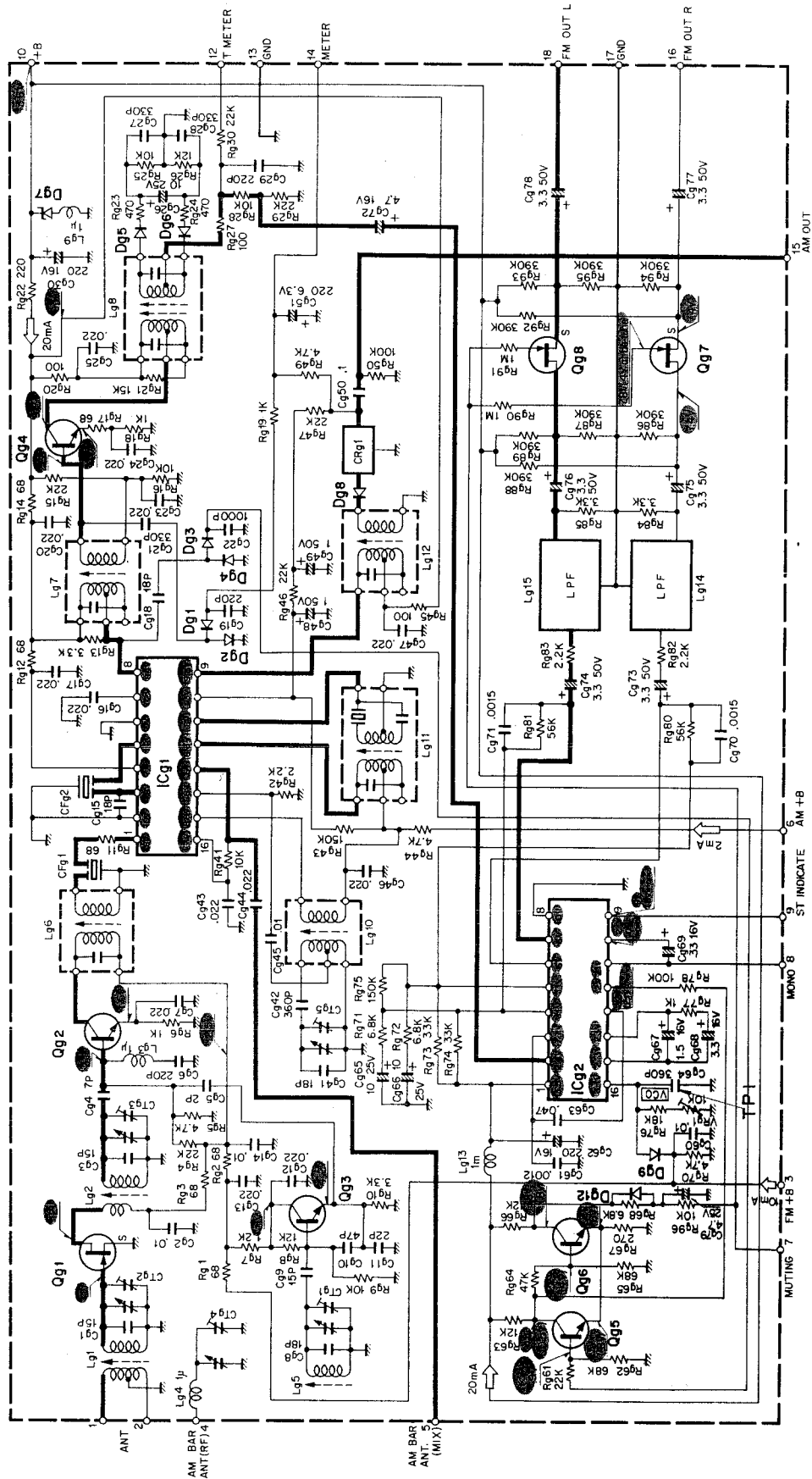


2SC1735

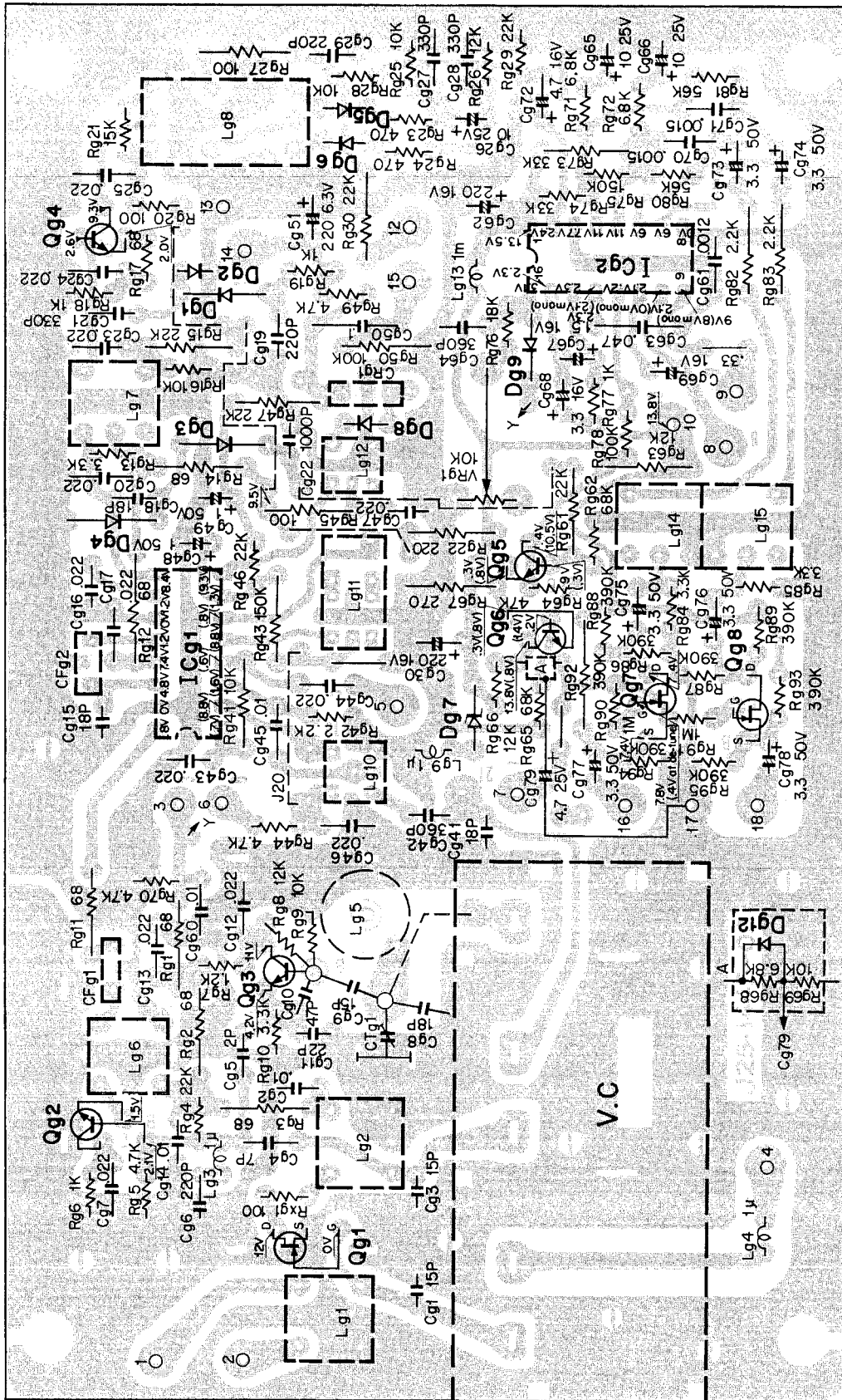


TUNER (X05-1390-10)

DC voltages are measured with 20k Ω /V meter at stereo signal reception except ()
 () voltages are measured at AM reception.

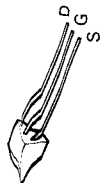


TUNER (X05-1390-10)

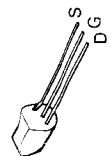


Qg1: 2KS55 (D) or (E), Qg2: 2SC381 (O), Qg3: 2SC1342 (A), Qg4: 2SC381 (R), Qg5, 6: 2SC945, Qg7, 8: 2SK68 (L) or (M),
 ICg1: AN-217BB, ICg2: HA-1196, Dg1~4: 8: 1N60, Dg5, 6, 9, 12: 1S2076 or 1S1555, Dg7: DZ-140

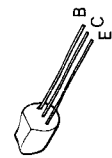
2SK55



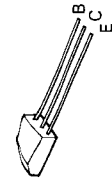
2SK68



2SC945

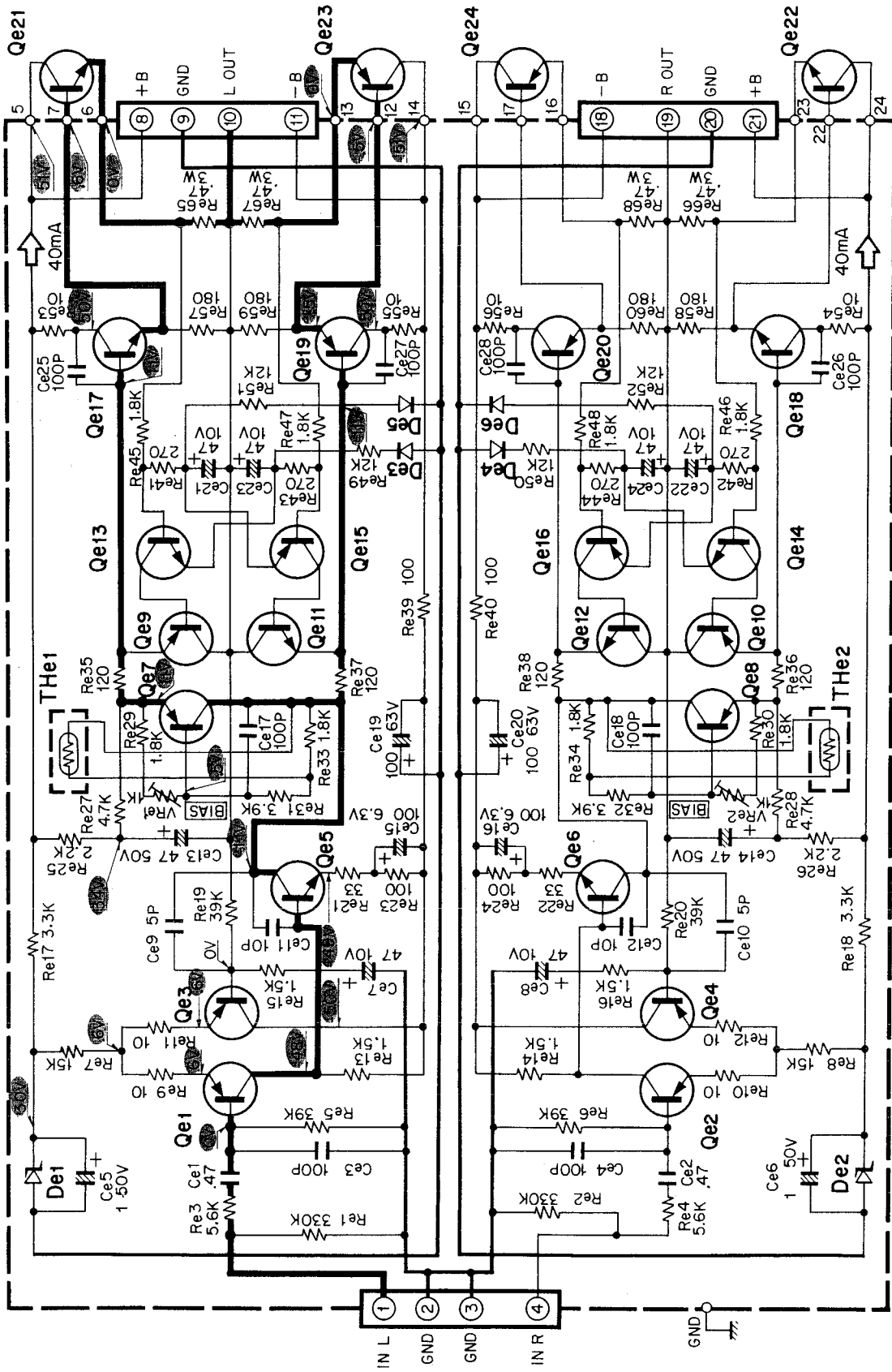


2SC1342

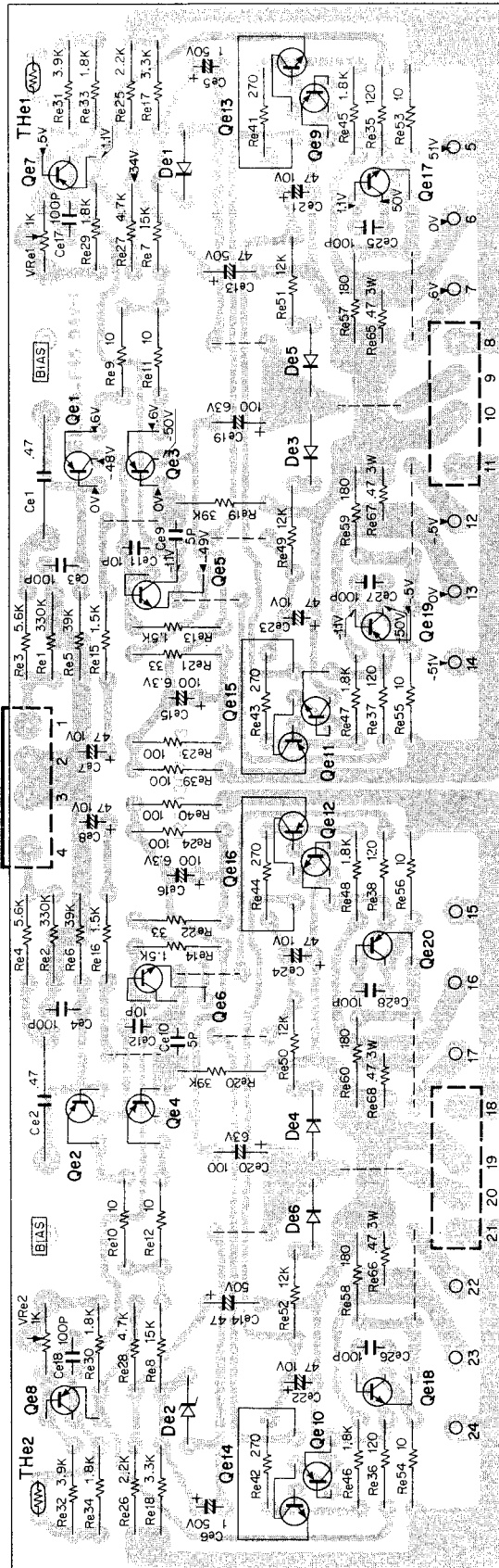


POWER AMP (X07-1450-12)

DC voltages are measured with 20k Ω /V meter at no signal fed condition.

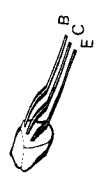


POWER AMP (X07-1450-12)



Qe1~4: 2SA872(D) or (E), Qe5, 6: 2SC1885(Q) or (R), Qe7, 8: 2SA620WB, Qe9, 10, 15, 16: 2SA733(Q) or (R),
 Qe11~14: 2SC945(Q) or (R), Qe17, 18: 2SC1913(Q) or (R), Qe19, 20: 2SA913(Q) or (R), Qe21, 22: 2SD425, Qe23,
 24: 2SB555, De1, 2: EQA01-30R, De3~6: 1S2076, The1, 2: 5TP-41L

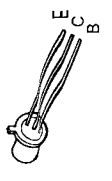
2SA733
 2SA872
 2SC945
 2SC1885



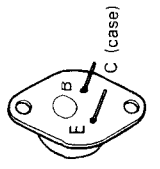
2SA913
 2SC1913



2SA620WB
 2SA620WL

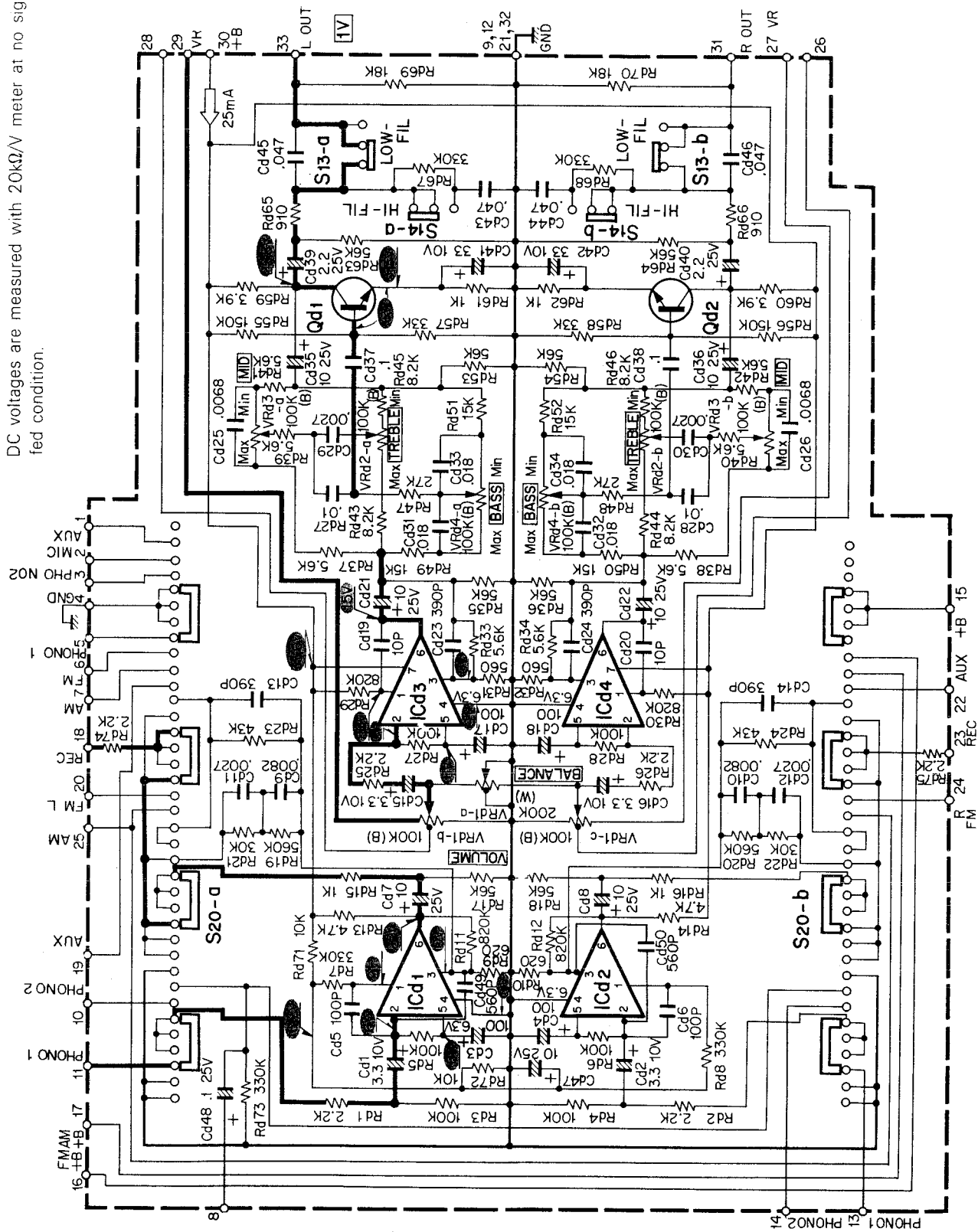


2SB555
 2SD425

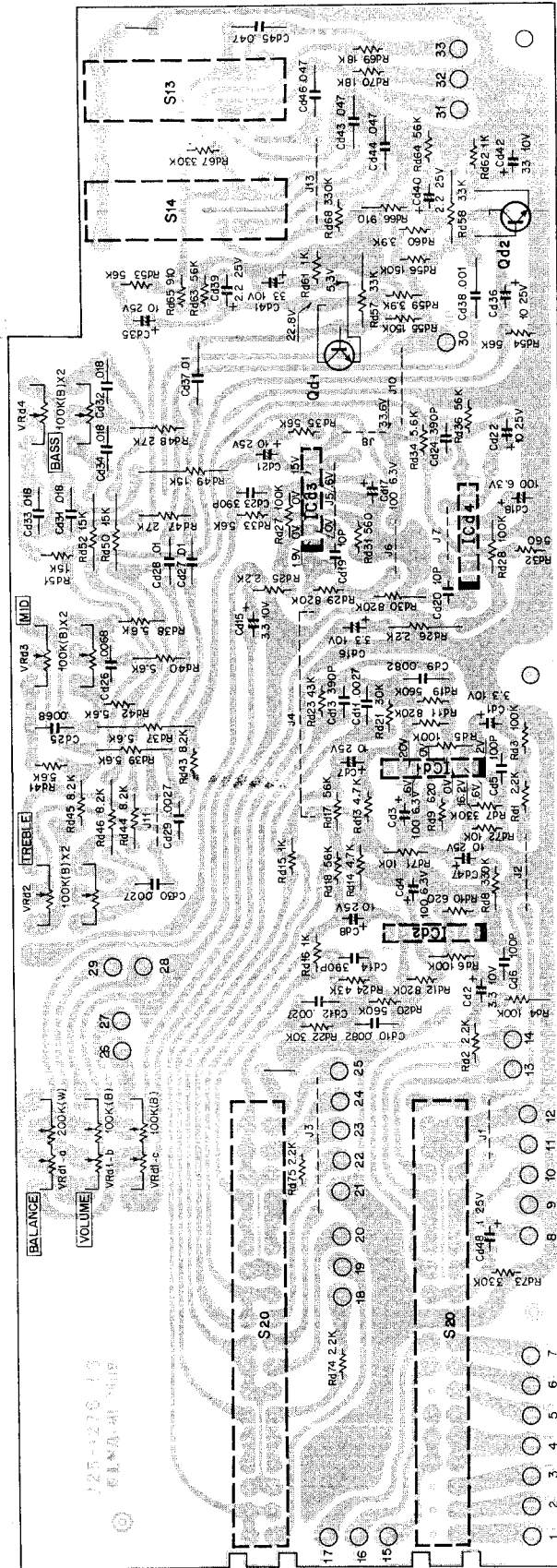


CONTROL AMP (X08-1430-00)

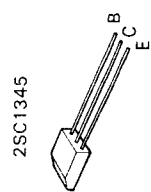
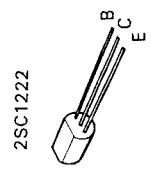
DC voltages are measured with 20k Ω /V meter at no signal fed condition.



CONTROL AMP (X08-1430-00)

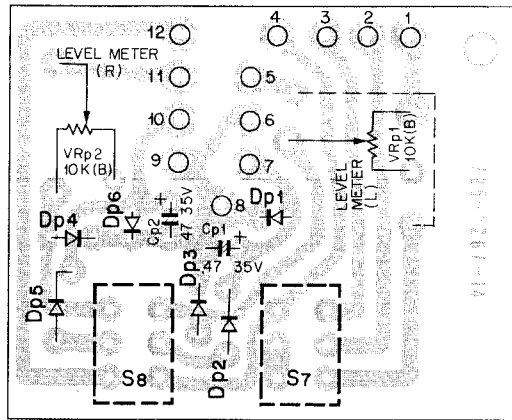
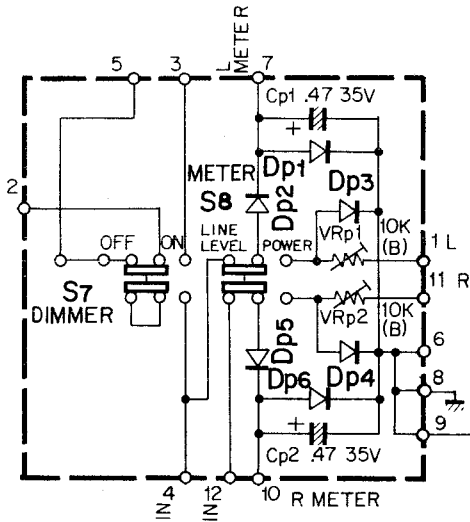


Qd1, 2: 2SC1222 (U) or 2SC1345 (E), ICd1~4: TA7129P



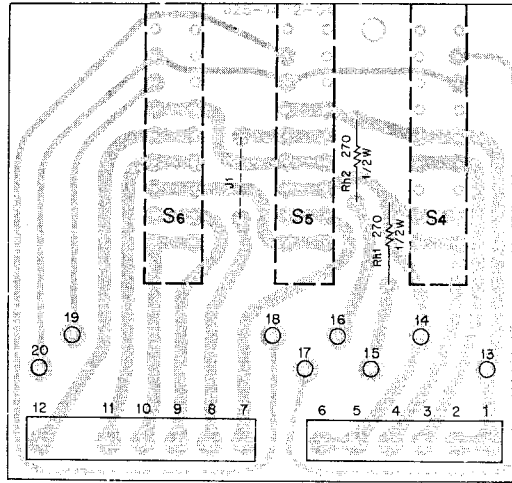
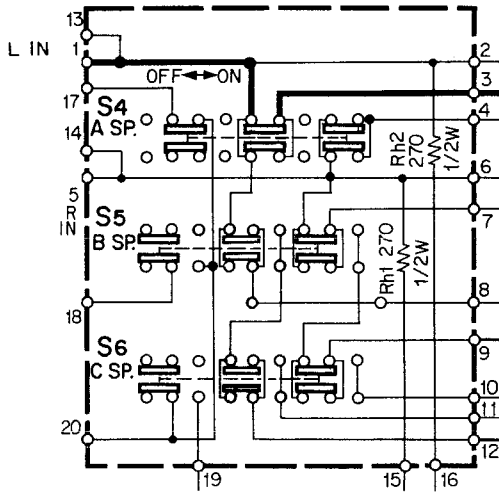
PUSH SWITCH (A) / SPEAKER SELECTOR / MUTING

PUSH SWITCH (A) (X13-2190-10)

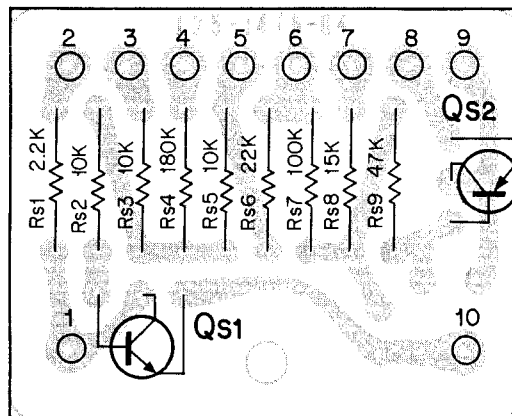
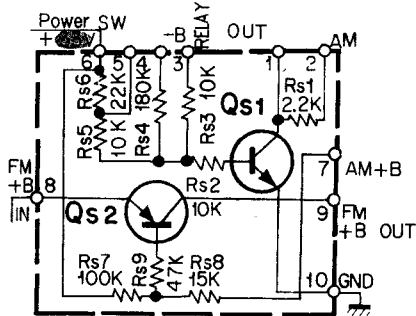


Dp1, 2, 5, 6: 1N60, Dp,3, 4: 1S1555

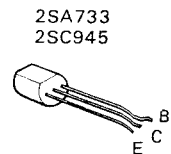
SPEAKER SELECTOR (X13-2390-80)



MUTING (X13-2420-80)



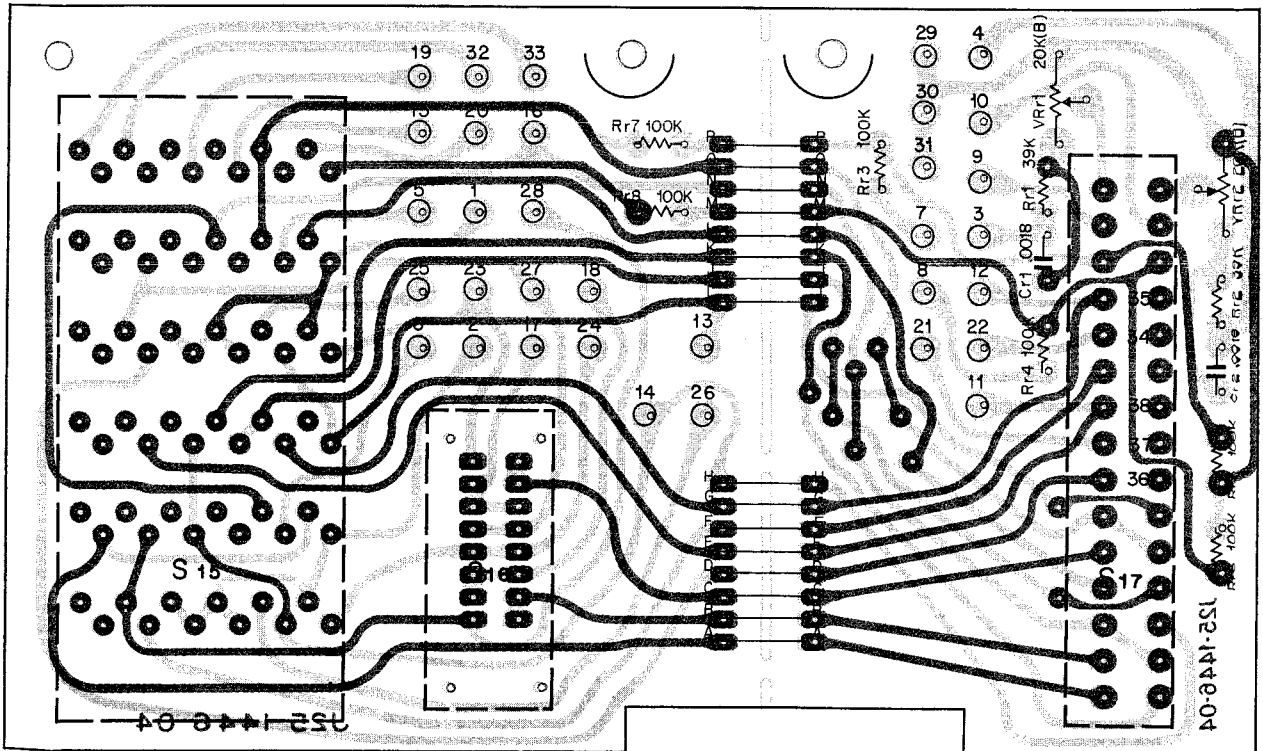
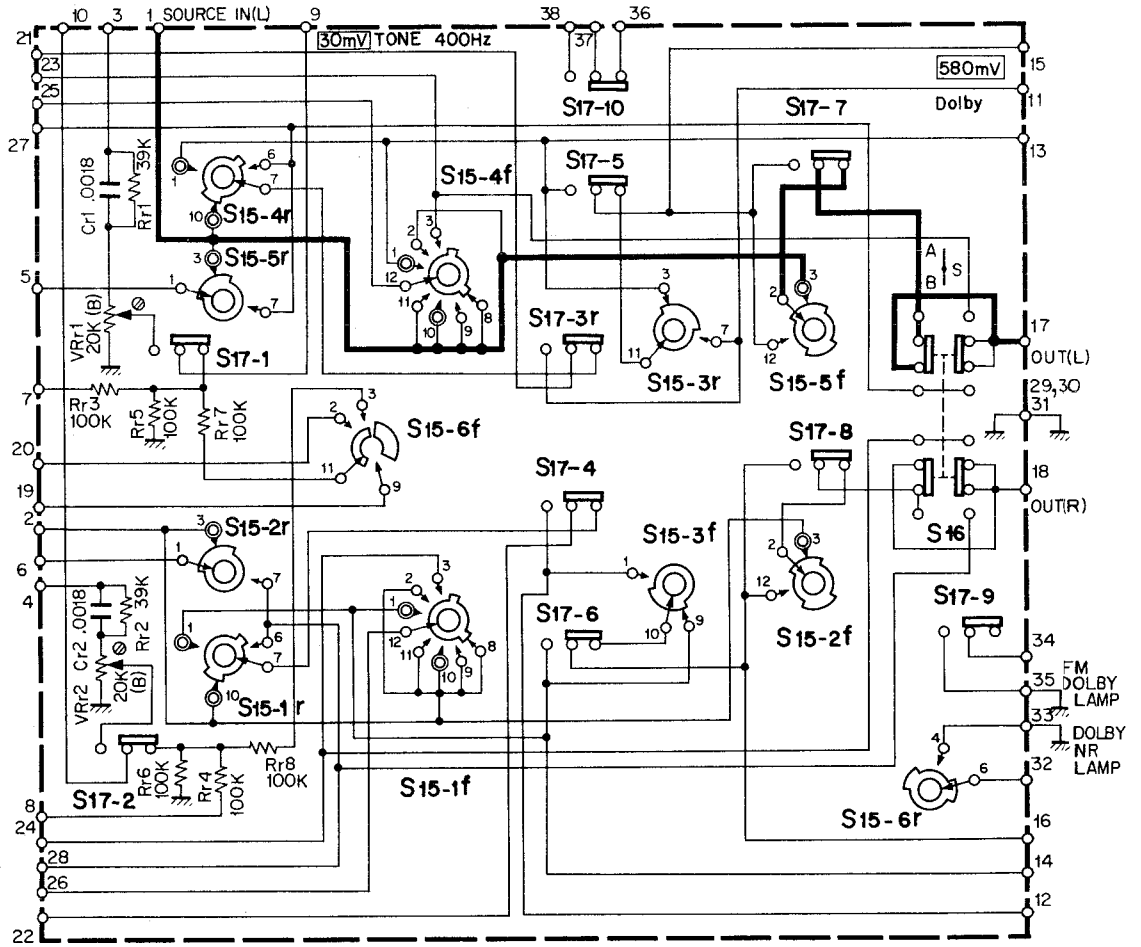
Qs1: 2SC945, Qs2: 2SA733



2SA733
2SC945

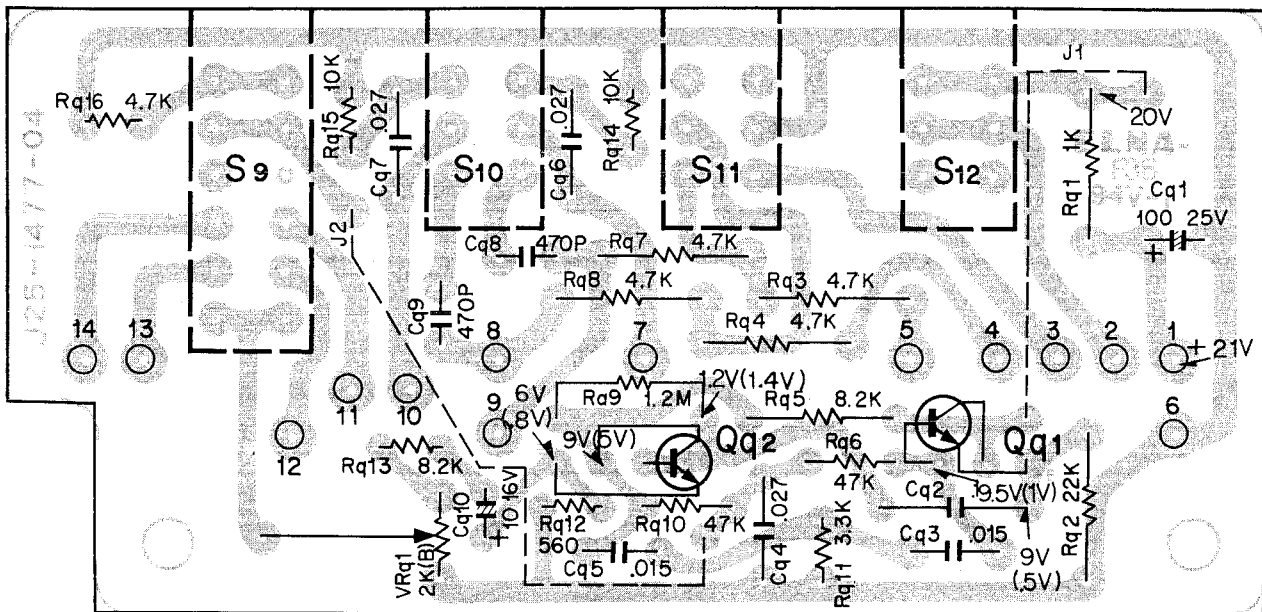
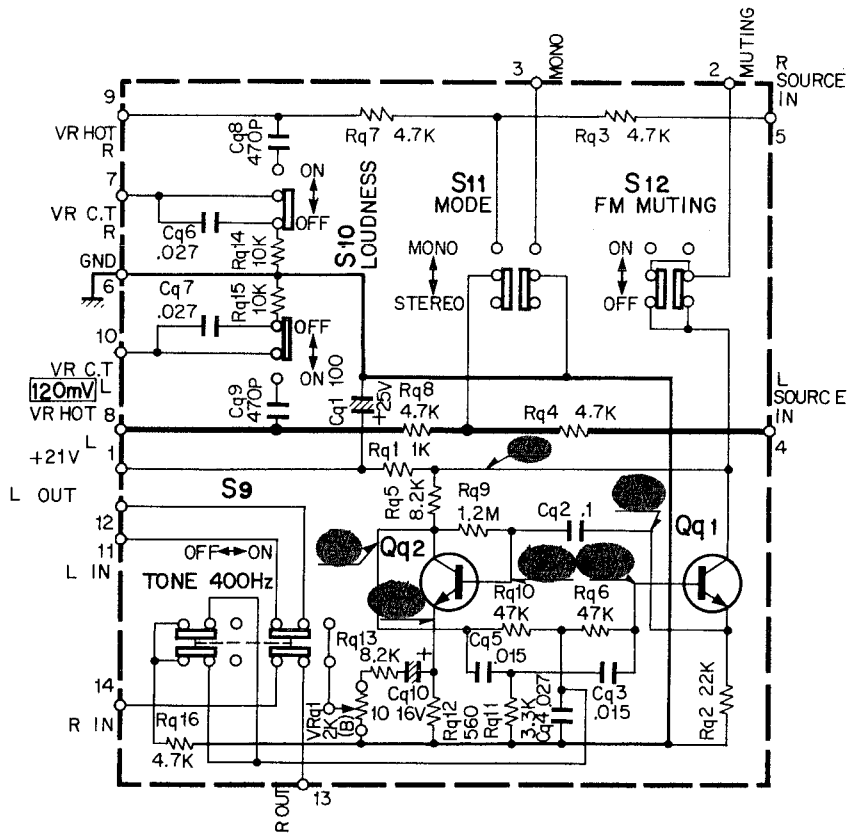
TAPE MONITOR (X13-2310-10)

TUNER
BIAS



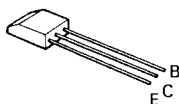
PUSH SWITCH (B) (X13-2430-80)

DC voltages are measured with 20kΩ/V meter.



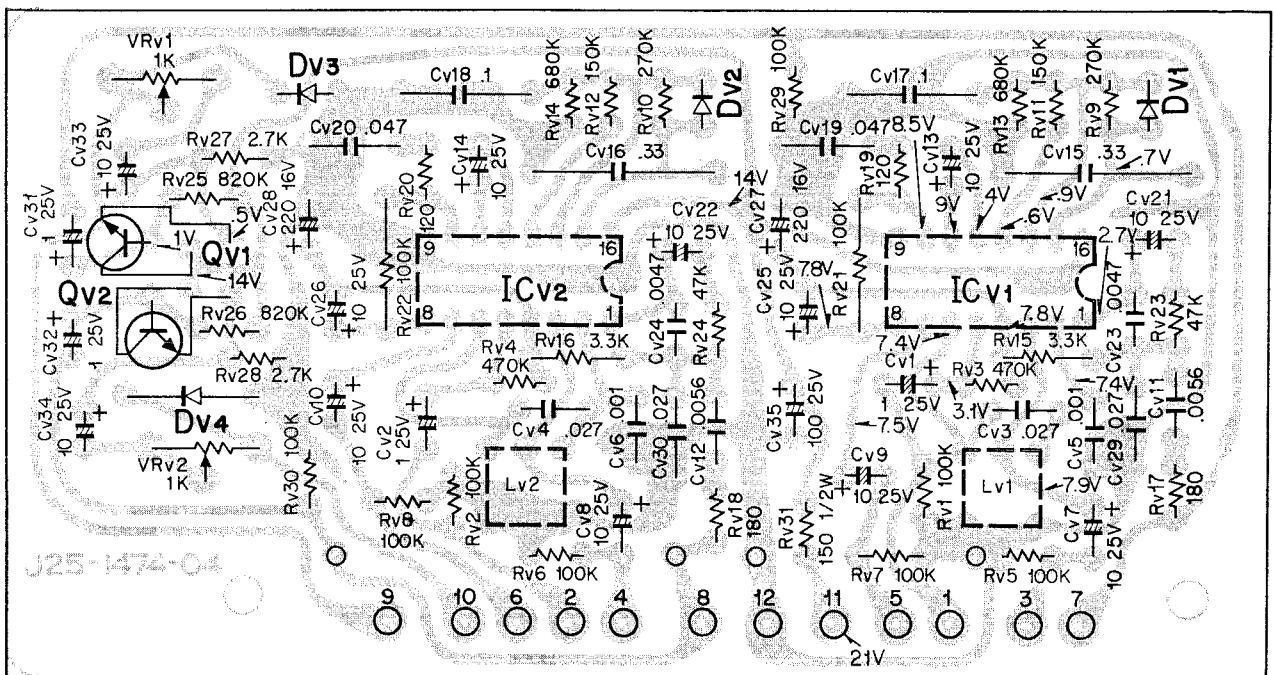
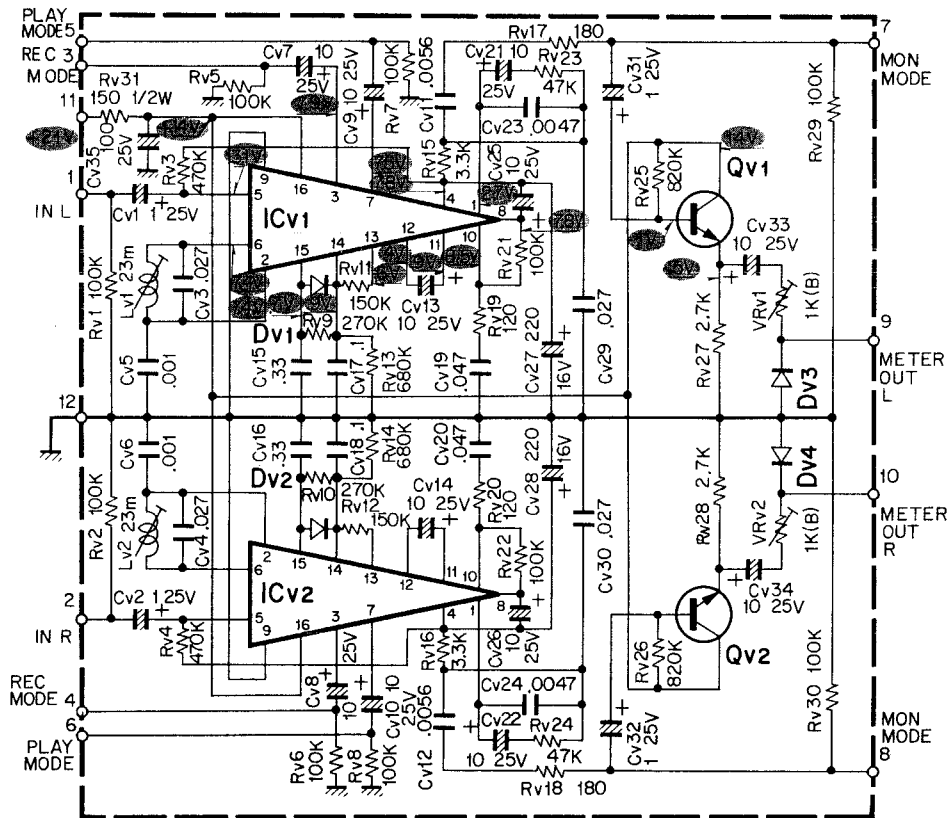
Qq1, 2: 2SC1345(E) or (F)

2SC1345



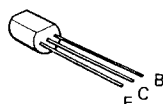
DOLBY (X14-1070-10)

DC voltages are measured with 20kΩ/V meter at no signal fed condition.



Qv1, 2: 2SC945(R) or (Q), ICv1, 2: NE545B

2SC945



ADJUSTMENTS

No.	ALIGN	TEST EQUIPMENTS		RECEIVER SETTING	OUTPUT INDICATOR	ADJUSTMENT POINTS	REMARKS
		CONNECTION	SETTING				
FM SECTION							
1	IF	(A) and (B)	95 MHz (60 dB) 1 kHz (Mod) 75 kHz (Dev)	95 MHz	SSVM & scope to REC jack	Lg6, 7	Maximum deflection
2		—	—	—	T meter	Lg8 (primary)	Make the pointer position in the center of the meter
3		(A) and (B)	95 MHz (60 dB) 1 kHz (Mod) 75 kHz (Dev)	95 MHz	SSVM, scope & distortion meter to REC jack (L)	Lg8 (secondary)	Maximum deflection and minimum distortion
4	OUTPUT	ditto	95 MHz 1 kHz (Mod) 75 kHz (Dev) 60 dB (input)	95 MHz	ditto	—	Confirm output voltage is 700 mV
5	TRACKING	ditto	90 MHz 1 kHz (Mod) 75 kHz (Dev)	90 MHz	ditto	Lg1, 2, 5	Maximum deflection
6			108 MHz 1 kHz (Mod) 75 kHz (Dev)	108 MHz		CTg1~3	
7	VCO	(A)	95 MHz 0 (Dev) 60 dB (Input)	95 MHz	Freq. counter via 20~30 dB amp*1 or SSVM to TP1	VRg1	Counter indicates 76 kHz
8	DISTORTION	(B) and (C)	95 MHz 1 kHz (Mod) 68.25 kHz (Dev) L (Select) 60 dB (Input)	98 MHz	SSVM, scope & distortion meter to REC jack (L)	Tg6, 7	Minimum distortion
AM SECTION							
1	IF	(B) and (D)	1000 kHz 400 Hz, 30% (Mod) 100 dB	1000 kHz	SSVM & scope to REC jack (L)	Lg11, 12	Maximum deflection
2	TRACKING	ditto	600 kHz 400 Hz, 30% (Mod) 100 dB	600 kHz	ditto	Lg10 Bar antenna	ditto
3			1400 kHz 400 Hz, 30% (Mod)	1400 Khz		CTg4, 5	
AUDIO SECTION							
1	BIAS	—	—	VOLUME is its min.	DC volt meter or BIAS current meter (B31-0125-05)	VRe1, 2	Meter indicates*2 45 mV
2	POWER METER	(E) and (F)	1 kHz	RMS output voltage is 2.8V/8Ω METER POWER	POWER/LINE LEVEL METER	VRp1, 2	Meter indicates*3 1W
DOLBY NR SECTION							
1	400 Hz OSC. CAL.	—	—	S9: ON S15: PLAY A▶B PLAY CAL VR: MAX REC LEVEL VR: MAX METER: LEVEL	SSVM to B REC jack (G)	VRq1	Output is 580 mV
2	METER CAL.	—	—	Same	POWER/LINE LEVEL METER	VRv1, 2	Meter points*4 Cal.
3	19 kHz COIL	(H) and (G)	19 kHz 1V	S9: OFF S15: PLAY A▶B PLAY CAL VR: MAX REC LEVEL VR: MAX	SSVM to B REC jack	Lv1, 2	Output is min.
4	DOLBY FM	(A) and (G)	95 MHz 37.5 kHz (Dev) 1 kHz (Mod) 1mV (60 dB input)	S9: OFF S17: ON S15: PLAY A▶B	Same	VRr1, 2	Output is 580 mV

ADJUSTMENTS

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% (AM)
- 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:** 1MΩ or more

OSCILLOSCOPE (SCOPE)

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

DISTORTION METER

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

FREQUENCY COUNTER (COUNTER)

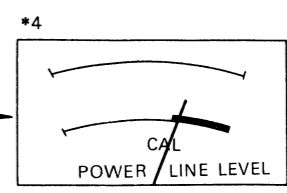
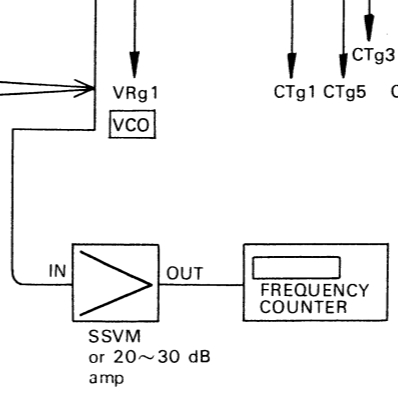
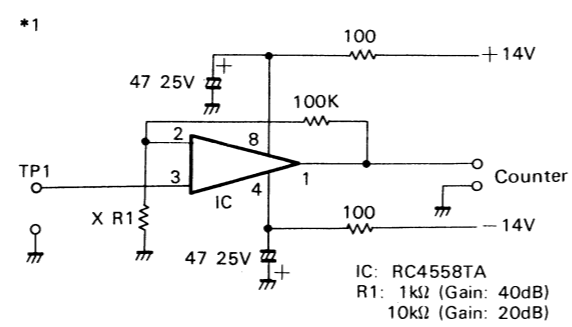
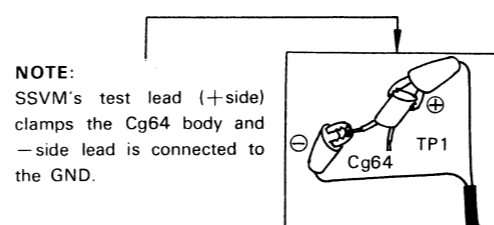
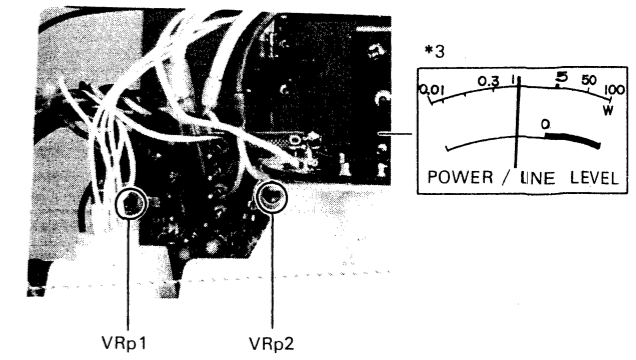
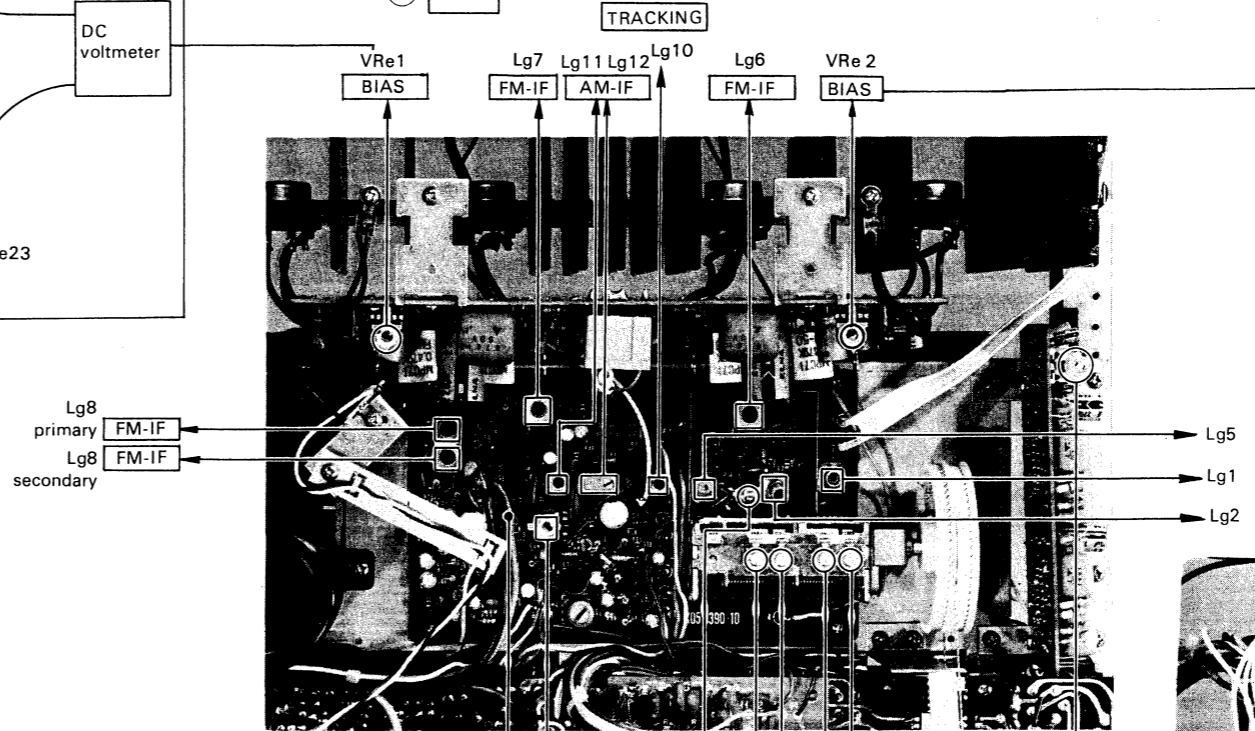
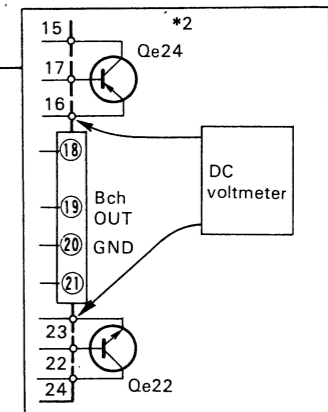
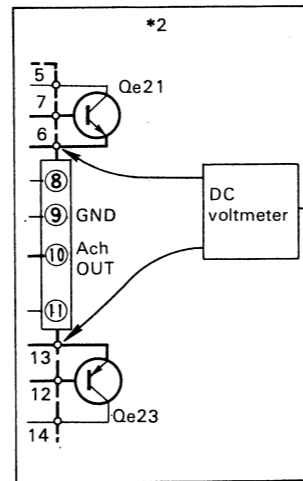
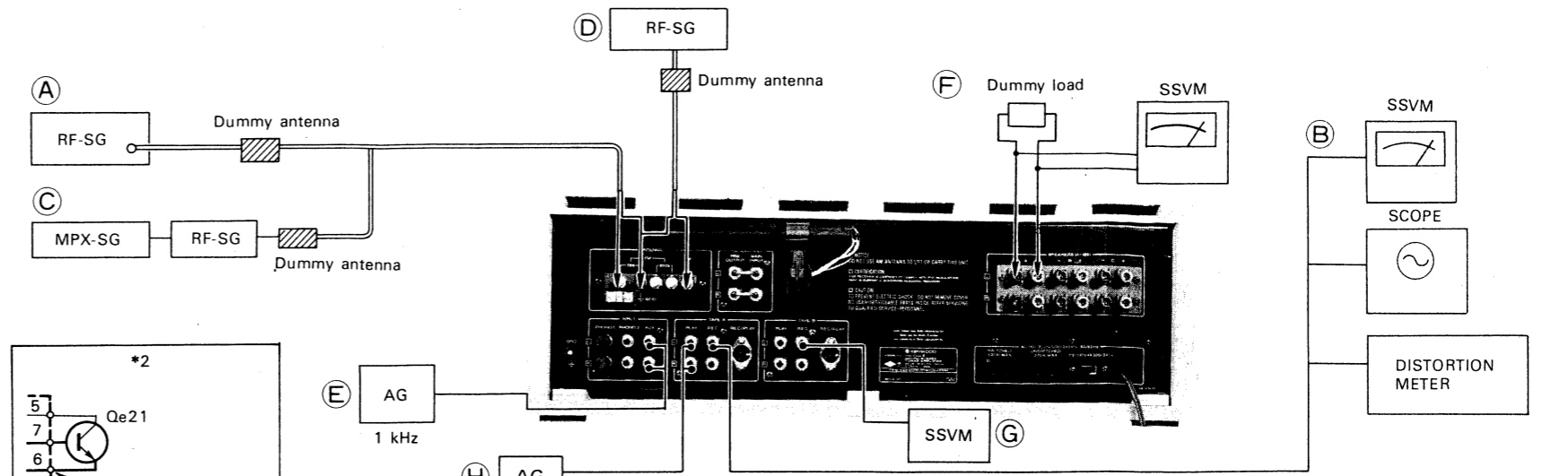
- Frequency response:** 10 Hz~1 MHz
- Sensitivity:** 50 mV or more
- Impedance:** 1MΩ or more

AUDIO SIGNAL GENERATOR (AG)

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

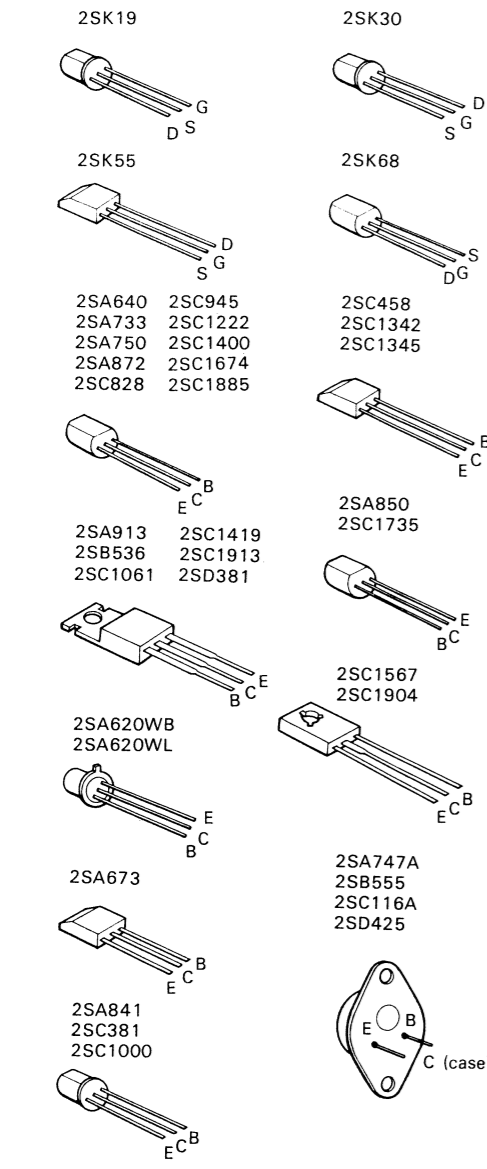
NOTE:

- * 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.

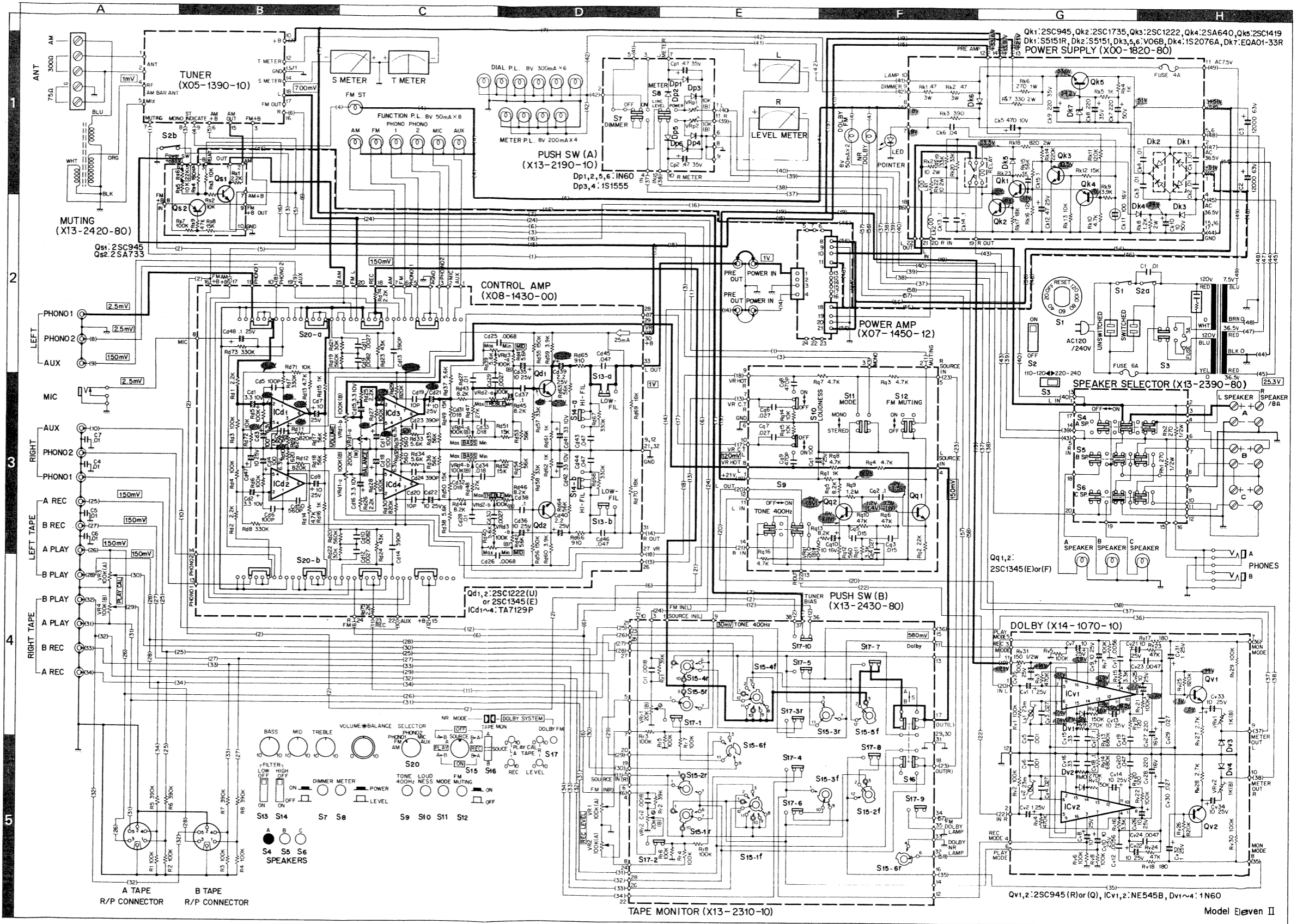


SCHEMATIC DIAGRAM (1)

DC voltages are measured with 20kΩ/V meter at no signal fed condition.



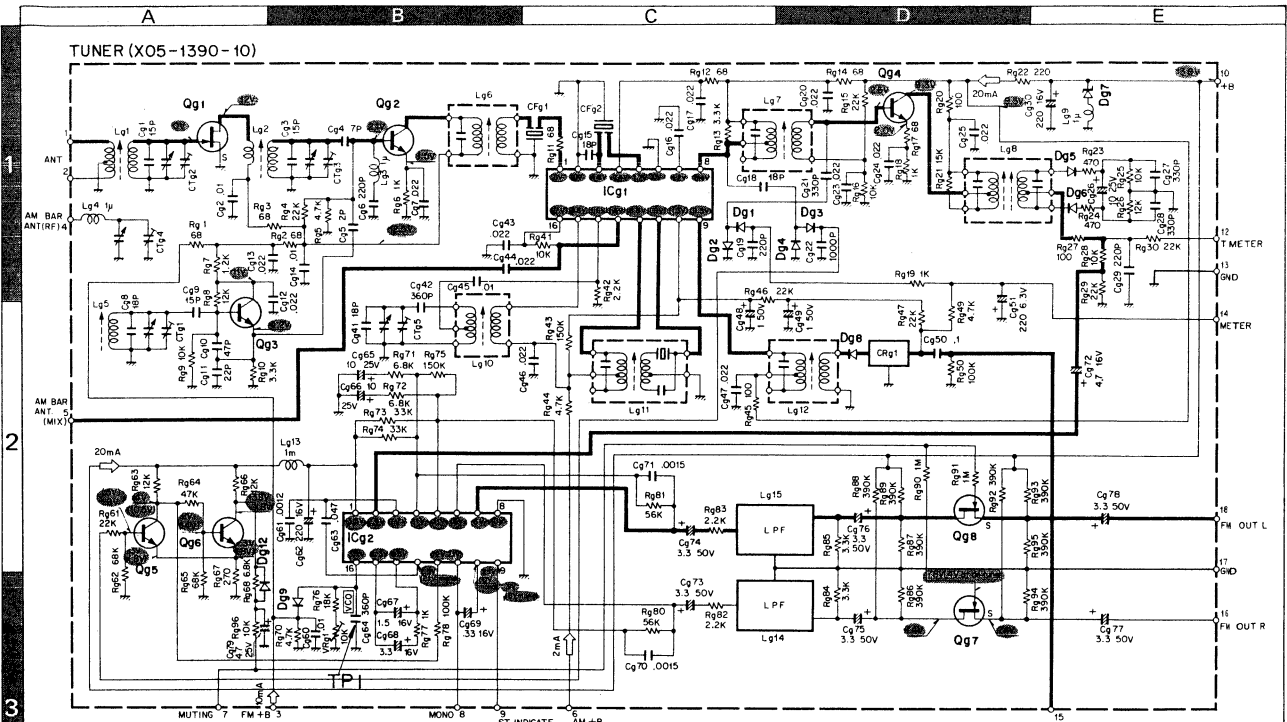
SEMICONDUCTOR NAME	SUBSTITUTIONS
POWER SUPPLY (X00-1820-80)	
2SA640	2SA750, 2SA841
2SC945	2SC458, 2SC828
2SC1222	2SC1345, 2SC1400
2SC1419	2SC1061
2SC1735	2SC1567
TUNER (X05-1390-10)	
2SC381	2SC1674
2SC945	2SC458, 2SC828
2SC1342	
2SK55	2SK19
2SK68	2SK30
AN217BB	
HA1196	
POWER AMP (X07-1450-12)	
2SA620(WB)	2SA620(WL)
2SA733	2SA640, 2SA673
2SA872	
2SA913	2SB536(2)
2SB555	2SA747A
2SC945	2SC1000, 2SC1345
2SC1885	2SC1904
2SC1913	2SD381(2)
2SD425	2SC116A
CONTROL AMP (X08-1430-00)	
2SC1222	2SC1345, 2SC1400
TA7129P	
MUTING (X13-2420-80)	
2SA640, 2SA673	
2SA733	
2SC945	2SC458, 2SC828
PUSH SW(B) (X13-2430-80)	
2SC1345	2SC1000
DOLBY (X14-1070-10)	
2SC945	2SC458, 2SC828
NE545B	



SEMICONDUCTOR NAME	SUBSTITUTIONS
POWER SUPPLY (X00-1820-80)	
2SA640	2SA750, 2SA841
2SC945	2SC458, 2SC828
2SC1222	2SC1345, 2SC1400
2SC1419	2SC1061
2SC1735	2SC1567
TUNER (X05-1390-10)	
2SC381	2SC1674
2SC945	2SC458, 2SC828
2SC1342	
2SK55	2SK19
2SK68	2SK30
AN217BB	
HA1196	
POWER AMP (X07-1450-12)	
2SA620(WB)	2SA620(WL)
2SA733	2SA640, 2SA673
2SA872	
2SA913	2SB536(2)
2SB555	2SA747A
2SC945	2SC1000, 2SC1345
2SC1885	2SC1904
2SC1913	2SD381(2)
2SD425	2SC116A
CONTROL AMP (X08-1430-00)	
2SC1222	2SC1345, 2SC1400
TA7129P	
MUTING (X13-2420-80)	
2SA640, 2SA673	
2SA733	
2SC945	2SC458, 2SC828
PUSH SW(B) (X13-2430-80)	
2SC1345	2SC1000
DOLBY (X14-1070-10)	
2SC945	2SC458, 2SC828
NE545B	

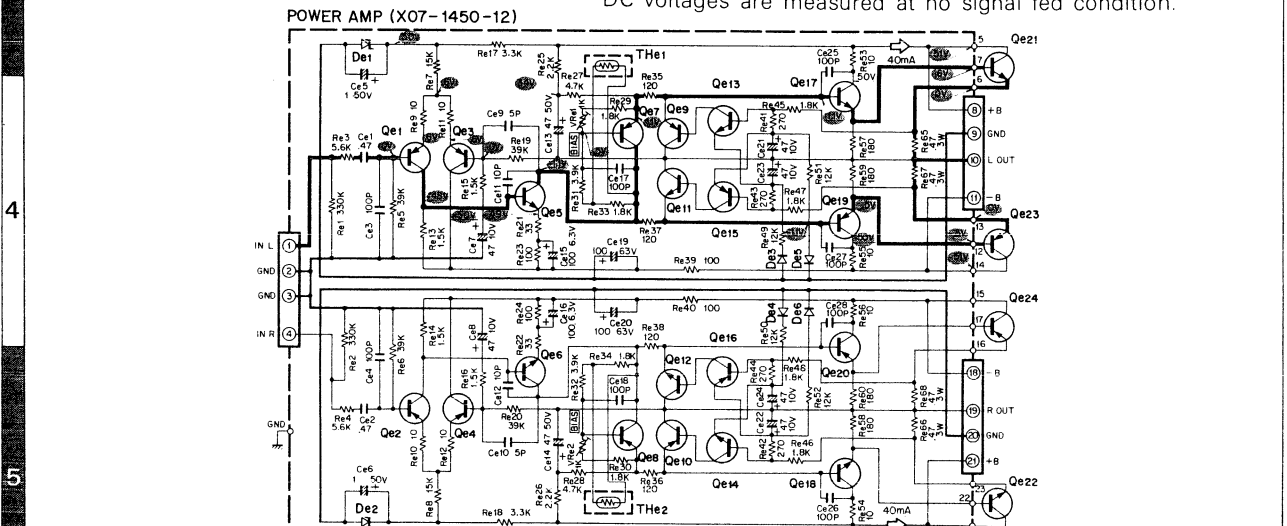
SCHEMATIC DIAGRAM (2)

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



Qg1: 2SK55 (D) or (E), Qg2: 2SC381 (O), Qg3: 2SC1342 (A), Qg4: 2SC381 (R), Qg5,6: 2SC945, Qg7,8: 2SK68 (L) or (M), ICg1: AN-217 BB, ICg2: HA-1196, Dg1~4,8: 1N60
 Dg5,6,9,12: 1S2076 or 1S1555, Dg7: DZ-140

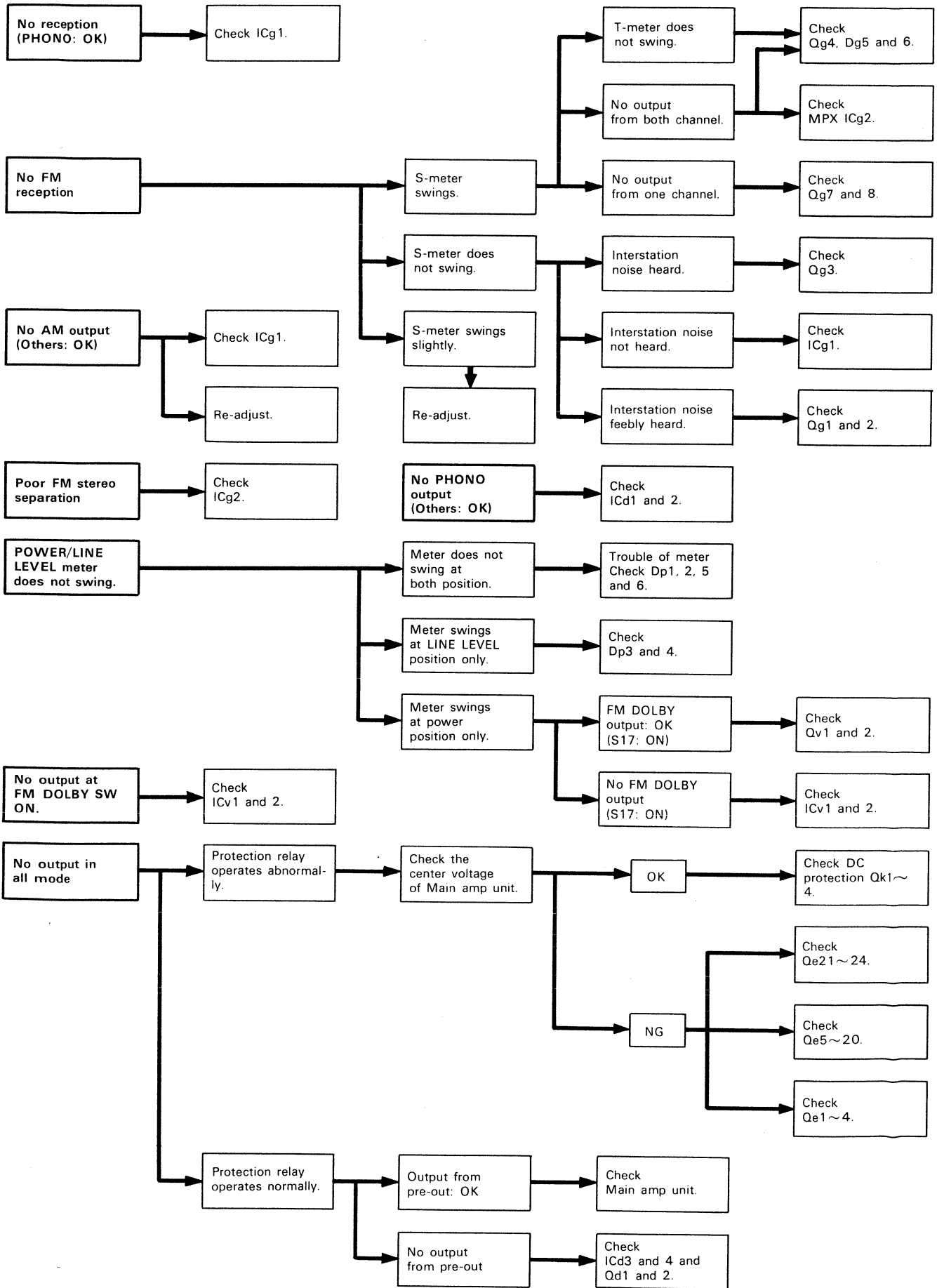
DC voltages are measured at no signal feed condition.



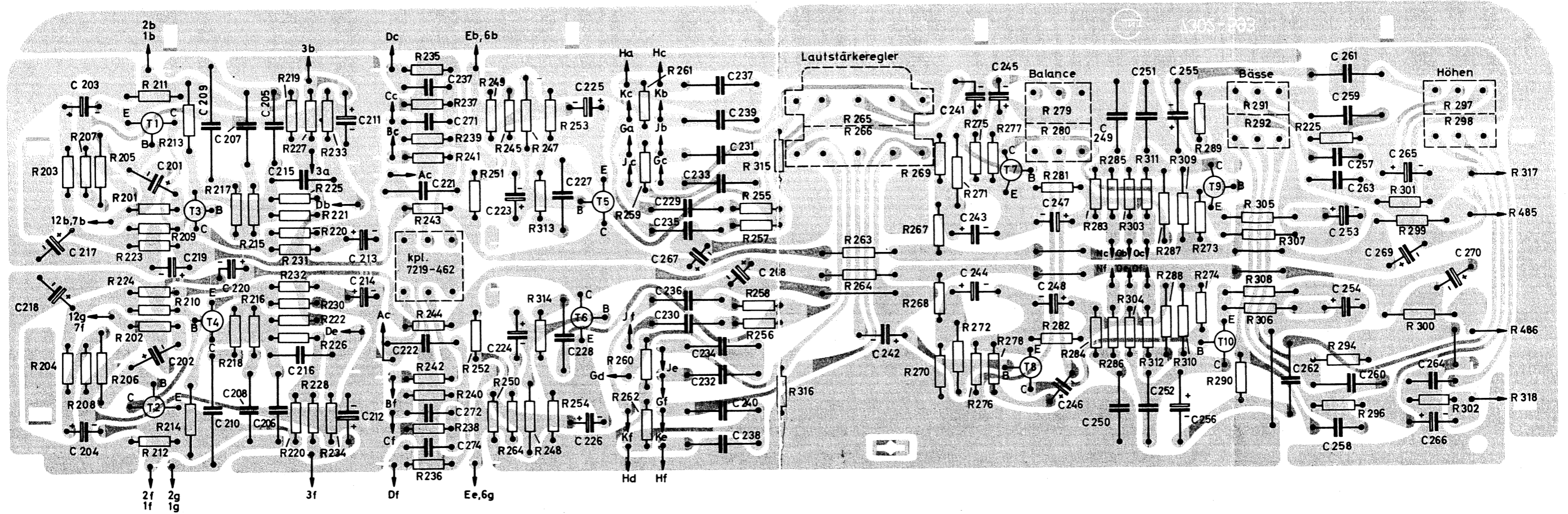
Qe1~4: 2SA872 (D) or (E), Qe5,6: 2SC1885 (O) or (R), Qe7,8: 2SA620 WB, Qe9,10,15,16: 2SA733 (Q) or (R)
 Qe11~14: 2SC945 (O) or (R), Qe17,18: 2SC1913 (O) or (R), Qe19,20: 2SA913 (Q) or (R), Qe21,22: 2SD425
 Qe23,24: 2SB555, De1,2: EQA01-30R, De3~6: 1S2076, THE1,2: 5TP-41L

Model Eleph n II

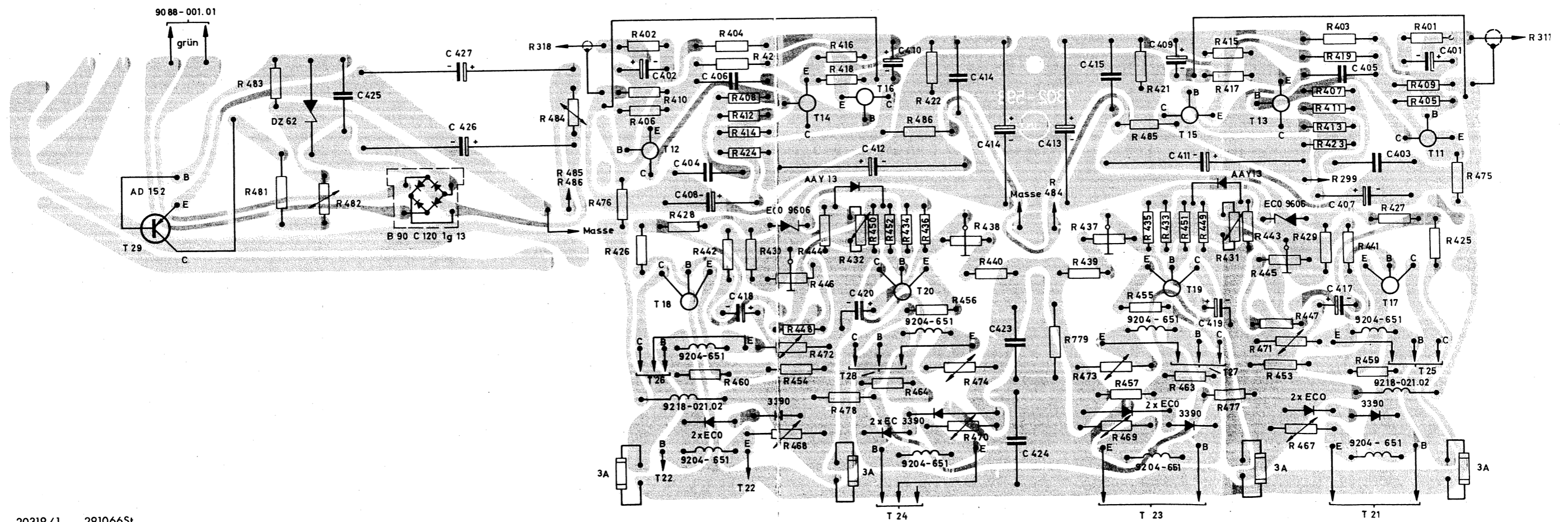
TROUBLESHOOTING



Hauptverstärker-Platte, auf die Bestückungsseite gesehen



Treiber- und Endverstärkerplatte, auf die Bestückungsseite gesehen



SPECIFICATIONS

FM TUNER SECTION (IHF)

Usable Sensitivity:	10.3 dBf (1.8 μ V at 75 ohms)
50 dB Quieting Sensitivity:	17.3 dBf (4.0 μ V at 75 ohms)
Signal to Noise Ratio at 65 dBf:	75 dB
Total Harmonic Distortion at 65 dBf:	0.2% at 1,000 Hz (Mono) 0.4% at 1,000 Hz (Stereo)
Capture Ratio:	1.5 dB
Alternate Channel Selectivity:	60 dB
Spurious Response Ratio:	80 dB
Image Response Ratio:	60 dB
AM Suppression Ratio:	55 dB
IF Response Ratio (balanced):	100 dB
Stereo Separation at Wide Band:	40 dB at 1,000 Hz
Antenna Impedance:	300 ohms balanced and 75 ohms unbalanced
FM Frequency Range:	88 MHz to 108 MHz

AM TUNER SECTION

Usable Sensitivity:	20 μ V
Signal to Noise Ratio:	50 dB
Image Response Ratio:	50 dB
Selectivity:	30 dB

POWER AMPLIFIER SECTION

Power Output:	80 watts per channel minimum RMS at 8 ohms from 20 Hz to 20,000 Hz with no more than 0.3% total harmonic distortion
Both Channels Driven:	85 watts per channel into 8 ohms at 1,000 Hz 110 watts per channel into 4 ohms at 1,000 Hz
Dynamic Power Output:	340 watts into 4 ohms
Total Harmonic Distortion:	0.3% at rated power into 8 ohms 0.05% at 1 watt into 8 ohms
Inter Modulation Distortion (60 Hz : 7,000 Hz = 4 : 1)	0.1% at rated power into 8 ohms 0.05% at rated power into 8 ohms
Power Bandwidth:	10 Hz ~ 60,000 Hz
Damping Factor:	50 at 8 ohms
Speaker Impedance:	Accepts 4 ohms to 16 ohms

PRE-AMPLIFIER SECTION

Input Sensitivity, Impedance, Signal to Noise Ratio	
Phono 1:	2.5 mV, 50 kohms, 77 dB
Phono 2:	2.5 mV, 50 kohms, 77 dB
AUX:	150 mV, 50 kohms, 95 dB
Tape Play A, B:	150 mV, 50 kohms, 95 dB
MIC:	2.5 mV, 50 kohms, 70 dB
Output Level, Impedance (Dolby Off)	
Tape Rec (pin):	A: 150 mV, 100 ohms B: 150 mV, 100 ohms
(DIN):	A: 30 mV, 80 kohms B: 30 mV, 80 kohms
Pre Out:	1V 50 kohms
Frequency Response	
Phono 1, 2:	RIAA Standard curve \pm 0.5 dB
AUX, Tape Play:	20 Hz ~ 40,000 Hz \pm 1.0 dB
Tone Controls	
Bass:	\pm 10 dB at 100 Hz
MID:	\pm 10 dB at 800 Hz
Treble:	\pm 10 dB at 10 kHz
Loudness (-30 dB)	+10 dB at 100 Hz +5 dB at 10 kHz
Low Filter:	-10 dB at 100 Hz
High Filter:	-10 dB at 10 kHz

GENERAL

AC Outlet:	Switched 1, Unswitched 1
Power Requirement:	50/60 Hz 110 ~ 120V, 220 ~ 240V
Power Consumption:	560 watts at full power
Dimensions:	W 22-19/32" (574 mm), H 7-3/4" (198 mm), D 14-3/4" (375 mm)
Weight (Net):	39 lbs (17.7 kg)