KENWOOD

HI/FI STEREO COMPONENTS

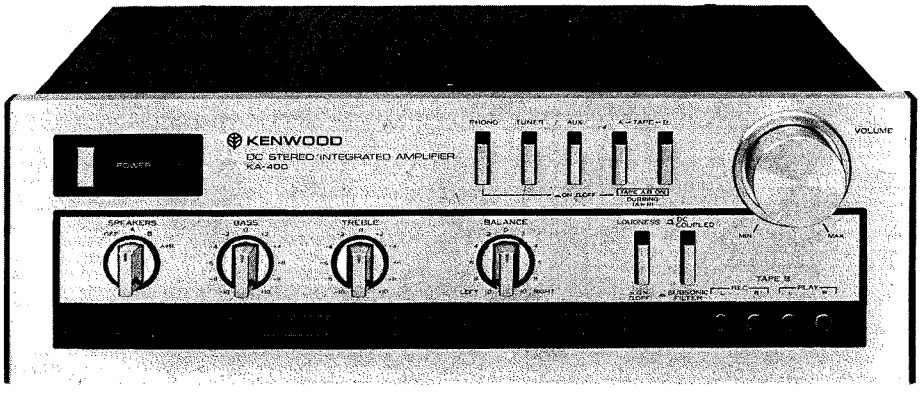
SERVICE MANUAL

KA-400

An item of adjustment is written in three languages — English, French and German.

Un article sur réglages est écrit en trois langues, Anglais, Français et Allemand.

Ein Artikel der Abgleich wird auf drei Sprachen, Englische, Französisch und Deutsch geschrieben.



DC STEREO INTEGRATED AMPLIFIER

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KA-400

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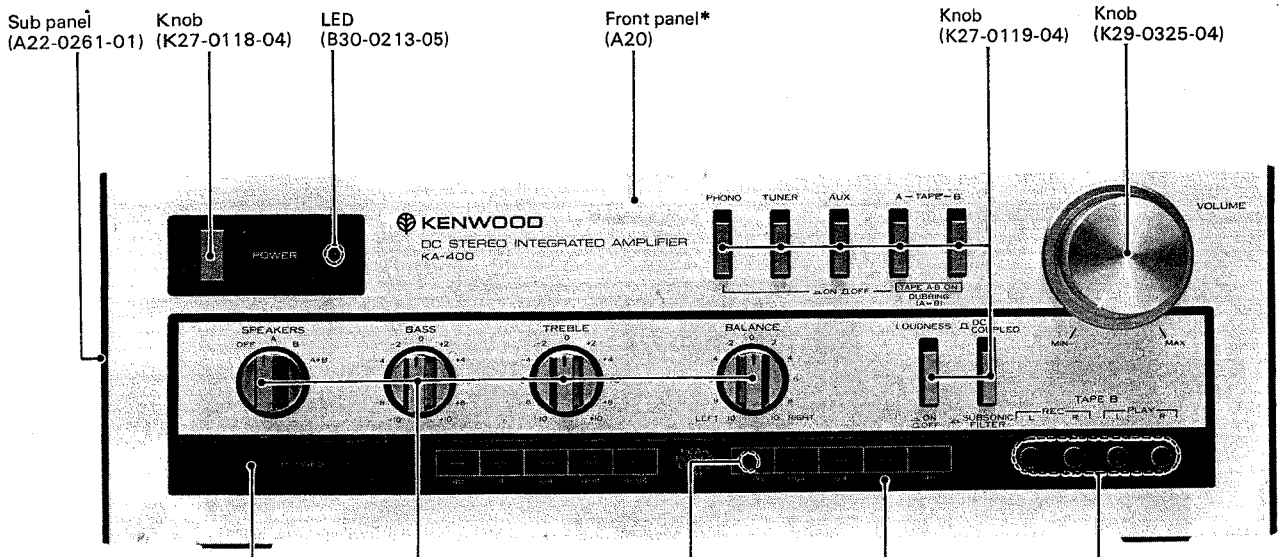
Note:
Component and circuitry are subject to modification to insure best operation under differing local conditions. This manual is based on the U.S(K) standard, and provides information on regional circuit modification through use of alternate schematic diagrams, and information on regional component variations through use of parts list.

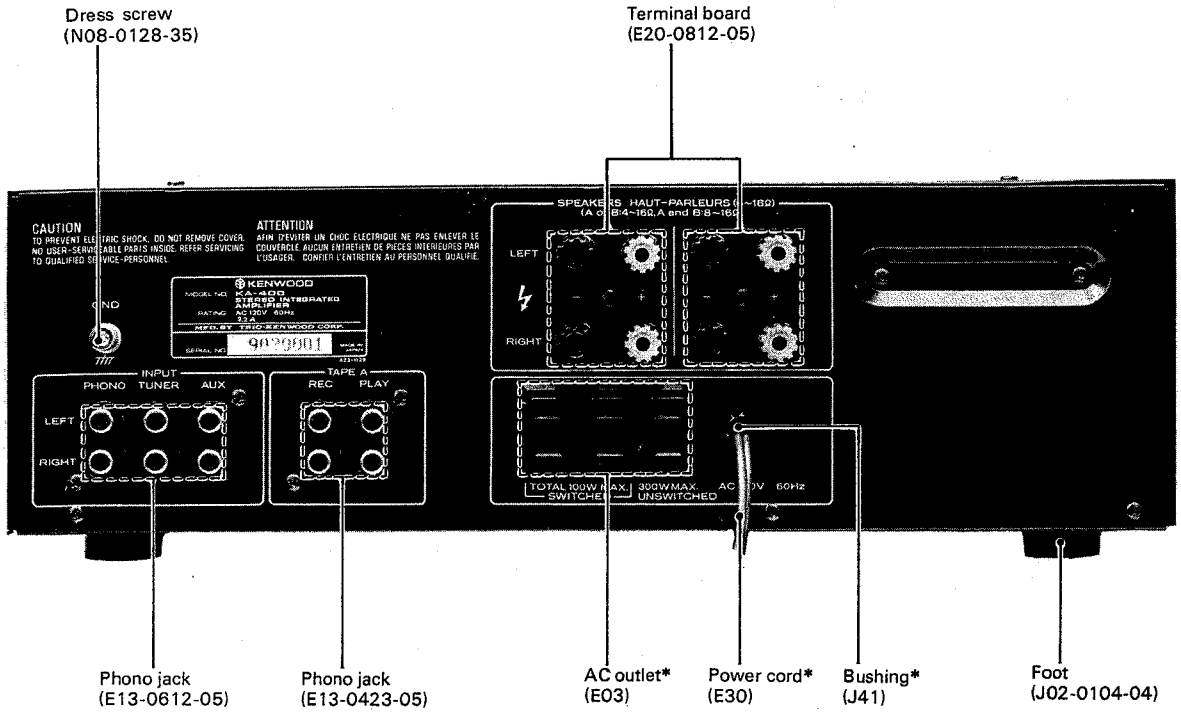
Region	Code
U.S.A.	K
Canada	P
PX	U
Australia	X
Europe and Scandinavia	E
England	T
South Africa	S
Other Areas	M

There is no plan for producing units of S types.

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EXTERNAL VIEW

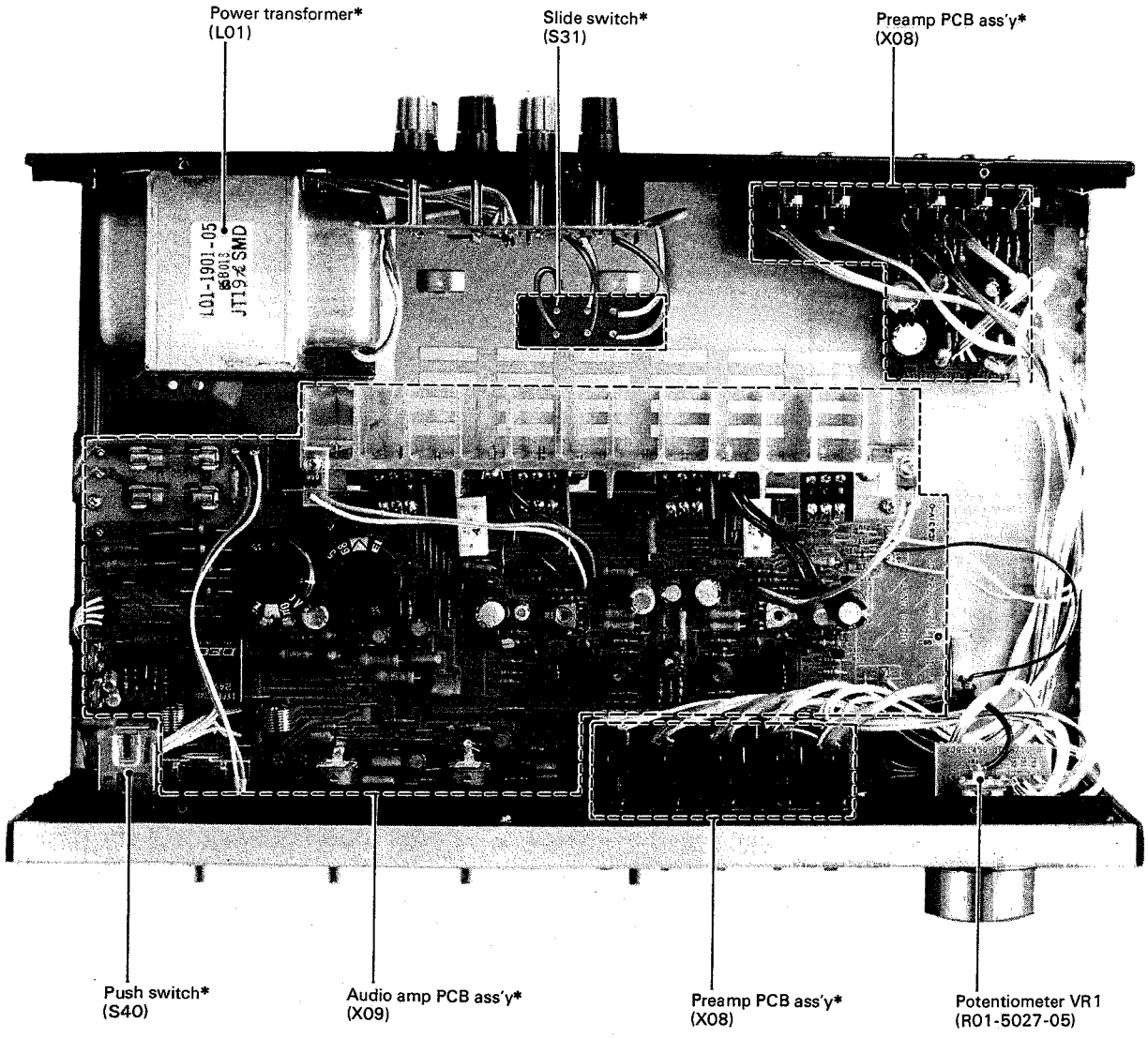




* Refer to parts list.

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INTERNAL VIEW

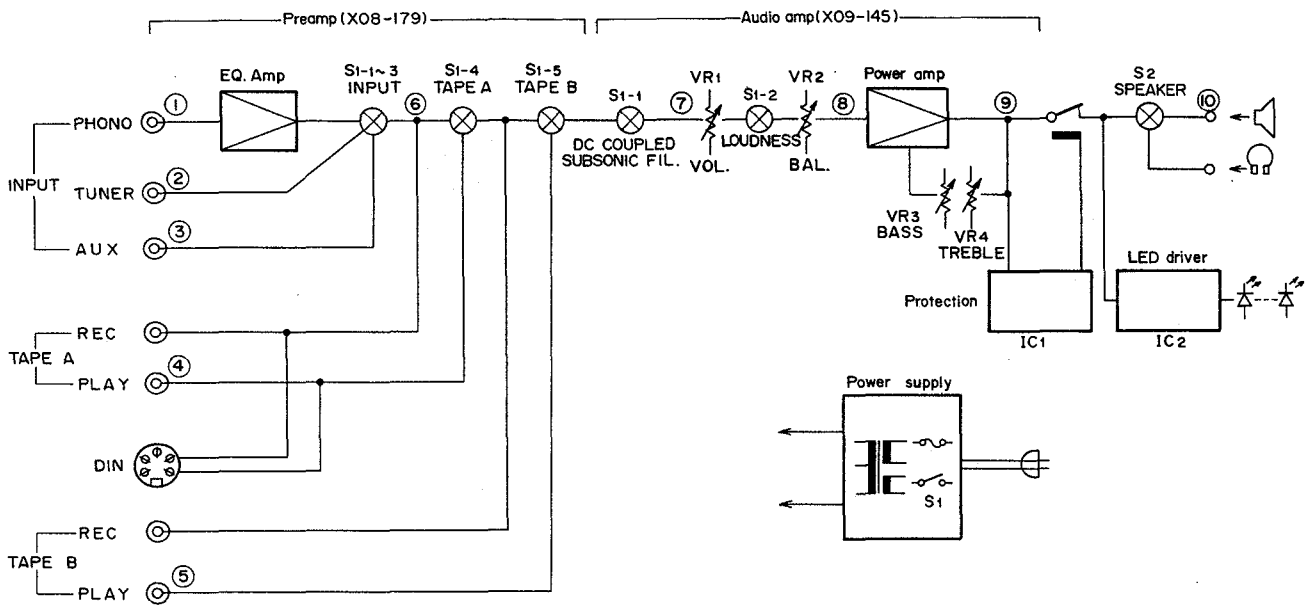


* Refer to parts list.

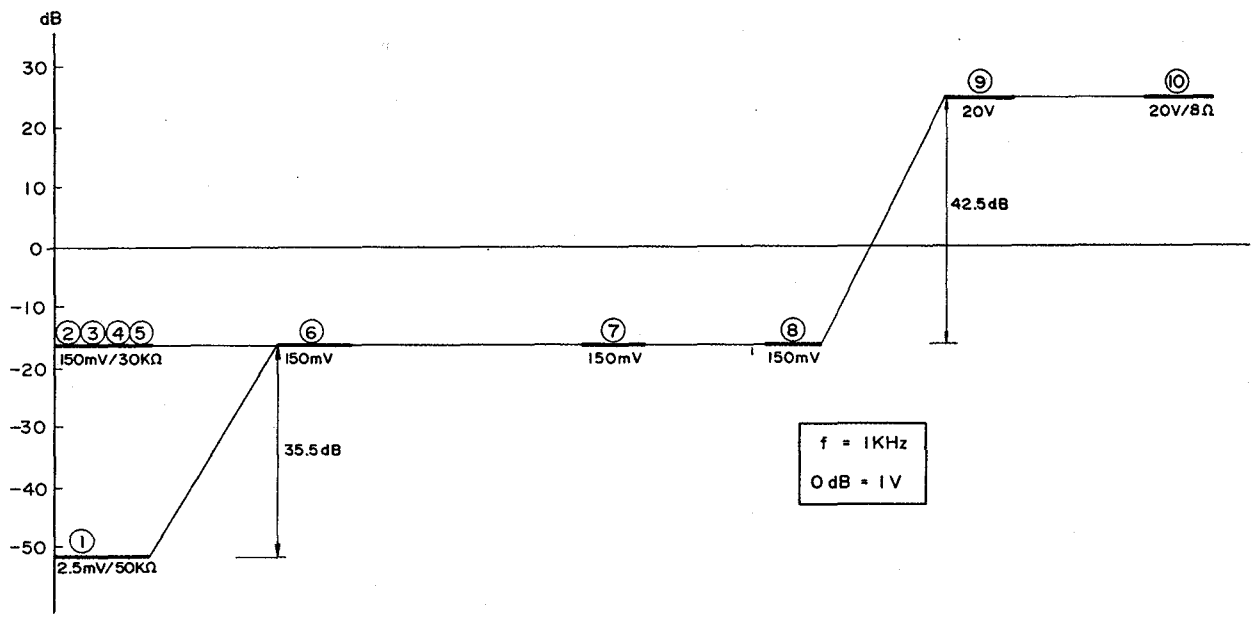
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BLOCK AND LEVEL DIAGRAM

BLOCK DIAGRAM



LEVEL DIAGRAM



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CIRCUIT DESCRIPTION

NON-SWITCHING CIRCUIT

Generally, power amplifiers are designed to operate in class B so that a high efficiency can be obtained. However, transistor amplifiers operated other than in class A cause the switching distortion and crossover distortion.

The crossover distortion is caused when a small signal is amplified in the nonlinear input /output characteristics range of a class B push-pull amplifier.

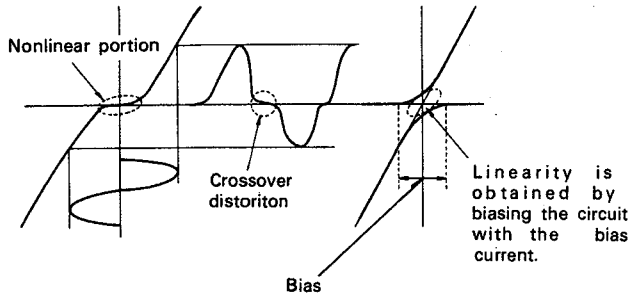


Fig. 1 Crossover distortion

The signal distortion due to the nonlinear amplification is called the crossover distortion, and it can be eliminated by biasing the circuit with the bias current so as the amplifier operates like that of class AB.

The switching distortion is caused by the delay of the switching operation of a transistor pair used in a class B push-pull amplifier.

The output stage of a power amplifier is, generally, connected in SEPP mode.

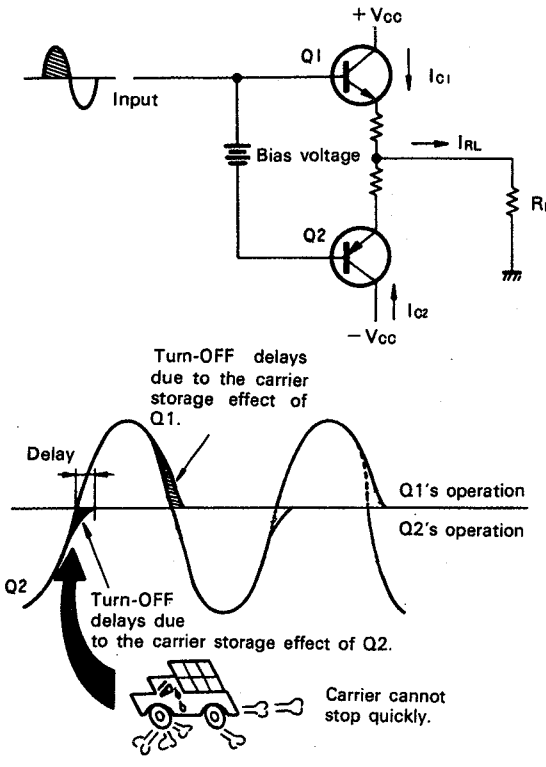


Fig. 2 Switching distortion

In figure 2, when an alternating signal is applied to the input, Q1 turns ON and Q2 is cut OFF in the positive half cycle; conversely, Q1 is cut OFF and Q2 turns ON in the negative half cycle. However, switching of conduction from Q1 to Q2, and vice versa, is not smooth because of the carrier storage effect.

Assuming that the input signal makes a transition from negative to positive, the Q1 turns ON immediately according to the input signal. However, the Q2 is not cut off immediately due to the carrier storage effect. The Q1 is already conducting a large current when the Q2 is completely cut off. This situation is also identical for a transition from positive to negative.

A non-switching amplifier reduces the distortion due to the carrier storage effect by conducting a current even through the OFF side transistor.

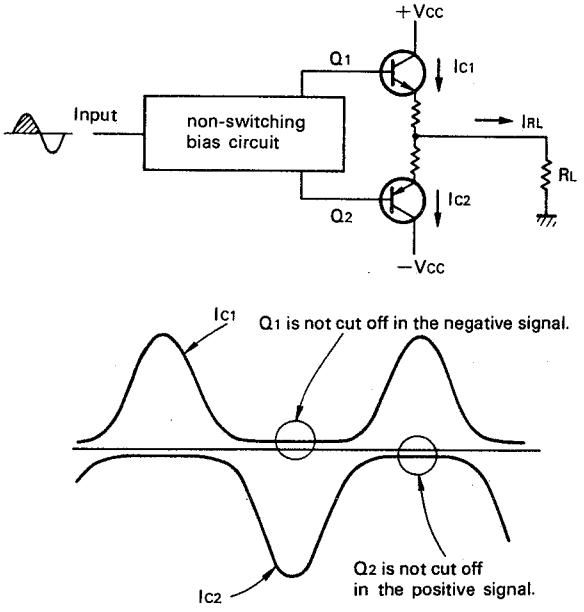


Fig. 3 Non-switching amplifier

The following figure shows the basic circuit diagram of KA-400 power amplifier.

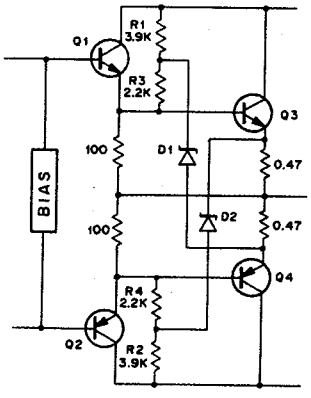


Fig. 4 Basic circuit diagram of KA-400, power amplifier

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CIRCUIT DESCRIPTION

Transistors Q1 and Q2 are the drivers, and Q3 and Q4 are power transistors. Zener diodes D1 and D2, having the zener voltage of 14V, make up the non-switching bias circuit together with resistors R1 through R4. Assuming a conventional class B power amplifier, when a positive signal is input, Q1 and Q3 turn ON and Q2 and Q4 are cut off. However, in the present circuit, Q4 is not cut off since it is biased through R2, R4 and D2. Similarly, when a negative signal is input, Q3 is not cut off since it is biased through R1, R3 and D1. This operation is further explained by the following figure.

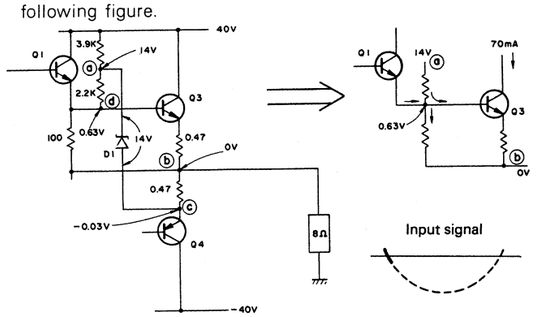


Fig. 5 Input signal goes from positive to negative

At the time when the input signal voltage goes from positve to negative ① (**Fig. 8**), the driver transistor Q1 is conducting a collector current and the zener diode D1 is also in active to produce 14V at point ⓐ . A part of the Q1's emitter current and a current from point a through the resistor are supplied to the base of the power transistor Q3 as a bias current. Then Q3's collector current will be approximately 70 mA.

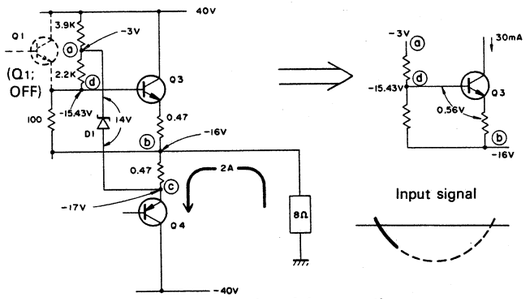


Fig. 6 Input signal is negative

The above figure shows the states of the circuit when the input signal is negative ② (**Fig. 8**) and the Q4's collector current is 2A. Since ② ampered flows through the 8-ohm resistor, the voltage at point ⓑ becomes −16V.
Most of this current flows through the emitter resistor of Q4, making −17V at point ⓒ . The voltage at point ⓐ is higher than that of point ⓒ by 14V which is the zener voltage of D1, thus resulting in the point ⓐ voltage at −3V. At this time, Q1 is cut off, and the voltage at point ⓓ is −15.43V which is the difference of voltages at points ⓐ and ⓑ divided by resistors of 2.2 kΩ and 100Ω.
Now, let's examine the operation of transistor Q3 referring to the voltages at points ⓐ through ⓓ . The base-emitter voltage VBE of Q3 is 0.56V (see **Fig. 5, 6** and **7**), thus the Q3 is not cut off. The Q3's collector current will be about 30 mA, which is reduced from the initial 70 mA.

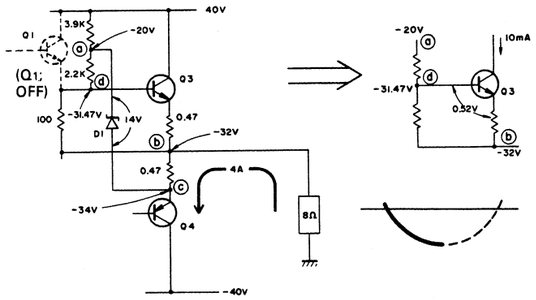


Fig. 7 Input signal is more negative

When the signal voltage becomes larger in negative ③ (**Fig. 8**), the voltage drop accross the Q4's emitter resistor increases, resulting in a reduction of Q3's VBE. Thus the collector current further decreases to become about 10 mA, but the Q3 will never be cut off. The following figure shows the voltage of various points in the circuit in relative to the time.

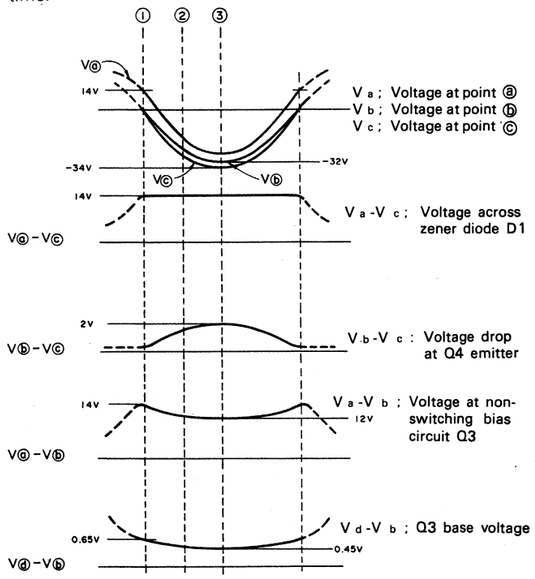


Fig. 8

The behavior of power transistor Q4 with a positive output signal is identical with the operation of Q3 for a negative output, as explained above. Thus, power transistors Q3 and Q4 are not cut off in any case, and the switching distortion by carrier strage effect is reduced. In the actual circuit, a thermistor is connected between the bases of Q1 and Q2, in order to prevent the over-driving of Q3 and Q4 when the ambient temperature rises.

DISASSEMBLY FOR REPAIR

AUDIO AMP PC BOARD ASS'Y

1. Detach the bottom plate Ⓑ from Ⓐ using a cutter.

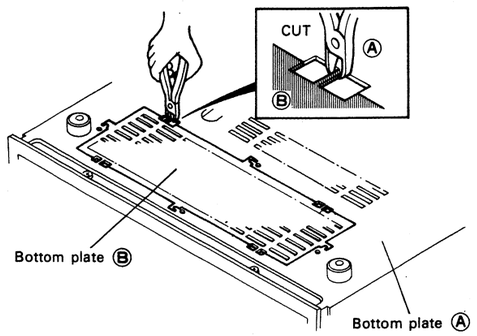


Fig. 1

2. Turn the bottom plate Ⓑ 180° as shown.

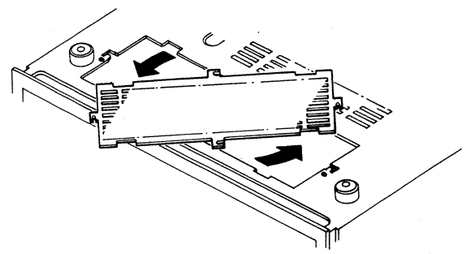


Fig. 2

3. Attach the bottom plate Ⓑ with screw as shown.

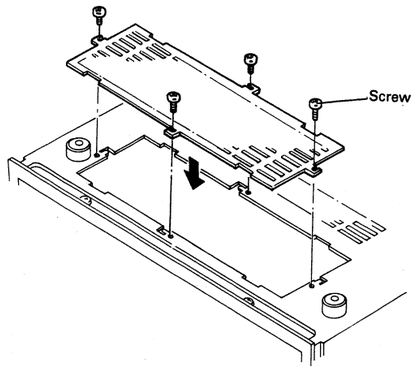


Fig. 3

POWER TRANSISTOR

1. Unsolder twelve pins from connection P.C. board.

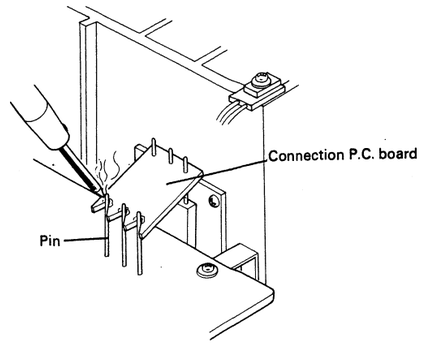


Fig. 4

2. Remove four screws Ⓐ on the heat sink.
Remove four screws Ⓑ fixing the heat sink.

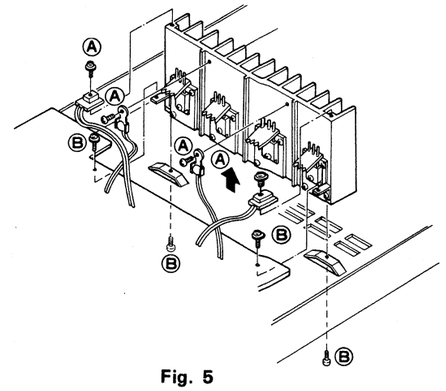


Fig. 5

3. Remove the defective transistor from heat sink Ⓑ .
4. Paint thermal compound on the heat sink Ⓑ where a new transistor is to be mounted.
5. Mount a new transistor on the heat sink Ⓑ

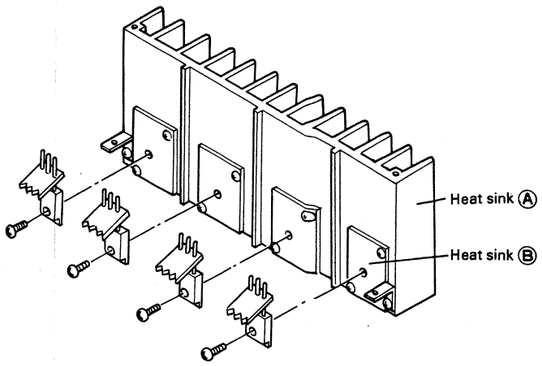


Fig. 6

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KA-400 KA-400

ADJUSTMENT/RÉGLAGES/ABGLEICH

1. POWER AMP OFFSET VOLTAGE ADJUSTMENT

1. Connect the DC voltmeter between the positive and negative speaker terminals.
2. Adjust the trimming pot VR7 (VR8) for a 0V reading of the DC voltmeter.

1. RÉGLAGE DE LA TENSION DE DECALAGE (OFFSET)

1. Brancher le voltmètre de c.c. aux bornes de sortie + et −.
2. Régler le potentiomètre ajustable VR7 (VR8) pour que la tension de sortie soit nulle.

1. OFFSET-SPANNUNG DER ENDVERSTÄRKER

1. Den Gleichspannungsmesser zwischen den Lautsprecherklemmen + und − der endverstärker anschließen.
2. Die Regelstange durch das Unterplattenloch einführen und den halbeingebetteten Widerstand VR7 (VR8) so regulieren, daß die Gleichspannungsmesser-Ablesung 0V ist.

2. BIAS CURRENT ADJUSTMENT

1. Turn the volume control knob fully counterclockwise.
2. Connect the DC voltmeter between the adjusting points ❶ and ❸ (❷ and ❹) of audio amp pc board ass'y (X09-145).
3. Adjust the BIAS CURRENT trimming pot VR5 (VR6), for a 70 mV reading of the voltmeter.

2. RÉGLAGE DU COURANT DE POLARISATION

1. Tourner le bouton de commande de volume à fond dans le sens invers de celui des aiguilles d'une montre.
2. Brancher le voltmètre de c.c. aux points d'alignment, ❶ et ❸ (❷ et ❹), sur la plaque circuit imprimè d'ampli de puissance (X09-145).
3. Réguler le potentiomètre ajustable VR5 (VR6) de façon à ce que le voltmètre de c.c. indique 70 mV.

2. LEERLAUFS

1. Den Lautstärkeregler (VOLUME) drehen um die Leistungsverstärker-Aufnahme auf Null zu reduzieren.
2. Den Gleichspannungsmesser zwischen der Regulierungs-Punkte ❶ und ❸ (❷ und ❹) der endverstärker anschließen.
3. Den halbeingebetteten Widerstand VR5 (VR6) der Leistungsverstärker so regulieren, daß die Gleichspannungs-messerAblesung 70 mV ist.

3. PEAK POWER LEVEL INDICATOR ADJUSTMENT

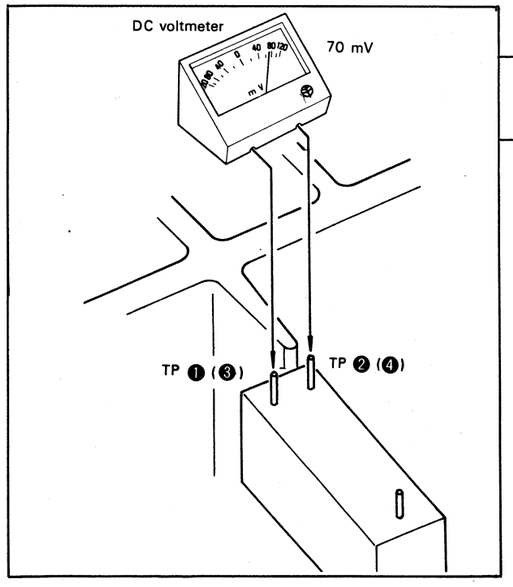
1. Connect an AG and dummy load to Aux jack and speaker terminal respectively.
2. Connect an AC voltmeter across the dummy load.
3. Set the AG to 1 kHz and its output for a 5.6V reading of the AC voltmeter.
4. Adjust the trimming pot. VR9 (VR10) so that the 4 LEDs (for 0.004, 0.04, 0.4 and 4) light.

3. REGLAGE DU "PEAK POWER LEVEL"

1. Relier un AG (générateur de signaux audio) sur les prises Aux et une fausse charge (Resistance) sur les bornes de haut-parleir.
2. Relier un voltmètre aux deux extrémités de la resistance (ou aux borne de sortie + et −).
3. Journer le potentiomètre d'AG et d'ampli en sortie que un voltmètre indique 5,6V.
4. Régler le potentiomètre adjustable VR9 (VR10) en sortie que les 4LEDs (0,004, 0,04, 0,4 et 4W) allument.

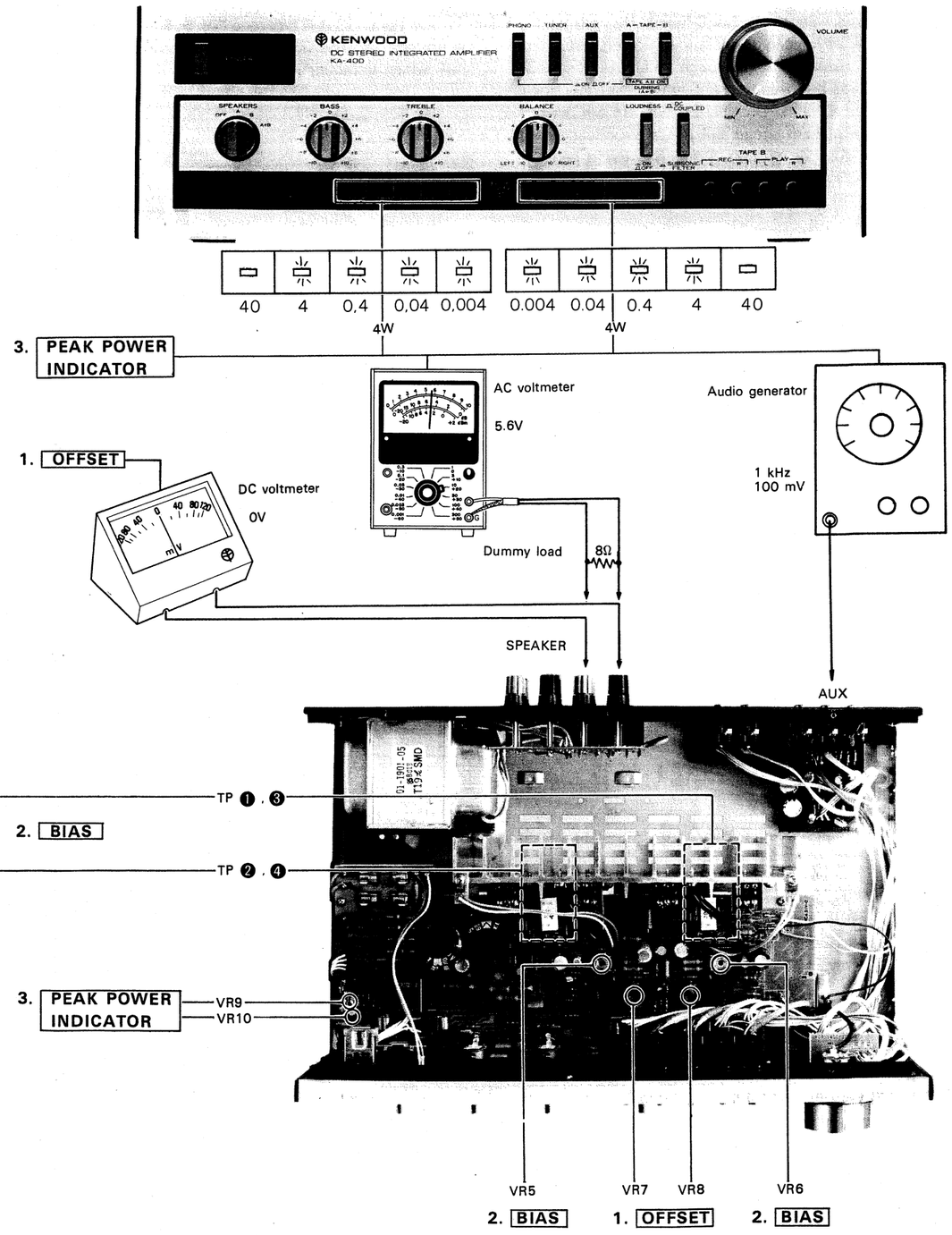
3. PEGELEINSTELLUNG DES "PEAK POWER LEVEL" INDIKATOR

1. Einen AG (NF-Signalgenerator) an die AUX-Buchsen und eine kunstliche Last (8Ω 100W order mehr) an die Lautsprecher-Anschlüsse anschließen.
2. Einen Wechselestrom-Voltmeter über die künstliche Last anschliessen.
3. Den AG auf 1 kHz einstellen. Die Lautstärke regler (oder den AG-Ausgang) so einstellen, daß Votmeter 5,6V anzeigt.
4. Das Trimme-Potentiometer VR9 (VR10) so einstellen, daß die 4 LEDs (für 0,004, 0,04, 0,4 und 4) leuchten auf.



KA-400 KA-400

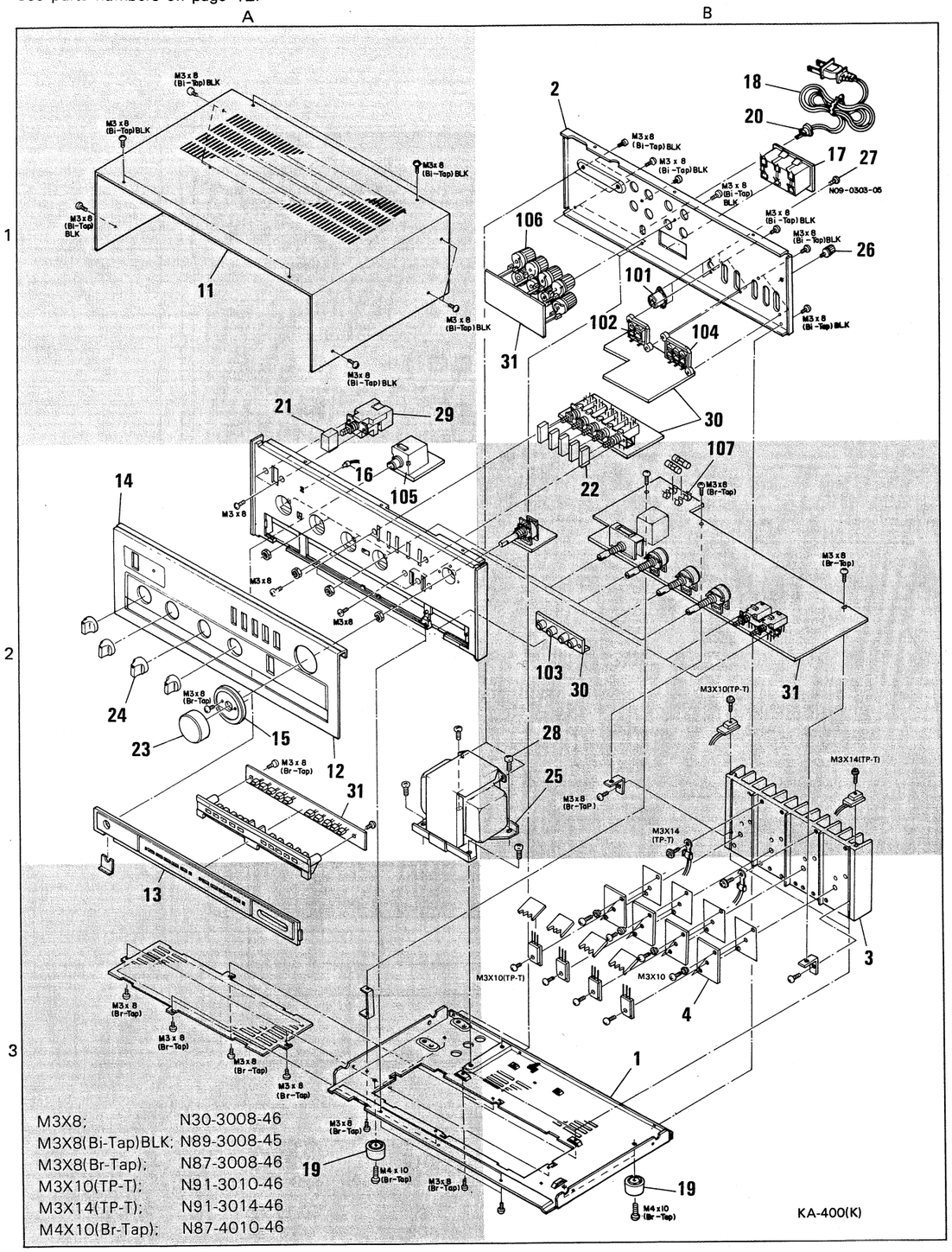
ADJUSTMENT/RÉGLAGES/ABGLEICH



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EXPLODED VIEW

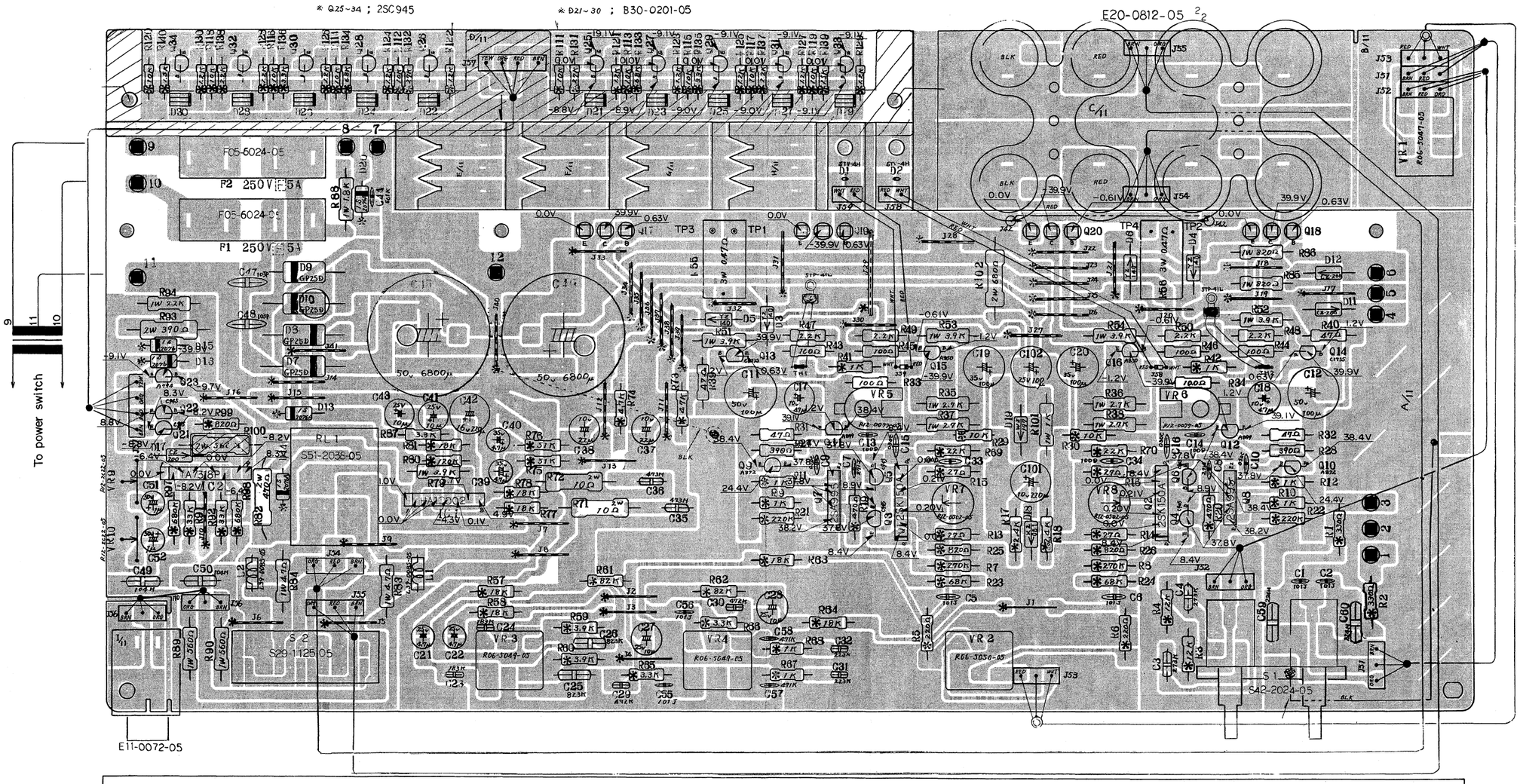
See parts numbers on page 12.


A
B
1
2
3
M3 x 8 (Bi-Tap) BLK
M3x8 (Bi-Tap)BLK
M3x

KA-400 KA-400

PC BOARD (2)

AUDIO AMP PCB ASS'Y (X09-1450-10, 0-81, 2-71)
(Component side)



Adjustment point

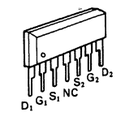
VR9		TP3	TP1		VR5	VR7		VR8	VR6
VR10								TP4	TP2

Q1, 2	: 2SK150A (Y, GR)	Q13, 14	: 2SC1735	D1, 2	: STV-4H (G)	D18	: XZ-051
Q3~6,21,22, 25~34	: 2SC945 (Q, P)	Q15, 16	: 2SA850	D3 ~ 6	: YZ-140 or WZ-140	D19	: WZ-197
Q7, 8	: 2SA995	Q17, 18	: 2SC2578	D7 ~ 10	: GP25D or U05C (S)	D21 ~ 30	: LED (B30-0201-05)
Q9, 10	: 2SA872 (E)	Q19, 20	: 2SA1103	D11, 12, 17	: CZ-200		
Q11, 12	: 2SA899 (B, V)	Q23	: 2SA794	D13, 14, 20	: 1S2076A	IC1	: HA12002
				D15, 16	: 1S2076 or 1S1555	IC2	: TA7318P

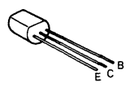
KENWOOD

DC STEREO INTEGRATED AMPLIFIER

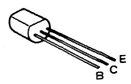
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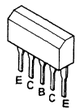
2SA872
2SC945



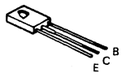
2SA850
2SC1735



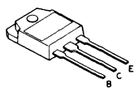
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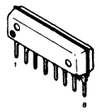
2SA794
2SA899



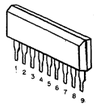
2SA1103
2SC2578



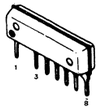
HA12002

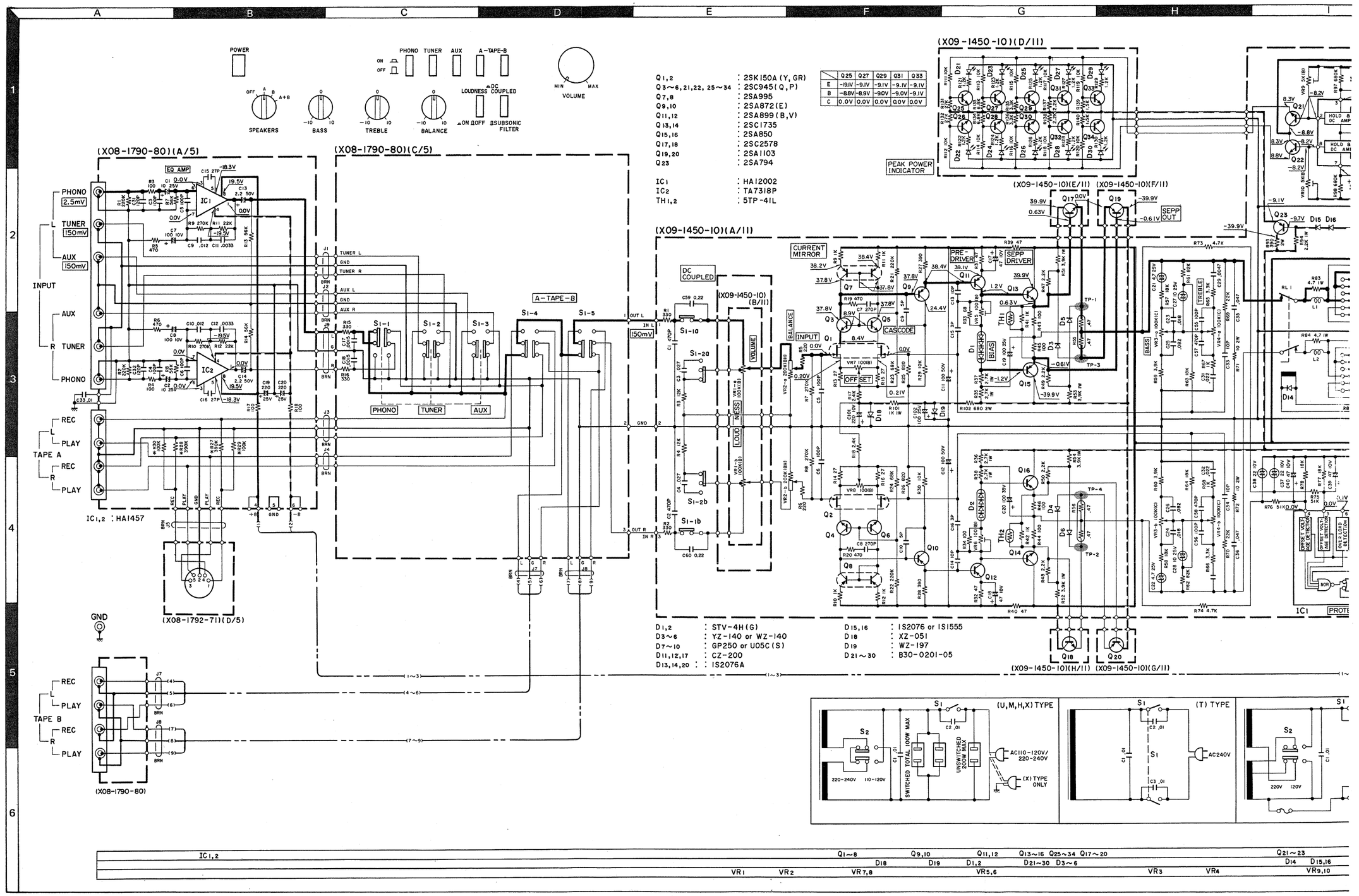


TA7318P



HA1457





	Q25	Q27	Q29	Q31	Q33
E	-19V	-9.1V	-9.1V	-9.1V	-9.1V
B	-8.8V	-8.9V	-9.0V	-9.0V	-9.1V
C	0.0V	0.0V	0.0V	0.0V	0.0V

IC1,2	Q1~8	Q9,10	Q11,12	Q13~16 Q25~34 Q17~20	Q21~23
	D18	D19	D1,2	D21~30 D3~6	D14 D15,16
VR1 VR2	VR7,8		VR5,6	VR3 VR4	VR9,10

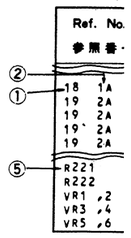
PARTS LIST

PARTS LIST

See instructions at the end of parts list.

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Remarks 備考
TOTAL			
1 3B	-	MAIN CHASSIS	
2 1B	-	REAR PANEL	
11 1A	A01-0366-03	METALLIC CABINET	
12 2A	A20-1557-02	FRONT PANEL	*K
12 2A	A20-1557-02	FRONT PANEL	PU
12 2A	A20-1557-02	FRONT PANEL	MX
12 2A	A20-1557-02	FRONT PANEL	E
12 2A	A20-1558-02	FRONT PANEL	*T
13 3A	A21-0319-03	DRESSING PANEL	*
14 2A	A22-0261-01	SUB PANEL	
-	B46-0055-20	WARRANTY CARD	P
-	B46-0060-00	WARRANTY CARD	T
-	B46-0061-20	WARRANTY CARD	K
-	B46-0062-20	WARRANTY CARD	U
-	B46-0063-13	WARRANTY CARD	U
-	B46-0064-10	WARRANTY CARD	X
-	B50-3076-00	INSTRUCTION MANUAL	*K
-	B50-3076-00	INSTRUCTION MANUAL	U
-	B50-3077-00	INSTRUCTION MANUAL	*P
-	B50-3077-00	INSTRUCTION MANUAL	MX
-	B50-3078-00	INSTRUCTION MANUAL	*T
-	B50-3079-00	INSTRUCTION MANUAL	*E
-	B59-0018-00	INSTRUCTION PRINT	U
15 2A	B07-0300-04	ESCUTCHEON	
16 2A	B30-0213-05	LED	
C1 -3	C54-3310-39	CERAMIC 0.01UF P	TE
C1 ,2	C91-0023-05	CERAMIC 0.01UF AC250V	UM
C1 ,2	C91-0023-05	CERAMIC 0.01UF AC250V	X
C1 ,2	C91-0079-05	CERAMIC 0.01UF AC125V	KP
17 1B	E03-0007-05	AC OUTLET	KU
17 1B	E03-0007-05	AC OUTLET	MX
17 1B	E03-0009-05	AC OUTLET	P
18 1B	E30-0181-05	POWER CORD	KP
18 1B	E30-0185-05	POWER CORD	X
18 1B	E30-0459-05	POWER CORD	E
18 1B	E30-0545-05	POWER CORD	UM
18 1B	E30-0587-05	POWER CORD	T
-	F09-0033-05	CAPACITOR COVER	TE
-	H01-3111-04	CARTON BOX	*K
-	H01-3111-04	CARTON BOX	UM
-	H01-3111-04	CARTON BOX	X
-	H01-3112-04	CARTON BOX	*P
-	H01-3113-04	CARTON BOX	*E
-	H01-3114-04	CARTON BOX	*T
-	H10-1544-02	POLYSTYRENE FIXTURE	
-	H20-0417-04	COVER	M
-	H20-0452-04	COVER 450X230X350	
-	H25-0078-04	BAG 235X315	
19 3A,3B	J02-0104-04	FOOT	
20 1B	J41-0024-15	BUSHING	XT
20 1B	J41-0033-05	BUSHING	E
20 1B	J41-0034-05	BUSHING	KP
20 1B	J41-0034-05	BUSHING	UM
21 1A	K27-0118-04	KNOB (POWER)	
22 2B	K27-0119-04	KNOB (INPUT,TAPE)	
23 2A	K29-0325-04	KNOB (VOLUME)	
24 2A	K29-0326-04	KNOB (TONE,BAL.)	
25 2B	L01-2061-05	POWER TRANSFORMER	*K
25 2B	L01-2062-05	POWER TRANSFORMER	*T
25 2B	L01-2065-05	POWER TRANSFORMER	*U
25 2B	L01-2065-05	POWER TRANSFORMER	MX
25 2B	L01-2066-05	POWER TRANSFORMER	*E
25 2B	L01-2067-05	POWER TRANSFORMER	*P
26 1B	N08-0128-35	DRESSED SCREW (GND)	
27 1B	N09-0303-05	SCREW (M3X6)	TE
28 2B	N09-0322-05	SCREW (M4X8)	
-	S31-2053-05	SLIDE SWITCH (V.SEL.)S2	UM
-	S31-2053-05	SLIDE SWITCH (V.SEL.)S2	XE
29 1A	S40-2074-05	PUSH SWITCH (POWER) S1	UM
29 1A	S40-2074-05	PUSH SWITCH (POWER) S1	X
29 1A	S40-2075-05	PUSH SWITCH (POWER) S1	TE
29 1A	S40-2085-05	PUSH SWITCH (POWER) S1	KP
30 1B,2B	X08-1790-80	PRE AMP PCB ASSY	KP
30 1B,2B	X08-1790-80	PRE AMP PCB ASSY	UM
30 1B,2B	X08-1790-80	PRE AMP PCB ASSY	X
30 1B,2B	X08-1792-71	PRE AMP PCB ASSY	TE
31 1B,2B	X09-1450-10	AUDIO AMP PCB ASSY	*K
31 1B,2B	X09-1450-10	AUDIO AMP PCB ASSY	P
31 1B,2B	X09-1450-81	AUDIO AMP PCB ASSY	*U
31 1B,2B	X09-1450-81	AUDIO AMP PCB ASSY	MX
31 1B,2B	X09-1452-71	AUDIO AMP PCB ASSY	*T
31 1B,2B	X09-1452-71	AUDIO AMP PCB ASSY	E
PREAMP (X08-179)			
C1 ,2	C25-1410-67	LL-ELEC 10UF 25WV	
C3 -6	C71-1710-15	CERAMIC 100PF J	
C7 ,8	C24-1010-71	ELECTRO 100UF 10WV	
C9 ,10	C46-1712-35	MYLAR 0.012UF J	
C11 ,12	C46-1733-25	MYLAR 0.0033UF J	
C13 ,14	C24-1722-51	ELECTRO 2.2UF 50WV	
C15 ,16	C71-1727-05	CERAMIC 27PF J	
C17 ,18	C52-1715-26	CERAMIC 0.0015UF K	
C19 ,20	C24-1422-71	ELECTRO 220UF 25WV	
C31 ,32	C71-1712-15	CERAMIC 120PF J	
C33	C55-1710-38	CERAMIC 0.01UF Z	
101 1B	E06-0510-05	REC/PLAY JACK (DIN)	TE
102 1B	E13-0423-05	PHONO JACK (TAPE A)	
103 2B	E13-0427-05	PHONO JACK (TAPE B)	
104 1B	E13-0612-05	PHONO JACK (INPUT)	
IC1 ,2	V30-0264-10	HA1457	
AUDIO AMP (X09-145)			
3 2B	-	HEAT SINK (A)	
4 2B	-	HEAT SINK (B)	
D21 -30	B30-0201-05	LED	
C1 ,2	C52-1747-15	CERAMIC 470PF J	
C3 ,4	C46-1727-36	MYLAR 0.027UF K	
C5 ,6	C71-1710-15	CERAMIC 100PF J	
C7 ,8	C71-1727-15	CERAMIC 270PF J	
C9 ,10	C71-1705-01	CERAMIC 5PF C	
C11 ,12	C24-1710-71	ELECTRO 100UF 50WV	
C13 ,14	C71-1710-02	CERAMIC 10PF D	
C15 ,16	C71-1703-01	CERAMIC 3PF C	
C17 ,18	C24-1047-61	ELECTRO 47UF 10WV	
C19 ,20	C24-6510-71	ELECTRO 100UF 35WV	
C21 ,22	C26-1447-57	NP-ELEC 4.7UF 25WV	
C23 ,24	C46-1718-36	MYLAR 0.018UF K	
C25 ,26	C46-1782-36	MYLAR 0.082UF K	
C27 ,28	C26-1410-67	NP-ELEC 10UF 25WV	
C29 ,30	C46-1747-26	MYLAR 0.0047UF K	
C31 ,32	C46-1722-36	MYLAR 0.022UF K	
C33 ,34	C71-1710-02	CERAMIC 10PF D	
C35 ,36	C46-1747-37	MYLAR 0.047UF M	
C37 ,38	C26-1022-67	NP-ELEC 22UF 10WV	
C39 ,40	C24-1047-61	ELECTRO 47UF 10WV	
C41	C24-1410-61	ELECTRO 10UF 25WV	
C42	C24-1222-71	ELECTRO 220UF 16WV	
C43	C24-1410-61	ELECTRO 10UF 25WV	
C44	C52-1756-16	CERAMIC 560PF K	
C45 ,46	C90-0366-05	ELECTRO 6800UF 50WV	
C47 ,48	C54-2710-39	CERAMIC 0.01UF P	
C49 ,50	C46-1710-47	MYLAR 0.1UF M	
C51 ,52	C24-1710-51	ELECTRO 1UF 50WV	
C55 ,56	C71-1710-15	CERAMIC 100PF J	
C57 ,58	C52-1747-16	CERAMIC 470PF K	
C59 ,60	C46-1722-47	MYLAR 0.22UF M	
C101	C24-1022-71	ELECTRO 220UF 10WV	
C102	C24-1410-71	ELECTRO 100UF 25WV	
105 2A	E11-0072-05	PHONE JACK	
106 2B	E20-0812-05	TERMINAL BOARD(SPEAKER)	
F1 ,2	F05-6021-05	FUSE 250V 6A	UM
F1 ,2	F05-6021-05	FUSE 250V 6A	X
F1 ,2	F05-6024-05	FUSE 250V 6A	KP
F1 ,2	F05-6322-05	FUSE 250VF 6.3A	TE
107 2B	J13-0055-05	FUSE HOLDER	
L1 ,2	L39-0085-05	COIL	
R27 ,28	R43-1239-15	FL-PROOF RD390 J 2E	
R31 ,32	R43-1247-05	FL-PROOF RD47 J 2E	
R33 ,34	R43-1210-15	FL-PROOF RD100 J 2E	
R35 -38	R47-5427-25	FL-PROOF RS2.7K J 3A	
R39 ,40	R43-1247-05	FL-PROOF RD47 J 2E	
R43 -46	R43-1210-15	FL-PROOF RD100 J 2E	
R47 -50	R43-1222-25	FL-PROOF RD2.2K J 2E	
R51 -54	R47-5439-25	FL-PROOF RS3.9K J 3A	
R55 ,56	R90-0128-05	CEMENT 0.47X2 3F	*
R71 ,72	R47-5510-05	FL-PROOF RS10 J 3D	
R79	R47-5439-25	FL-PROOF RS3.9K J 3A	
R82	R47-5547-15	FL-PROOF RS470 J 3D	
R83 ,84	R47-5447-95	FL-PROOF RS4.7 J 3A	
R85 ,86	R47-5482-15	FL-PROOF RS820 J 3A	
R88	R47-5418-25	FL-PROOF RS1.8K J 3A	
R89 ,90	R47-5456-15	FL-PROOF RS560 J 3A	
R93	R47-5539-15	FL-PROOF RS390 J 3D	
R94	R47-5422-25	FL-PROOF RS2.2K J 3A	
R100	R47-5556-15	FL-PROOF RS560 J 3D	
R101	R47-5410-25	FL-PROOF RS1K J 3A	
R102	R47-5568-15	FL-PROOF RS680 J 3D	
VR1	R06-5047-05	POTENTIOMETER (VOLUME)	
VR2	R06-5050-05	POTENTIOMETER (BALANCE)	*
VR3 ,4	R06-5049-05	POTENTIOMETER (TONE)	*
VR5 ,6	R12-0077-05	TRIMMING POT. 100	
VR7 ,8	R12-0502-05	TRIMMING POT. 100	
VR9 ,10	R12-2022-05	TRIMMING POT. 5K	
RL1	S51-2038-05	RELAY	
S1	S42-2024-05	PUSH SWITCH	*
S2	S29-1125-05	ROTARY WAFER SWITCH	*
D1 ,2	V11-5100-40	STV-4H(G)	
D3 -6	V11-0254-05	YZ-140	
D7 -10	V11-0465-05	GP25D	
D11 ,12	V11-4104-70	CZ-200	
D13 ,14	V11-0273-05	1S2076A	
D15 ,16	V11-0271-05	1S2076	
D17	V11-4104-70	CZ-200	
D18	V11-4103-60	XZ-051	
D19	V11-4100-30	WZ-197	
D20	V11-0273-05	1S2076A	
IC1	V30-0291-10	HA12002	
IC2	V30-0292-10	TA7318P	
Q1 ,2	V09-0137-40	2SK150A(Y,GR)	
Q3 -6	V03-0348-05	2SC945(Q,P)	
Q7 ,8	V01-0995-00	2SA995	
Q9 ,10	V01-0189-05	2SA872(E)	
Q11 ,12	V01-0199-05	2SA899(B,V)	
Q13 ,14	V03-0452-05	2SC1735	
Q15 ,16	V01-0173-05	2SA850	
Q17 ,18	V03-2578-00	2SC2578	
Q19 ,20	V01-1103-00	2SA1103	
Q21 ,22	V03-0348-05	2SC945(Q,P)	
Q23	V01-0794-00	2SA794	
Q25 -34	V03-0348-05	2SC945(Q,P)	
TH1 ,2	V22-0027-05	5TP-41L	

INSTR



① Exploded vi
② Position in
③ Symbol of
④ Area to wh
parts No. c
USA).
When this
(same parts
⑤ Reference N
⑥ Abbreviatio
capacitors a
⑦ Abbreviatio

* Abbreviatio
ELECTRO .
LL-ELEC....
NP-ELEC...
MICA .....
POLYSTY..
MYLAR ....
CERAMIC
TANTAL....
MF.....
OIL .....
The unit "U

* Abbreviatio
RC .....
RD .....
FL-PROOF I
RW .....
FL-PROOF I
RN .....
FUSE-RESIS
2B .....
2E .....
2H .....
3A .....
3D .....
3F .....
3G .....
3H .....
All resistor

* Abbreviatio
C .....
D .....
F .....
G .....
J .....
K .....
M.....
Z .....
P.....

⑧ Resistors Rl
list. For val

See EXPLODED VIEW on page 9.

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PARTS LIST

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Remarks 備考
C29 ,30	C46-1747-26	MYLAR 0.0047UF K	
C31 ,32	C46-1722-36	MYLAR 0.022UF K	
C33 ,34	C71-1710-02	CERAMIC 10PF D	
C35 ,36	C46-1747-37	MYLAR 0.047UF M	
C37 ,38	C26-1022-67	NP-ELEC 22UF 10WV	
C39 ,40	C24-1047-61	ELECTRO 47UF 10WV	
C41	C24-1410-61	ELECTRO 10UF 25WV	
C42	C24-1222-71	ELECTRO 220UF 16WV	
C43	C24-1410-61	ELECTRO 10UF 25WV	
C44	C52-1756-16	CERAMIC 560PF K	
C45 ,46	C90-0366-05	ELECTRO 6800UF 50WV	
C47 ,48	C54-2710-39	CERAMIC 0.01UF P	
C49 ,50	C46-1710-47	MYLAR 0.1UF M	
C51 ,52	C24-1710-51	ELECTRO 1UF 50WV	
C55 ,56	C71-1710-15	CERAMIC 100PF J	
C57 ,58	C52-1747-16	CERAMIC 470PF K	
C59 ,60	C46-1722-47	MYLAR 0.22UF M	
C101	C24-1022-71	ELECTRO 220UF 10WV	
C102	C24-1410-71	ELECTRO 100UF 25WV	
105 2A	E11-0072-05	PHONE JACK	
106 2B	E20-0812-05	TERMINAL BOARD(SPEAKER)	
F1 ,2	F05-6021-05	FUSE 250V 6A	UM
F1 ,2	F05-6021-05	FUSE 250V 6A	X
F1 ,2	F05-6024-05	FUSE 250V 6A	KP
F1 ,2	F05-6322-05	FUSE 250VF 6.3A	TE
107 2B	J13-0055-05	FUSE HOLDER	
L1 ,2	L39-0085-05	COIL	
R27 ,28	R43-1239-15	FL-PROOF RD390 J 2E	
R31 ,32	R43-1247-05	FL-PROOF RD47 J 2E	
R33 ,34	R43-1210-15	FL-PROOF RD100 J 2E	
R35 -38	R47-5427-25	FL-PROOF RS2.7K J 3A	
R39 ,40	R43-1247-05	FL-PROOF RD47 J 2E	
R43 -46	R43-1210-15	FL-PROOF RD100 J 2E	
R47 -50	R43-1222-25	FL-PROOF RD2.2K J 2E	
R51 -54	R47-5439-25	FL-PROOF RS3.9K J 3A	
R55 ,56	R90-0128-05	CEMENT 0.47X2 3F	*
R71 ,72	R47-5510-05	FL-PROOF RS10 J 3D	
R79	R47-5439-25	FL-PROOF RS3.9K J 3A	
R82	R47-5547-15	FL-PROOF RS470 J 3D	
R83 ,84	R47-5447-95	FL-PROOF RS4.7 J 3A	
R85 ,86	R47-5482-15	FL-PROOF RS820 J 3A	
R88	R47-5418-25	FL-PROOF RS1.8K J 3A	
R89 ,90	R47-5456-15	FL-PROOF RS560 J 3A	
R93	R47-5539-15	FL-PROOF RS390 J 3D	
R94	R47-5422-25	FL-PROOF RS2.2K J 3A	
R100	R47-5556-15	FL-PROOF RS560 J 3D	
R101	R47-5410-25	FL-PROOF RS1K J 3A	
R102	R47-5568-15	FL-PROOF RS680 J 3D	
VR1	R06-5047-05	POTENTIOMETER (VOLUME)	
VR2	R06-5050-05	POTENTIOMETER (BALANCE)	*
VR3 ,4	R06-5049-05	POTENTIOMETER (TONE)	*
VR5 ,6	R12-0077-05	TRIMMING POT. 100	
VR7 ,8	R12-0502-05	TRIMMING POT. 100	
VR9 ,10	R12-2022-05	TRIMMING POT. 5K	
RL1	S51-2038-05	RELAY	
S1	S42-2024-05	PUSH SWITCH	*
S2	S29-1125-05	ROTARY WAFER SWITCH	*
D1 ,2	V11-5100-40	STV-4H(G)	
D3 -6	V11-0254-05	YZ-140	
D7 -10	V11-0465-05	GP25D	
D11 ,12	V11-4104-70	CZ-200	
D13 ,14	V11-0273-05	1S2076A	
D15 ,16	V11-0271-05	1S2076	
D17	V11-4104-70	CZ-200	
D18	V11-4103-60	XZ-051	
D19	V11-4100-30	WZ-197	
D20	V11-0273-05	1S2076A	
IC1	V30-0291-10	HA12002	
IC2	V30-0292-10	TA7318P	
Q1 ,2	V09-0137-40	2SK150A(Y,GR)	
Q3 -6	V03-0348-05	2SC945(Q,P)	
Q7 ,8	V01-0995-00	2SA995	
Q9 ,10	V01-0189-05	2SA872(E)	
Q11 ,12	V01-0199-05	2SA899(B,V)	
Q13 ,14	V03-0452-05	2SC1735	
Q15 ,16	V01-0173-05	2SA850	
Q17 ,18	V03-2578-00	2SC2578	
Q19 ,20	V01-1103-00	2SA1103	
Q21 ,22	V03-0348-05	2SC945(Q,P)	
Q23	V01-0794-00	2SA794	
Q25 -34	V03-0348-05	2SC945(Q,P)	
TH1 ,2	V22-0027-05	5TP-41L	

INSTRUCTION FOR PARTS LIST

	Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Remarks 備考	
②					
①	18 1A	A01-0608-12	METALLIC CABINET	*	③
	19 2A	A20-1979-11	FRONT PANEL ASSY	*K	④
	19 2A	A20-1979-11	FRONT PANEL ASSY	PM	
	19 2A	A20-1979-11	FRONT PANEL ASSY	SU	
	19 2A	A20-1979-11	FRONT PANEL ASSY	XW	
⑤	R221	R43-1333-15	FL-PROOF RD330 J 2H	*	⑥
	R222	R43-1368-15	FL-PROOF RD680 J 2H	*	
	VR1 ,2	R12-3301-05	TRIMMING POT, 20K(B)		
	VR3 ,4	R19-4305-05	POTENTIOMETER (OUTPUT)	*	
	VR5 ,6	R12-2302-05	TRIMMING POT, 5K(B)		

① Exploded view drawing No.
② Position in exploded view.
③ Symbol of new parts.
④ Area to which parts are shipped. Example: A20-1979-11 is the parts No. of FRONT PANEL ASS'Y for the "K" type products (for USA).
When this column is blank, it means that the same type of parts (same parts No.) are used for the products shipped to all areas.
⑤ Reference No. in schematic diagram.
⑥ Abbreviation of "Flame proof metal oxide film resistor". All capacitors and resistors are listed using abbreviations.
⑦ Abbreviations

* Abbreviations of capacitors (Parts No. with initial letter "C").
ELECTRO ..... Electrolytic capacitor
LL-ELEC ..... Low leak electrolytic capacitor
NP-ELEC ..... Non-pole electrolytic capacitor
MICA ..... Mica capacitor
POLYSTY ..... Polystyrene capacitor
MYLAR ..... Mylar capacitor
CERAMIC ..... Ceramic capacitor
TANTAL ..... Tantalum capacitor
MF ..... Metallized film capacitor
OIL ..... Oil capacitor
The unit "UF" is used in lieu of "μF".

* Abbreviations of resistors (Parts No. with initial letters "R").
RC ..... Carbon composition resistor
RD ..... Carbon film resistor
FL-PROOF RD ..... Flame-proof carbon film resistor
RW ..... Wire wound power resistor
FL-PROOF RS ..... Flame-proof metal oxide film resistor
RN ..... Metal film resistor
FUSE-RESIST ..... Resistor with fuse function
2B ..... Rated wattage 1/8W
2E ..... Rated wattage 1/4W
2H ..... Rated wattage 1/2W
3A ..... Rated wattage 1W
3D ..... Rated wattage 2W
3F ..... Rated wattage 3W
3G ..... Rated wattage 4W
3H ..... Rated wattage 5W
All resistor values are indicated with the unit (Ω) omitted.

* Abbreviations common to capacitors and resistors.
C ..... ±0.25pF (Used for capacitors only)
D ..... ±0.5pF (Used for capacitors only)
F ..... ±1%
G ..... ±2%
J ..... ±5%
K ..... ±10%
M ..... ±20%
Z ..... +80%, −20% (Used for capacitors only)
P ..... +100%, −0% (Used for capacitors only)

⑧ Resistors RD (carbon composition resistors) are not listed in the parts list. For values, refer to the schematic diagram.

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