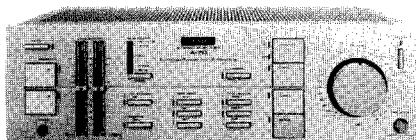


# Service Manual

**CIRCUIT DESCRIPTIONS  
REPAIR & ADJUSTMENTS**



**ORDER NO.  
ARP-345-0**

**STEREO AMPLIFIER**

# A-70

**MODEL A-70 COMES IN SEVEN VERSIONS DISTINGUISHED AS FOLLOWS:**

Type	Voltage	Remarks
KU	AC 120V only	U.S.A. model
KC	AC 120V only	Canada model
HE	AC 220V, 240 (switchable)	European continent model
HB	AC 220V, 240V (switchable)	United Kingdom model
S	AC 110V, 120V, 220V, 240V (switchable)	General export model
S/G	AC 110V, 120V, 220V, 240V (switchable)	U.S. Military model
HEZ	AC 220V, 240V (switchable)	West Germany model

- This service manual is applicable to the KU type. For servicing of the other types, please refer to the additional service manual.
- Ce manuel d'instruction se réfère au mode de réglage, en français.
- Este manual de de servicio trata del método de ajuste escrito en español.

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**PIONEER ELECTRONIC CORPORATION** 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan  
**PIONEER ELECTRONICS (USA) INC.** 1925 E. Dominguez St., Long Beach, California 90810 U.S.A.  
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**PIONEER ELECTRONICS AUSTRALIA PTY. LTD.** 178-184 Boundary Road, Braeside, Victoria 3195, Australia

# 1. SPECIFICATIONS

## Amplifier Section

Continuous Average Power Output is 120 watts\* per channel, min., at 8 ohms from 20 Hertz to 20,000 Hertz with no more than 0.003 % total harmonic distortion.\*\*

Continuous Power Output at 1kHz  
(both channel driven)

T. H. D. 0.03%, 8 ohms . . . . . 130watts per channel  
T.H.D. 0.1%, 8 ohms . . . . . 140 watts per channel (DIN)

Total Harmonic Distortion (20 Hertz to 20,000 Hertz, 8 ohms)

continuous rated power output . . . . . \*\* No more than 0.003%  
60 watts per channel power output . . . . . \*\* No more than 0.003%

Intermodulation Distortion (50 Hertz: 7,000 Hertz = 4:1, 8 ohms)

continuous rated power output . . . . . No more than 0.003%

Damping Factor (20 Hertz to 20,000 Hertz, 8 ohms) . . . . . 60

Input (Sensitivity/Impedance)

PHONO MM . . . . . 2.5mV/50 kilohms  
PHONO MC . . . . . 200µV/100 ohms  
TUNER, CD/AUX, TAPE PLAY 1, 2 . . . . . 150 mV/50 kilohms

Phono Overload Level (T.H.D. 0.005%, 1,000Hz)

PHONO MM . . . . . 150mV  
PHONO MC . . . . . 11mV

Output (Level/Impedance)

TAPE REC 1, 2 . . . . . 150mV/2.2 kilohms

Frequency Response

PHONO (RIAA Equalization) . . . . . 20Hz to 20,000Hz ±0.2dB  
TUNER, CD/AUX, TAPE PLAY 1, 2 . . . . . 5Hz to 100,000Hz <sup>+0</sup>/<sub>-3</sub>dB

Tone Control

BASS . . . . . ±10dB (100Hz)  
TREBLE . . . . . ±10dB (10kHz)

Filter

LOW (SUBSONIC) . . . . . 15Hz (-6dB/oct.)

Loudness Contour (Volume control set at -40dB)

. . . . . +6dB (100Hz), +3dB (10kHz)

Hum and Noise (IHF, short circuited A network)

PHONO MM . . . . . 87dB  
PHONO MC . . . . . 70dB  
TUNER, CD/AUX, TAPE PLAY 1, 2 . . . . . 108dB

Hum and Noise (DIN, continuous power/50mW)

PHONO MM . . . . . 80dB/66dB  
PHONO MC . . . . . 70dB/65dB  
TUNER, CD/AUX, TAPE PLAY 1, 2 . . . . . 95dB/69dB

Muting . . . . . -20dB

## Miscellaneous

Power Requirements

. . . . . AC120V, 50/60Hz

Power Consumption . . . . . 450W

Dimensions . . . . . 420(W) x 131(H) x 411(D) mm

16-9/16(W) x 5-3/16(H) x 16-3/16(D) in

Weight (without package) . . . . . 12.3kg (27 lb 2 oz)

## Furnished Parts

Operating Instructions . . . . . 1

*\*Measured pursuant to the Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifier.*

*\*\* Measured by Shibasoku 725 Automatic Distortion Analyzer.*

**NOTE:**

*Specifications and designa subject to possible modification without notice.*

QUESTIONNAIRE

MODEL \_\_\_\_\_

One Model per questionnaire

Dear Servicer,

Thank you for your cooperation in the post-sale service of Pioneer products.

This questionnaire is used as a tool to improve the serviceability of our products and service manuals. Please evaluate this model and service manual by answering the following questions. Your ideas may be realized in our future products. Your answers will be appreciated. Thank you.

PIONEER ELECTRONIC CORP.

T. Nakagawa, Manager, Service Section, International Division

1. SERVICING EVALUATION	Circle applicable number:	Good	Fair	Poor		
a. Disassembly/Re-assembly:		1	2	3	*4	*5
b. Circuit Checks:		1	2	3	*4	*5
c. Replacement of Parts:		1	2	3	*4	*5
d. Adjustment (s):		1	2	3	*4	*5

\* If (4) or (5) was circled, please be specific.

e. Your advice, opinion or ideas related to servicing this product.

**2. SERVICE MANUAL EVALUATION**

a. Circuit & Mechanism Description

b. Circuit Diagram

**3. OTHER**

Please describe other areas of servicing which you may find difficult.

Completed by :

Date :

Company Name :

Address :

City/State/Zip :

Please send this form filled to the distributor in your country.

e. Votre conseil ou avis sur la service

**2. VOTRE APPRÉCIATION EN SERVICE MANUEL**

a. Description

b. Circuit diagramme

**3. AUTRES POINTS DIFFICILES**

Répondé par :

Date :

Nom :

Age :

Compagnie :

Adresse :

Adressez-vous ce questionnaire au distributeur s'il vous plait.

**QUESTIONNAIRE**

Modèle \_\_\_\_\_

Un modèle par questionnaire

Cher Monisieur,

Nous voudrions faire l'enquête sur la réparation et le manuel de service comme indiqué dans la formule ci-jointe. Cette enquête a pour objectif d'améliorer la facilité de la réparation et le manuel de service. Vos précieux conseils seront sûrement considérés dans le processus de la réalisation de produits. Nous vous remercions de votre coopération.

Veillez agréer, monisieur, l'expression de nos sentiments distingués.

**PIONEER ELECTRONIC CORPORATION**

T. Nakagawa, Manager, Service Section, Administration Department, International Division

**1. EVALUATION EN FACILITE DE SERVICE  
MODÈLE**

Circlez le numéro.

Bon, Passable, Mauvais,

a. Démontage/remontage

1 2 3 \*4 \*5

b. Examen de circuits

1 2 3 \*4 \*5

c. Rechange de pièces

1 2 3 \*4 \*5

d. Facilité de réglage

1 2 3 \*4 \*5

\* Si vous circlez No. 4 ou 5, donnez l'explication concrète.

**ENCUESTA**

Modelo \_\_\_\_\_  
Uno modelo por encuesta

Querido señor,

Muchas gracias por su cooperación de servicio de post-venta de productos de Pioneer. Esto es para mejorar el servicio de post-venta de nuestros productos. Les pedimos a ustedes responder a las preguntas siguientes. Su opinion e idea estaran tenido en cuenta en los productos futuros.

Nos complacemos en saludarles muy atentamente,

**PIONEER ELECTRONIC CORPORATION**

T. Nakagawa, Manager, Service Section, Administration Department, International Division

**1. EVALUACION EN LA FACILIDAD DE SERVICIO**

**MODELO**

Marque uno entre los numeros siguientes.

Bueno      Medio      Malo

a. Desmante:

1      2      3      \*4      \*5

b. Examen de circuito:

1      2      3      \*4      \*5

c. Reemplazo de piezas:

1      2      3      \*4      \*5

d. Ajuste:

1      2      3      \*4      \*5

\* Si marca (4) o (5), ejemplifiquelo concretamente.

e. Su consejo, opinion u idea en el servicio de este modelo.

## 2. EVALUACION DE MANUAL DE SERVICIO

a. Descripción

b. Circuito diagramma

## 3. OTRAS PARTES DIFICIL POR REPARAR

Respondido por

Fecha :

Nombre :

Edad :

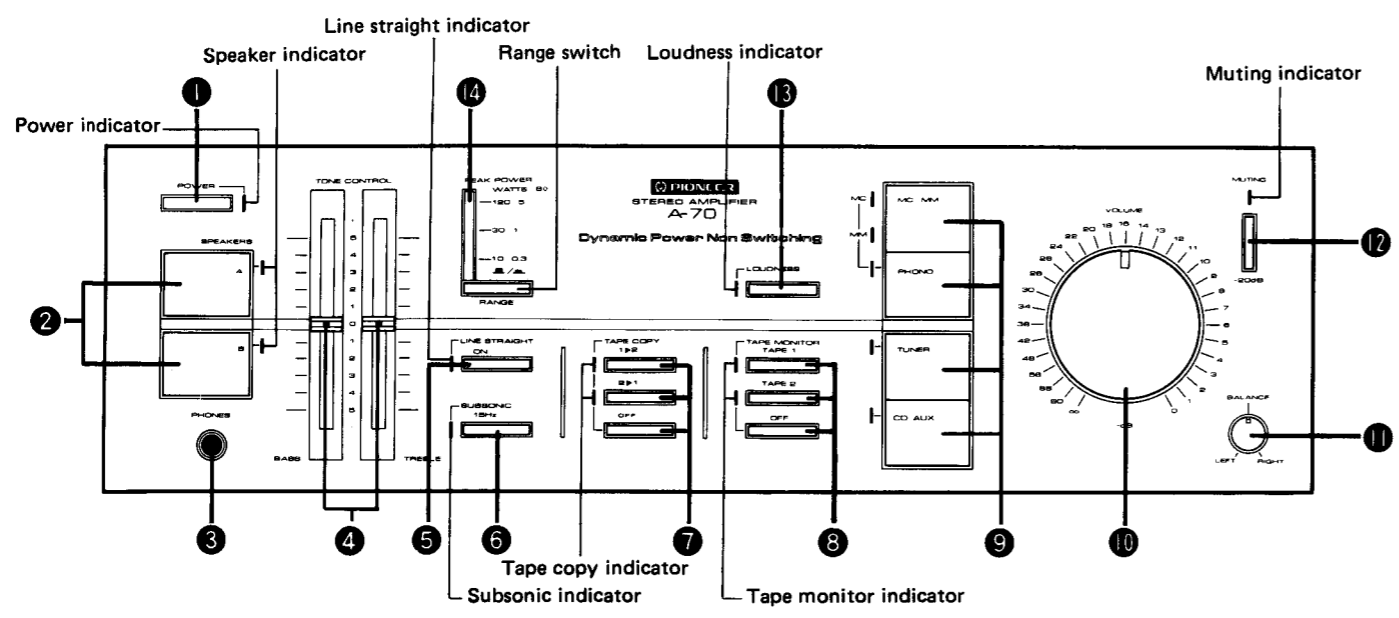
Compania :

Dirección :

Manda esta encuesta al domicilio de distribuidor por favor.



## 2. FRONT PANEL FACILITIES



### 1 POWER SWITCH

Power is supplied to the stereo amplifier when the switch is depressed (Power indicator lights up). When the switch is released, the power is turned off.

### 2 SPEAKERS SWITCHES

These are used to select the speakers through which you wish to listen. When a switch is depressed, the corresponding SPEAKER indicator will light up to indicate that speaker is in operation. If the same switch is depressed again, the SPEAKER indicator will go out, and that speaker will no longer be in operation.

A: When the speakers connected to A terminals are in use.

B: When the speakers connected to B terminals are in use.

- Turn both A and B speaker switches to OFF position when only the HEADPHONES are in use.

**NOTE:**

When only one set of speakers is used, the impedance is different from that obtained when two sets are used. Read the instructions on Page 6, regarding operation of the SPEAKER IMPEDANCE switch and adjust correctly.

### 3 PHONES JACK

Connect the plug on your headphones to this jack. To listen to a program through the headphones, turn both the SPEAKER A and B switches to OFF position.

### 4 TONE CONTROLS (BASS AND TREBLE)

The controls can be adjusted when the LINE STRAIGHT switch is set to OFF position (The Line Straight indicator turns off).

**Bass Control** ..... Adjusts the quality of the Bass (Low frequency range) sound. The bass is boosted when the control is slid upward from the center "O" position and attenuated when slid downward.

**Treble Control** ..... Adjusts the treble (high frequency) sound. The treble is boosted when the control is slid upward from the center "O" position and attenuated when slid downward.

### 5 LINE STRAIGHT SWITCH

When the switch is depressed to the ON position, (the Line Straight indicator lights up) the signal from the input jacks is sent directly to the power amplifier, without passing through the tone control circuit or the loudness circuit, and consequently a flat frequency response is obtained.

### 6 SUBSONIC SWITCH

When this switch is depressed, the Subsonic Filter indicator lights up and the subsonic filter is activated. The filter serves to attenuate frequencies lower than 15 Hz with a 6 dB/oct slope, and can therefore be used to suppress the ultra low range noise, generated by record warp. This noise cannot actually be heard by the ear, but it can cause intermodulation distortion and even speaker damage. Use the switch as required during record play.

### 7 TAPE COPY SWITCHES (TAPE COPY)

When using two tape decks to copy a tape, use these switches. When pressed, the indicator lights up.

1 ▶ 2 ..... When recording from tape deck 1 to tape deck 2, push this switch.

2 ▶ 1 ..... When recording from tape deck 2 to tape deck 1, push this switch

OFF ..... Push when not copying a tape. Normally leave in the OFF position.

### 8 TAPE MONITOR SWITCHES (TAPE MONITOR)

These are used when monitoring the recording or playback of a tape. When pressed, the indicator lights up.

TAPE 1 ..... Push to monitor recording or playback of a deck connected to the PLAY jack of TAPE 1.

TAPE 2 ..... Push to monitor recording or playback of a deck connected to the PLAY jack of TAPE 2.

OFF ..... Push when not monitoring recording or playback of a tape.

**NOTE:**

Simultaneous monitoring or playback of TAPE 1 and TAPE 2 is not possible. Make sure that TAPE MONITOR switch is pressed down firmly.

### 9 FUNCTION SWITCHES

These switches select the program source. A function indicator is attached to the left side of each FUNCTION switch. When pressed, the indicator lights up.

MC/MM ..... When playing a record on the turntable, adjust the switch to correspond to the cartridge being used. Confirmed by the MC or MM indicator that lights up.

PHONO ..... Depress for playing records on a turntable connected to the PHONO jack on the rear panel.

TUNER ..... Depress for listening to a program on a tuner connected to the TUNER jacks on the rear panel.

CD/AUX ..... Depress for listening to the sound from a stereo component connected to the CD/AUX jacks on the rear panel. (for eg. the Compact Disc Player or TV tuner, which can be bought separately).

**NOTE:**

Since the TAPE MONITOR switches have priority over the FUNCTION switches, turn the TAPE MONITOR switches to OFF.

### 10 VOLUME CONTROL

This is used to adjust the volume of sound heard through the speakers or headphones. No sound is heard when the control is at the "∞" position. To increase the volume, turn the control slowly clockwise (↻).

### 11 BALANCE CONTROL

This is used to adjust the balance of sound from the left and right channels. To increase the volume of the right channel, turn the control clockwise (↻) from the centre position. To increase the volume of the left channel, turn counter-clockwise (↺).

### 12 MUTING SWITCH (MUTING-20dB)

When this switch is pushed the MUTING indicator comes on and the volume level falls by 20 dB.

This control is effective in record playing when the stylus is lowered onto the record disc, when it is necessary to decrease the volume level temporarily and for fine volume adjustments when playing at low volume levels.

### 13 LOUDNESS SWITCH

Depress this switch under low volume listening conditions. The LOUDNESS indicator lights up and the bass and treble sound is emphasised.

When the volume of sound is low, the capability of the ear to pick up the bass and treble sound drops off, compared with high volume listening conditions. The loudness circuit compensates for this characteristic of the ear. The bass and treble are emphasized when the switch is set to ON and the sound comes alive, even when the volume is low.

**NOTE:**

The LOUDNESS switch does not operate if the LINE STRAIGHT switch is ON.

### 14 PEAK POWER INDICATOR (PEAK POWER WATTS/8 Ω)

This indicator shows in 6 stages the output level when a speaker system with an impedance rating of 8 Ω is connected to the amplifier's speaker terminals.

#### The range switch operates as follows

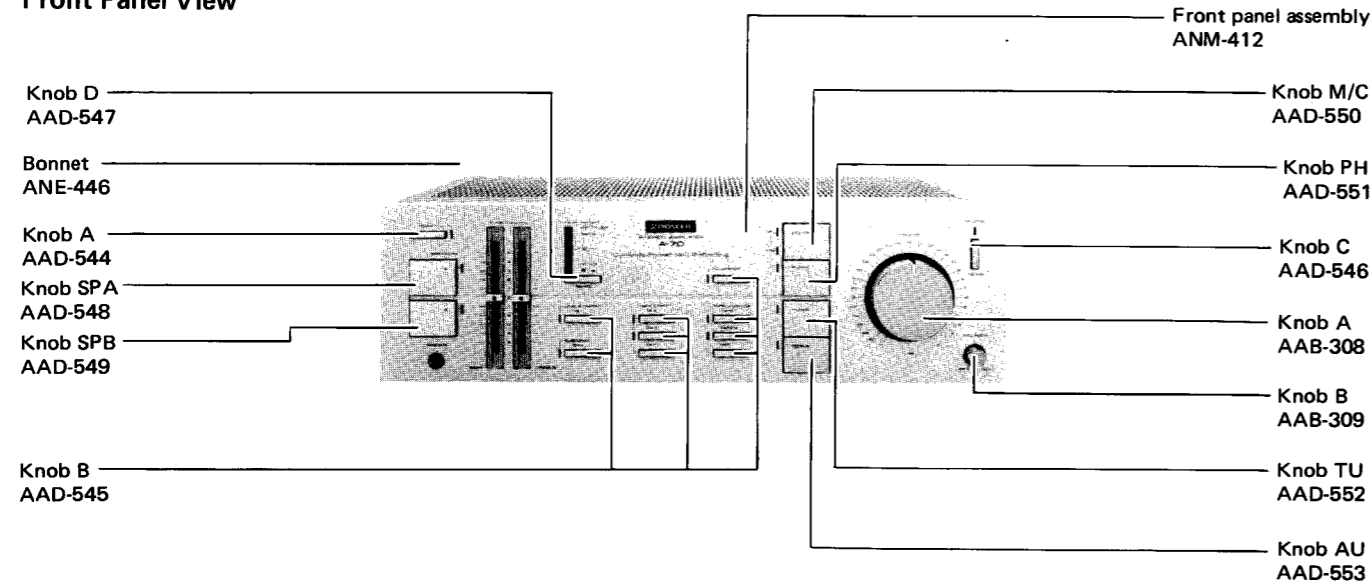
- : When in the released position, high level output (120, 30, 10) is shown in watts.
- : When in the depressed position, low level output (5, 1, 0.3) is shown in watts.

### 3. PARTS LOCATION

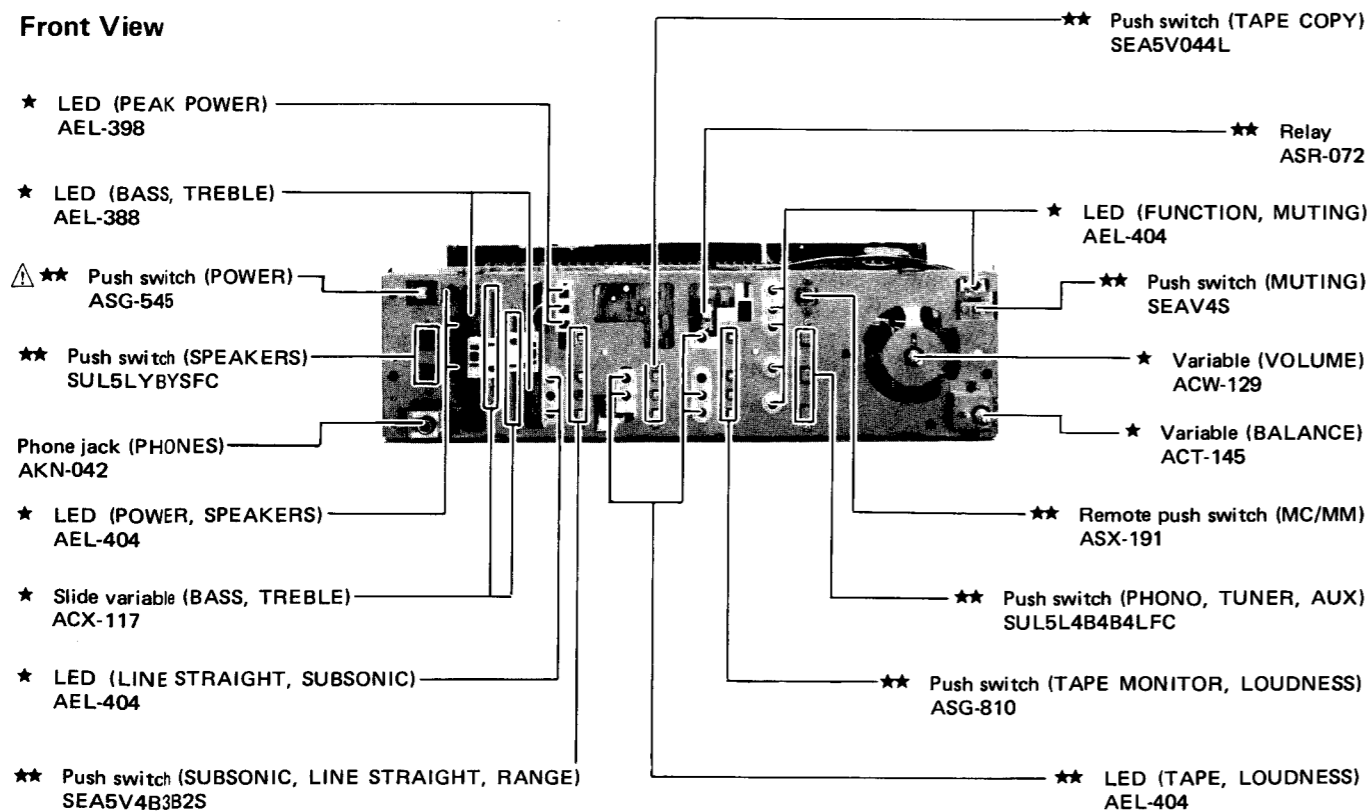
**NOTES:**

- Parts without part number cannot be supplied.
- The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks **★★** and **★**.  
**★★ GENERALLY MOVES FASTER THAN ★.**  
 This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

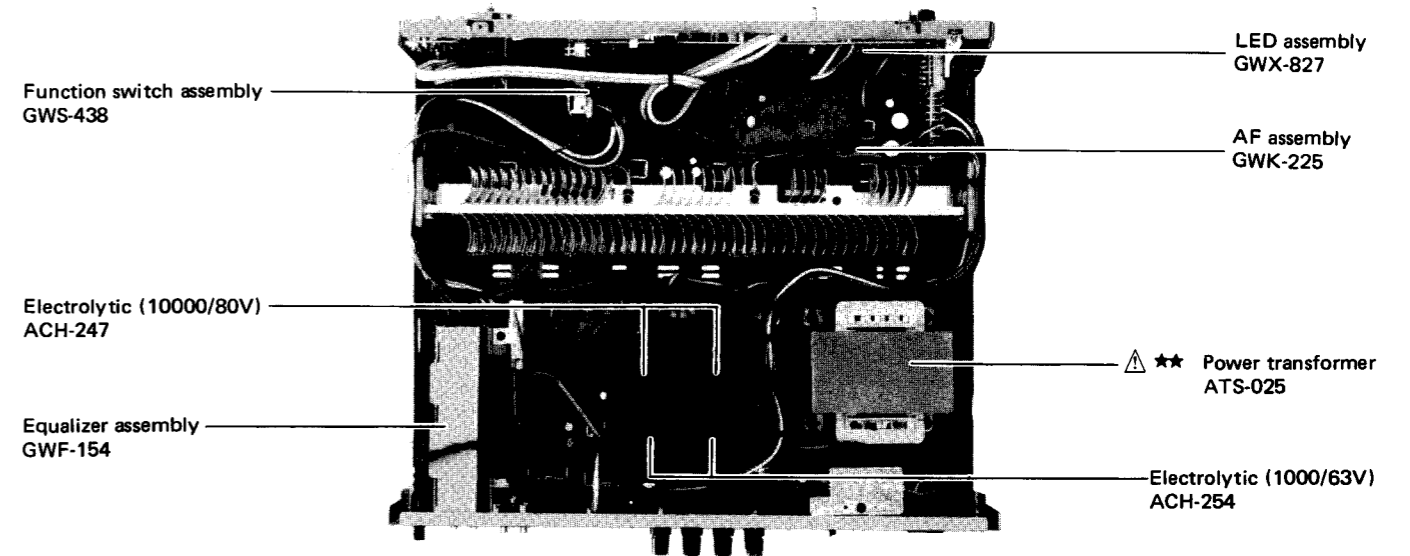
**Front Panel View**



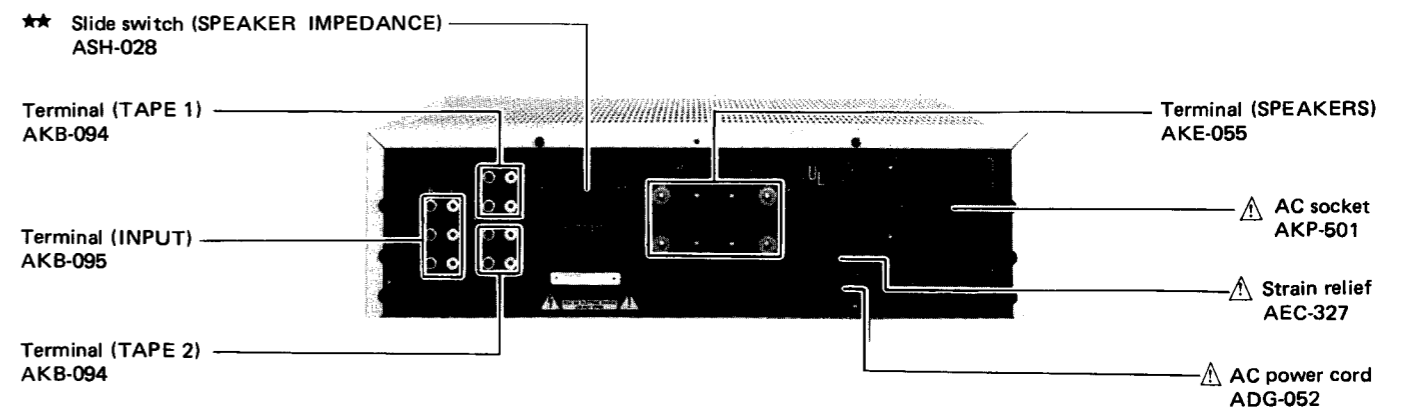
**Front View**



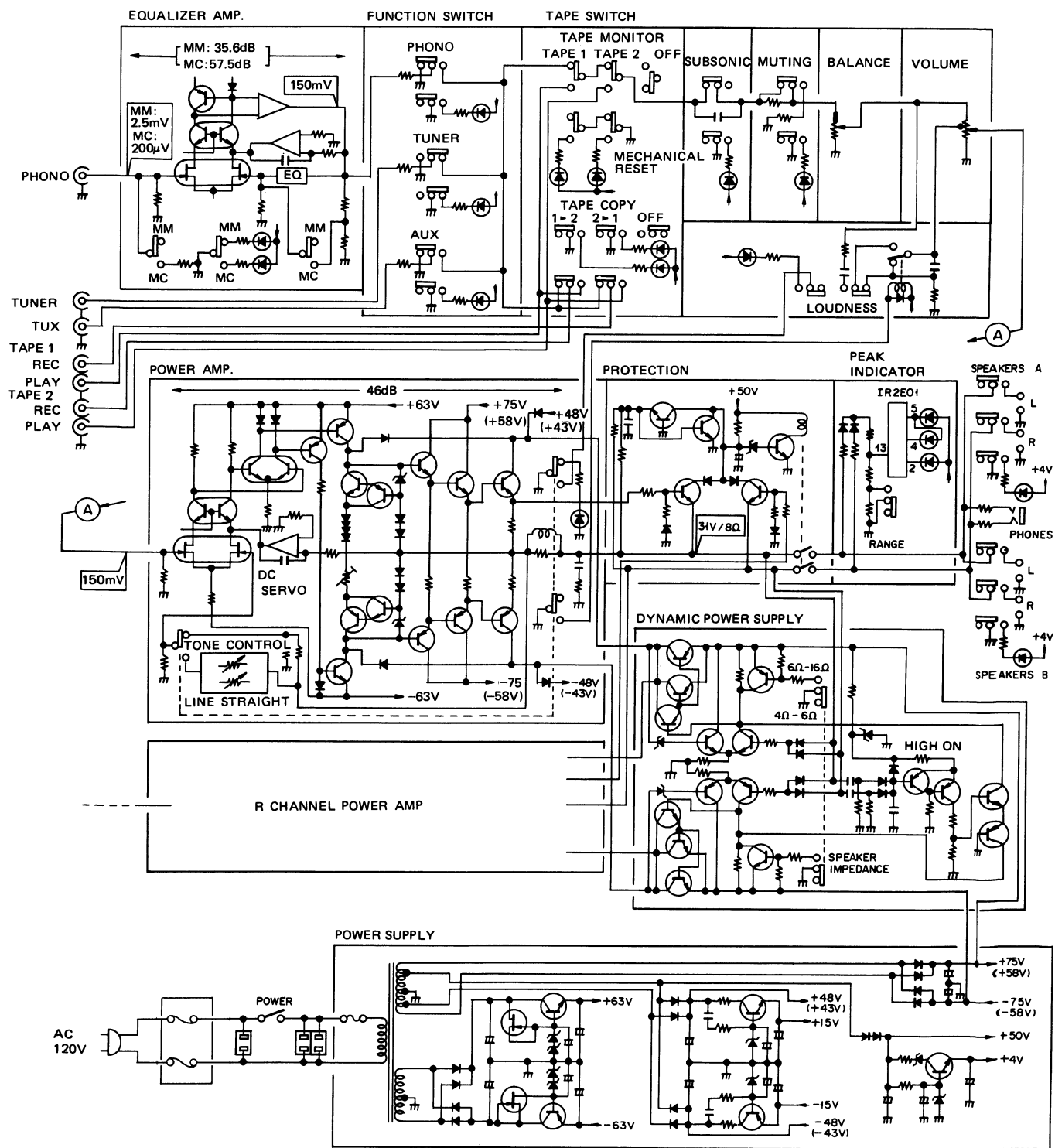
**Top View**



**Rear View**



# 4. BLOCK DIAGRAM



## 5. CIRCUIT DESCRIPTIONS

### 5.1 OUTLINE OF COMPONENT CIRCUITS

#### Equalizer Amplifier

By using an input stage FET and a DC servo control mechanism, coupling capacitors have been eliminated from the input and output circuits. Gain switching enables a gain of 35.6dB to be obtained in the MM position, and 57.5dB in the MC position.

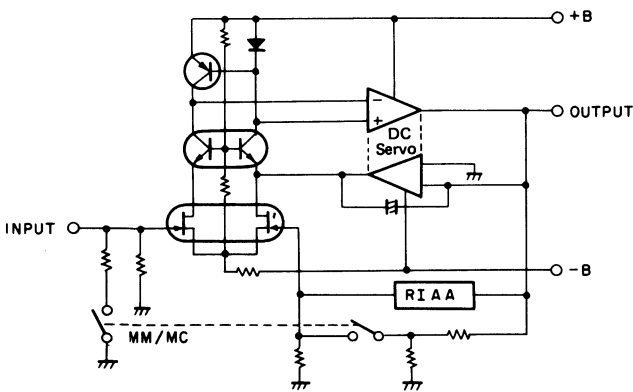


Fig. 5-1 Equalizer amplifier

#### Tone Control

With the tone control elements inserted in the main NFB loop of the power amplifier, a flat frequency response is obtained when the LINE STRAIGHT switch is on. The loudness circuit is switched off by the same action.

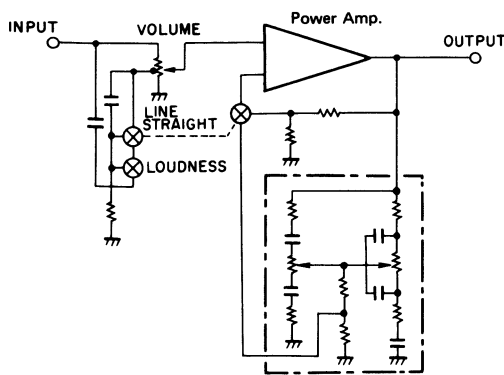


Fig. 5-2 Tone control

#### Power Amplifier

The power amplifier features a highly efficient dynamic power supply amplifier, a high-speed bias servo control non-switching amplifier, and a DC amplifier with a first-stage FET differential input and DC servo control mechanism.

#### Protector Circuit

In addition to standard protector circuit features including a bridge-type overload detector, a DC voltage detector, and relays designed to delay contact when the power is switched on and to cut the power line immediately when the power is switched off, an overcurrent protector circuit and clipper circuit have been used in the power amplifier stage.

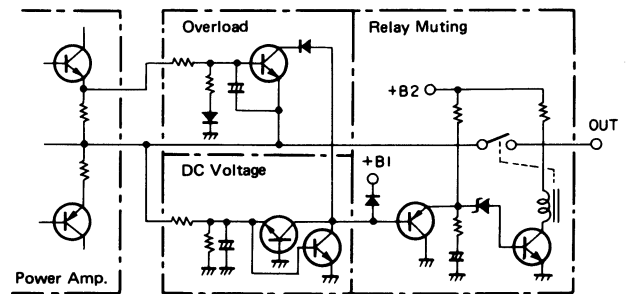


Fig. 5-3 Protector circuit

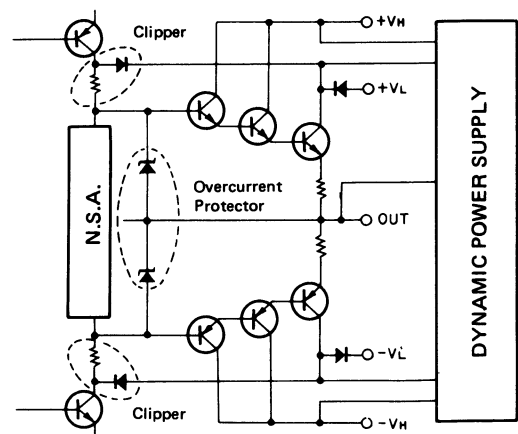


Fig. 5-4 Overcurrent protector and clipper

### 5.2 DYNAMIC POWER SUPPLY CIRCUIT

The dynamic power supply system featured in the final stage of the A-70 power amplifier varies the voltage applied to the power transistor in accordance to the signal level. The result is reduced heat loss and higher efficiency.

#### Operating Principles

The basic circuitry is outlined in Fig. 5-5. There are two  $V_H$  and  $V_L$  power lines. The signal output  $v_o$  is compared with final stage power voltage  $v_a$  by differentiator,  $v_a$  being obtained by controlling  $V_H$ . With the  $v_a$  input applied to the differentiator being offset by  $E_s$  (several volts), the  $v_a$  waveform is traced,  $v_a$  being several volts larger than  $v_o$ . If, however,  $v_o$  is less than  $V_L - E_s$ ,  $v_a$  is fixed at the  $V_L$  level (see Fig. 5-6).

The purpose of the high-region ON circuit is to avoid irregularities from occurring where  $v_a$  can no longer follow  $v_o$  at high signal frequencies, and to prevent high-speed continuous operation in the control transistor. That is, when high frequency signals appear at the output, the control transistors (Q3 and Q4) are turned fully on, and  $v_a$  is fixed at the  $V_H$  level.

#### A-70 Dynamic Power Supply Circuit

The overall circuit structure is outlined in Fig. 5-7.  $V_L$  is fixed so as to obtain the rated output (100W) for a 4Ω load, and the high region ON circuit is designed to operate at frequencies above 3kHz. The SPEAKER IMPEDANCE switch set to the 4Ω ~ 6Ω position fixes the power supply to the final stage transistor at the  $V_L$  level.

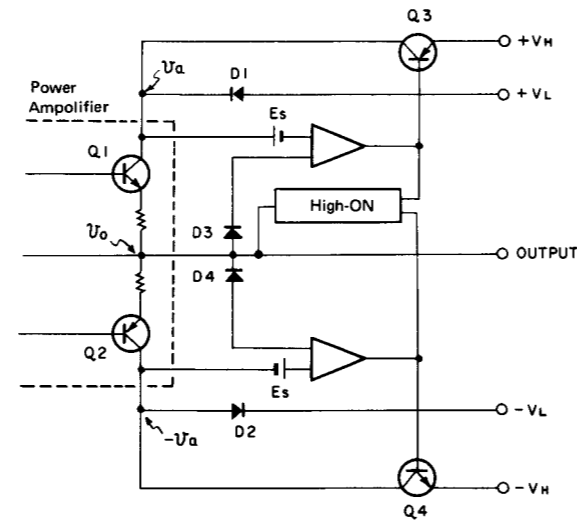


Fig. 5-5 Basic circuitry

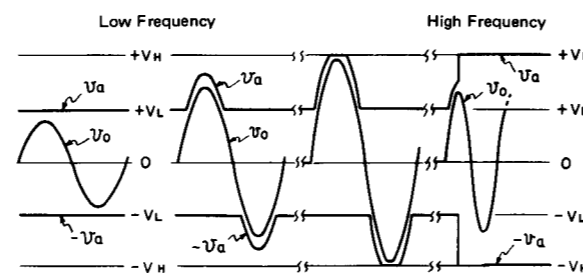


Fig. 5-6 Operating waveforms

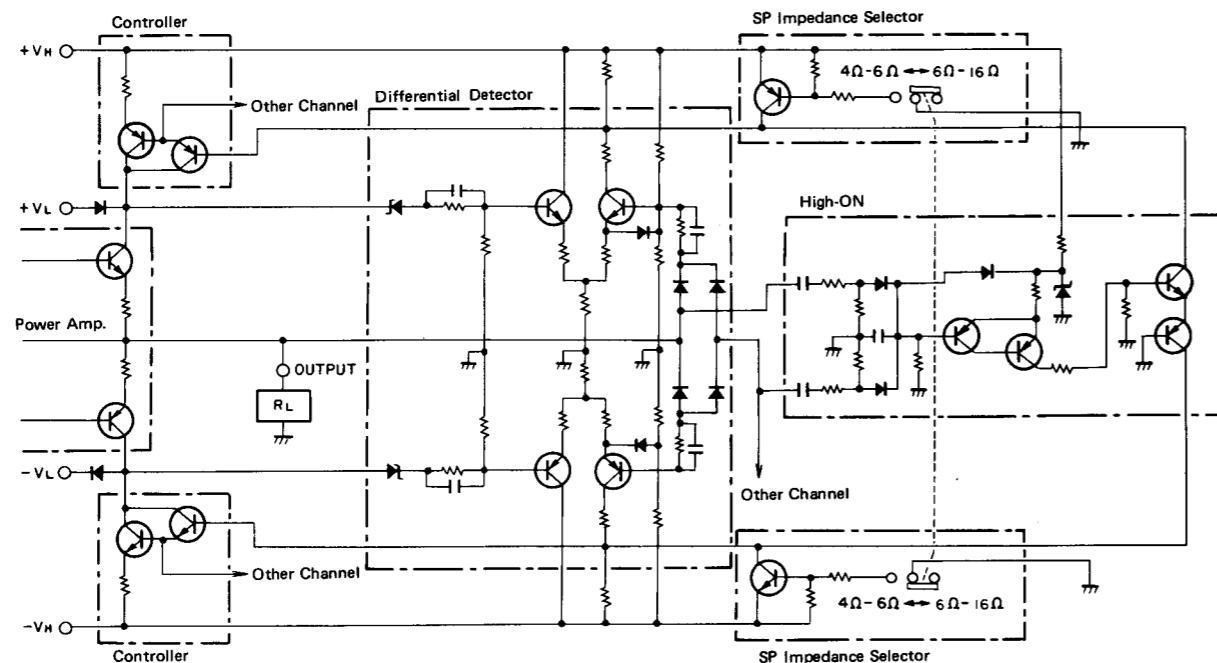
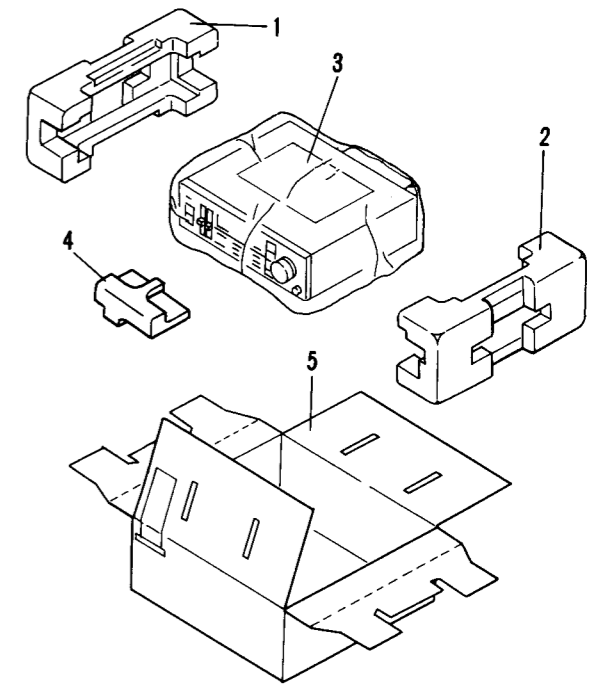


Fig. 5-7 A-70 Dynamic power supply circuit

## 6. PACKING

Mark	No.	Part No.	Description
	1.	AHA-322	Side pad L
	2.	AHA-323	Side pad R
	3.	ARB-560	Operating instructions (English)
	4.	AHA-330	Front pad
	5.	AHE-207	Packing case

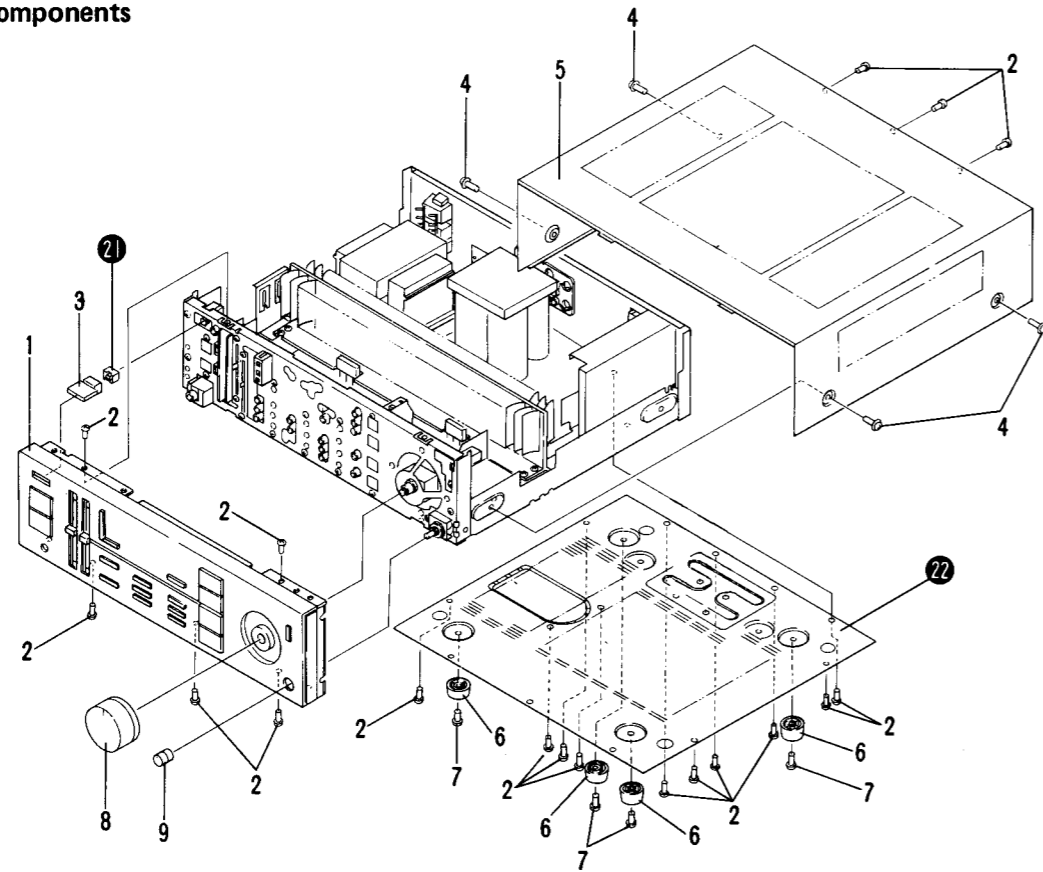


## 7. EXPLODED VIEWS AND PARTS LIST

**NOTES:**

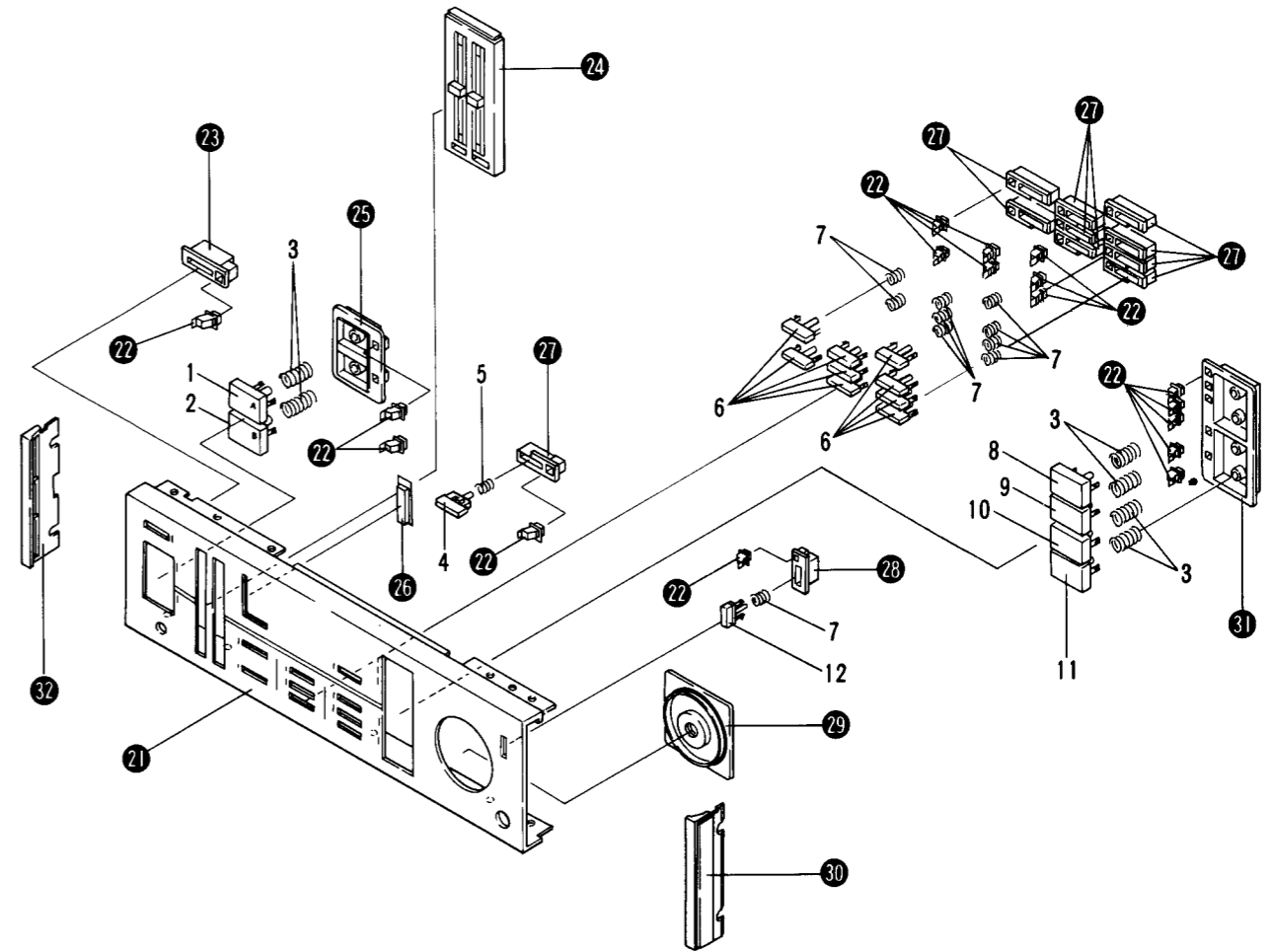
- Parts without part number cannot be supplied.
- The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks **\*\*** and **\***.  
**\*\* GENERALLY MOVES FASTER THAN \***  
 This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

**Exterior Components**



Mark	No.	Part No.	Description
	1.	ANM-412	Front panel assembly
	2.	BBZ30P080FZK	Screw (3 x 8)
	3.	AAD-544	Knob A (POWER)
	4.	FBT40P080FCR	Screw (4 x 8)
	5.	ANE-446	Bonnet
	6.	AEC-613	Bumper
	7.	VBZ40P080FMC	Screw (4 x 8)
	8.	AAB-308	Knob A (VOLUME)
	9.	AAB-309	Knob B (BALANCE)
	21.		Flexible ring
	22.		Bottom plate

**Front Panel Assembly (ANM-412)**



Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
	1.	AAD-548	Knob SPA		21.		Front panel
	2.	AAD-549	Knob SPB		22.		Indicator lens A
	3.	ABH-069	Spring		23.		Knob spacer E
	4.	AAD-547	Knob D		24.		Knob assembly
	5.	ABH-098	Spring		25.		Knob spacer B
	6.	AAD-545	Knob B		26.		Indicator lens B
	7.	ABH-091	Spring		27.		Knob spacer C
	8.	AAD-550	Knob M/C		28.		Knob spacer D
	9.	AAD-551	Knob PH		29.		VL spacer
	10.	AAD-552	Knob TU		30.		Side panel R
	11.	AAD-553	Knob AU		31.		Knob spacer A
	12.	AAD-546	Knob C		32.		Side panel L

1

2

3

4

5

6

A

A

B

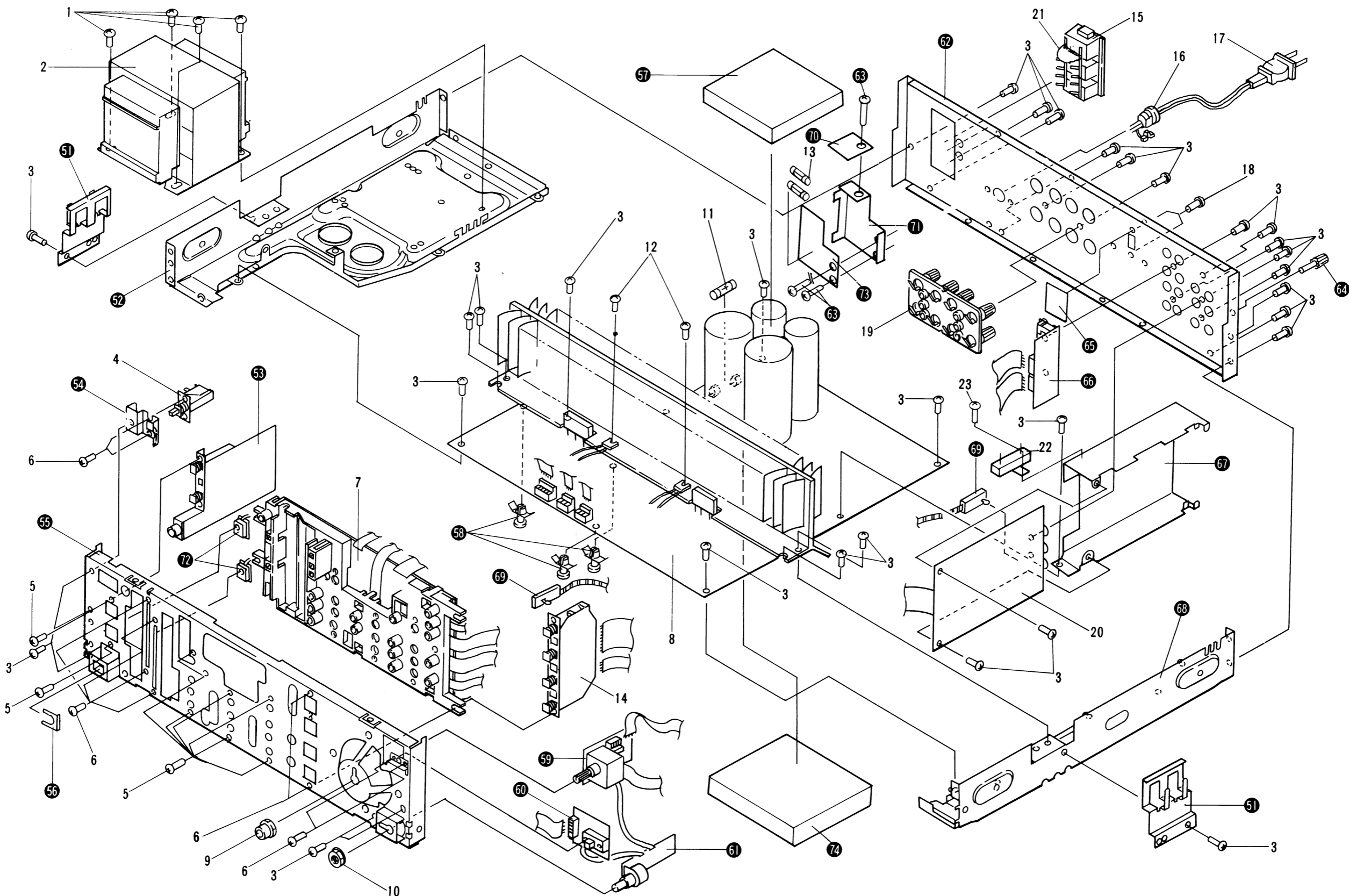
B

C

C

D

D



Mark	No.
△ ★	1.
△ ★★	2.
△ ★★	3.
△ ★★	4.
△ ★★	5.
△ ★★	6.
△ ★★	7.
△ ★★	8.
△ ★★	9.
△ ★★	10.
△ ★★	11.
△ ★★	12.
△ ★★	13.
△ ★★	14.
△ ★★	15.
△ ★★	16.
△ ★★	17.
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△ ★★	19.
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△ ★★	21.
△ ★★	22.
△ ★★	23.

1

2

3

4

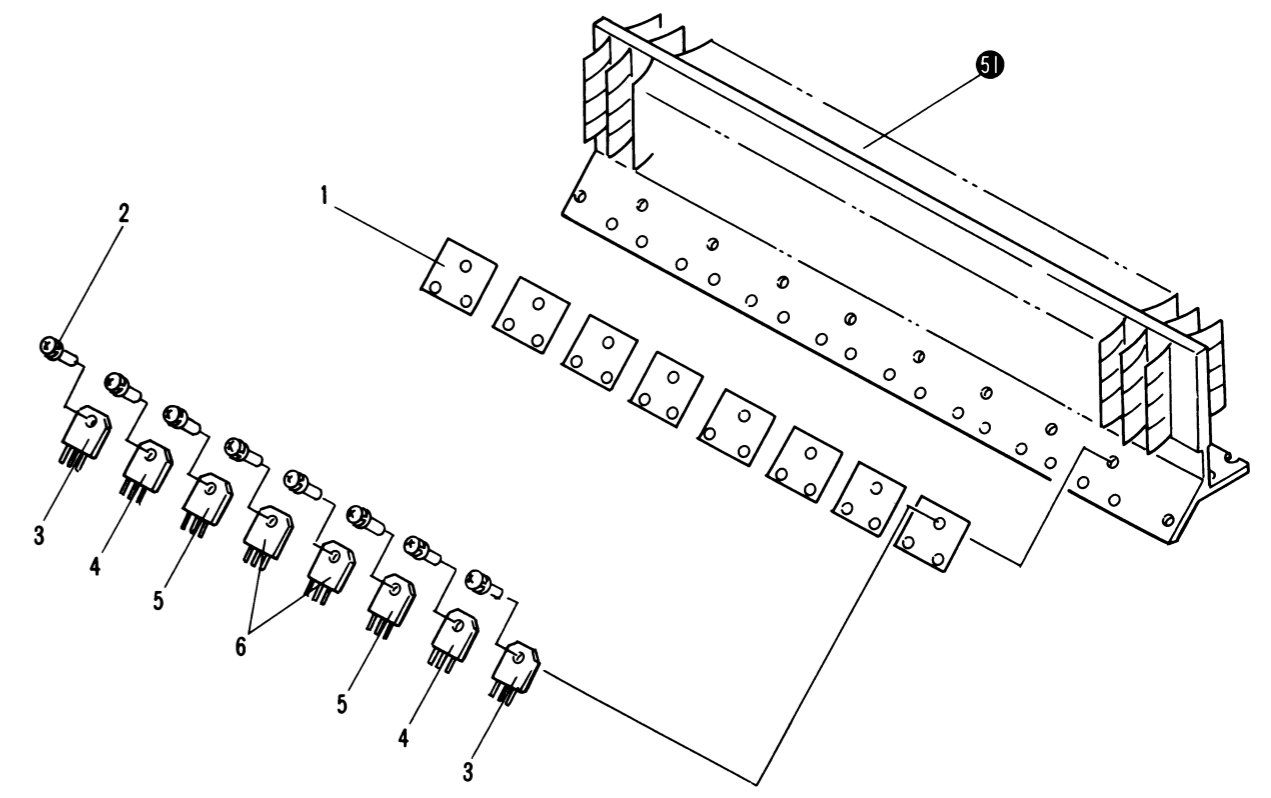
5

6

14

Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
	1.	VBZ40P080FMC	Screw (4 x 8)	51.			Wire holder
⚠ ★	2.	ATS-025	Power transformer	52.			Transformer holder
	3.	BBZ30P080FZK	Screw (3 x 8)	53.			Speaker switch assembly
⚠ ★★	4.	ASG-545	push switch (POWER)	54.			Switch holder
	5.	BMZ30P100FMC	Screw (3 x 10)	55.			Front panel holder
	6.	VMZ30P060FMC	Screw (3 x 6)	56.			Mounting plate
	7.	GWX-827	LED assembly	57.			Cushion
	8.	GWK-225	AF assembly	58.			Spacer
	9.	ABN-028	Nut	59.			Main volume assembly
	10.	NK90FZB	Nut	60.			Muting switch assembly
⚠ ★★	11.	AEK-304	Fuse (8A)	61.			Balance volume assembly
	12.	ABA-252	Screw (3 x 8)	62.			Rear panel
⚠ ★★	13.	AEK-119	Fuse (1A)	63.			Rivet
	14.	GWS-438	Function switch assembly	64.			Terminal (GND)
⚠	15.	AKP-501	AC.soket	65.			Speaker impedance switch assembly
⚠	16.	AEC-327	Strain relief	66.			Input terminal assembly
⚠	17.	ADG-052	AC power cord	67.			Shielding case
	18.	PMZ30P060FZB	Scew (3 x 6)	68.			Side frame R
	19.	AKE-055	Terminal (SPEAKERS)	69.			Remote wire
	20.	GWF-154	Equalizer assembly	70.			Caution board
	21.	ACE-214	Ceramic (0.22/AC 125V)	71.			PCB Holder
	22.	ACN-144	Wire wound resistor	72.			Tone inductor (included in 7)
	23.	BBZ30P060FZB	Screw (3 x 6)	73.			Fuse assembly
				74.			Cushion

Heat Sink



Mark	No.	Part No.	Description
	1.	AEC-818	Insulator spacer
	2.	ABA-258	Screw
	3.	2SC3263-O* (2SC3263-Y*)	
	4.	2SA1104-O* (2SA1104-Y*)	
	5.	2SA1294-O* (2SA1294-Y*)	
	6.	2SC2579-O* (2SC2579-Y*)	
		*hfe must have the same value.	
	51.		Heat sink

A

B

C

D





7

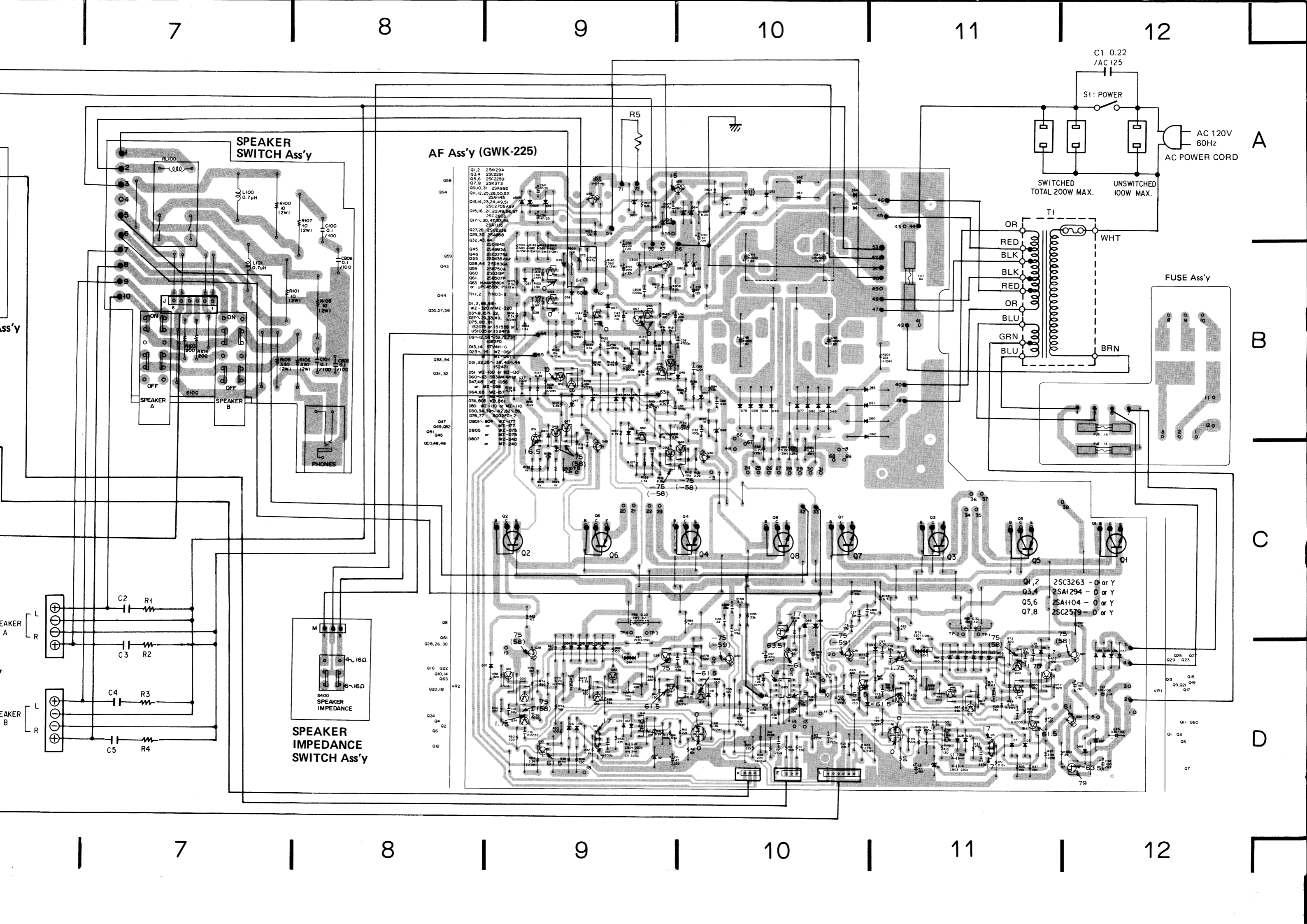
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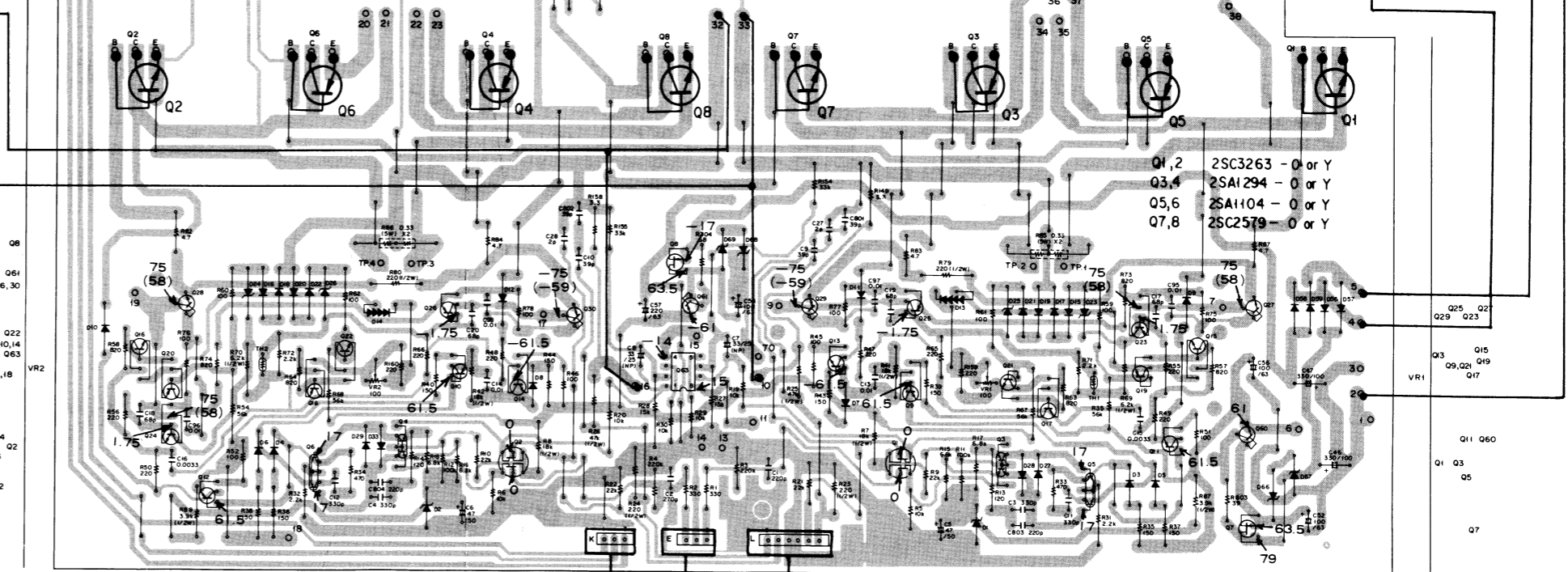
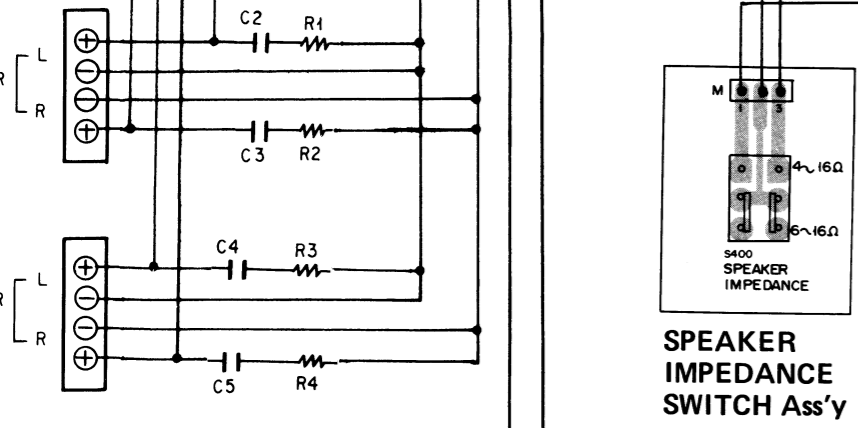
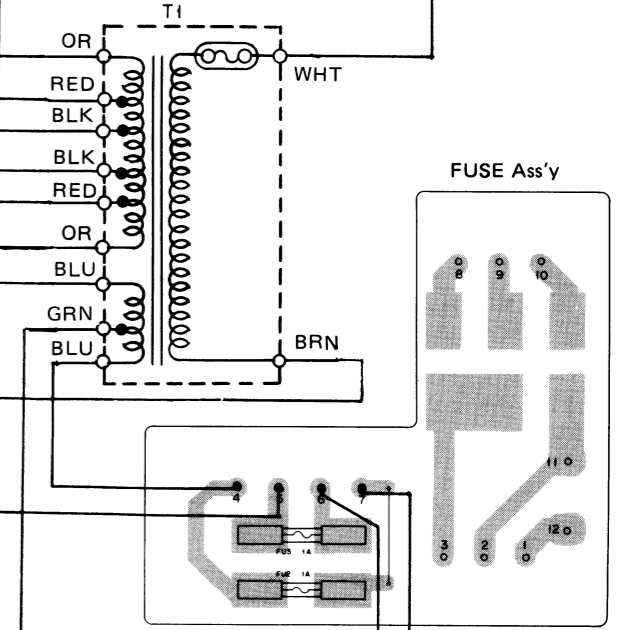
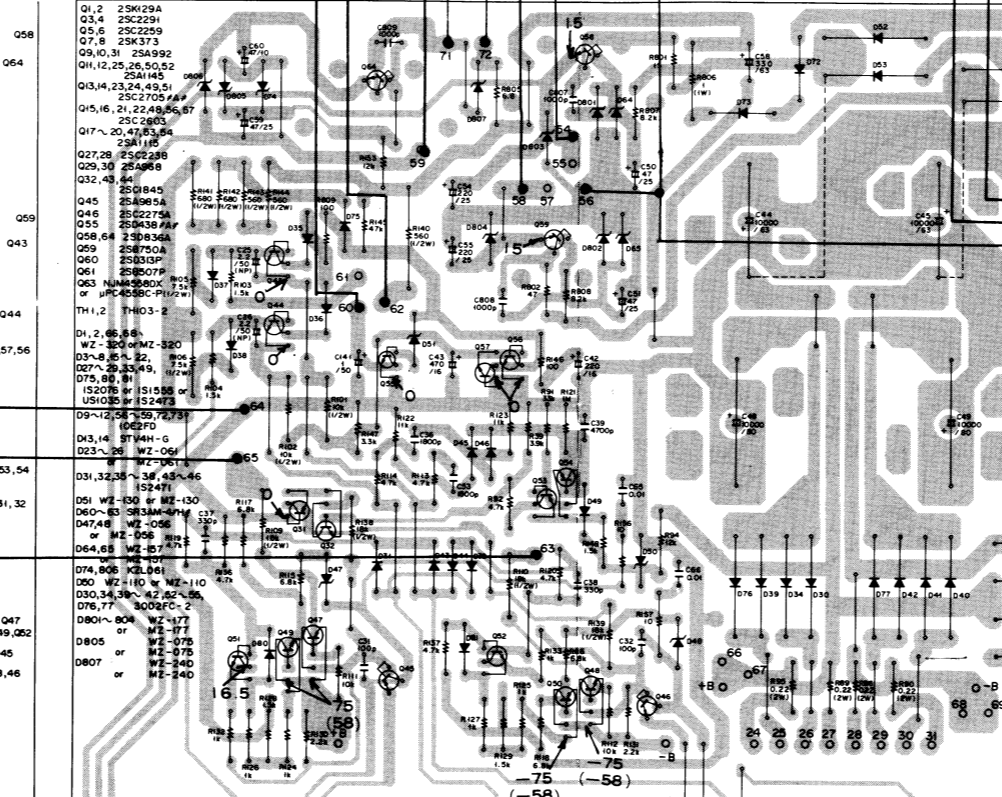
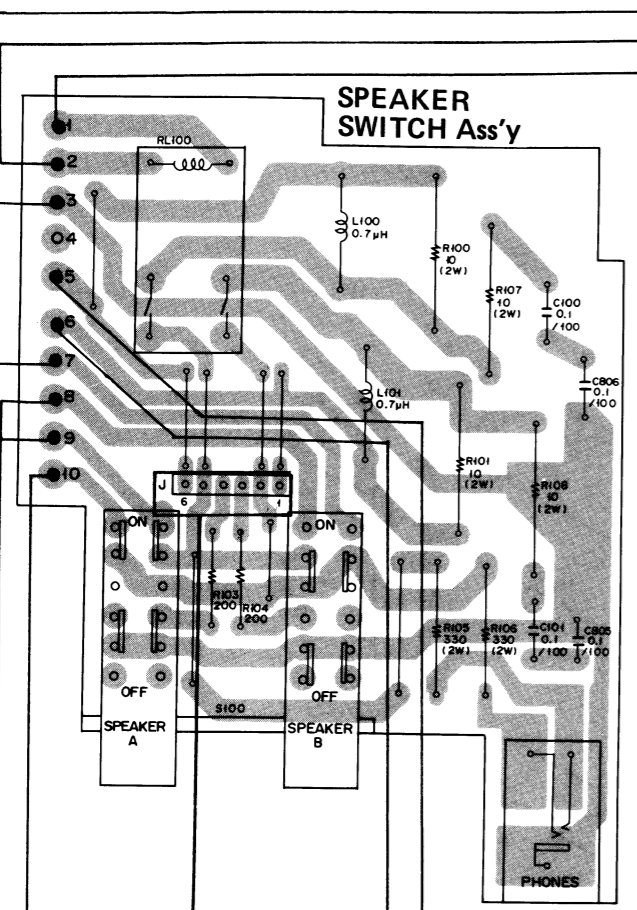
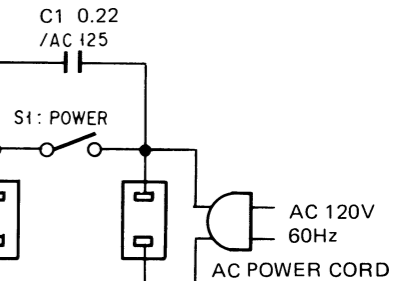
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**SPEAKER SWITCH Ass'y**

**AF Ass'y (GWK-225)**



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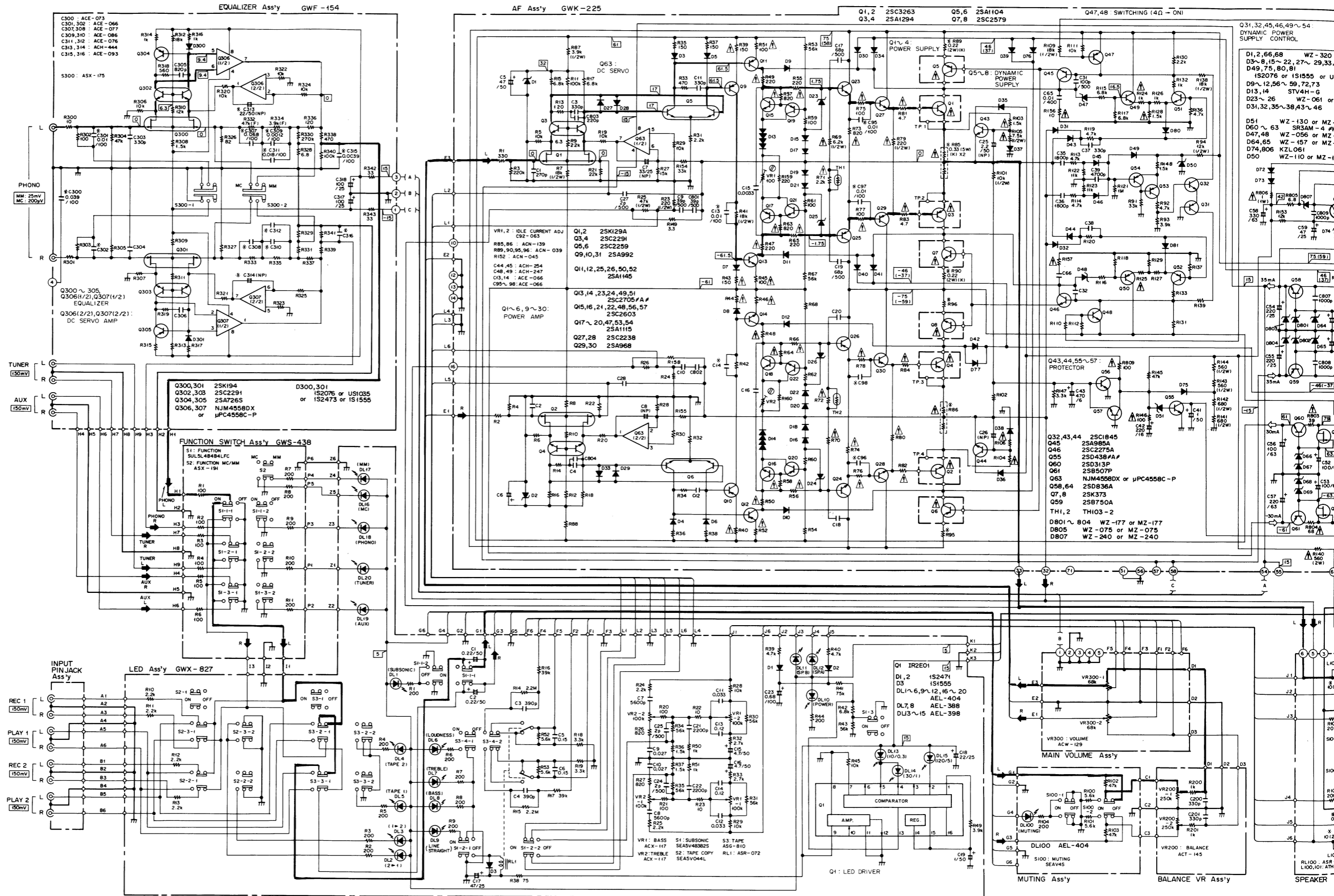
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# 9. SCHEMATIC DIAGRAM



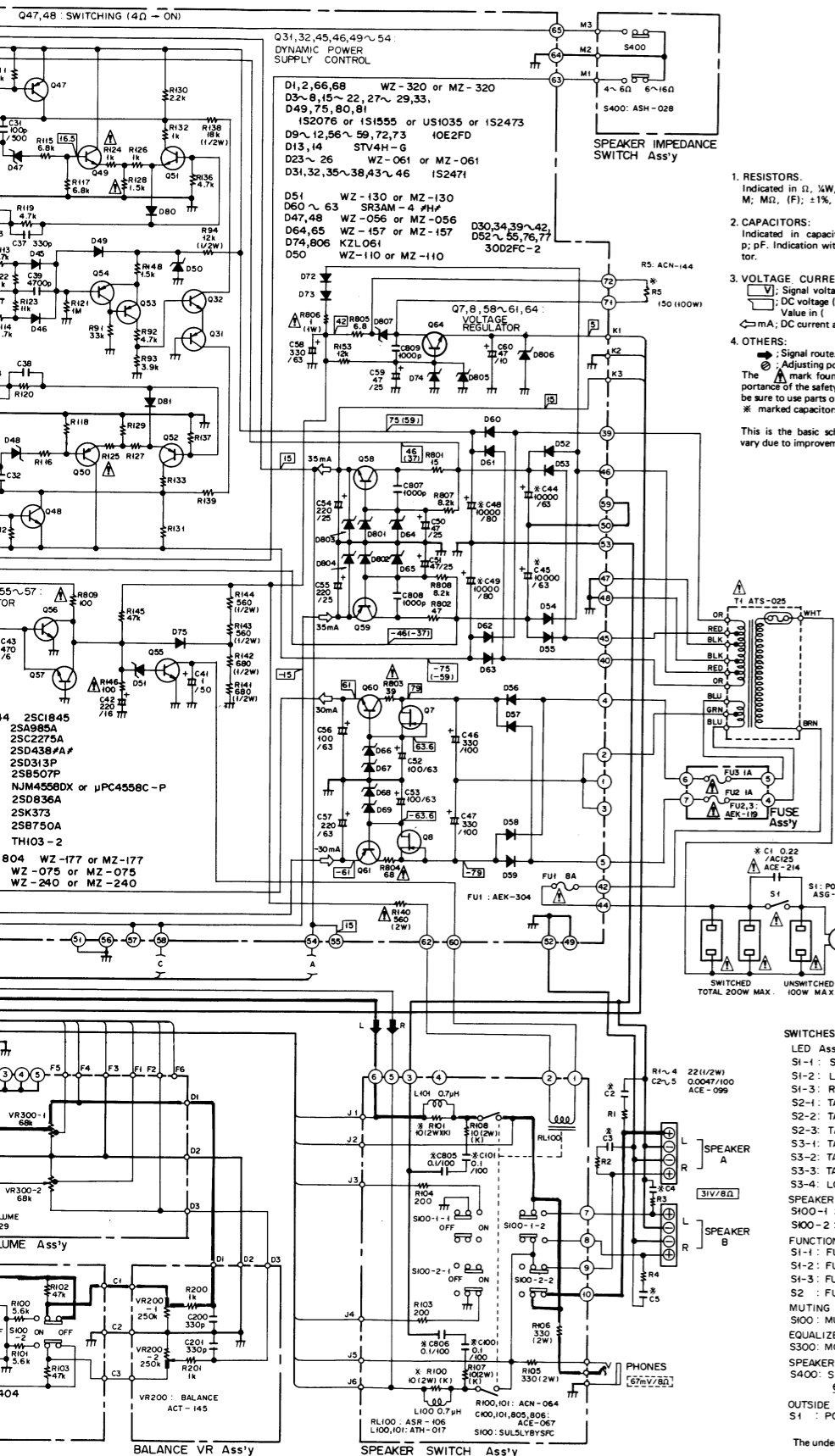
A

B

C

D

**NOTE:**  
 The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.



- RESISTORS:**  
 Indicated in  $\Omega$ ,  $\frac{1}{2}W$ ,  $\frac{1}{4}W$ ;  $\pm 5\%$  tolerance unless otherwise noted k; k $\Omega$ , M, M $\Omega$ , (F);  $\pm 1\%$ , (G);  $\pm 2\%$ , (K);  $\pm 10\%$ , (M);  $\pm 20\%$  tolerance
  - CAPACITORS:**  
 Indicated in capacity ( $\mu F$ )/voltage (V) unless otherwise noted; p; pF. Indication without voltage is 50V except electrolytic capacitor.
  - VOLTAGE CURRENT:**  
 [V]: Signal voltage at (120 W, 120 W, 8 $\Omega$ ) output (1kHz)  
 [DC]: DC voltage (V) at no input signal  
 Value in ( ) is DC voltage at rated power.  
 [mA]: DC current at no input signal
  - OTHERS:**  
 [•]: Signal route.  
 [⊙]: Adjusting point.  
 The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.  
 \* marked capacitors and resistors have parts numbers.
- This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

- SWITCHES:**
- |                               |   |
|-------------------------------|---|
| LED Assy                      | ON - OFF  |
| S1-1: SUBSONIC                | ON - OFF  |
| S1-2: LINE STRAIGHT           | ON - OFF  |
| S1-3: RANGE                   | ON - OFF  |
| S2-1: TAPE COPY OFF           | ON - OFF  |
| S2-2: TAPE COPY 1 = 2         | ON - OFF  |
| S2-3: TAPE COPY 2 = 1         | ON - OFF  |
| S3-1: TAPE MONITOR OFF        | ON - OFF  |
| S3-2: TAPE MONITOR 2          | ON - OFF  |
| S3-3: TAPE MONITOR 1          | ON - OFF  |
| S3-4: LOUDNESS                | ON - OFF  |
| SPEAKER SWITCH Assy           | ON - OFF  |
| S100-1: SPEAKER B             | ON - OFF  |
| S100-2: SPEAKER A             | ON - OFF  |
| FUNCTION SWITCH Assy          | ON - OFF  |
| S1-1: FUNCTION PHONO          | ON - OFF  |
| S1-2: FUNCTION TUNER          | ON - OFF  |
| S1-3: FUNCTION AUX            | ON - OFF  |
| S2: FUNCTION MC/MM            | ON - OFF  |
| MUTING Assy                   | ON - OFF  |
| S100: MUTING (-20dB)          | ON - OFF  |
| EQUALIZER Assy                | ON - OFF  |
| S300: MC/MM SELECTOR          | MC - MM   |
| SPEAKER IMPEDANCE SWITCH Assy | ON - OFF  |
| S400: SPEAKER IMPEDANCE       | 6 $\sim$ 16 $\Omega$ / 12 $\sim$ 32 $\Omega$ - 4 $\sim$ 6 $\Omega$ / 8 $\sim$ 12 $\Omega$ |
- OUTSIDE OF PC BOARD  
 S1: POWER ON - OFF
- The underlined indicates the switch position.

**External Appearances of Transistor and IC's**

<p><b>2SA726S</b></p> <p>Lot No hFE Type No B C E</p>	<p><b>2SB507P</b></p> <p>Type No Suffix Lot No hFE B C E</p>	<p><b>2SK194</b></p> <p>Loss Type No Mark Lot No S G D</p>
<p><b>2SA970</b></p> <p>Type No Lot No hFE E C B</p>	<p><b>2SC2291</b></p> <p>Type No Lot No hFE E1 C1 B C2 E2</p>	<p><b>NJM4558DX μPC4558C-P</b></p> <p>Index</p>
<p><b>2SA1115 2SC2603</b></p> <p>Type No Lot No hFE E C B</p>	<p><b>2SC2259</b></p> <p>Type No Lot No hFE B1 C1 E B2 C2</p>	<p><b>IR2E01</b></p> <p>Index</p>
<p><b>2SA992 2SC1845</b></p> <p>Type No Lot No hFE E C B</p>	<p><b>2SD313P</b></p> <p>Dot Type No Lot No hFE B C E</p>	<p><b>2SK373</b></p> <p>Type No Loss Lot No S G D</p>
<p><b>2SA985A 2SC2275A</b></p> <p>Type No Lot No hFE B C E</p>	<p><b>2SD438/A/</b></p> <p>Type No Lot No hFE E C B</p>	<p><b>2SA1145/A/ 2SC2705/A/</b></p> <p>Type No Lot No hFE E C B</p>
<p><b>2SA968 2SB750A 2SC2238 2SD836A</b></p> <p>Type No Lot No hFE B C E</p>	<p><b>2SK34-D</b></p> <p>Lot No Loss Type No S G D</p>	
<p><b>2SA1104 2SA1294 2SC2579 2SC3263</b></p> <p>Type No Lot No hFE B C E</p>	<p><b>2SK129A</b></p> <p>Loss Type No Mark Lot No S G D</p>	

A

B

C

D

# 10. ELECTRICAL PARTS LIST

**NOTES:**

• When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω 56 x 10<sup>1</sup> 561 ..... RD¼PS 561J  
 47kΩ 47 x 10<sup>3</sup> 473 ..... RD¼PS 473J  
 0.5Ω 0R5 ..... RN2H 0R5K  
 1Ω 010 ..... RS1P 010K

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ 562 x 100 5621 ..... RN¼SR 5621F

• The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

• For your Parts Stock Control, the fast moving items are indicated with the marks **★★** and **★**.

**★★** GENERALLY MOVES FASTER THAN **★**.

This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

**Miscellaneous Parts List**

**P.C. BOARD ASSEMBLIES**

Mark	Part No.	Symbol & Description
	GWF-154	Equalizer assembly
	GWK-225	AF Assembly
	GWX-827	LED Assembly
	GWS-438	Function switch assembly Speaker switch assembly
		Speaker impedance switch assembly Muting switch assembly Main volume assembly Balance volume assembly Input terminal assembly
		Fuse assembly

**SEMICONDUCTORS**

Mark	Part No.	Symbol & Description
<b>★★</b>	2SC3263-O* (2SC3263-Y*)	Q1, Q2
<b>★★</b>	2SA1294-O* (2SA1294-Y*)	Q3, Q4
<b>★★</b>	2SA1104-O* (2SA1104-Y*)	Q5, Q6
<b>★★</b>	2SC2579-O* (2SC2579-Y*)	Q7, Q8

\*hfe must have the same value.

**OTHERS**

Mark	Part No.	Symbol & Description
$\Delta$ <b>★★</b>	ASG-545	Push switch (POWER)
$\Delta$	ACE-214	C1 (0.22/AC 125V)
	ACE-099	C2 - C5 Mylar (0.0047/100V)
	ACN-144	R5 Wire wound (150/10W)
	RD1/2PSF220J	R1 - R4

Mark	Part No.	Symbol & Description
$\Delta$ <b>★</b>	ATS-025	T1 Power transformer (120V)
$\Delta$ <b>★★</b>	AEK-304	FU1 Fuse (8A)
$\Delta$ <b>★★</b>	AEK-119	FU2, FU3 Fuse (1A)
$\Delta$	ADG-052	AC power cord
$\Delta$	AKP-501	AC socket
	AKE-055	Terminal (SPEAKERS)

**Equalizer Assembly (GWF-154)**

**SEMICONDUCTORS**

Mark	Part No.	Symbol & Description
<b>★★</b>	2SK194	Q300, Q301
<b>★★</b>	2SC2291	Q302, Q303
<b>★★</b>	2SA726S	Q304, Q305
<b>★★</b>	NJM4558DX ( $\mu$ PC4558C-P)	Q306, Q307
<b>★</b>	1S2076 (US1035) (1S2473) (1S1555)	D300, D301

**SWITCHES**

Mark	Part No.	Symbol & Description
<b>★★</b>	ASX-175	S300 Remote slide switch (MC/MM)

**CAPACITORS**

Mark	Part No.	Symbol & Description
	ACE-073	C300 Mylar (0.039/100V)
	ACE-066	C301, C302 Mylar (0.01/100V)
	ACE-076	C311, C312 Mylar (0.018/100V)
	ACE-077	C307, C308 Mylar (0.068/100V)
	ACE-086	C309, C310 Mylar (0.0012/100V)
	ACE-093	C315, C316 Mylar (0.0039/100V)
	ACH-444	C313, C314 Electrolytic (22/50V, NP)
	CQSA 331J 50	C303, C304
	CQSA 821J 50	C305, C306
	CEA 101M 25L	C317, C318

**RESISTORS**

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	RDH1/8P 0000J	R326 - R331, R336, R337
	RDH1/8P 0000 F	R332 - R335
$\Delta$	RFA1/4PS330J	R342, R343
	RD1/4PM 000JNL	R308, R309, R314 - R317
	RD1/4PM 000J	Other resistors

**OTHERS**

Mark	Part No.	Symbol & Description
	AKB-095	Terminal (INPUT)

**AF Assembly (GWK-225)**

**SEMICONDUCTORS**

Mark	Part No.	Symbol & Description
<b>★★</b>	2SA1115	Q17 - Q20, Q47, Q53, Q54
<b>★★</b>	2SA1145/A/	Q11, Q12, Q25, Q26, Q50, Q52
<b>★★</b>	2SA968	Q29, Q30
<b>★★</b>	2SA985A	Q45
<b>★★</b>	2SA992	Q9, Q10, Q31
<b>★★</b>	2SB507P	Q61
<b>★★</b>	2SB750A	Q59
<b>★★</b>	2SC1845	Q32, Q43, Q44
<b>★★</b>	2SC2238	Q27, Q28
<b>★★</b>	2SC2259	Q5, Q6

Mark	Part No.	Symbol & Description
<b>★★</b>	2SC2275 A	Q46
<b>★★</b>	2SC2291	Q3, Q4
<b>★★</b>	2SC2603	Q15, Q16, Q21, Q22, Q48, Q56, Q57
<b>★★</b>	2SC2705/A/	Q13, Q14, Q23, Q24, Q49, Q51
<b>★★</b>	2SD313P	Q60
<b>★★</b>	2SD438/A/	Q55
<b>★★</b>	2SD836A	Q58, Q64
<b>★★</b>	2SK129A	Q1, Q2
<b>★★</b>	2SK373	Q7, Q8
<b>★★</b>	NJM4558-DX ( $\mu$ PC4558C-P)	Q63
<b>★</b>	TH103-2	TH1, TH2
<b>★</b>	STV4H-G	D13, D14
<b>★</b>	WZ-177 (MZ-177)	D801 - D804
<b>★</b>	WZ-075 (MZ-075)	D805
<b>★</b>	WZ-240 (MZ-240)	D807
<b>★</b>	1S2076 (1S2473) (US1035) (1S1555)	D3 - D8, D15 - D22, D27 - D29 D33, D49, D75, D80, D81
<b>★</b>	1S2471	D31, D32, D35 - D38, D43 - D46
<b>★</b>	10E2FD	D9 - D12, D56 - D59, D72, D73
<b>★</b>	SR3AM-4/H/	D60 - D63
<b>★</b>	30D2FC-2	D30, D34, D39, D40 - D42, D52 - D55, D76, D77
<b>★</b>	KZL061	D74, D806
<b>★</b>	WZ-056 (MZ-056)	D47, D48
<b>★</b>	WZ-061 (MZ-061)	D23 - D26
<b>★</b>	WZ-110 (MZ-110)	D50
<b>★</b>	WZ-130 (MZ-130)	D51
<b>★</b>	WZ-157 (MZ-157)	D64, D65
<b>★</b>	WZ-290 (MZ-290)	D67, D69
<b>★</b>	WZ-320 (MZ-320)	D1, D2, D66, D68

**CAPACITORS**

Mark	Part No.	Symbol & Description
	ACH-247	
	ACH-254	
	ACE-066	
	CMA 020D 500	
	CMA 390J 500	
	CEXANP 330M 2	
	CEXA 470M 50	
	CEA 010M 50L	
	CEA 221M 16L	
	CEA 221M 25L	
	CEA 101M 63L	
	CEA 221M 63L	
	CEA 331M 63L	
	CEA 331M 100L	
	CEA 470M 10L	
	CEA 470M 25L	
	CEA 471M 6L	
	CEANP 2R2M 50	
	CQMA 332J 50	
	CQMA 103K 400	

**RESISTORS**

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	ACN-039	
$\Delta$	ACN-139	
$\Delta$	RS1LF 010J	
$\Delta$	RS2L 561J	
<b>★</b>	C92-063	
$\Delta$	RD1/2PSF622J	
$\Delta$	RD1/4PMFL 000J	
$\Delta$	RD1/4PS 000J	
$\Delta$	RD1/4PMF 000J	
$\Delta$	RD1/2PS 000J	

## CAPACITORS

Mark	Part No.	Symbol & Description
	ACH-247	C48, C49 Electrolytic (10000/80V)
	ACH-254	C44, C45 Electrolytic (10000/63V)
	ACE-066	C13, C14, C95 - C98 Mylar (0.01/100V) C27, C28
	CMA 020D 500	C9, C10, C801, C802
	CMA 390J 500	
	CEXANP 330M 25	C7, C8
	CEXA 470M 50	C5, C6
	CEA 010M 50L	C41
	CEA 221M 16L	C42
	CEA 221M 25L	C54, C55
	CEA 101M 63L	C52, C53, C56
	CEA 221M 63L	C57
	CEA 331M 63L	C58
	CEA 331M 100L	C46, C47
	CEA 470M 10L	C60
	CEA 470M 25L	C50, C51, C59
	CEA 471M 6L	C43
	CEANP 2R2M 50	C25, C26
	CQMA 332J 50	C15, C16
	CQMA 103K 400	C65, C66
	CCDSL 680K 500	C17 - C20
	CCDSL 221J 50	C803, C804
	CCDSL 101K 500	C31, C32
	CKDYB 472K 50	C39
	CKDYB 182K 50	C35, C36
	CDKYB 331K 50	C3, C4, C11, C12, C37, C38
	CKDYB 102K 50	C807 - C809

## RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	ACN-039	R89, R90, R95, R96 (Wire wound, 0.22/2W)
△	ACN-139	R85, R86 (Wire wound, 0.33/5W)
△	RS1LF 010J	R806
△	RS2L 561J	R140
★	C92-063	VR1, VR2 (Semi-fixed, 100)
△	RD1/2PSF622J	R69, R70
△	RD1/4PMFL○○○J	R103, R104, R124, R125, R128, R129
△	RD1/4PS○○○J	R39, R40, R43 - R52, R55, R56 R65, R66, R75 - R84, R146, R156, R157, R801 - R805, R809
△	RD1/4PMF○○○J	R57, R58, R63, R64, R71 - R74 R7, R8, R23 - R26, R41, R42, R87, R88, R95, R101, R102, R105, R106, R109, R110, R138, R139, R141 - R144, R201
△	RD1/2PS○○○J	

## OTHERS

Mark	Part No.	Symbol & Description
	PBZ30P060FMC	Screw (3 x 6)

## LED Assembly (GWX-827)

## SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	IR2E01	Q1
★	1S2471	D1, D2
★	1S1555	D3
★	AEL-404	DL1 - DL6, DL9 - DL12, DL16 - DL20 LED (Red)
★	AEL-388	DL7, DL8 LED (Red)
★	AEL-398	DL13 - DL15 LED (Red)

## SWITCHES

Mark	Part No.	Symbol & Description
★★	SEA5V4B3B2S	S1 Push switch (SUBSONIC, LINE STRAIGHT, RANGE)
★★	SEA5V044L	S2 Push switch (TAPE COPY)
★★	ASG-810	S3 Push switch (TAPE MONITOR, LOUDNESS)
★★	ASR-072	RL1 Relay

## CAPACITORS

Mark	Part No.	Symbol & Description
	CEA R22M 50L	C1, C2
	CEA R68M 100L	C23
	CEA 4R7M 50L	C15, C16
	CEA 220M 25L	C18
	CEA 010M 50L	C19
	CEA 470M 25L	C17
	CQMLA 154K 50	C5, C6
	CQMLA 562K 50	C7, C8
	CQMA 124K 50	C13, C14
	CQMA 273K 50	C9, C10
	CQMA 333K 50	C11, C12
	CCDSL 020C 500	C24, C25
	CKDYB 391K 50	C3, C4
	CKDYB 222K 50	C21, C22

## RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
★	ACX-117	VR1, VR2 Slide variable (BASS, TREBLE)
	RD1/4PM○○○J	Other resistors

## Speaker Switch Assembly

## CAPACITORS

Mark	Part No.	Symbol & Description
	ACE-068	C100, C101 Mylar (0.047/100V)

## RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	ACN-064	R100, R101 Wire wound (10/2W)
	RS2P331J	R105, R106
	RS2P100J	R107, R108
	RD1/4PM201J	R103, R104

## OTHERS

Mark	Part No.	Symbol & Description
★★	SUL5LYBYSFC	S100 Push switch (SPEAKERS)
★★	ASR-106	RL100 Relay
	ATH-017	L100, L101 AF choke
	AKN-050	Phone jack (PHONES)

## Speaker Impedance Switch Assembly

Mark	Part No.	Symbol & Description
★★	ASH-028	S400 Slide switch (SPEAKER IMPEDANCE)

## Muting Switch Assembly

## RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	RD1/4PM○○○J	R100 - R104

## OTHERS

Mark	Part No.	Symbol & Description
★	AEL-404	DL100 LED (Red)
★★	SEAV4S	S100 Push switch (MUTING)

## Main Volume Assembly

Mark	Part No.	Symbol & Description
★	ACW-129	VR300 (VOLUME)

## Balance Volume Assembly

## CAPACITORS

Mark	Part No.	Symbol & Description
	CQSH 331K 50	C200, C201

## RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
★	ACT-145	VR200 (BALANCE)
	RD1/4PM102J	R200, R201

## Input Terminal Assembly

Mark	Part No.	Symbol & Description
	AKB-094	Terminal (TAPE)

## Function Switch Assembly (GWS-438)

## SWITCHES

Mark	Part No.	Symbol & Description
★★	SUL5L4B4B4LFC	Push switch (PHONO, TUNER, AUX)
★★	ASX-191	Remote push switch (MC/MM)

## RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	RD1/4PM○○○J	R1 - R11

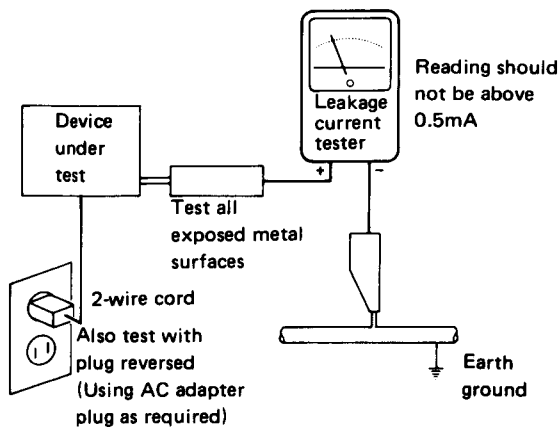
# 11. SAFETY INFORMATION

## 1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

### LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

## 2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a  $\Delta$  on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which does not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

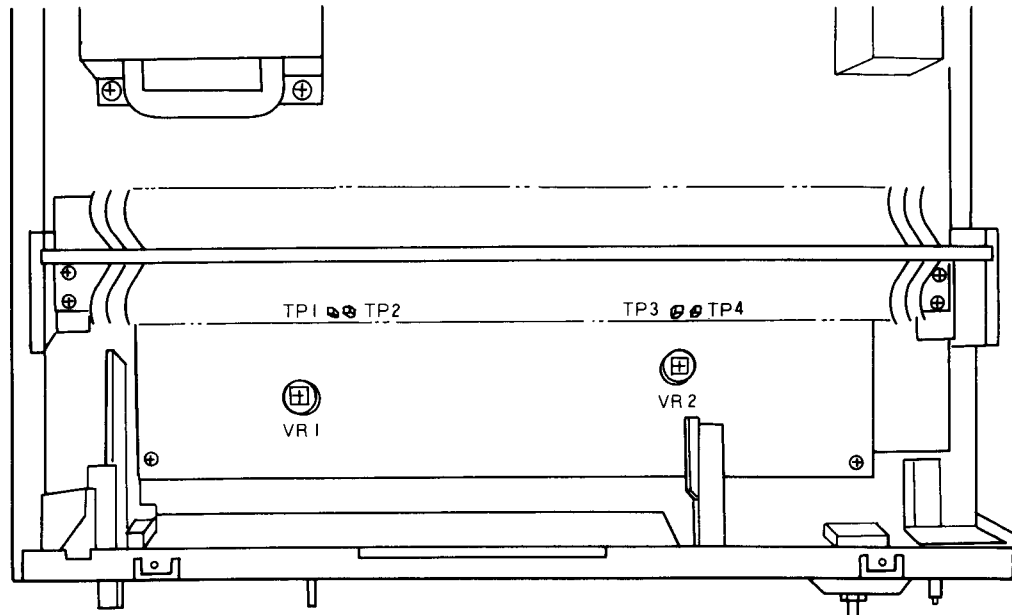
Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

## 12. ADJUSTMENTS

1. Turn the VOLUME control down to minimum volume, and switch the LINE STRAIGHT switch on.
2. Rotate VR1 and VR2 counter clockwise.
3. Switch the power on with no input and no load applied to the unit.
4. Adjust VR1 to obtain a reading of  $46\text{mV} \pm 20\text{mV}$  between TP1 ( + ) and TP2 ( - ).
5. Adjust VR2 to obtain a reading of  $46\text{mV} \pm 20\text{mV}$  between TP4 ( + ) and TP3 ( - ).
6. Readjust after aging for at least 10 minutes.

**Reference:**

Center DC output voltage tolerance:  $\pm 50\text{mV}$ .



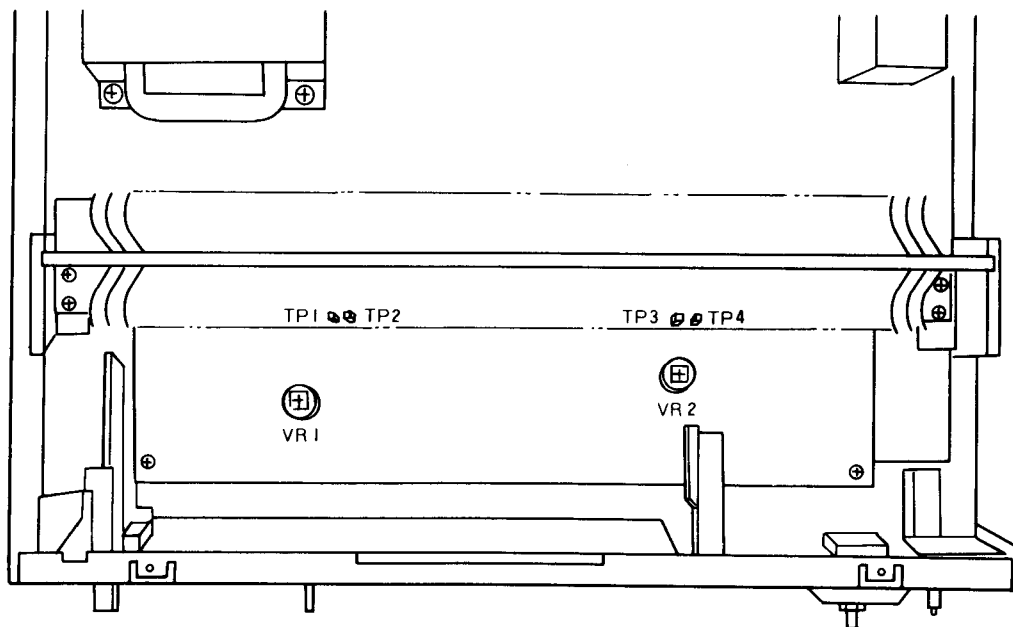


## 12. RÉGLAGE

1. Turn the VOLUME control down to minimum volume, and switch the LINE STRALIGHT switch on.
2. Rotate VR1 and VR2 counter clockwise.
3. Switch the power on with no input and no load applied to the unit.
4. Adjust VR1 to obtain a reading of  $46\text{mV} \pm 20\text{mV}$  between TP1 (+) and TP2 (-).
5. Adjust VR2 to obtain a reading of  $46\text{mV} \pm 20\text{mV}$  between TP4 (+) and TP3 (-).
6. Readjust after aging for at least 10 minutes.

Reference:

Center DC output voltage tolerance:  $\pm 50\text{mV}$ .



## 12. AJUSTE

1. Baisser le réglage du VOLUME sur le niveau minimum et placer le commutateur LINE STRAIGHT sur la position de marche (ON).
2. Tourner VR1 et VR2 dans le sens contraire des aiguilles d'une montre.
3. Enclencher l'alimentation, alors qu'aucune entrée et aucune charge n'est appliquée à l'appareil.
4. Régler VR1 de façon à obtenir une valeur de  $46\text{mV} \pm 20\text{mV}$  entre TP1 (+) et TP2 (-).
5. Régler VR2 de façon à obtenir une valeur de  $46\text{mV} \pm 20\text{mV}$  entre TP4 (+) et TP3 (-).
6. Réajuster après avoir procédé au vieillissement pendant au moins 10 minutes.

Référence:

Tolérance sur la tension de sortie continue centrale:  
 $\pm 50\text{mV}$ .

