



Service Manual

STEREO AMPLIFIER

SA-710

 PIONEER®

MODEL SA-710 COMES IN ONE VERSION DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
KU	120V only	U.S.A. model

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1. SPECIFICATIONS

Semiconductors

ICs	3
Transistors	34
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Amplifier Section

Continuous power output of 65watts* per channel, min., at 8ohms from 20Hertz to 20,000 Hertz with no more than 0.02% total harmonic distortion.

Total Harmonic Distortion (20 Hertz to 20,000 Hertz, 8 ohms, from AUX)
32.5 watts per channel power output
. No more than 0.015%

Intermodulation Distortion (50 Hertz : 7,000 Hertz = 4 : 1
8 ohms, from AUX)
continuous rated power output . . . No more than 0.02%
32.5 watts per channel power output
. No more than 0.015%

Damping Factor (20 Hertz to 20,000 Hertz, 8 ohms) . . 60
Input (Sensitivity/Impedance)

PHONO	2.5mV/50 kilohms
TUNER	150mV/50 kilohms
AUX	150mV/50 kilohms
TAPE PLAY 1, 2	150mV/50 kilohms

Phono Overload Level (T.H.D. 0.01%, 1,000Hz)
PHONO 220mV
Output (Level)
TAPE REC 1, 2 150mV
Speaker A, B, OFF

Frequency Response

PHONO (RIAA Equalization) 20Hz to 20,000Hz ± 0.2 dB
TUNER, AUX, TAPE PLAY 1, 2 10Hz to 100,000Hz $\begin{matrix} +0 \\ -1 \end{matrix}$ dB

Tone Control

BASS	± 10 dB (100Hz)
TREBLE	± 10 dB (10,000Hz)
Subsonic Filter	15Hz (-6dB/oct)
Loudness Contour (Volume control set at -40dB position) +6dB (100Hz), +3dB (10,000Hz)
Hum and Noise (IHF, short-circuited, A network)	
PHONO	87dB
TUNER, AUX, TAPE PLAY 1, 2	108dB

Miscellaneous

Power Requirements	AC 120V, 60Hz
Power Consumption	130W (UL)
Dimensions	420(W) x 94(H) x 347(D) mm 16-9/16(W) x 3-11/16(H) x 13-11/16(D) in
Weight (without package)	7.5kg (16 lb 9oz)

Furnished Parts

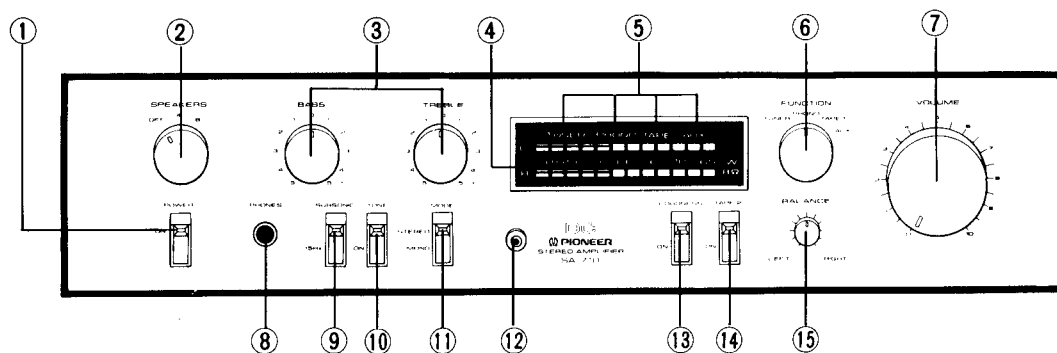
Operating Instructions	1
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NOTE:

Specifications and the design subject to possible modifications without notice due to improvements.

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

2. FRONT PANEL FACILITIES



① POWER SWITCH

Set this switch to ON to supply power to the amplifier. There will be a short delay when it is set to ON, because the muting circuit has been actuated to suppress the unpleasant noise that is sometimes generated when the power is on and off.

② SPEAKER SELECTOR

Use this selector to select the speaker system.

OFF: Sound not obtained from speakers.

A: Sound obtained from speakers connected to the A speaker terminals.

B: Sound obtained from speakers connected to the B speaker terminals.

③ BASS AND TREBLE CONTROLS

Use these controls to adjust the bass and the treble. If you set the tone switch to ON and turn the bass control to right from its center position, you will be able to emphasize the sound in the low-frequency range. Conversely, turning the bass control to the left from the center position, you will attenuate the sound.

You can use the treble control to adjust the sound in the high-frequency range.

④ POWER METER

This meter allows you to read out the rated power level on the fluorescent display tube when speakers with a nominal impedance of 8 ohms are connected to the amplifier's speaker terminals.

⑤ FUNCTION INDICATORS

The TUNER, PHONO, TAPE, AUX function indicators light up in accordance with the position of the function selector.

⑥ FUNCTION SELECTOR

Use this selector to select the program source. When set, the function indicator above the meter panel corresponding to the position of the function selector will light up.

TUNER: Set here when listening to broadcasts on a tuner connected to the TUNER jacks.

(The TUNER function indicator lights up.)

PHONO: Set here when playing records on a turntable connected to the PHONO jacks.

(The PHONO function indicator lights up.)

TAPE 1: Set here when playing tapes on the tape deck connected to the TAPE 1 jacks.

(The TAPE function indicator lights up.)

AUX: Set here when listening to a program source which is connected to the AUX jacks.

(The AUX function indicator lights up.)

⑦ VOLUME CONTROL

Use this control to adjust the output level to the speakers and headphones. Turn it clockwise to increase the output level. No sound will be heard if you set it to "0."

⑧ HEADPHONE JACK

Plug the headphones into this jack when you want to listen through your stereo headphones.

NOTE:

Set the speaker selector to OFF when listening only with headphones.

⑨ SUBSONIC FILTER SWITCH

When this switch is set to the 15Hz position, the subsonic filter with a cut-off frequency of 15Hz is actuated. The subsonic filter serves to attenuate frequencies lower than 15Hz in a 6dB/oct slope. It is therefore effective in suppressing ultra-low-frequency noise which is generated by record warp and other causes. You cannot actually hear this noise but it is a factor in the generation of intermodulation distortion and it may damage your speaker system. Set this switch to the 15Hz position during record play for the best effect.

⑩ TONE SWITCH

Set this switch to ON when adjusting the bass and treble controls. When set to the upper (OFF) position, the tone control circuits are disengaged and frequency response is flat. This function is convenient for checking phono cartridge and speaker tone quality and listening room acoustics.

⑪ MODE SELECTOR

Use this selector for selecting the performances.

STEREO: Set to this position for normal stereo reproduction.

MONO: Mixes left and right channel signals and reproduces them monophonically.

⑫ POWER INDICATOR

When the power switch is set to ON this lamp lights up, indicating the amplifier is turned on.

⑬ LOUDNESS SWITCH

When listening to a performance with the volume control turned down, set this switch to ON and the bass and treble will be accentuated.

When the volume is low, the human ear finds it harder to hear the bass and treble than when the volume is high. The loudness switch is thus designed to compensate for this deficiency. By setting it to ON, the bass and treble come through much more strongly and the sound takes on a punch even when the volume control is turned down.

⑭ TAPE 2 SWITCH

Set this switch to the ON position when monitoring a tape performance on a tape deck which you have connected to the TAPE 2 jacks or when monitoring a recording.

NOTE:

Set the switch to the upper (OFF) position when listening to records or broadcasts, etc. selected by the function selector.

⑮ BALANCE CONTROL

Use this control to balance the volume of the left and right channels. First, however, set the mode selector to MONO, and adjust so that the sound appears to come from somewhere exactly between the two speakers. If the sound appears to be louder on the right, it means that the volume of the right channel is higher. Turn the balance control to the left and adjust.

Conversely, if the sound appears to be louder on the left, it means that the volume of the left channel is higher. Therefore, turn the balance control to the right and adjust. After adjusting, return the mode selector to STEREO.

3. DISASSEMBLY

Bonnet Case

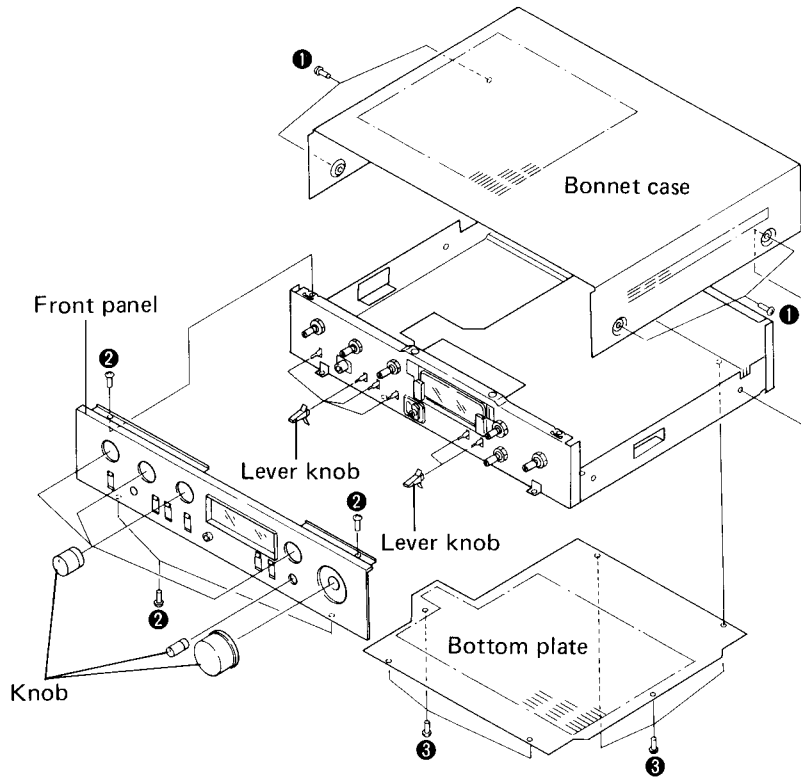
Remove the four screws ❶.

Bottom Plate


Remove the six screws ❸.

Front Panel

Remove the four screws ❷.



4. PARTS LOCATION

- The  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.

Front Panel View

Knob (SPEAKERS, BASS, TREBLE)
AAB-222

Knob (FUNCTION)
AAB-222

Front panel assembly
ANB-846

Knob (VOLUME)
AAB-221

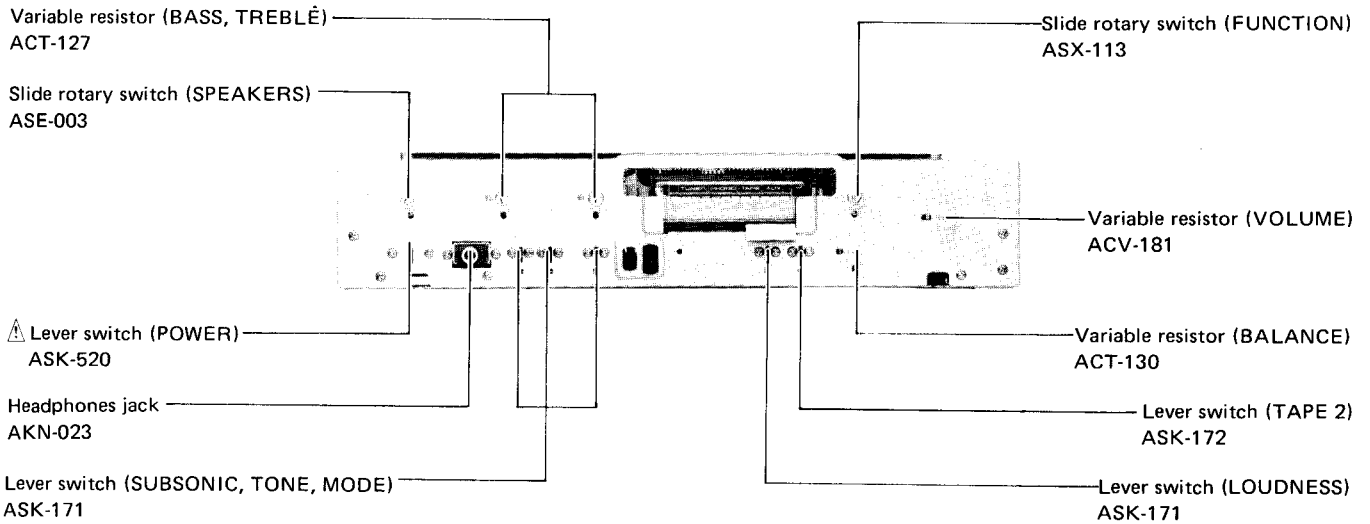
Lever knob (POWER)
AAD-200

Knob (BALANCE)
AAB-223

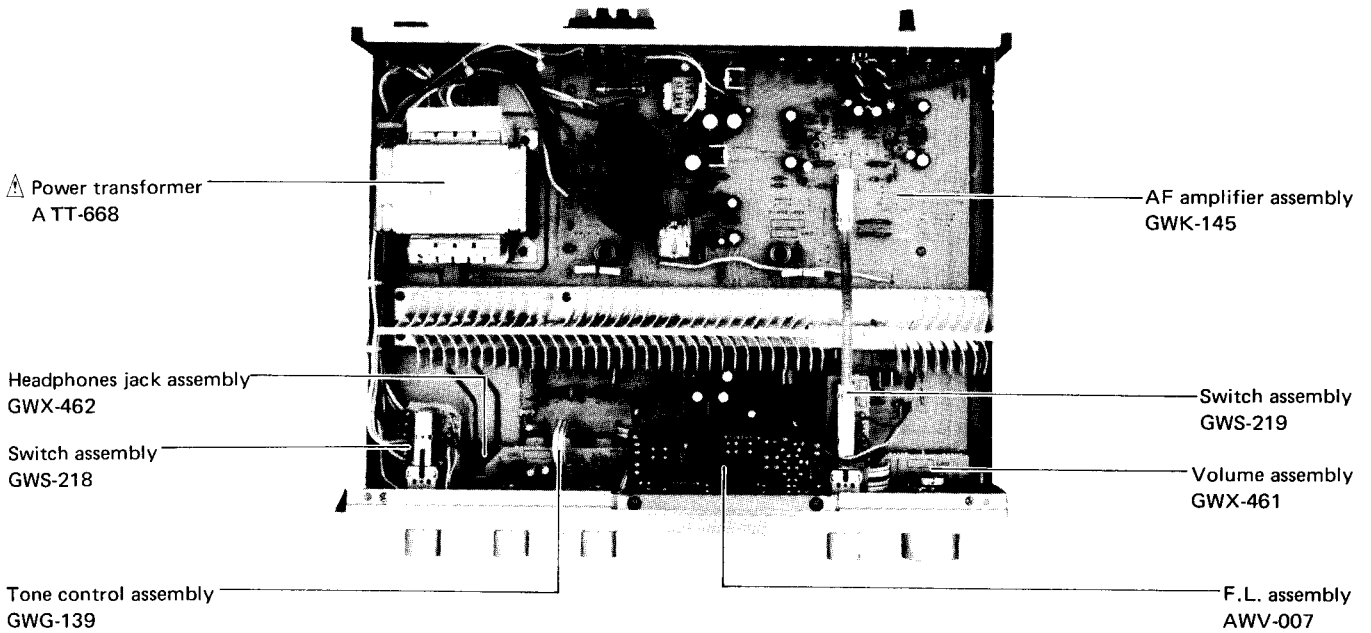
Lever knob (SUBSONIC, TONE, MODE)
AAD-200

Lever knob (LOUDNESS, TAPE2)
AAD-200

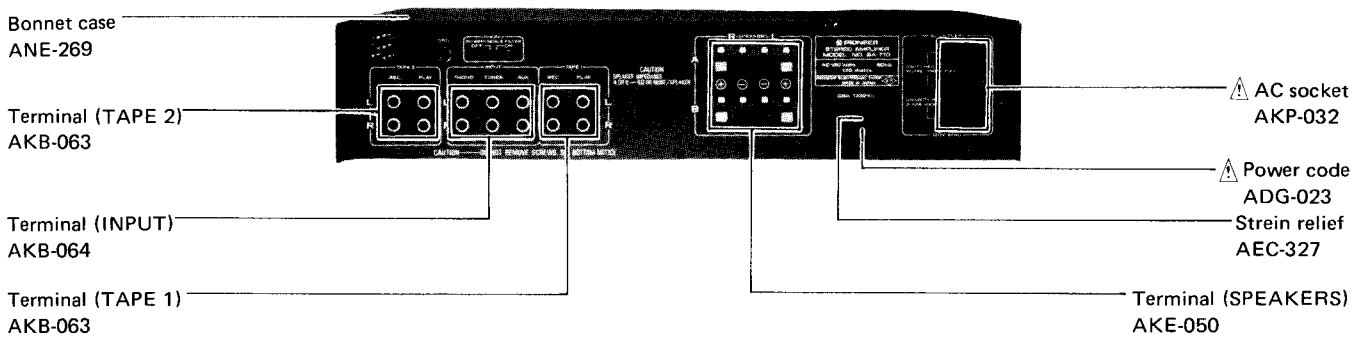
Front View with Front Panel Removed



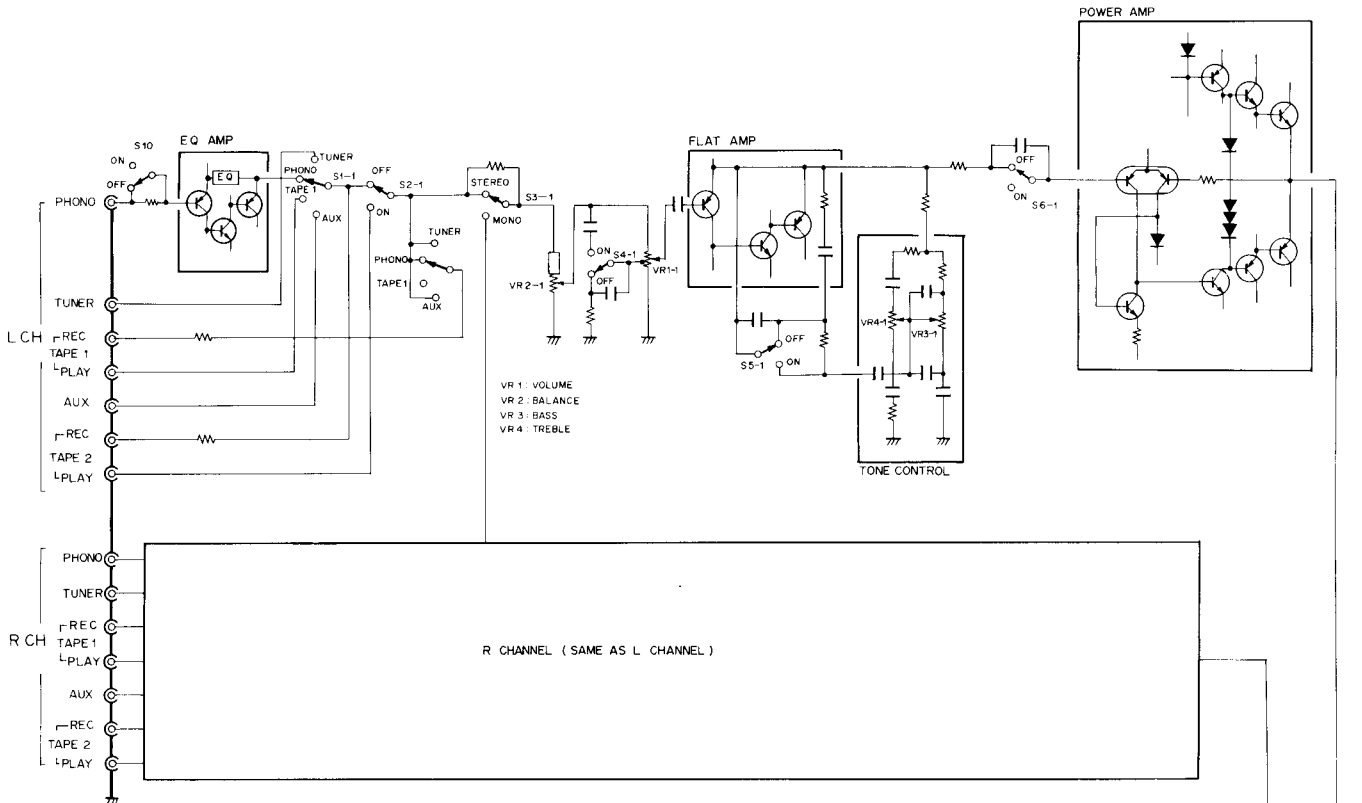
Top View with Bonnet Removed



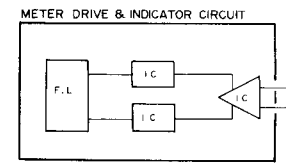
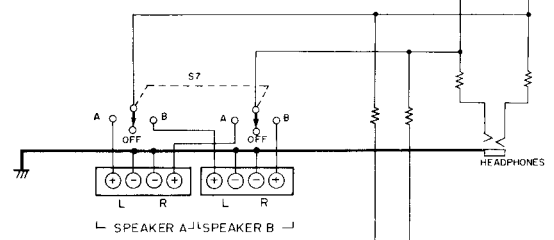
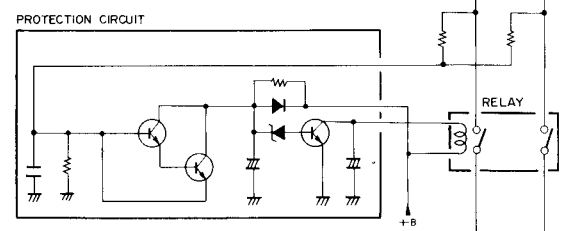
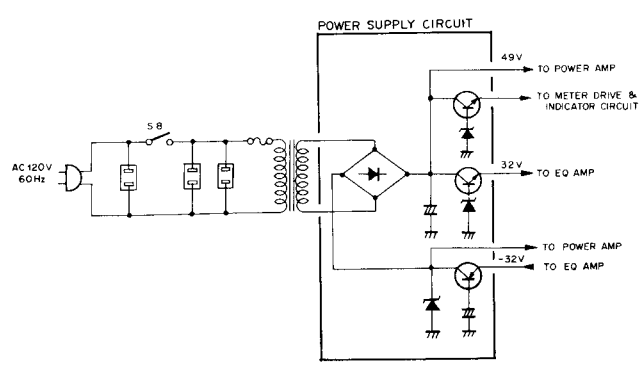
Rear Panel View



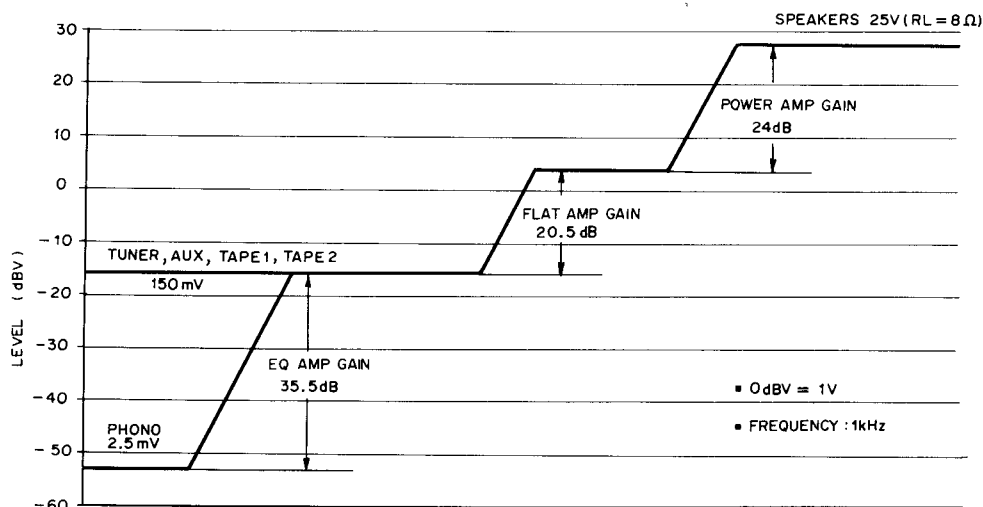
5. BLOCK DIAGRAM



- SWITCHES:
- S1 FUNCTION: TUNER — PHONO — TAPE 1 — AUX / TV
 - S2 TAPE 2: ON — OFF
 - S3 MODE: STEREO — MONO
 - S4 LOUDNESS: ON — OFF
 - S5 TONE: ON — OFF
 - S6 SUBSONIC (15Hz): ON — OFF
 - S7 SPEAKER: OFF — A — B
 - S8 POWER: ON — OFF
 - S10 PHONO INTERFERENCE: ON — OFF



6. LEVEL DIAGRAM



7. CIRCUIT DESCRIPTIONS

Equalizer Amplifier

The SA-710 features a 3-stage direct-coupled equalizer amplifier for greater reduction of noise and distortion.

Besides the use of an ultra low-noise transistor (2SA978) in the first stage, the adoption of low impedance input resistance and equalizer circuit has contributed to an S/N ratio of at least 87dB (at 2.5mV input, IHF-A). The 2nd stage load has been reduced, a large output voltage obtained, and the output impedance lowered by using an emitter follower at the output stage.

Power Amplifier

This all stage direct-coupled pure complementary SEPP circuit features a current mirror load differential amplifier in the first stage.

The power amplifier stage is a complementary 2-stage Darlington connection, resulting in an output power rating of 65W + 65W (8Ω, 20Hz - 20kHz), harmonic distortion of less than 0.02% (20Hz - 20kHz at rated output), and output power bandwidth of 5Hz - 40kHz (0.04% THD). Certainly a superb performance for an amplifier of this class is obtained.

Protection Circuit

Besides protecting the speakers if a DC voltage should happen to appear at the power amplifier stage outputs, this circuit also mutes the signal path when the power switch is turned on and off. (See Fig. 7-1).

If for any reason a DC voltage (in excess of about ±5V) should happen to appear in the output

of the power amplifier stage, it is detected immediately by either Q25 or Q26. Q25 is turned on by a positive voltage, and Q26 by a negative voltage. In either case, Q27 is also turned off, thereby opening the relay contact to disconnect the power amplifier stage from the speakers.

The muting action when the power switch is turned on is achieved by delaying the rise of the Q27 base potential by means of the R110/C74 time constant circuit. When the power switch is turned on, C74 is charged up via R110, thereby increasing the voltage across both ends of this capacitor. When this voltage exceeds the zener voltage of the D13 zener diode, Q27 is biased in the forward direction, and is thereby turned on to close the relay contact.

When the power switch is turned off, C74 discharges rapidly via D14, resulting in Q27 being turned off, thereby opening the relay contact.

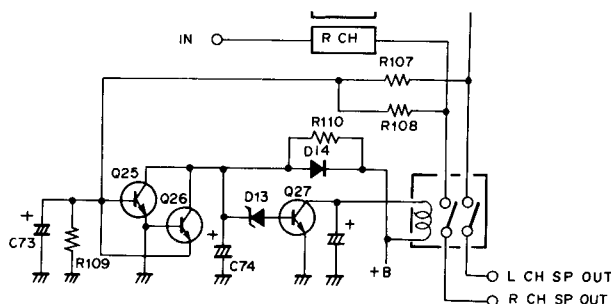


Fig. 7-1 Protection circuit

8. ADJUSTMENTS

8.1 IDLE CURRENT ADJUSTMENT

1. Set the SPEAKERS selector to the A position, and connect an 8Ω resistor to the speaker output terminals.
2. Turn the VOLUME control down to minimum level, turn the power on, and wait about 10 minutes.
3. Connect a DC voltmeter to the TP terminals (L ch; TP23 \oplus and TP22 \ominus , R ch; TP20 \oplus and TP21 \ominus) of the AF Amplifier Assembly (GWK-145).
4. Check that the voltage between TP22 and TP23 (L ch), and TP20 and TP21. If the voltage is less than 4.4mV , cut jumper wire A (L ch), and jumper B (R ch).

8.2 OUTPUT INDICATOR ADJUSTMENT

1. Set the TONE CONTROL to the center position.
2. Set the SPEAKERS selector to the A position, and connect an 8Ω resistor and AC voltmeter to the speaker output terminals.
3. Set the FUNCTION switch to the AUX position, and apply a 1kHz , 150mV signal to the AUX terminals.
4. Adjust the VOLUME control so that the voltage on the output terminals (SPEAKERS) read 9V (AC).
5. Adjust VR1 (L ch) and VR2 (R ch) of the indicator assembly so that the output power indicator read 10 watts.

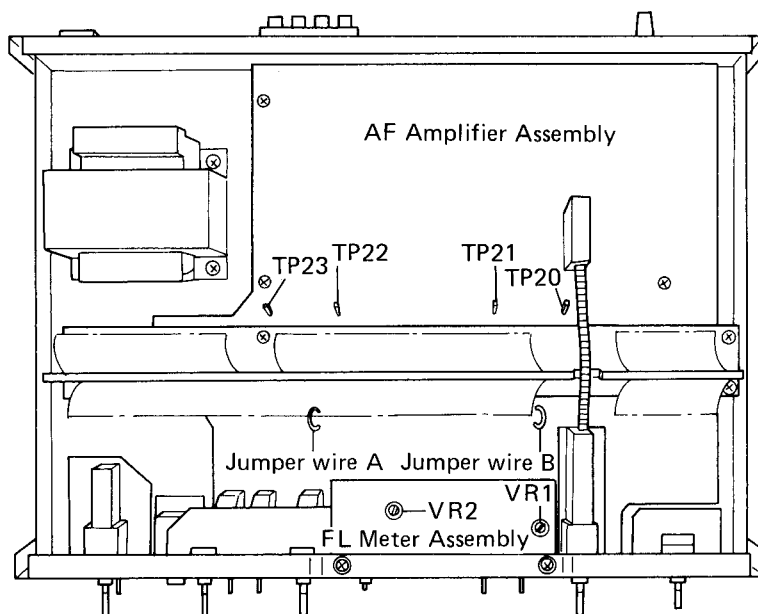
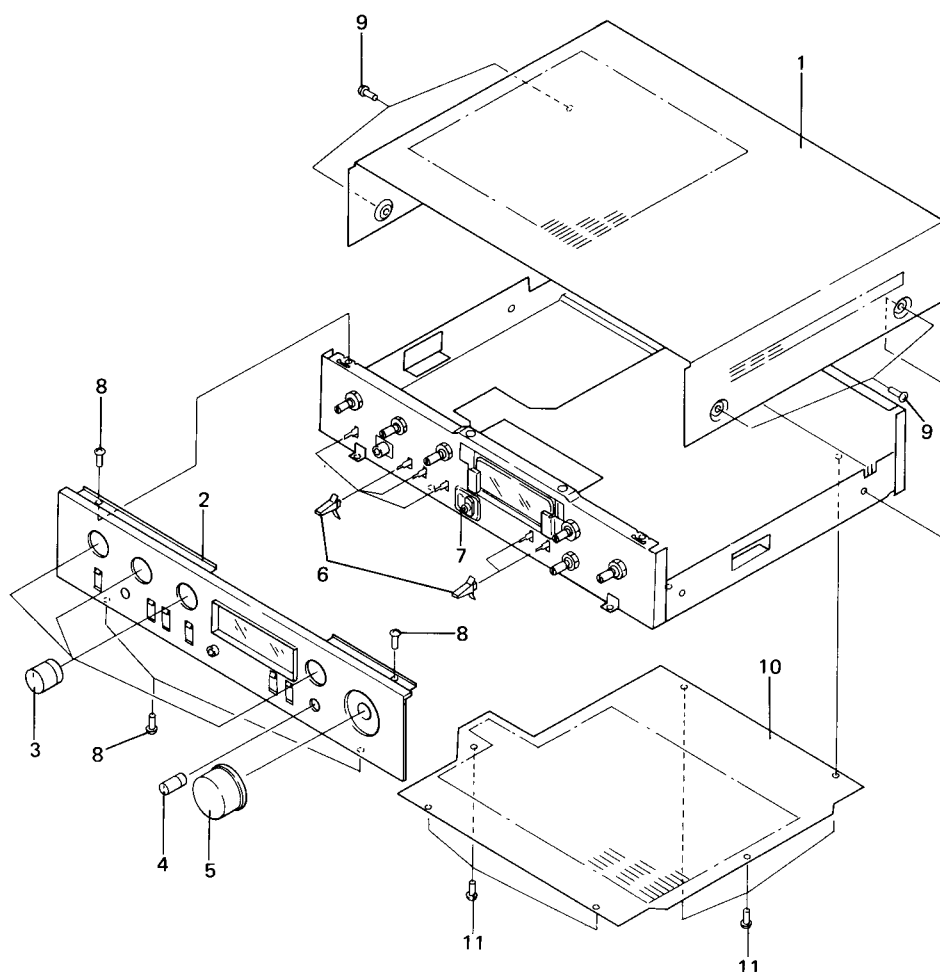


Fig. 8-1 Adjustment point


9. EXPLODED VIEW AND PARTS LIST

Exterior component



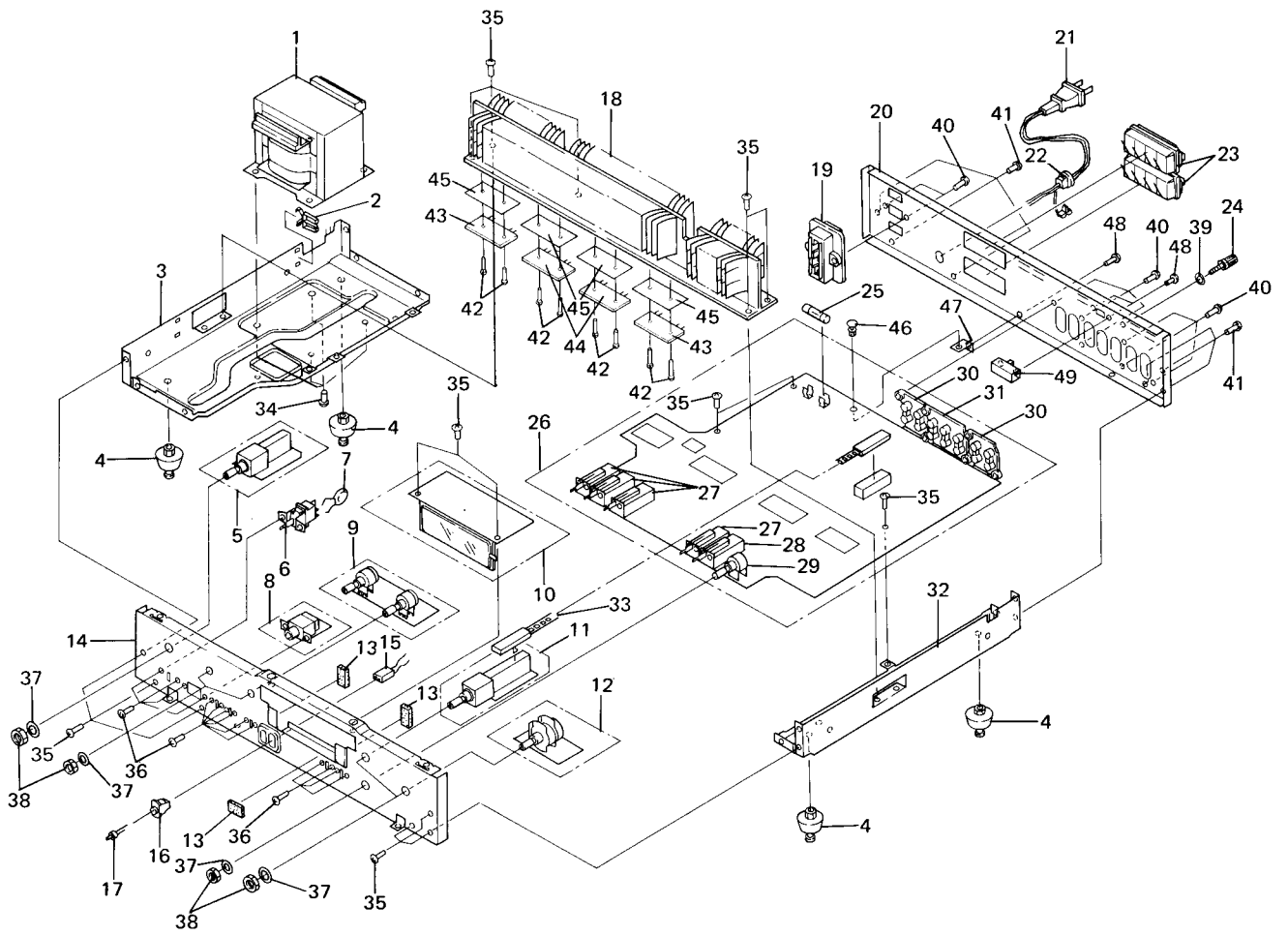
Parts List

NOTES:

- Parts without part number cannot be supplied.
- The  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.

Key No.	Part No.	Description
1.	ANE-269	Bonnet case
2.	ANB-846	Front panel assembly
3.	AAB-222	Knob
4.	AAB-223	Knob
5.	AAB-221	Knob
6.	AAD-200	Lever knob
7.	AEL-320	LED
8.	ABA-186	Screw
9.	ABA-079	Screw
10.		Bottom plate
11.	ABA-066	Screw

Interior Component



Parts List

Key No.	Part No.	Description	Key No.	Part No.	Description
⚠ 1.	ATT-668	Power transformer	26.	GWK-145	AF amplifier assembly
2.		Wire clip	27.	ASK-171	Lever switch
3.		Frame	28.	ASK-172	Lever switch
4.	AEC-672	Foot assembly	29.	ACT-130	Variable resistor (BALANCE)
5.	GWS-218	Switch assembly	30.	AKB-063	Terminal
⚠ 6.	ASK-520	Lever switch (POWER)	31.	AKB-064	Terminal
⚠ 7.	ACG-001	Capacitor	32.		Frame
8.	GWX-462	Headphones jack assembly	33.		Remote wire
9.	GWG-139	Tone control assembly	34.	ABA-107	Screw
10.	AWV-007	F.L. assembly	35.	ABA-066	Screw
11.	GWS-219	Switch assembly	36.	ABA-026	Screw
12.	GWX-461	Volume assembly	37.	M45-086	1t spacer
13.		Cushion	38.	B71-004	Nut 9φ
14.		Panel stay	39.	ABE-005	Washer
15.		LED socket	40.	ABA-240	Screw
16.		Cushion rubber	41.	ABA-198	Screw
17.	AEL-320	LED	42.	ABA-234	Screw
18.		Heat sink	43.	2SC2525/A/	Transistor
⚠ 19.	AKP-032	AC socket	44.	2SA1075/A/	Transistor
20.		Rear panel	45.	AEC-488	Insulator spacer
⚠ 21.	ADG-023	Power code	46.	AEC-352	Nylon rivet
22.	AEC-327	Strain relief	47.		P.C.B. holder
23.	AKE-050	Terminal	48.	ABA-145	Screw
24.		Terminal (GND)	49.	ASH-016	Slide switch
⚠ 25.	AEK-108	Fuse			

10. SCHEMATIC DIAGRAMS, P.C. BOARD PATTERNS AND PARTS LIST

10.1 MISCELLANEA

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 × 10¹ 561 RD¼PS 561J
 47kΩ 47 × 10³ 473 RD¼PS 473J
 0.5Ω 0R5 RN2H 0R5K
 1Ω 010 RSIP 010K

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

5.62kΩ 562 × 10¹ 5621 RN¼SR 5621F

- The Δ 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.

Miscellaneous Parts

ASSEMBLIES

Part No.	Symbol & Description
GWK-145	AF amplifier assembly
GWG-139	Tone control assembly
GWS-218	Switch assembly
GWS-219	Switch assembly
GWX-461	Volume assembly
GWX-462	Headphones jack assembly
AWV-007	F.L. assembly

OTHERS

Part No.	Symbol & Description
Δ ATT-668	T1 Power transformer
Δ AEK-108	F1 Fuse
Δ ASK-520	S8 Lever switch (POWER)
Δ AKP-032	AC socket
Δ ADG-023	Power code
ANB-846	Front panel assembly
AKE-050	Terminal (SPEAKERS)

SEMICONDUCTORS

Part No.	Symbol & Description
2SC2525/A/ 2SA1075/A/	Q1, Q2 } hfe should have the same rank. Q3, Q4 }
AEL-320	D1 LED

CAPACITOR

Part No.	Symbol & Description
Δ ACG-001	C1 Capacitor 0.01/250V

List of Changed Parts for Factory Modification

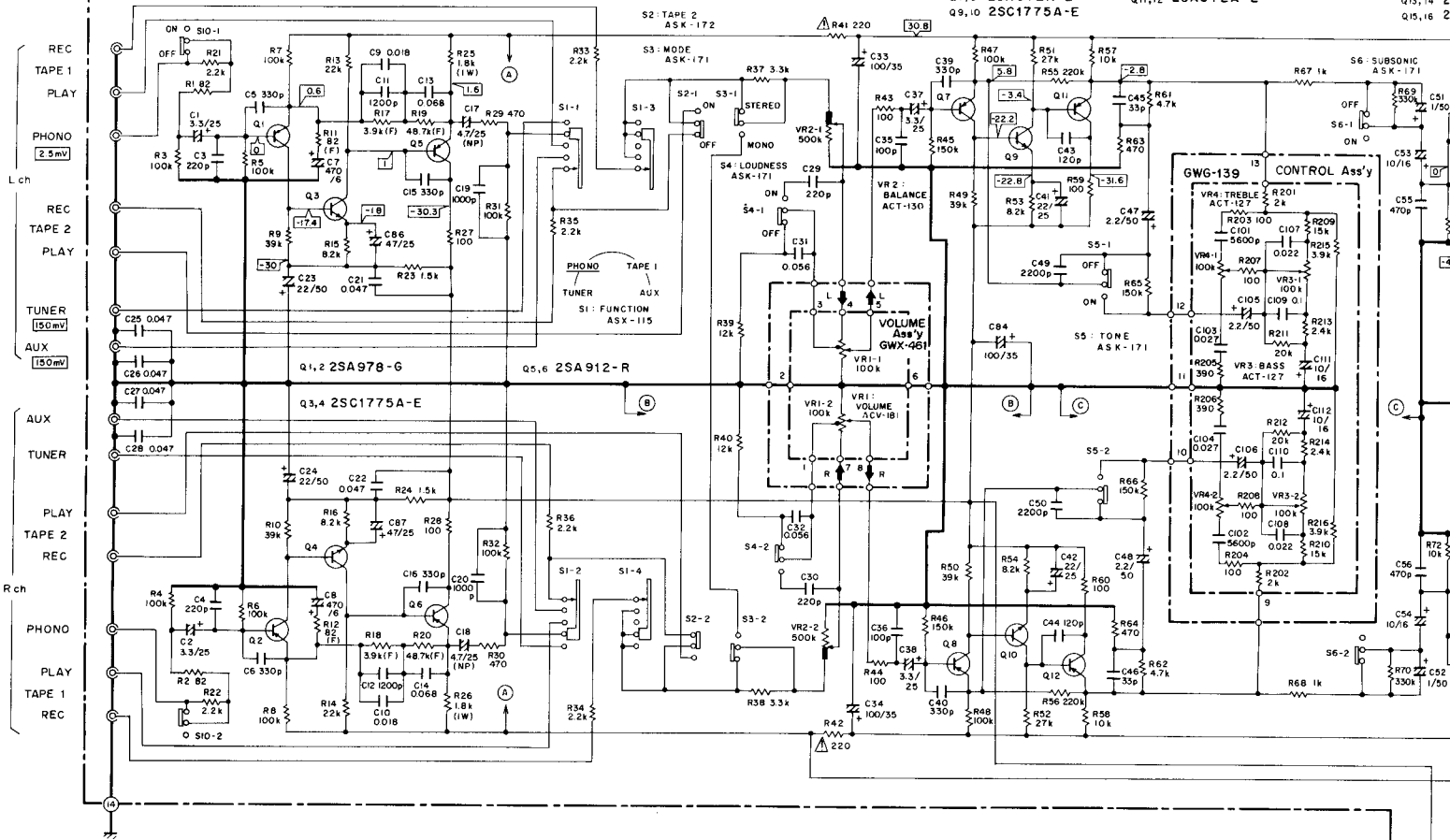
List of changed parts information will be furnished whenever necessary and you are requested to amend parts number in this parts list.

Symbol	Part No.	Description

10.2 SCHEMATIC DIAGRAM

AF AMP Ass'y (1/2) GWK-145

SIO: PHONO INTERFERENCE ASH-016



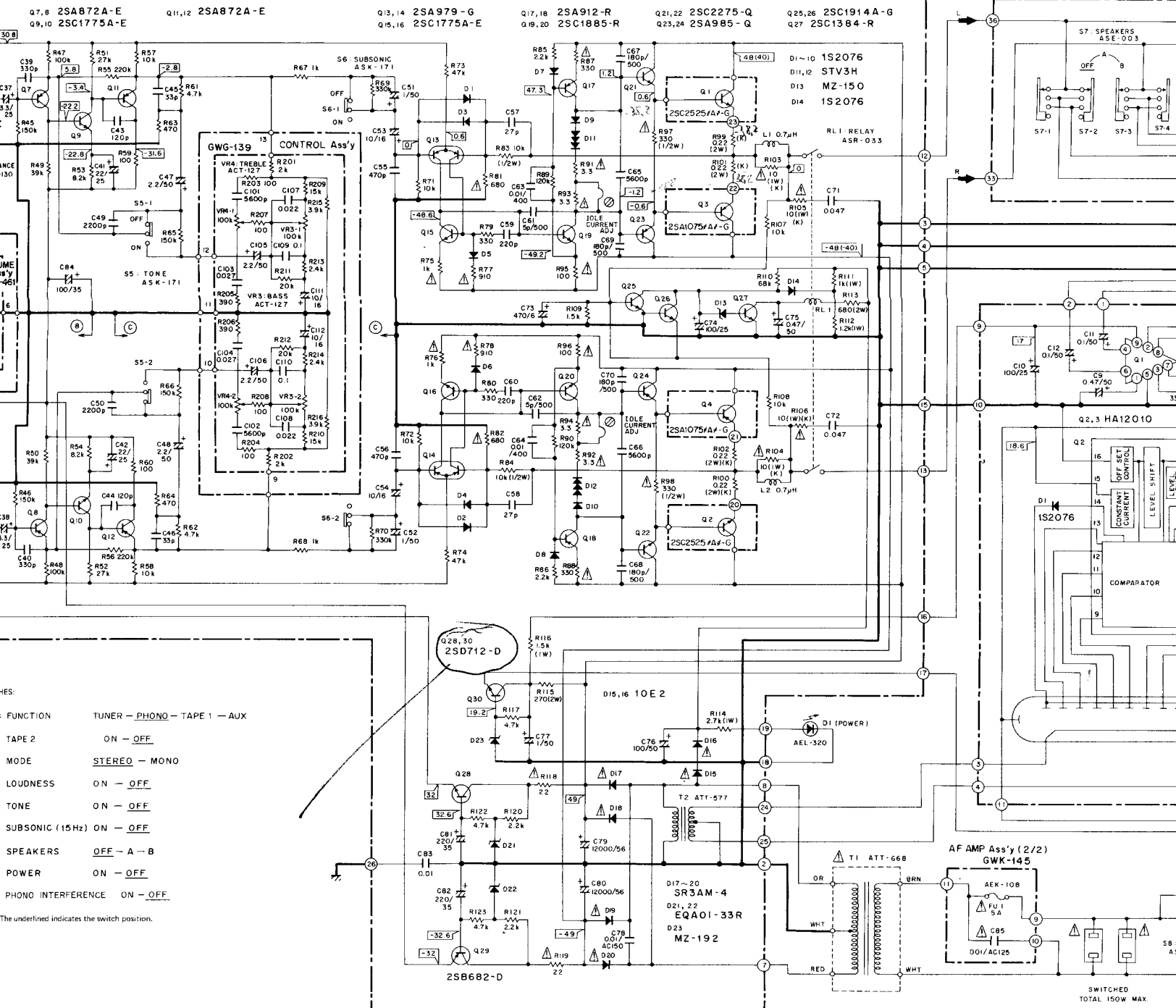
1. RESISTORS:
Indicated in Ω, kΩ, 5% tolerance unless otherwise noted k: kΩ, M: MΩ, (F): ±1%, (G): ±2%, (K): ±10% tolerance
2. CAPACITORS:
Indicated in capacity (μF)/voltage (V) unless otherwise noted p: pF
Indication without voltage is 50V except electrolytic capacitor.
3. VOLTAGE, CURRENT:
 - : Signal voltage at 65 W + 65 W 8Ω output (1kHz)
 - : DC voltage (V) at no input signal
 - Value in () is DC voltage at rated power.
 - mA: DC current at no input signal
4. OTHERS:
 - : Signal route.
 - : Adjusting point.

The 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.

- SWITCHES:
- S1,9 : FUNCTION TUNER - PHONO - TAPE 1 - AUX
 - S2 : TAPE 2 ON - OFF
 - S3 : MODE STEREO - MONO
 - S4 : LOUDNESS ON - OFF
 - S5 : TONE ON - OFF
 - S6 : SUBSONIC (15Hz) ON - OFF
 - S7 : SPEAKERS OFF - A - B
 - S8 : POWER ON - OFF
 - SIO : PHONO INTERFERENCE ON - OFF

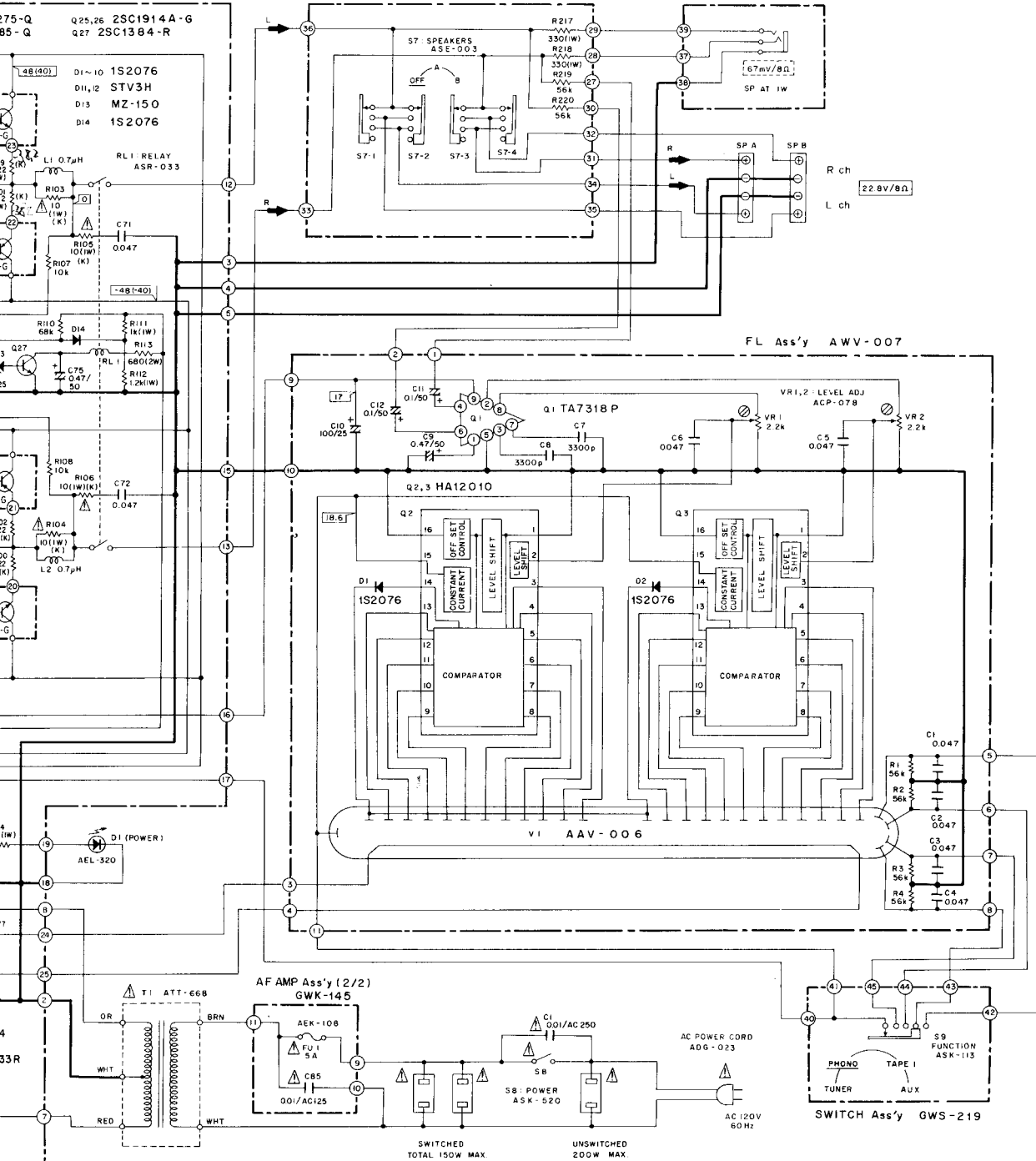
The underlined indicates the switch position.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

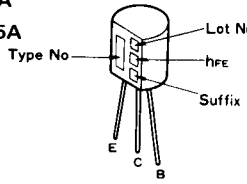


- FUNCTION TUNER - PHONO - TAPE 1 - AUX
- TAPE 2 ON - OFF
- MODE STEREO - MONO
- LOUDNESS ON - OFF
- TONE ON - OFF
- SUBSONIC (15Hz) ON - OFF
- SPEAKERS OFF - A - B
- POWER ON - OFF
- PHONO INTERFERENCE ON - OFF
- The underlined indicates the switch position.

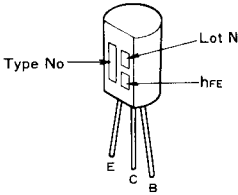
External Appearance of Tra



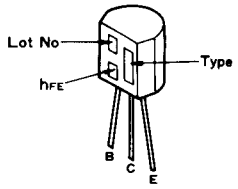
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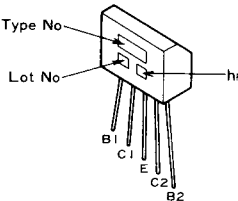
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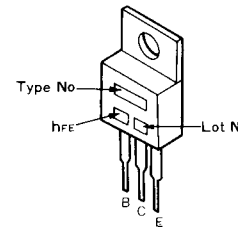
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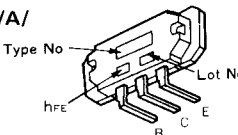
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2SA985
2SC2275



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2SC2525/A/

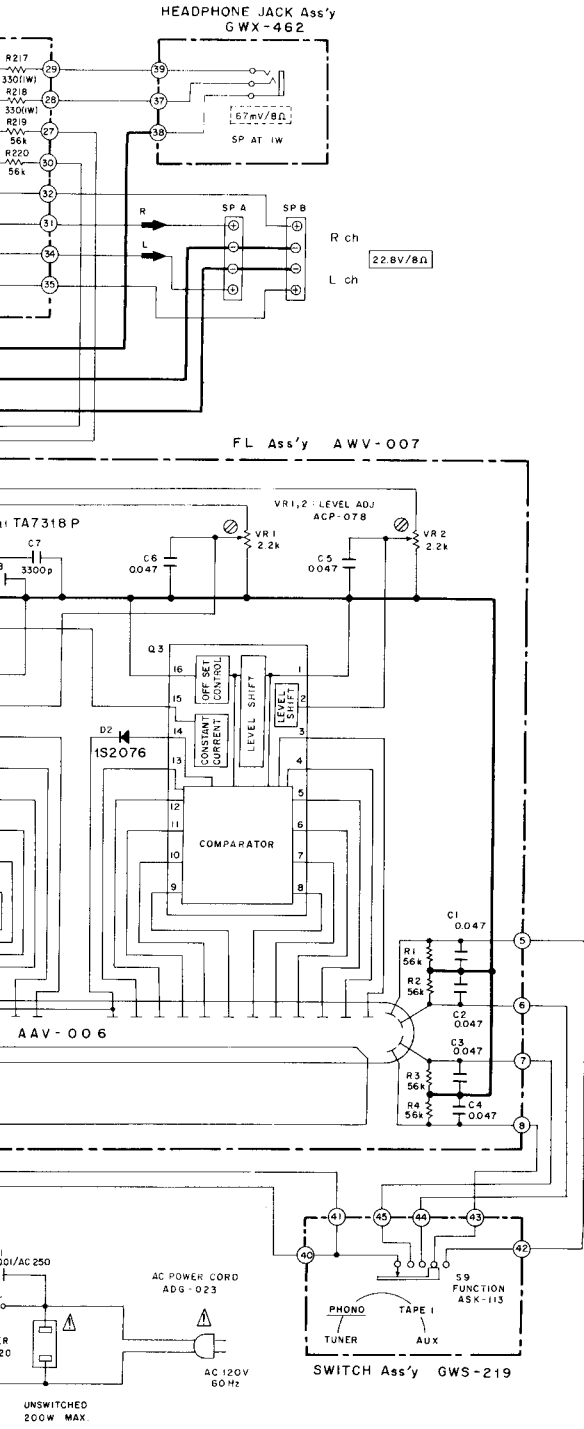


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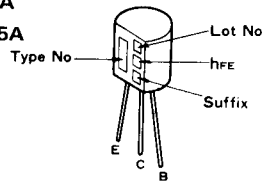
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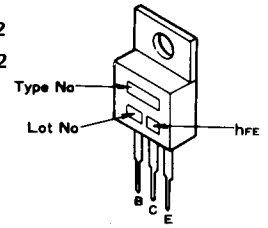
External Appearance of Transistors and ICs



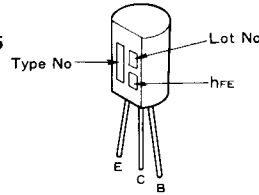
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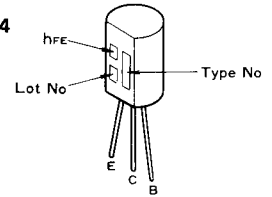
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2SD712



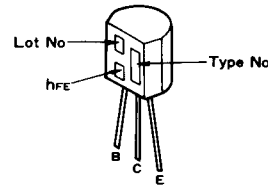
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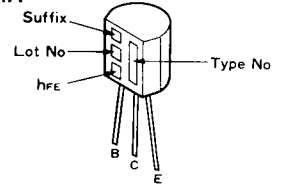
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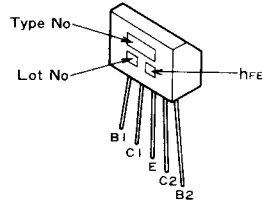
2SA978



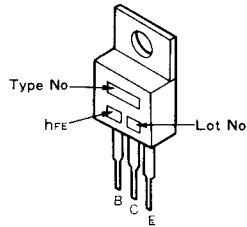
2SC1914A



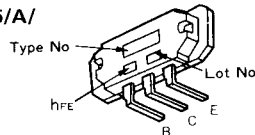
2SA979



2SA985
2SC2275



2SA1075/A/
2SC2525/A/



7

8

9

A

B

C

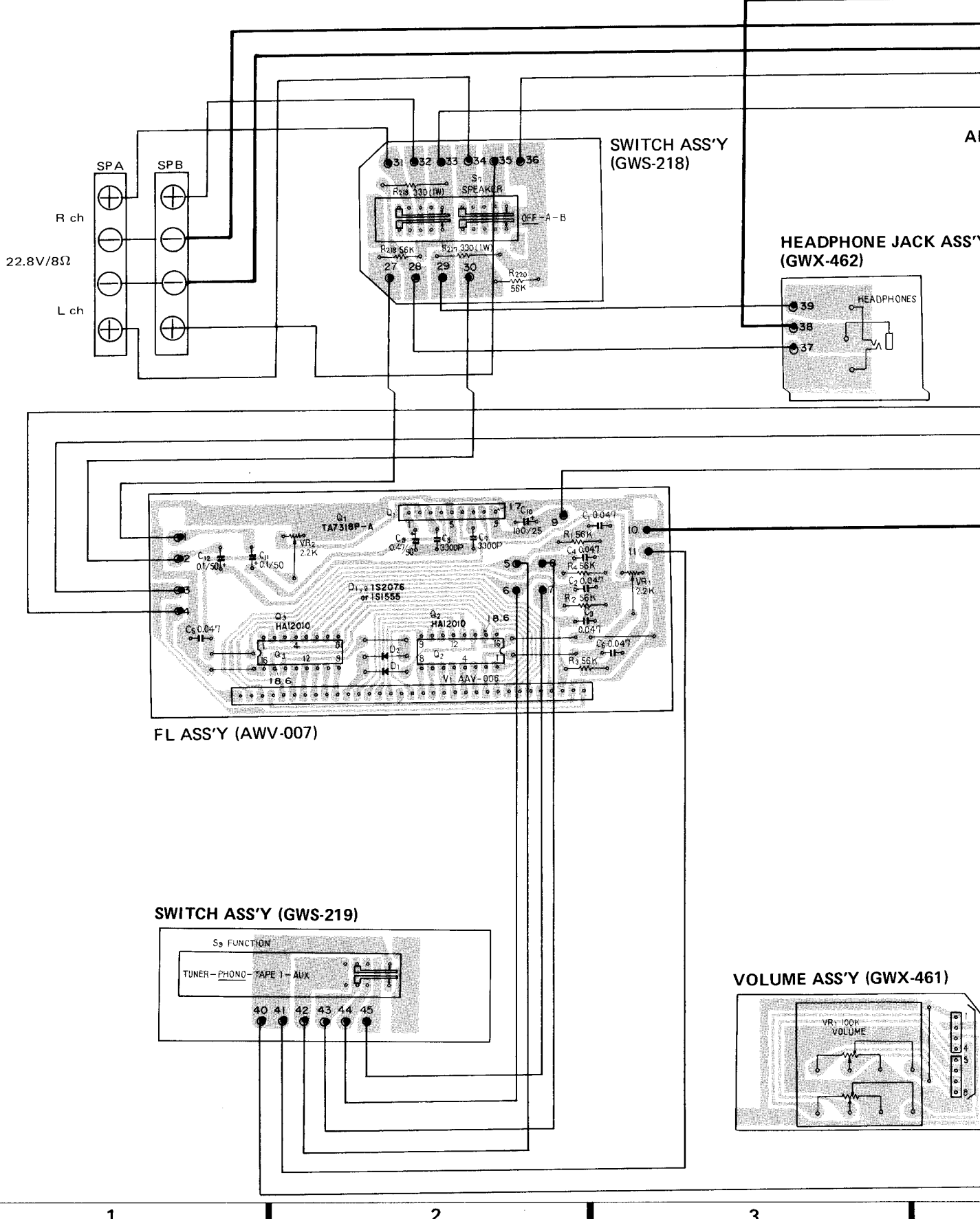
D

1

2

3

10.3 P.C. BOARD CONNECTION DIAGRAM



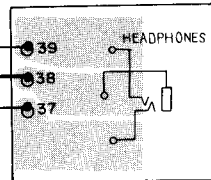
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2

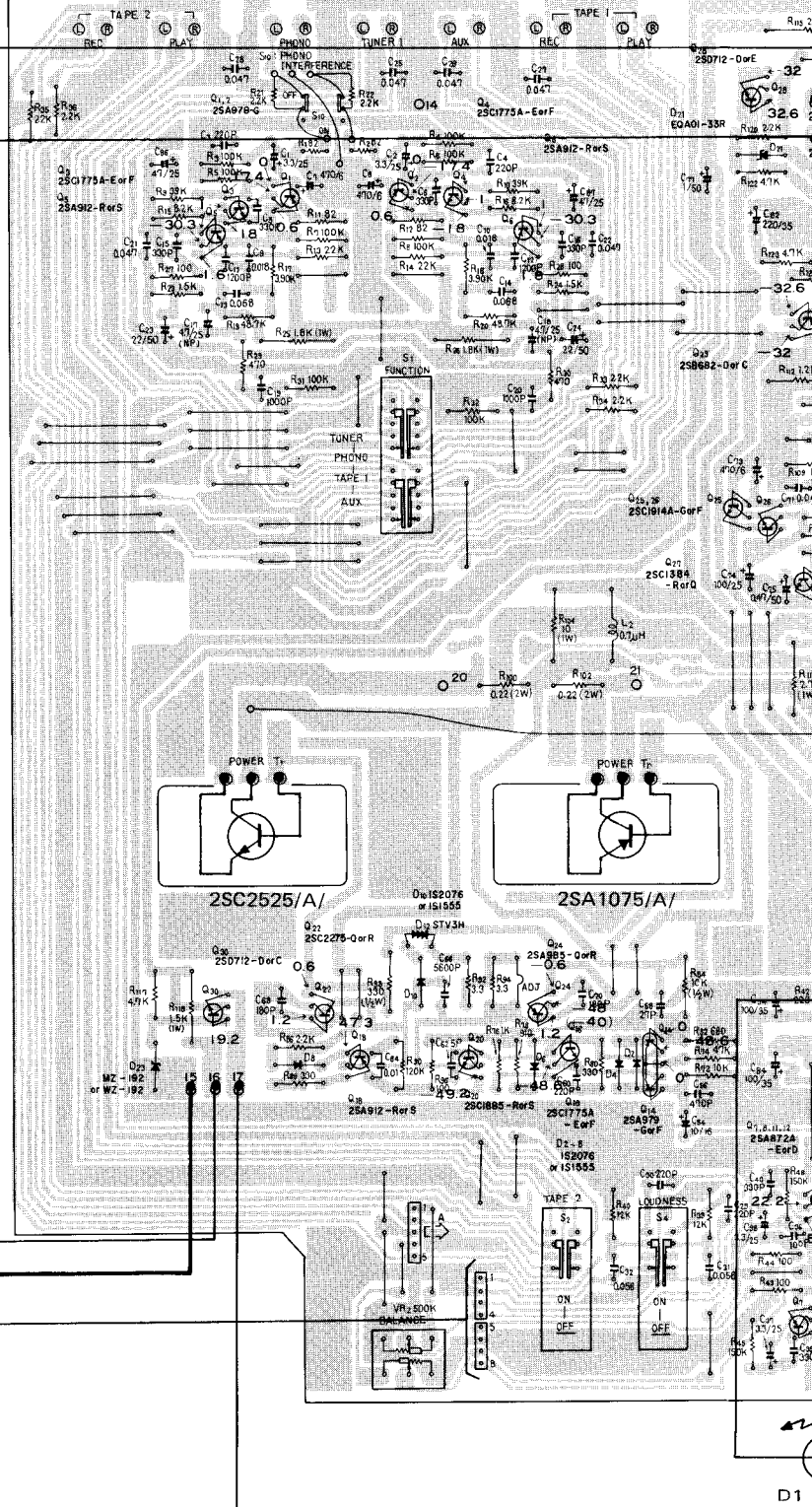
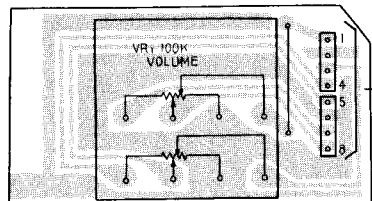
3

AF AMP ASS'Y (GWK-145)

HEADPHONE JACK ASS'Y (GWX-462)



VOLUME ASS'Y (GWX-461)



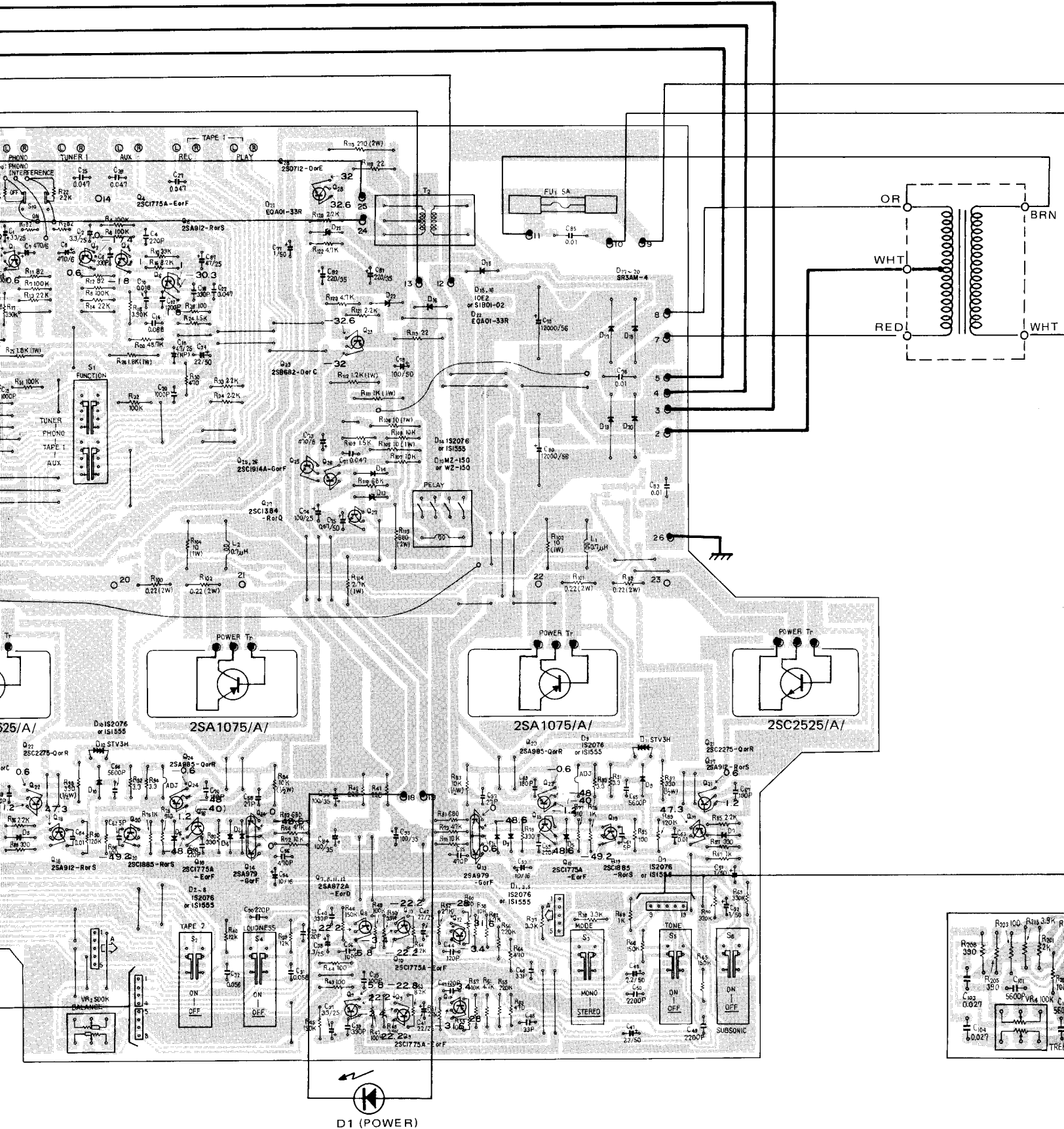
SA-710

5

6

7

8



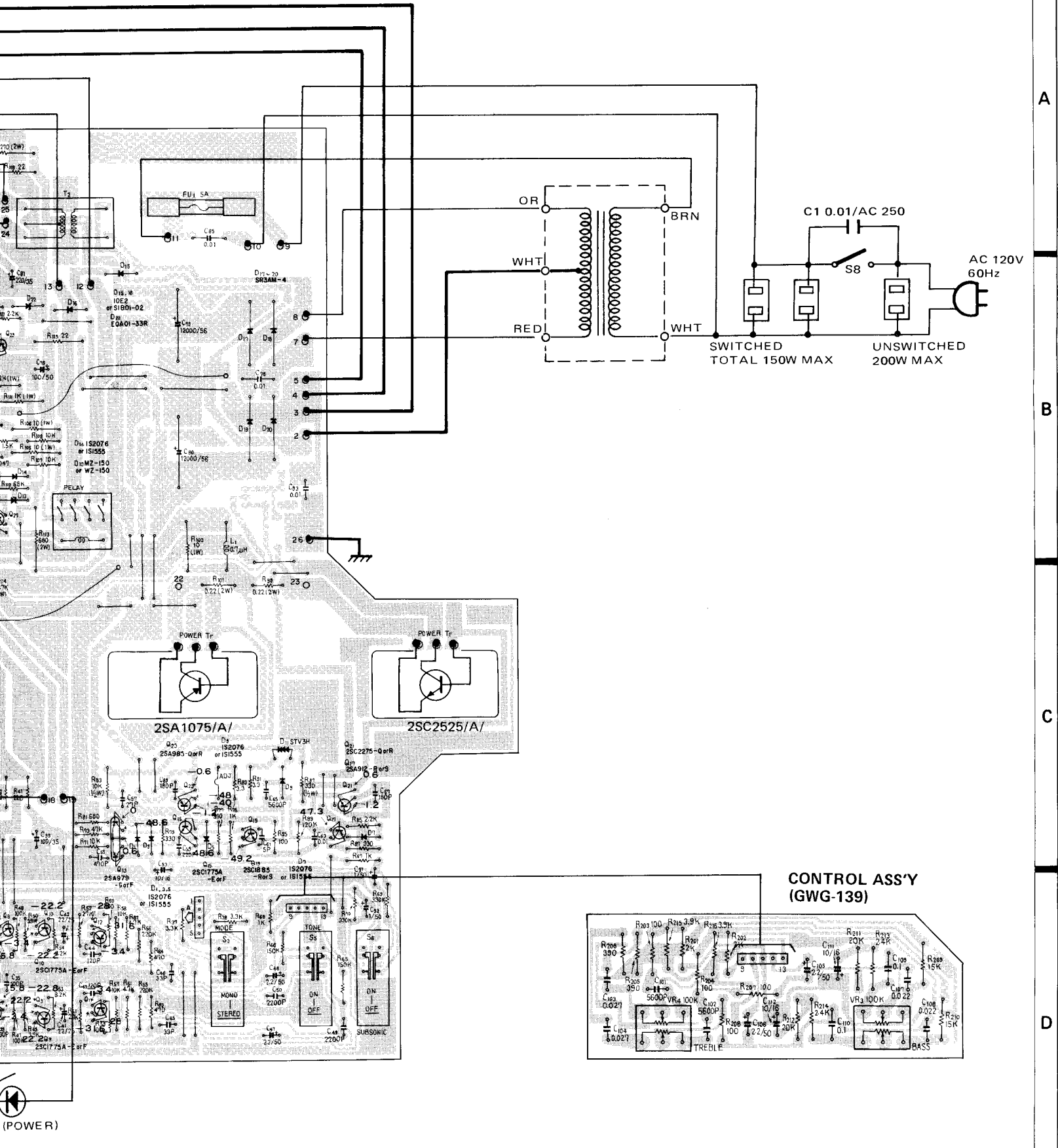
D1 (POWER)

5

6

7

8



A

B

C

D

(POWER)

10.4 PARTS LIST OF P.C. BOARD ASSEMBLY

Parts List of AF Amplifier Assembly (GWK-145)

SWITCHES

Part No.	Symbol & Description
ASX-115	S1 Remote slide switch
ASK-172	S2 Lever switch
ASK-171	S3-S6 Lever switch
ASH-016	S10 Slide switch

CAPACITORS

Part No.	Symbol & Description
CEANL 3R3M 25	C1, C2, C37, C38
CEA 221M 35L	C81, C82
CEA 101M 50L	C76
CEA 101M 35L	C33, C34, C84
CEA 101M 25L	C74
CEA 471M 6L	C7, C8, C73
CEA 220M 50L	C23, C24
CEA 470M 25L	C86, C87
CEA 220M 25L	C41, C42
CEA 010M 50L	C77
CEA R47M 50L	C75
CEANL 2R2M 50	C47, C48
CEANL 010M 50	C51, C52
CEANL 100M 16	C53, C54
CQMA 473K 50	C71, C72
CQMA 563K 50	C31, C32
CQMA 102K 50	C19, C20
CQMA 103K 400	C63, C64
CQPA 683G 50	C13, C14
CQPA 183G 50	C9, C10
CQSA 122G 50	C11, C12
CCDSL 050D 500	C61, C62
CCDSL 181J 500	C67-C70
CCDSL 330J 50	C45, C46
CCDSL 270J 50	C57, C58
CCDSL 101J 50	C35, C36
CCDSL 121J 50	C43, C44
CCDSL 221J 50	C3, C4, C29, C30, C59, C60
CKDYB 331K 50	C5, C6, C15, C16, C39, C40
CKDYB 471K 50	C55, C56
CKDYB 222K 50	C49, C50
CKDYB 562K 50	C65, C66
CKDYF 473Z 50	C21, C22, C25-C28
ACH-212	C79, C80
ACH-318	C17, C18
ACG-017	C85
ACG-004	C78
CKDYF 103Z 50	C83

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

RESISTORS

Part No.	Symbol & Description
RD¼PM □□□ J	R1-R10, R13-R16, R21-R24, R27-R74, R77-R82, R85-R96, R107-R110, R117, R121-R123
RD¼PMF □□□ J	R75, R76, R118, R119
RN¼PQ □□ R □ F	R11, R12
RN¼PQ □□□□ F	R17-R20
RS1P □□□ J	R25, R26, R111, R112, R114, R116
RD¼PS □□□ J	R83, R84
ACN-039	R99-R102
RN1H □□□ K	R103-R106
RS2P □□□ J	R113, R115
RD¼PSF □□□ J	R97, R98

SEMICONDUCTORS

Part No.	Symbol & Description
2SA978	Q1, Q2
2SC1775A	Q3, Q4, Q9, Q10, Q15, Q16
2SA912	Q5, Q6, Q17, Q18
2SA872A	Q7, Q8, Q11, Q12
2SA979	Q13, Q14
2SC1885	Q19, Q20
2SC2275	Q21, Q22
2SA985	Q23, Q24
2SC1914A	Q25, Q26
2SC1384	Q27
2SD712	Q28, Q30
2SB682	Q29
1S2076	D1-D10, D14
△ SR3AM-4	D17-D20
△ 10E2	D15, D16
(SIB01-02)	
EQA01-33R	D21, D22
MZ-192	D23
(WZ-192)	
MZ-150	D13
(WZ-150)	
STV3H	D11, D12

OTHERS

Part No.	Symbol & Description
ACT-130	VR2 Variable resistor
ATT-577	T2 Heater transformer
ASR-033	Relay
AKB-063	Terminal
AKB-064	Terminal
ABA-139	Screw

Parts List of Control Assembly (GWG-139)

CAPACITORS

Part No.	Symbol & Description
CQMA 562K 50	C101, C102
CQMA 273K 50	C103, C104
CEANL 2R2M 50	C105, C106
CQMA 223K 50	C107, C108
CQMA 104K 50	C109, C110
CEANL 100M 16	C111, C112

RESISTORS

Part No.	Symbol & Description
ACT-127	VR3, VR4 Variable resistor
RD $\frac{1}{4}$ PM □□□J	R201-R216

Parts List of Switch Assembly (GWS-218)

Part No.	Symbol & Description
ASE-003	S7 Slide rotary switch
RS1P 331J	R217, R218
RD $\frac{1}{4}$ PM 563J	R219, R220

Parts List of Switch Assembly (GWS-219)

Part No.	Symbol & Description
ASX-113	S9 Slide rotary switch

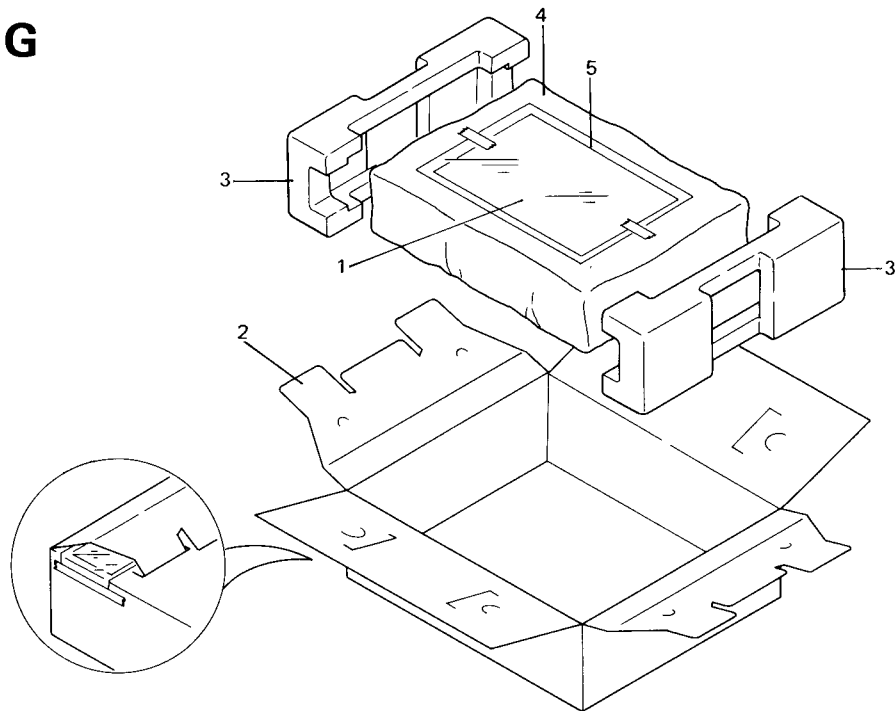
Parts List of Volume Assembly (GWX-461)

Part No.	Symbol & Description
ACV-181	VR1 Variable resistor

Parts List of Headphones Jack Assembly (GWX-462)

Part No.	Symbol & Description
AKN-023	Headphones jack

11. PACKING



Parts List

Key No.	Part No.	Description
1.	ARB-353	Operating instructions
2.	AHD-753	Packing case
3.	AHA-239	Side pad
4.		Packing sheet
5.		Vinyl bag