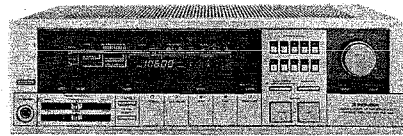




Service Manual

REPAIR & ADJUSTMENTS



**ORDER NO.
ARP-293-0**

AM/FM STEREO RECEIVER

SX-60

MODEL SX-60 COMES IN FOUR VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
KU	AC120V only	U. S. A. model
KC	AC120V only	Canada model
S	AC110V, 120V, 220V, 240V (switchable)	General export model
S/G	AC110V, 120V, 220V, 240V (switchable)	U. S. Military model

- This service manual is applicable to the KU type.
For servicing of the other types, please refer to the additional service manual.
- For the circuit descriptions, please refer to the SX-60, SX-50, SX-40 service manual (ARP-393-0).
- 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.

CONTENTS

1. SPECIFICATIONS	2	7. ELECTRICAL PARTS LIST	24
2. FRONT PANEL FACILITIES	3	8. PACKING	27
3. PARTS LOCATION	5	9. ADJUSTMENT	28
4. EXPLODED VIEW AND PARTS LIST	7	RÉGLAGE	30
5. SCHEMATIC DIAGRAM	11	AJUSTE	32
6. P. C. BOARDS CONNECTION DIAGRAM	17	10. SAFETY INFORMATION	34

1. SPECIFICATIONS

Amplifier Section

Continuous Average Power Output is 80 watts* per channel, min., at 8 ohms from 20 Hertz to 20,000 Hertz with no more than 0.005% total harmonic distortion.**

Intermodulation Distortion (50 Hertz; 7,000 Hertz = 4:1, 8 ohms, from POWER IN)	
continuous rated power output	No more than 0.005%
Input (Sensitivity/Impedance)	
PHONO MM	2.5mV/50kilohms
PHONO MC	0.25mV/100ohms
CD/AUX, TAPE PLAY 1, 2, VIDEO	150mV/50kilohms
Phono Overload Level (T.H.D. 0.007% 1,000Hz)	
PHONO MM	150mV
PHONO MC	14mV
Output (Level/Impedance)	
TAPE REC 1, 2	150mV/2.2kilohms
SPEAKER	A, B, A series B, off (6 to 16ohms)
Frequency Response	
PHONO (RIAA Equalization)	20Hz to 20,000Hz \pm 0.3dB
CD/AUX, TAPE PLAY 1, 2, VIDEO	5Hz to 100,000Hz $^{+0}_{-3}$ dB
Tone control	
BASS	\pm 8dB (100Hz)
TREBLE	\pm 8dB (10kHz)
Loudness Contour (Volume control set at -40dB position)	
.	+6dB (100Hz), +3dB (10,000Hz)
Filter	
SUBSONIC	20Hz (6dB/oct)
Hum and Noise (IHF, short circuited, A network)	
PHONO MM	86dB
PHONO MC	67dB
CD/AUX, TAPE PLAY 1, 2, VIDEO	95dB

FM Tuner Section

Frequency range	87.5MHz to 108MHz
Usable Sensitivity	10.3 dBf, IHF (0.9 μ V/75ohms)
50dB Quieting Sensitivity	
MONO	15.7dBf, IHF (1.6 μ V/75ohms)
STEREO	37dBf, IHF (19.5 μ V/75ohms)
Signal-to-Noise Ratio	
MONO	83dB (at 65dBf)
STEREO	80dB (at 85dBf)

Distortion (at 65dBf)	
MONO	100Hz 0.1%
	1kHz 0.07%
	6kHz 0.15%
STEREO	100Hz 0.2%
	1kHz 0.1%
	6kHz 0.25%
Capture Ratio	1.0dB
Alternate Channel Selectivity	400kHz; 80dB
Stereo Separation	1kHz; 50dB
	30Hz to 15kHz; 35dB
Frequency Response	20Hz to 15kHz $^{+0}_{-1.0}$ dB
AUTO TUNING threshold	29.3dBf (8 μ V/75 ohms)
Antenna Input	300ohms balanced, 75 ohms unbalanced

AM Tuner Section

Frequency range	522kHz to 1620kHz
	(When 10kHz step) 520kHz to 1620kHz
Sensitivity (IHF, Loop antenna)	220 μ V/m
	(IHF, EXT. antenna) 10 μ V
Selectivity	60dB
Signal-to-Noise Ratio	50dB
Antenna	High sensitivity Loop Antenna

Miscellaneous

Power Requirements	AC 120V, 60Hz
Power Consumption	310W (UL)
Dimensions	420(W) x 130(H) x 364(D) mm
	16-9/16(W) x 5-2/16(H) x 14-5/16(D) in
Weight (without package)	10.3kg (22lb 11oz)

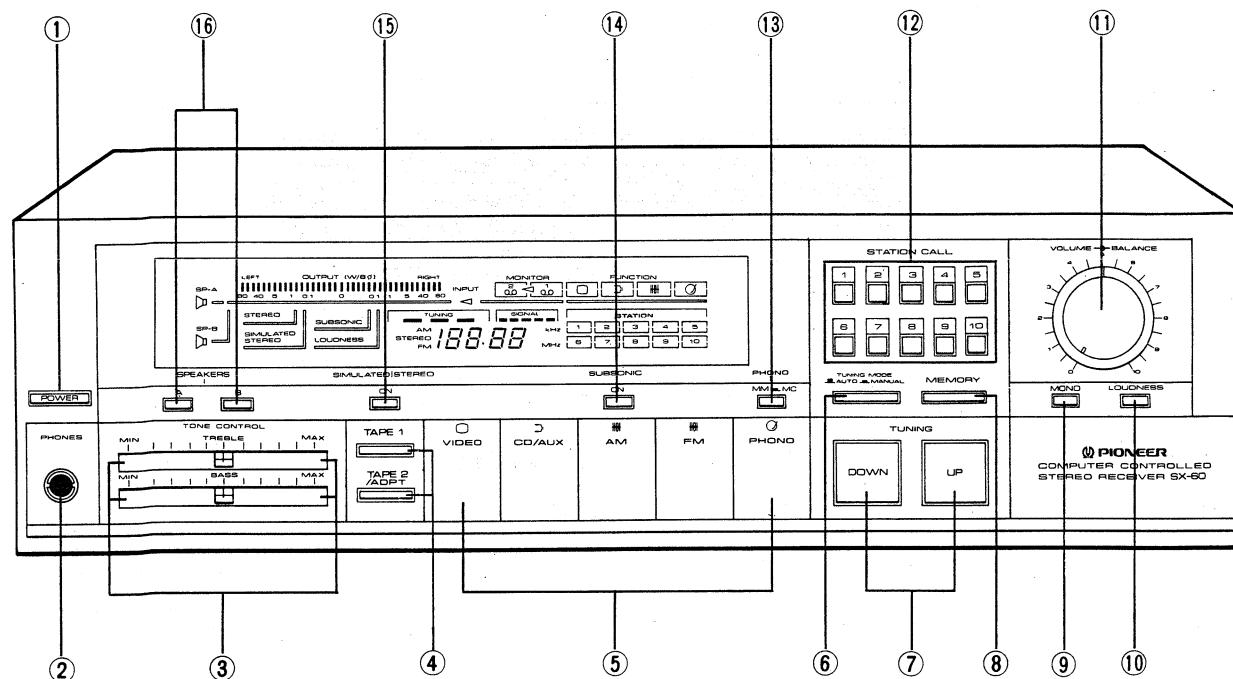
Furnished Parts

FM T-type Antenna	1
AM Loop Antenna	1
Operating Instructions	1

* Measured pursuant to the Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifier.
 ** Measured by Audio Spectrum Analyzer.

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

2. FRONT PANEL FACILITIES



① POWER SWITCH

Power is supplied to the unit when this switch is depressed. To turn off the power, release the switch.

② PHONES JACK

Plug the headphones into this jack when you want to listen to a performance alone.

- When listening through the headphones alone, set both SPEAKERS SWITCHES A and B to OFF.

③ TONE CONTROL

This control is used to adjust the tone quality.

BASS Use this control to adjust the bass of the sound. When the control is moved from the central position towards "MIN", the bass is attenuated and when it is moved towards "MAX", the bass is emphasized.

TREBLE . . Use this control to adjust the treble of the sound.

When the control is moved from the central position towards "MIN", the treble is attenuated and when it is moved towards "MAX", the treble is emphasized.

④ TAPE MONITOR SWITCHES

Use these switches when playing back tapes or monitoring a recording. There are tape terminals for two systems on this receiver. Two tape decks can be attached and record-

ing or playback performed. The two tape decks can also be used for recording simultaneously or for copying from one tape to another (but only from tape deck 1 to tape deck 2).

TAPE 1 . . Press when performing with a tape deck connected to the TAPE 1 jacks on the rear panel. Also, press when copying a tape from tape deck 1 to tape deck 2.

TAPE 2 . . Press when performing with a tape deck or other adaptor connected to the TAPE 2 jacks on the rear panel.

⑤ FUNCTION SWITCHES

VIDEO SWITCH:

Press this switch when listening to a video unit such as a VCR or laser disc player connected to the VIDEO SOUND jacks on the rear panel.

CD/AUX SWITCH:

Press this switch when listening to a compact disc player (CD player) or TV tuner connected to the CD/AUX jacks on the rear panel.

AM SWITCH:

Press this switch for AM reception.

FM SWITCH:

Press this switch for FM reception.

PHONO SWITCH:

Press this switch when listening to a record on a turntable connected to the PHONO jacks on the rear panel.

⑥ TUNING MODE SWITCH

This switch is used to select either AUTO search or MANUAL tuning.

■ AUTO (released position):

When the TUNING switch is pressed, the broadcasting stations are automatically scanned. Once a station has been found, the scanner stops at that frequency. To listen to another station, press the TUNING switch once again and the procedure is repeated. The procedure stops as soon as another station is found.

■ MANUAL (depressed position):

For normal manual tuning.

Press the TUNING switch and tune in to the desired station manually.

NOTES:

- If the broadcasting station is distant and its signals weak, you may not be able to find the station with AUTO tuning. In such an event, tune in to the desired station using MANUAL mode (■ depressed position).
- If the AUTO mode stops frequently when trying to tune into an AM broadcast because of city interference or weak nighttime stations, tune in using the MANUAL mode (■ depressed position).

⑦ TUNING SWITCHES

These are used to select the broadcasting station.

During MANUAL tuning, if the TUNING switch is depressed once, the frequency changes one step at a time. If the TUNING switch is kept depressed, the frequency changes continuously.

NOTE:

During AUTO SEARCH tuning, intermittent noise may occur, but this is not a malfunction.

⑧ MEMORY SWITCH

This switch is used to preset the broadcasting stations into the STATION CALL switches.

When this switch is depressed, the STATION indicators light up from 1 to 10 in sequence. To preset the station, press the STATION CALL switch when the indicator lights up.

⑨ MONO SWITCH

This switch is depressed to mix the L and R channel stereo input signals and listen to them in mono through both the left and right speakers.

⑩ LOUDNESS SWITCH

When listening to a performance when the VOLUME level is low, depress this switch 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.

⑪ VOLUME/BALANCE CONTROL

The inside knob is the VOLUME control and the outside knob the BALANCE control.

VOLUME:

This control is used to adjust the volume of the speakers and headphones. To increase the output level, turn the knob slowly clockwise (↻).

BALANCE:

This control is used to balance the volume of the left and right channels. If the sound appears to be weaker from the right speaker, turn the BALANCE control clockwise (↻). If the sound is weaker from the left speaker, turn the control counterclockwise (↺).

NOTE:

When operating the VOLUME control, be careful not to turn the BALANCE control at the same time.

⑫ STATION CALL SWITCHES

Once the broadcasting stations are preset to these STATION CALL switches, the desired station can be received merely by pressing the appropriate switch and without having to operate the TUNING switch each time.

⑬ PHONO SELECTOR SWITCH

When playing a record on a turntable, adjust this switch in accordance with the cartridge type being used.

Depress the switch (■ MC) when listening to a performance from an MC cartridge turntable. Release the switch (■ MM) when using an MM cartridge turntable.

⑭ SUBSONIC SWITCH

When this switch is depressed, the subsonic filter operates. The filter attenuates frequencies lower than 20Hz by 6dB/oct and can be used to suppress the ultra low range noise generated by record warp and other factors. This noise cannot actually be heard by the ear, but it can cause intermodulation distortion and even damage to the speaker systems. Use therefore as required.

⑮ SIMULATED STEREO SWITCH

This turns monaural signals into simulated stereo sound. Use this when you wish to experience the sense of stereo presence with AM broadcasts, VCR or other monaural signal sources.

NOTE:

This function can also be used with stereo sources, but it will result in a different sound from the normal stereo sound.

⑯ SPEAKERS SWITCHES

Depress the switch corresponding to the speakers connected to the SPEAKERS terminals (A and B) on the rear panel. "A" refers to the speakers which have been connected to the A SPEAKERS terminals, while "B" refers to the speakers which have been connected to the B SPEAKERS terminals.

NOTE:

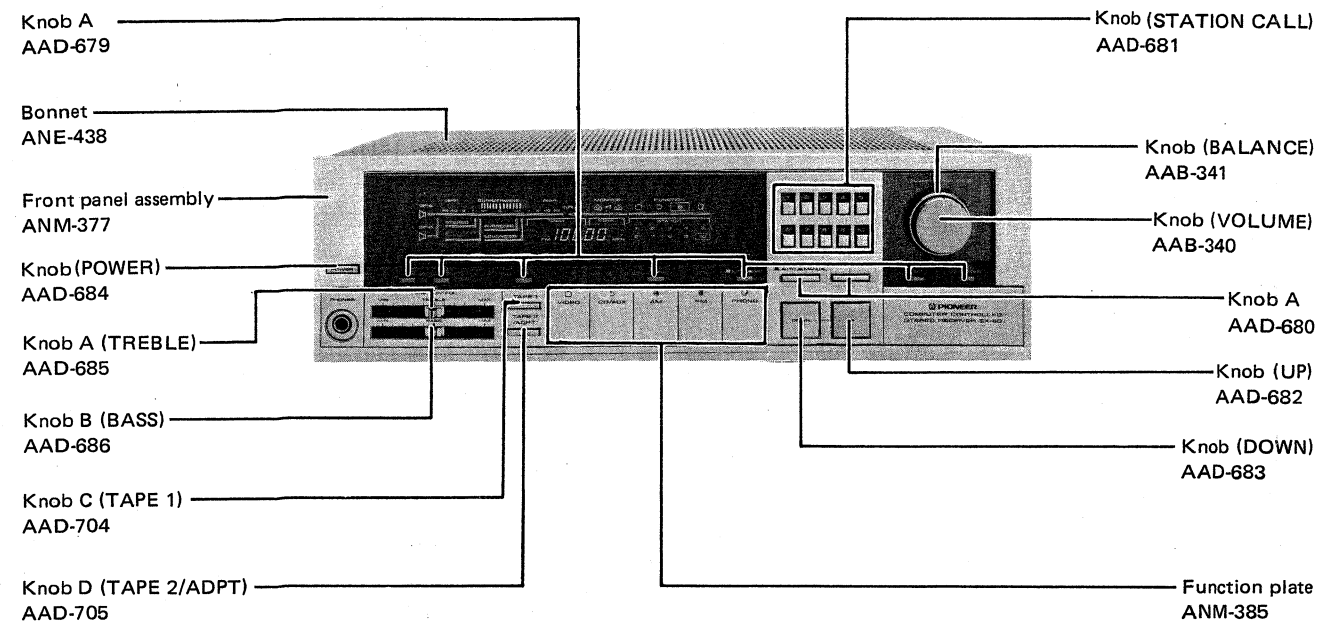
No sound will be heard through the speakers when both A and B switches are depressed if only one set of speakers has been connected to either A or B SPEAKERS terminals.

3. PARTS LOCATION

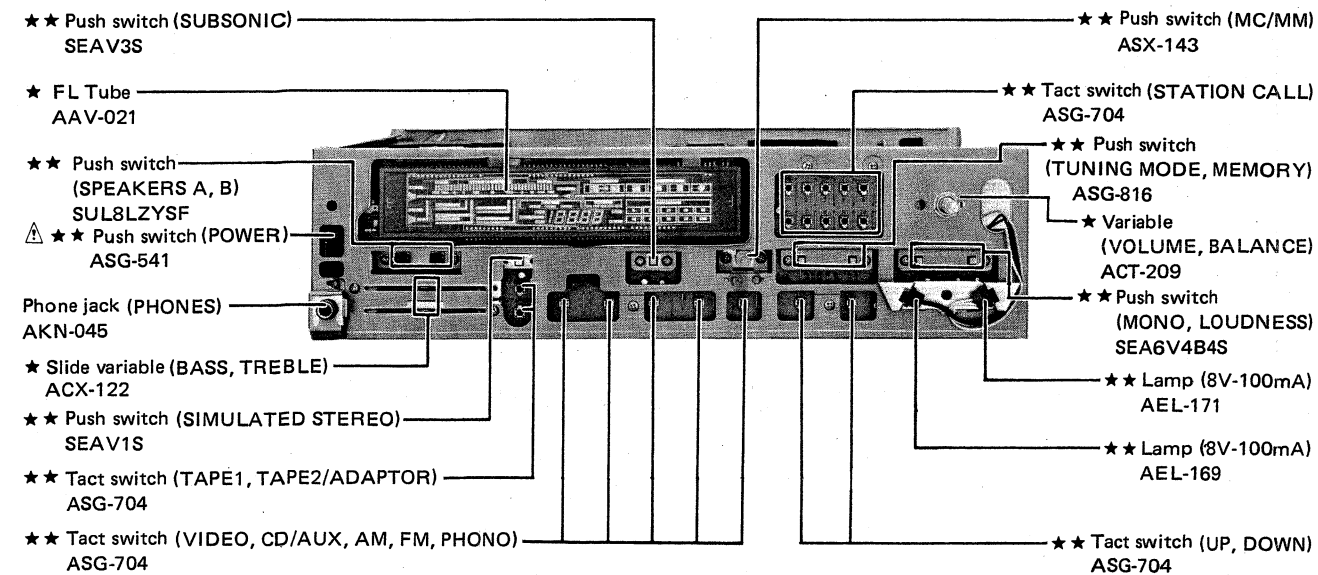
NOTES:

- 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.
- 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.

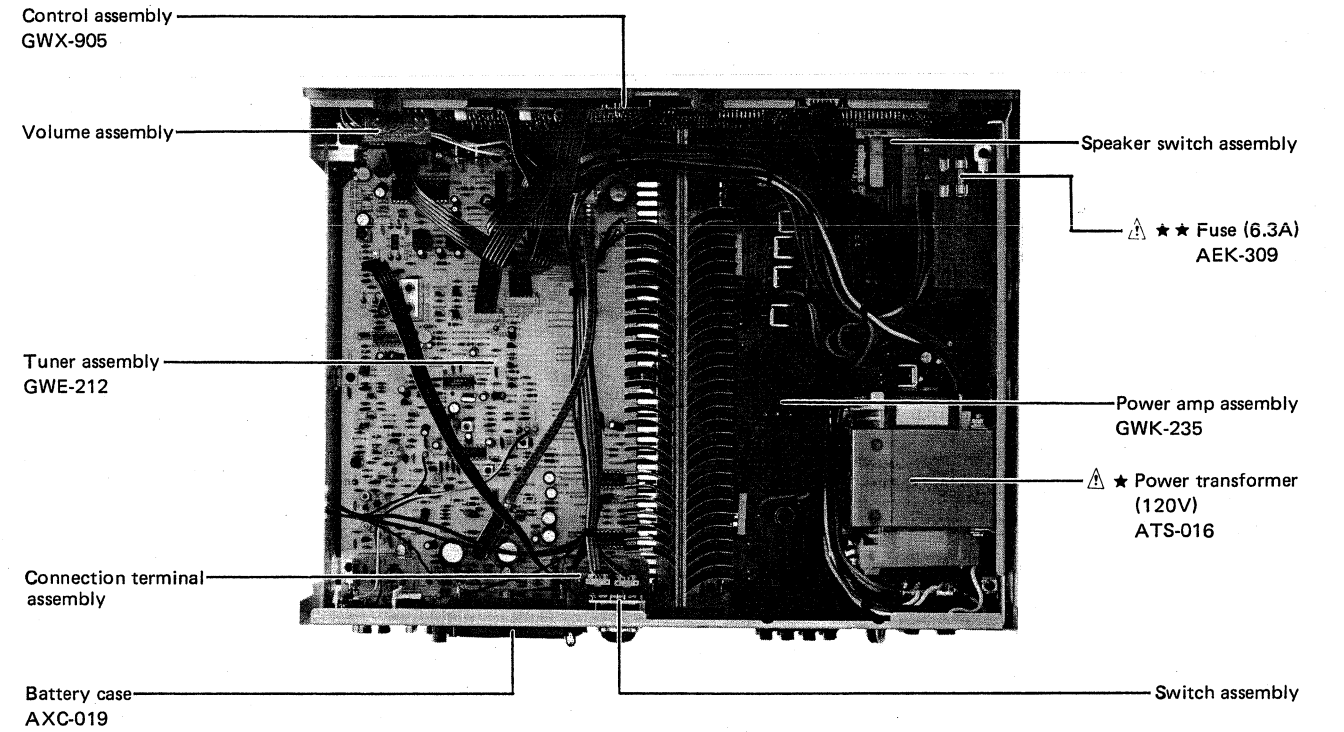
Front Panel View



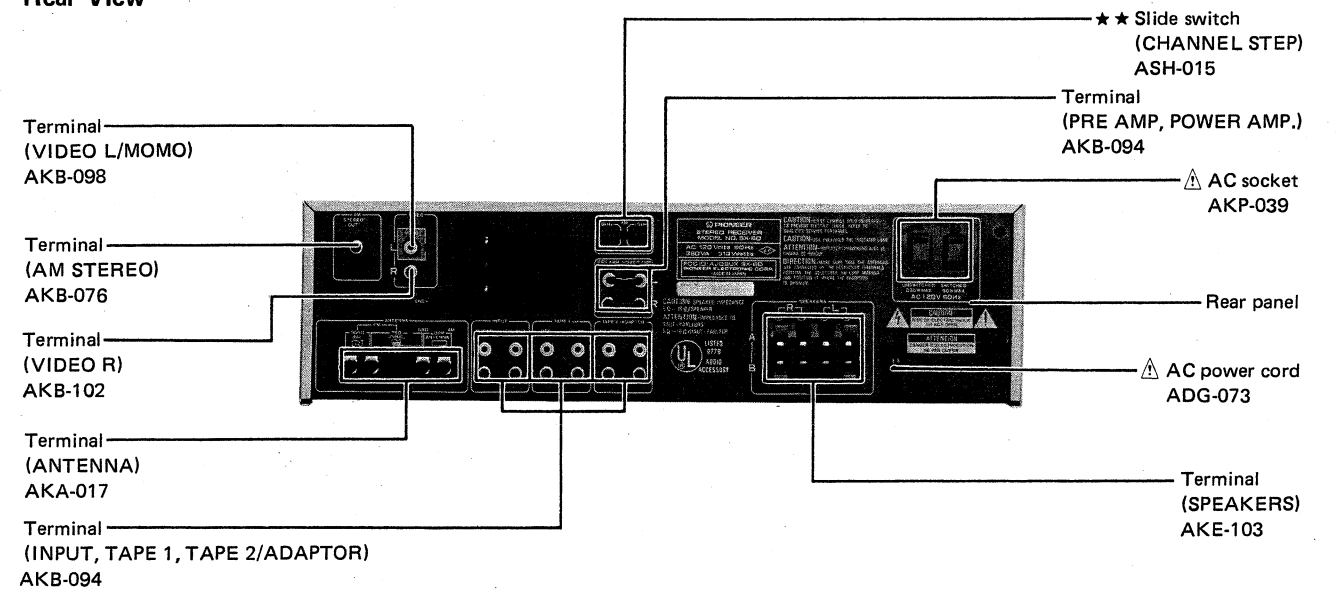
Front View



Top View



Rear View

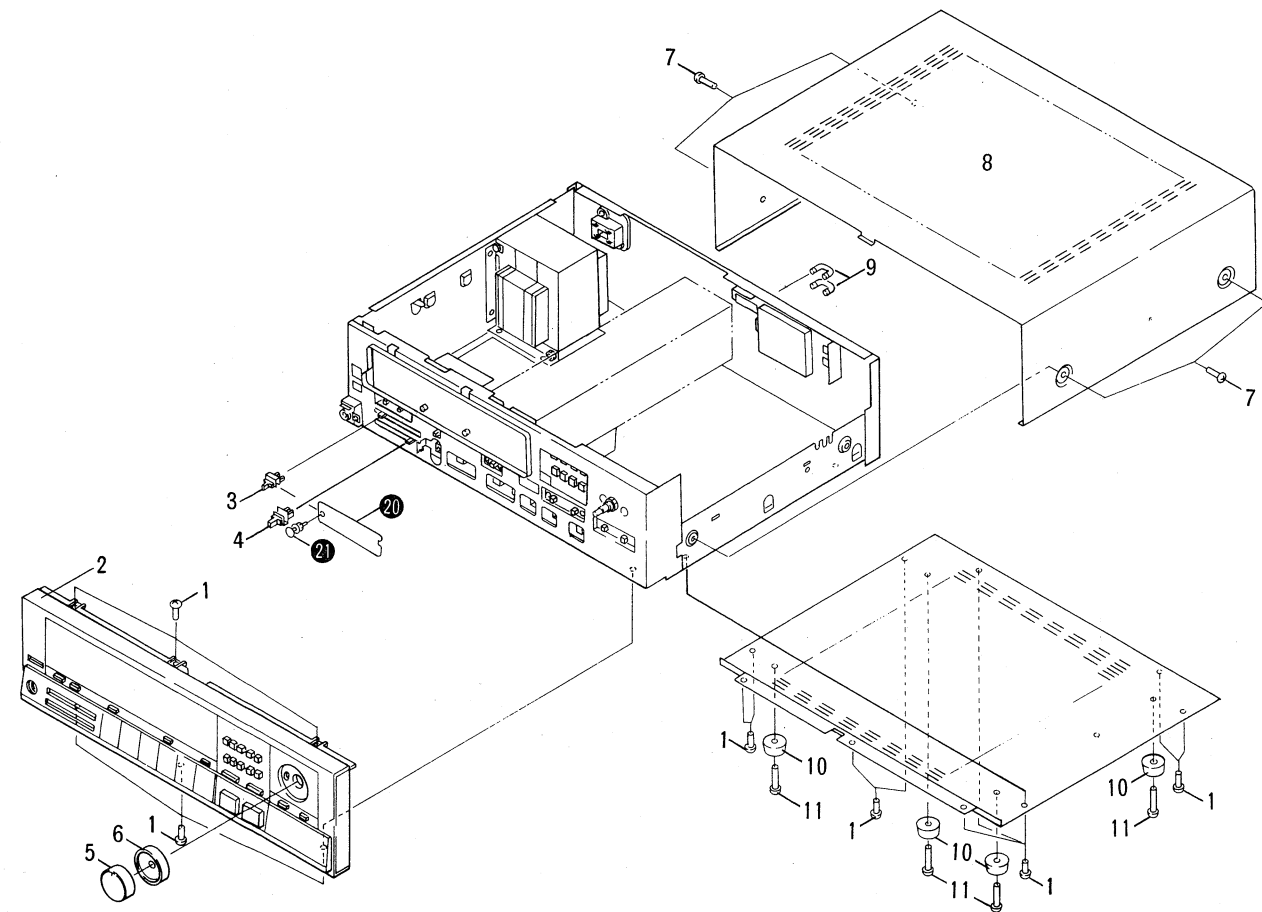


4. EXPLODED VIEW AND PARTS LIST

NOTES:

- Parts without part number cannot be supplied.
- 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.
- For your Parts Stock Control, the fast moving items are indicated with the marks $\star\star$ and \star
 $\star\star$ **GENERALLY MOVES FASTER THAN \star**
 This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Exterior Components



Parts List

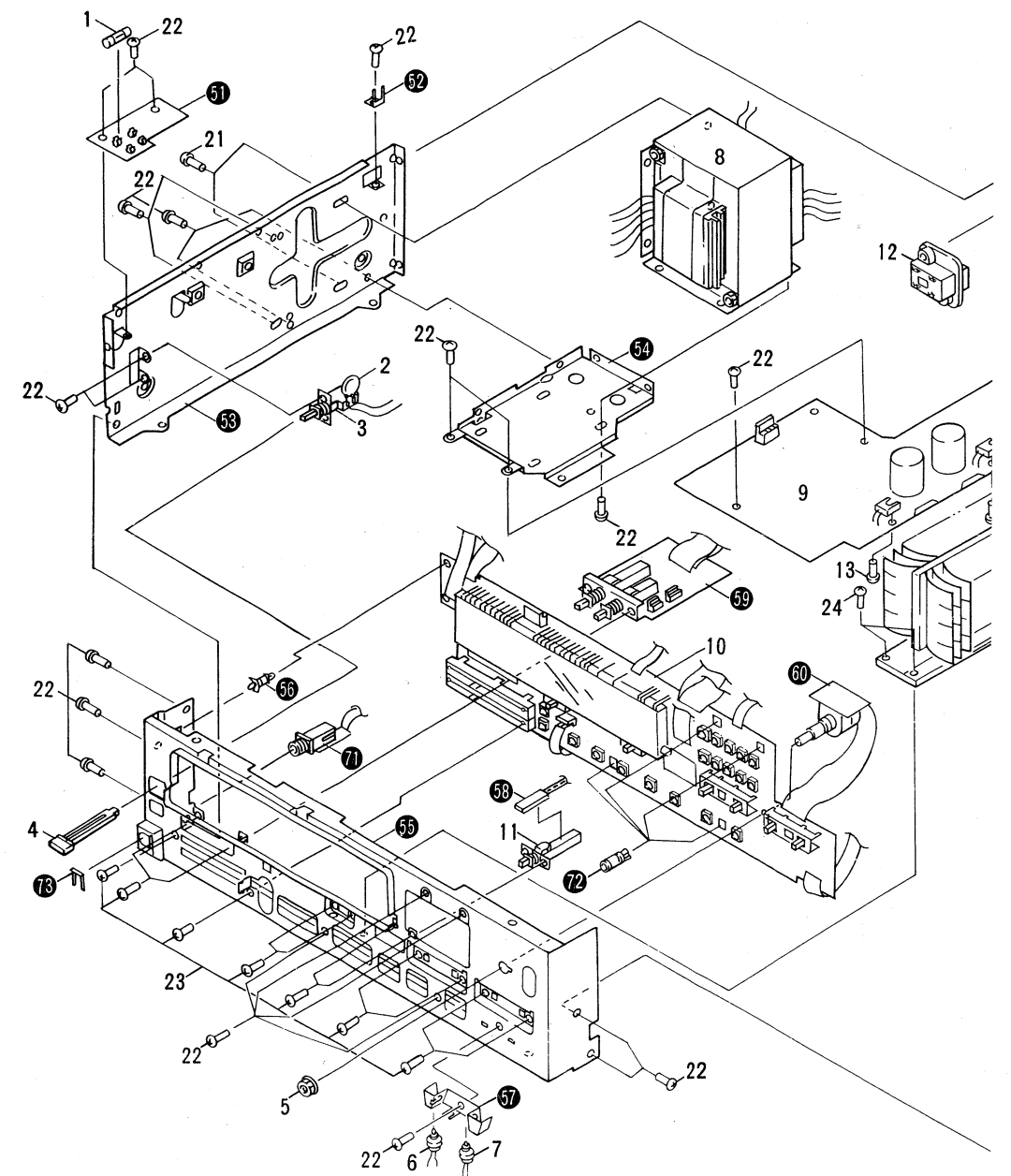
Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
	1.	BBZ30P080FZK	Screw (3 x 8)		6.	AAB-341	Knob (BALANCE)
	2.	ANM-377	Front panel assembly		7.	ABA-193	Screw
	3.	AAD-685	Knob A		8.	ANE-438	Bonnet
	4.	AAD-686	Knob B		9.	AKM-041	Connection pin
	5.	AAB-340	Knob (VOLUME)		10.	AEC-613	Bumper
					11.	VTZ40P100FMC	Screw (4 x 10)
					20.		Masking sheet
					21.		Rivet

A

B

C

D



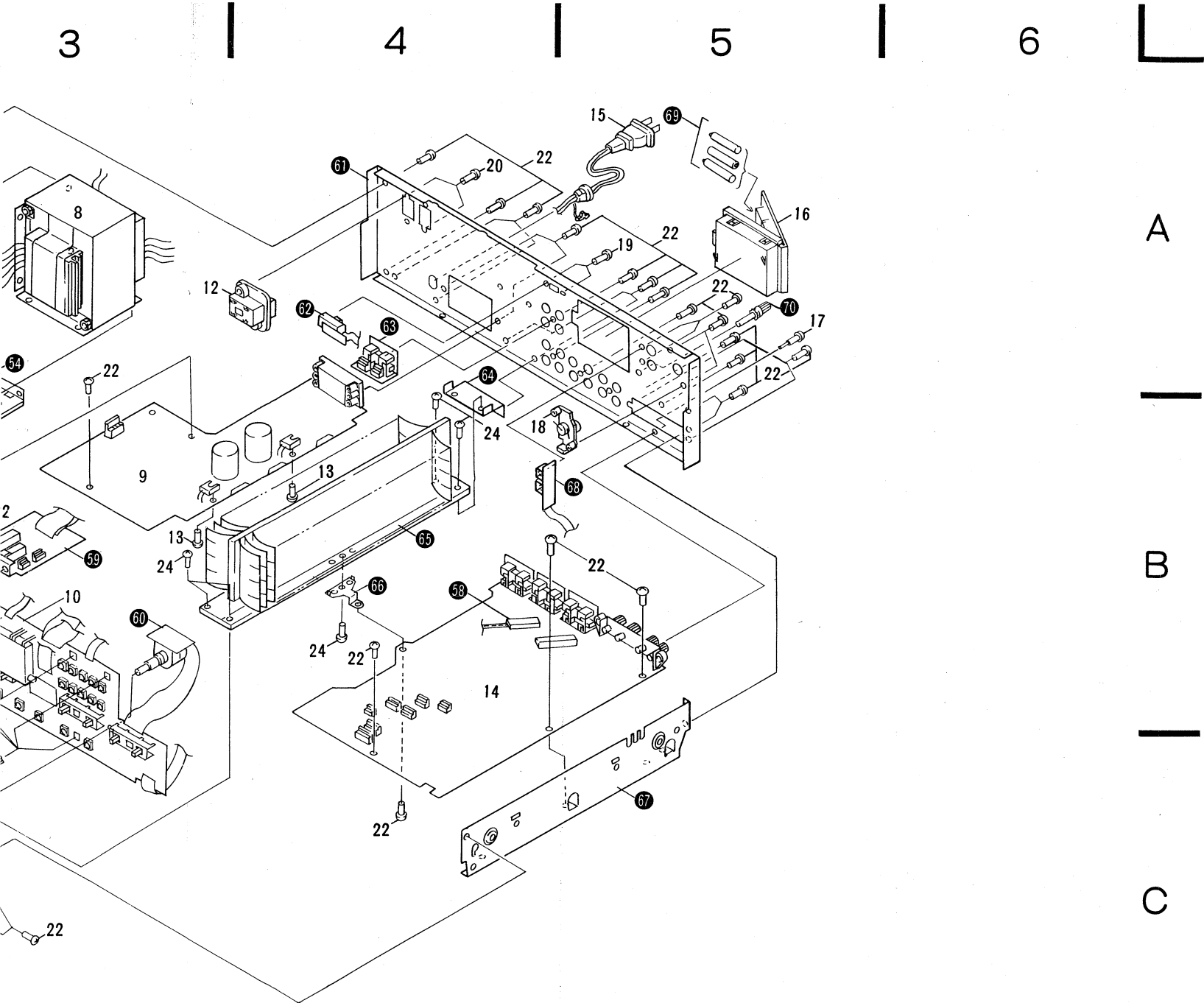
Parts List

Mark	No.	Part No.	Description	Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
Δ	$\star\star$	1.	AEK-309	Fuse (6.3A)		11.	ASX-143	Push switch (MC/MM)			
Δ	$\star\star$	2.	ACG-502	Ceramic (0.01/AC125V)	Δ	12.	AKP-039	AC socket			
Δ	$\star\star$	3.	ASG-541	Push switch (POWER)		13.	ABA-234	Screw			
		4.	AAD-684	Knob (POWER)		14.	GWE-212	Tuner assembly			
		5.	ABN-048	Nut	Δ	15.	ADG-073	AC power cord			
	$\star\star$	6.	AEL-169	Lamp (8V-100mA)		16.	AXC-019	Battery case			
	$\star\star$	7.	AEL-171	Lamp (8V-100mA)		17.	ABA-176	Screw			
Δ	\star	8.	ATS-016	Power transformer		18.	AKB-076	Terminal (AM STEREO)			
		9.	GWK-235	Power amp assembly		19.	PMZ30P060FZB	Screw (3 x 6)			
		10.	GWX-905	Control assembly		20.	MTZ30P100FZK	Screw (3 x 10).			
						21.	BMZ40P080FZB	Screw (4 x 8)			
						22.	BBZ30P080FZK	Screw (3 x 8)			
						23.	VBZ30P060FMC	Screw (3 x 6)			
						24.	BBZ30P200FMC	Screw (3 x 20)			

1

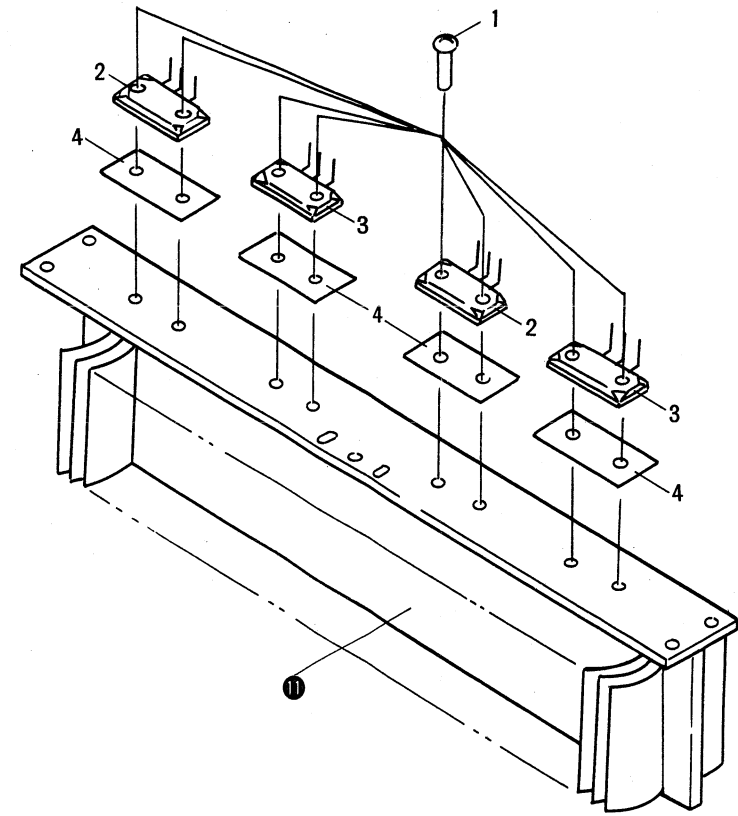
2

3



Description	Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
Push switch (MC/MM)		51.		Fuse assembly		61.		Rear panel
AC socket		52.		Grounding terminal		62.		Switch assembly
Screw		53.		Side frame L		63.		Connection terminal assembly
Tuner assembly		54.		Transformer frame		64.		Heat sink holder
AC power cord		55.		Front frame		65.		Heat sink assembly
Battery case		56.		Rivet		66.		PCB holder
Screw		57.		Lamp holder		67.		Side frame R
Terminal (AM STEREO)		58.		Remote wire		68.		VCR terminal assembly
Screw (3 x 6)		59.		Speaker switch assembly		69.		Dry battery
Screw (3 x 10)		60.		Volume assembly		70.		Terminal (ground)
Screw (4 x 8)						71.		Headphone jack assembly
Screw (3 x 8)						72.		Rivet
Screw (3 x 6)						73.		Mounting plate
Screw (3 x 20)								

A
—
B
—
C



Parts List

Mark	No.	Part No.	Description
	1.	ABA-258	Screw
▲★★	2.	2SC2922/A/-Y* (2SC2922/A/-P*) (2SC2922/A/-G*)	Q1, Q2
▲★★	3.	2SA1216/A/-Y* (2SA1216/A/-P*) (2SA1216/A/-G*)	Q3, Q4
			<i>*The hfe value of Q1, Q3 and Q2, Q4 must be the same.</i>
	4.	AEC-886	Insulating sheet
	11.		Heat sink



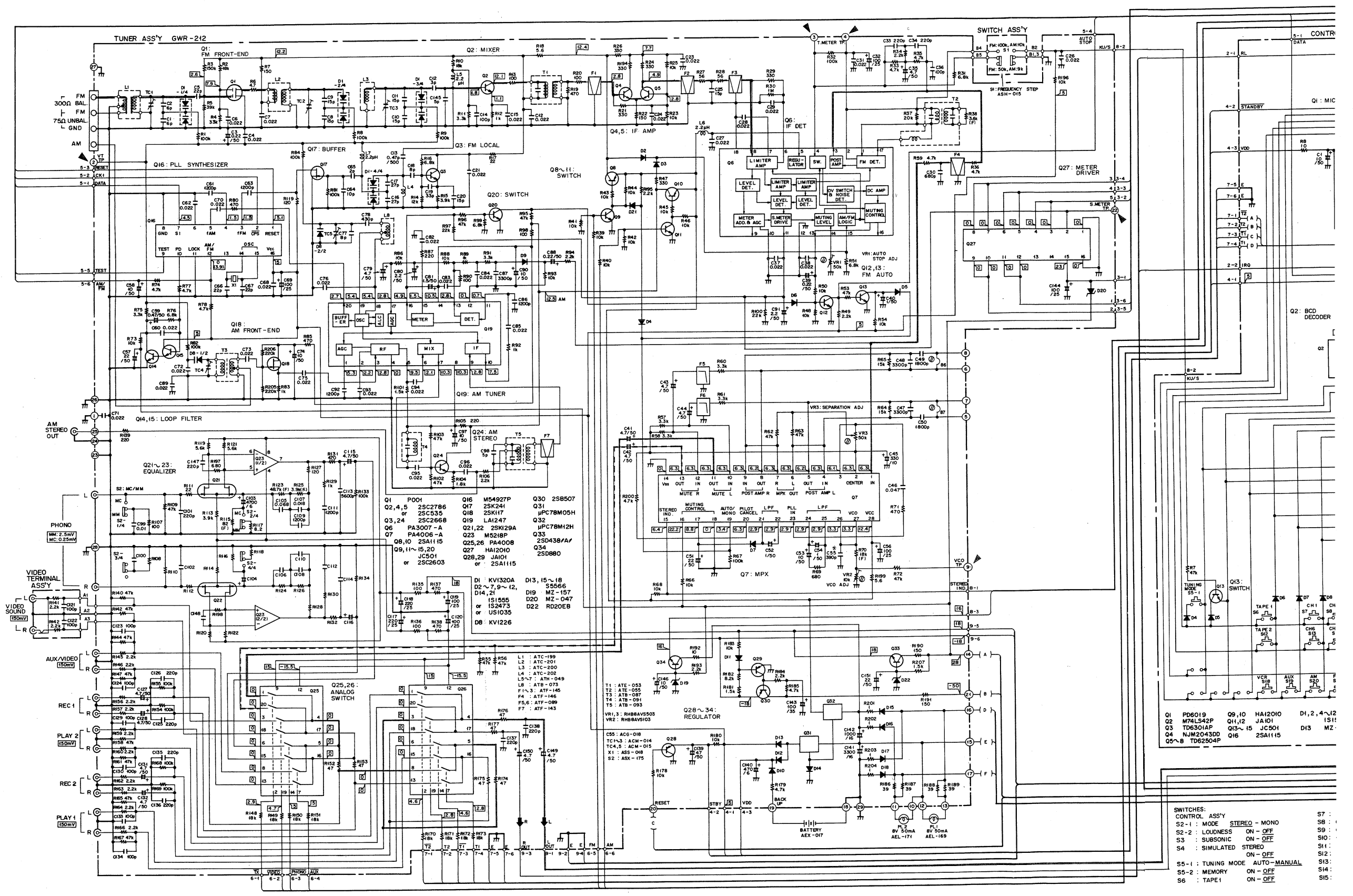
5. SCHEMATIC DIAGRAM

A

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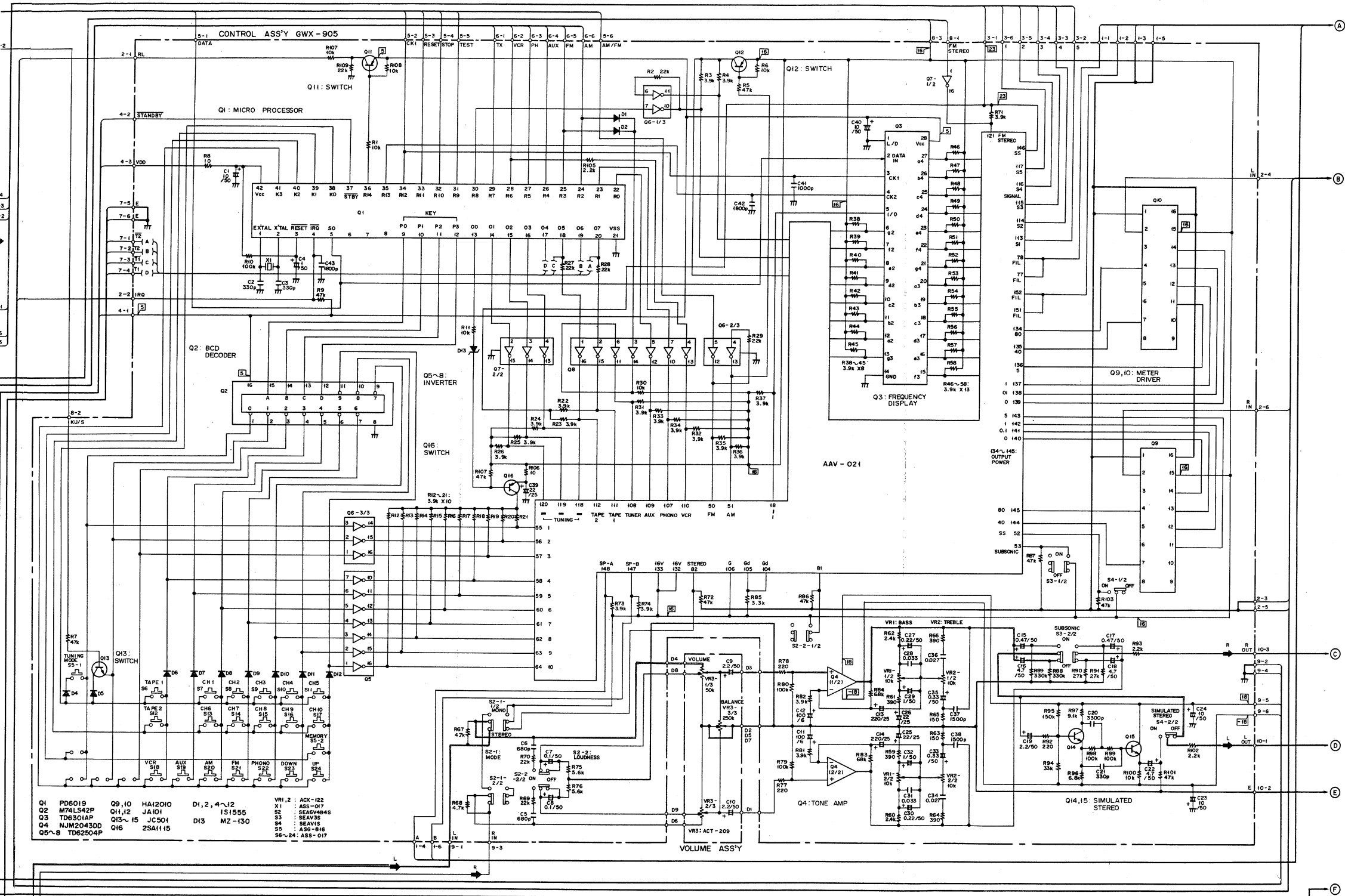
NOTE:
 The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.

A

B

C

D



- Q1 PD6019 Q9,10 HA12010 DI,2,4-12 VR1,2 : CX-122
 Q2 M74LS42P Q11,12 JA101 X1 : AS5-017
 Q3 TD6301AP Q13-15 JC501 X2 : SEAV335
 Q4 NJM2043DD Q16 2SA1115 X3 : SEAV335
 Q5-B TD62504P X4 : SEAV335
 X5 : AS5-B16
 X6 : AS5-017

- SWITCHES:**
 CONTROL ASS'Y
 S2-1 : MODE STEREO - MONO
 S2-2 : LOUDNESS ON - OFF
 S3 : SUBSONIC ON - OFF
 S4 : SIMULATED STEREO ON - OFF
 S5-1 : TUNING MODE AUTO - MANUAL
 S5-2 : MEMORY ON - OFF
 S6 : TAPE1 ON - OFF
 S7 : CH1 ON - OFF
 S8 : CH2 ON - OFF
 S9 : CH3 ON - OFF
 S10 : CH4 ON - OFF
 S11 : CH5 ON - OFF
 S12 : TAPE2 ON - OFF
 S13 : CH6 ON - OFF
 S14 : CH7 ON - OFF
 S15 : CH8 ON - OFF
 S16 : CH9 ON - OFF
 S17 : CH10 ON - OFF
 S18 : VCR ON - OFF
 S19 : AUX ON - OFF
 S20 : AM ON - OFF
 S21 : FM ON - OFF
 S22 : PHONO ON - OFF
 S23 : DOWN ON - OFF
 S24 : UP ON - OFF

- SWITCH ASS'Y**
 S1 : FREQUENCY STEP
 TUNER ASS'Y
 S2 : MC/MM MC - MM
 The underlined indicates the switch position.

- 1. RESISTORS:**
 Indicated in Ω, kΩ, M, 1/2W, 1/4W, ±5% tolerance unless otherwise noted; k, kΩ, M, MΩ, (F): ±1%, (G): ±2%, (K): ±10%, (M): ±20% 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:**
 V: Signal voltage at (80W, 80W, 8Ω) output (1kHz)
 V: DC voltage (V) at no input signal
 Value in [] is DC voltage at rated power.
 mA: DC current at no input signal
 mV: Signal voltage at FM 400Hz ± 75kHz DEV.

- 4. OTHERS:**
 Ⓢ: Signal route
 Ⓢ: Adjusting point
 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.
 * marked capacitors and resistors have parts numbers.
 This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

1 2 3 4 5 6

A

A

B

B

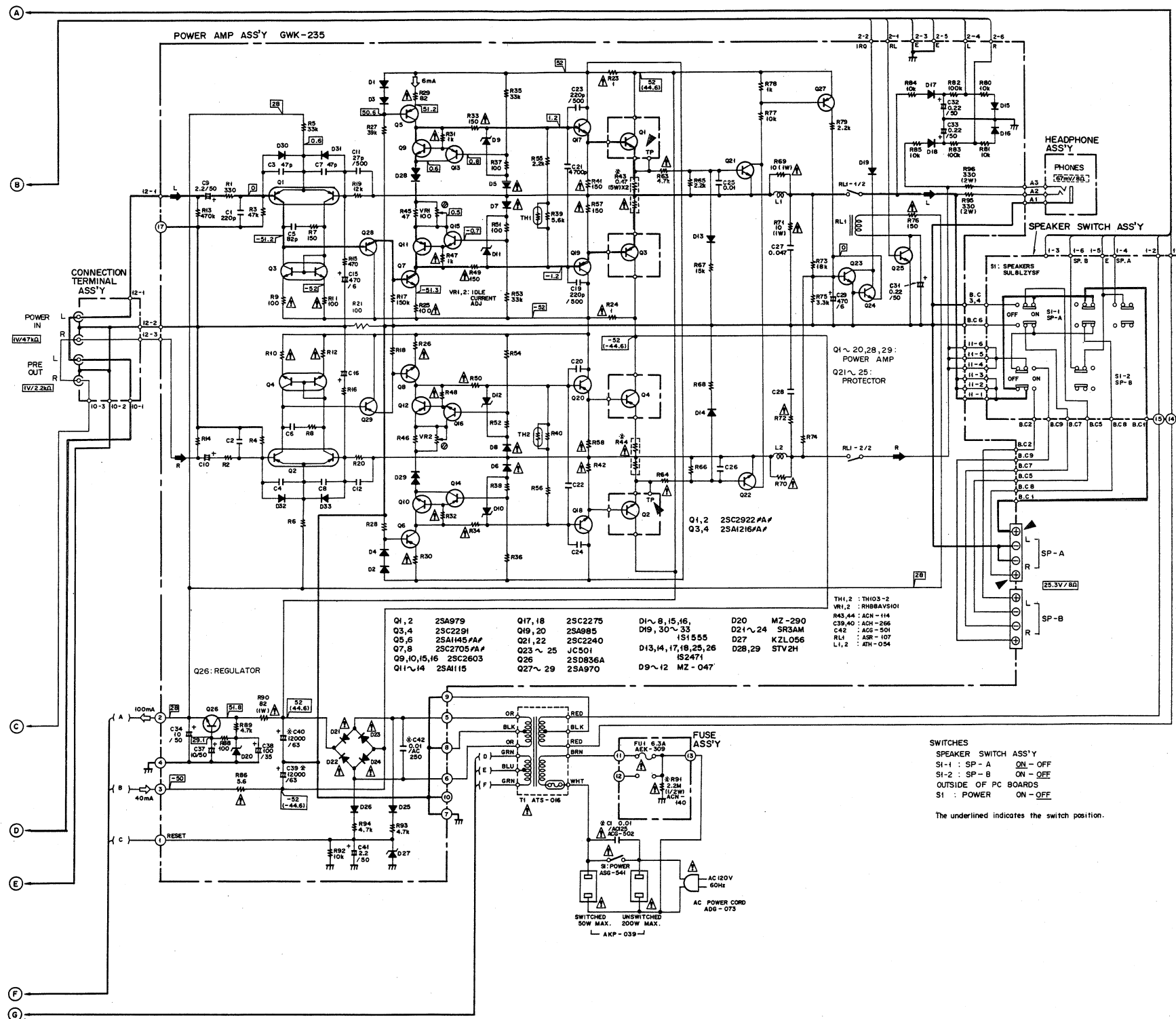
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C

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D

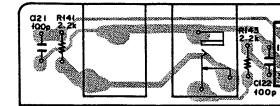
1 2 3 4 5 6



SX-60

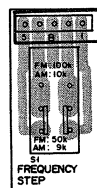
6. P.C. BOARD CONNECTION DIAGRAM

TUNER Ass'y (GWR-212)



VIDEO
TERMINAL
Ass'y

SWITCH
Ass'y



AM
STEREO
OUT

BATTERY
AEX-017

PL2
8V50mA
AEL-171

PL1
8V50mA
AEL-169

A

B

C

D

A

B

C

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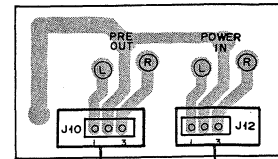
A

B

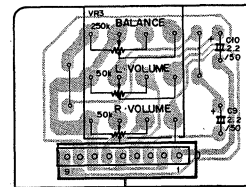
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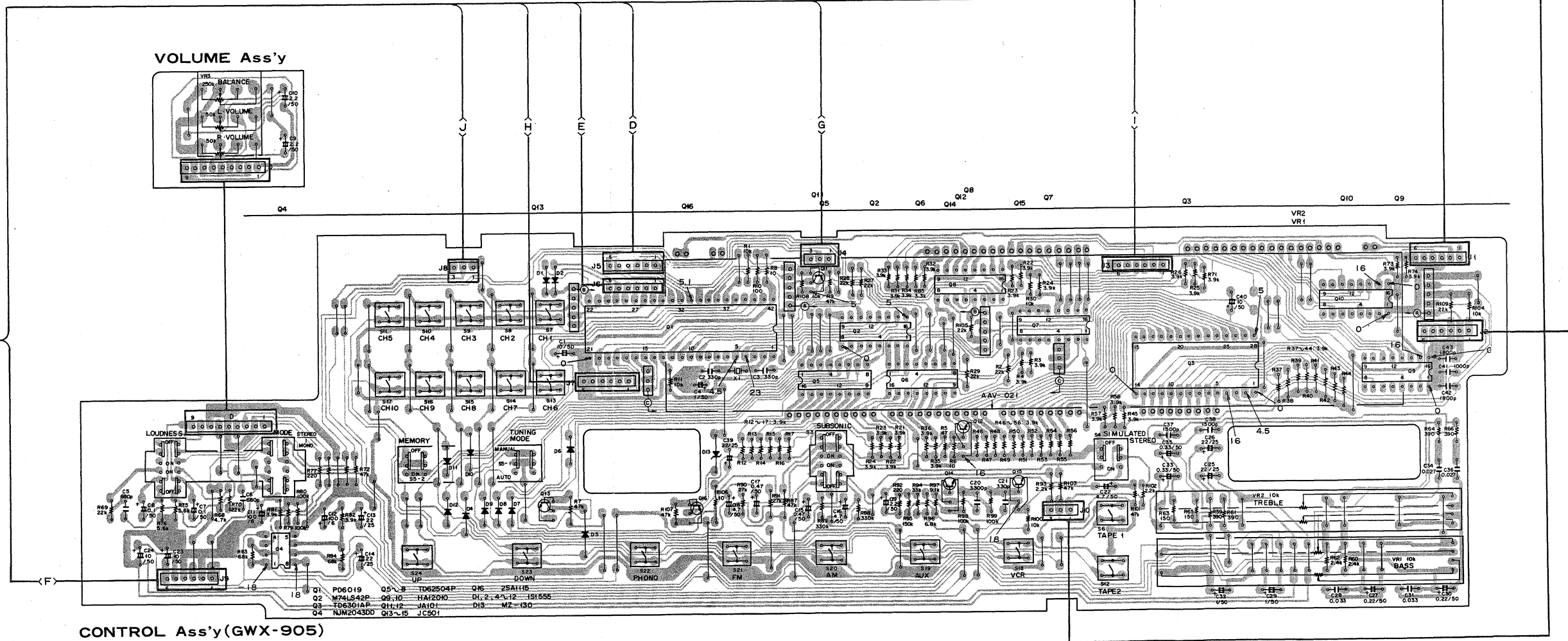
CONNECTION TERMINAL Ass'y



VOLUME Ass'y



CONTROL Ass'y (GWX-905)



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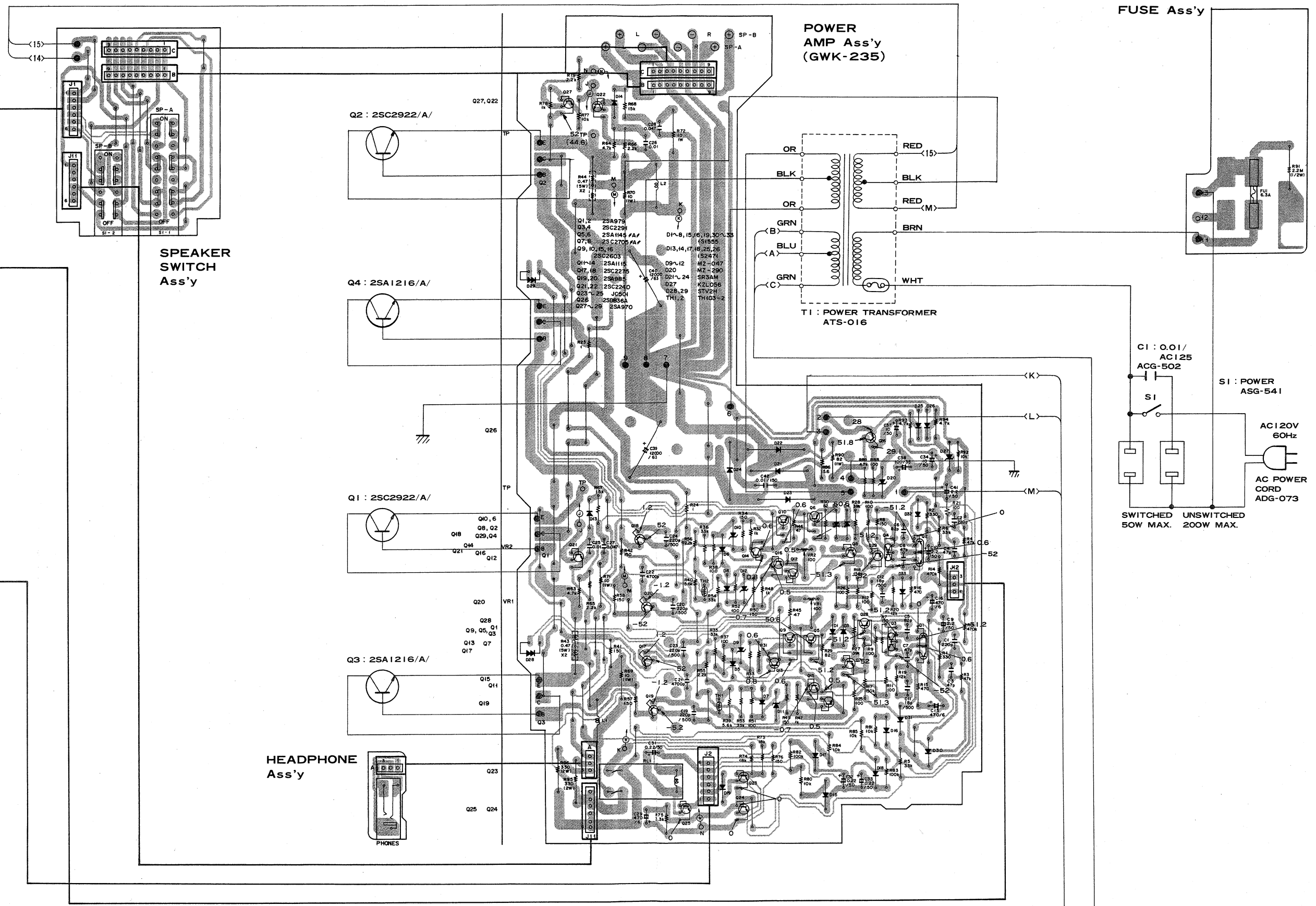
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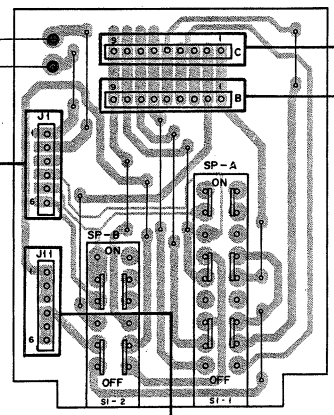
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22



SPEAKER SWITCH Ass'y

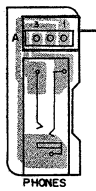
Q2 : 2SC2922/A/

Q4 : 2SA1216/A/

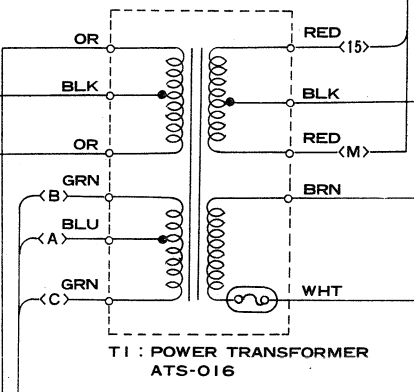
Q1 : 2SC2922/A/

Q3 : 2SA1216/A/

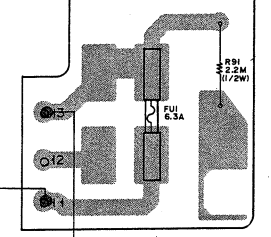
HEADPHONE Ass'y



POWER AMP Ass'y (GWK-235)

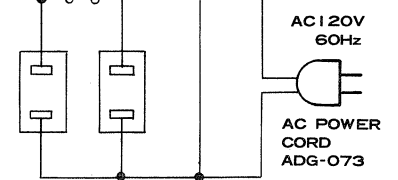


FUSE Ass'y



C1 : 0.01/AC125 ACG-502

S1 : POWER ASG-541



A

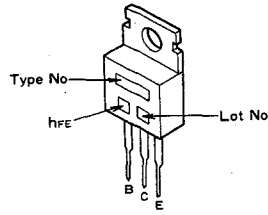
B

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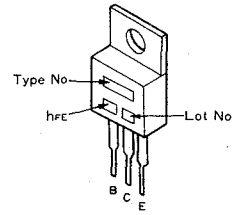
D

External Appearances of Transistors and ICs

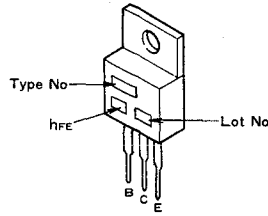
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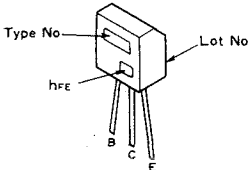
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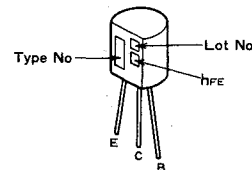
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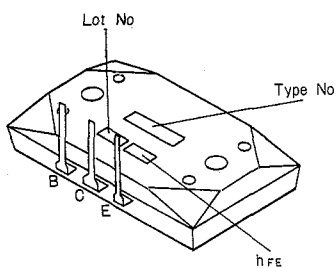
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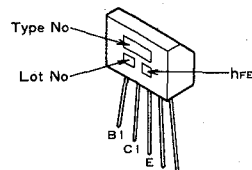
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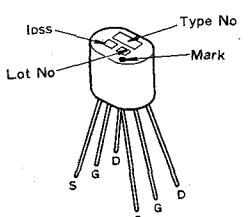
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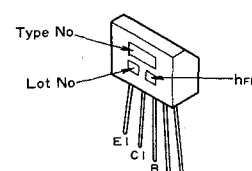
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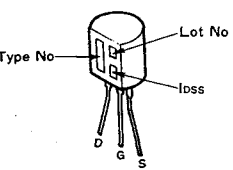
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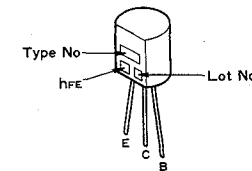
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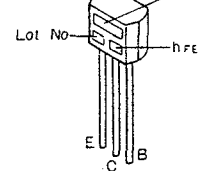
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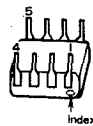
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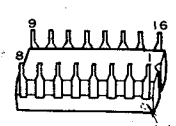
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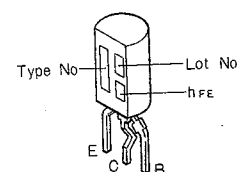
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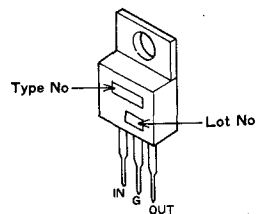
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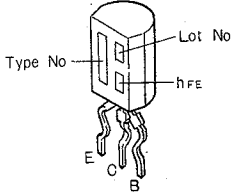
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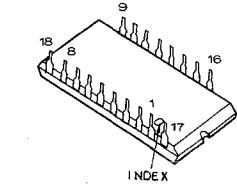
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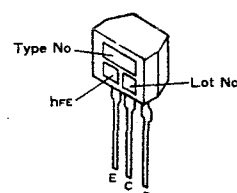
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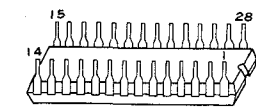
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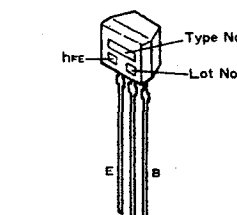
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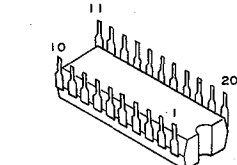
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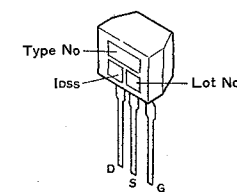
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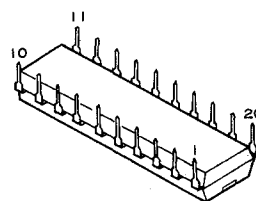
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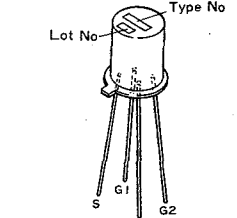
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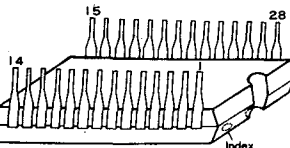
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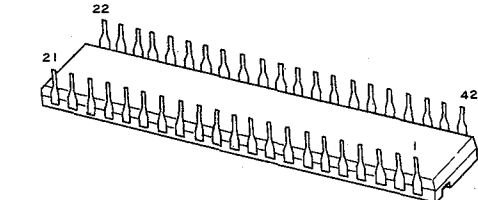
P001



PA4006-A
PA4006



PD6019



7. 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 × 10 ¹	561 RD½PS	561 J
47kΩ	47 × 10 ³	473 RD½PS	473 J
0.5Ω	0R5	RN2H	0R5 K
1Ω	010	RS1P	010 K

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

5.62kΩ	562 × 10 ¹	5621 RN½SR	5621 F
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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.

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
	GWE-212	Tuner assembly
	GWK-235	Power amp assembly
	GWX-905	Control assembly
	non supply	Headphone jack assembly
	non supply	Connection terminal assembly
	non supply	Speaker switch assembly
	non supply	Fuse assembly
	non supply	Video terminal assembly
	non supply	Switch assembly
	non supply	Volume assembly

Power Amp Assembly (GWK-235)

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
	★ 1S1555	D1 - D4, D15, D16, D19, D30 - D33
	(1S2473)	
	(US1035)	
Δ	★ 1S1555	D5 - D8
	★ 1S2471	D13, D14, D17, D18, D25, D26
Δ	★ SR3AM-4/H/	D21 - D24
	★ STV2H	D28, D29
	★ MZ-047	D9 - D12
	★ MZ-290	D20
	★ KZL056	D27

OTHERS

Mark	Part No.	Symbol & Description
Δ	★ AT5-016	T1 Power transformer
Δ	★ AEK-309	FU1 Fuse (6.3A)
Δ	ADG-073	AC power cord
Δ	AKP-039	AC socket
Δ	ACG-502	C1 Ceramic (0.01/AC125V)
Δ	★ 2SA1216/A/-Y*	Q3, Q4
	(2SA1216/A/-P*)	
	(2SA1216/A/-G*)	
Δ	★ 2SC2922/A/-Y*	Q1, Q2
	(2SC2922/A/-P*)	
	(2SC2922/A/-G*)	

*The hfe value of Q1, Q3 and Q2, Q4 must be the same.

	AKB-076	Terminal (AM STEREO)
★	AEL-169	PL1 Lamp (8V-100mA)
★	AEL-171	PL2 Lamp (8V-100mA)
★	ASG-541	S1 Push switch (POWER)
★	ASX-143	Push switch (MC/MM)
	AKM-041	Connection plug

CAPACITORS

Mark	Part No.	Symbol & Description
	ACG-501	C42 Ceramic (0.01/AC250V)
	ACH-266	C39, C40 Electrolytic (12000/63V)
	CCDSL 470J 50	C3 - C8
	CCDSL 820J 50	C5, C6
	CCDSL 221J 50	C1, C2
	CCDSL 221K 500	C19, C20, C23, C24
	CCDSL 270K 500	C11, C12
	CEA R22M 50L	C31 - C33
	CEA 2R2M 50L	C9, C10, C41
	CEA 100M 50L	C34, C37
	CEA 101M 35L	C38
	CEA 471M 6L	C15, C16, C29
	CKDYF 103Z 50	C25, C26
	CQMA 472K 50	C21, C22
	CQMA 473K 50	C27, C28

Fuse Assembly

Mark	Part No.	Symbol & Description
	ACN-140	R91 Carbon compound (2.2M, 1/2)

Control Assembly (GWX-905)

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
	★ 1S1555 (1S2473) (US1035)	D1 - D12
	★ MZ-130	D13
	★★ 2SA1115	Q16
	★★ JA101 (2SA1115)	Q11, Q12
	★★ JC501 (2SC2603)	Q13 - Q15
	★★ HA12010	Q9, Q10
	★★ NJM2043DD	Q4
	★★ M74LS42P	Q2
	★★ PD6019	Q1
	★★ TD6301AP	Q3
	★★ TD62504P	Q5 - Q8

SWITCHES

Mark	Part No.	Symbol & Description
	★★ SEA6V4B4S	S2 Push switch (MONO, LOUDNESS)
	★★ SEAV3S	S3 Push switch (SUBSONIC)
	★★ SEAV1S	S4 Push switch (SIMULATED STEREO)
	★★ ASG-816	S5 Push switch (TUNING MODE, MEMORY)
	★★ ASG-704	S6 - S24 Tact switch (STATION CALL, VIDEO, CD/AUX, PHONO, AM, FM, UP, DOWN, TAPE 1, TAPE 2/ADPT)

CAPACITORS

Mark	Part No.	Symbol & Description
	CKDYB 331K 50	C2, C3, C21
	CKDYB 681K 50	C5, C6
	CKDYB 102K 50	C41
	CKDYB 182K 50	C42, C43
	CQMLA 152K 50	C37, C38
	CQMLA 332K 50	C20
	CQMLA 273K 50	C34, C36
	CQMLA 333K 50	C28, C31
	CEJA 0R1M 50	C7, C8
	CEJA R22M 50	C27, C30
	CEJA R33M 50	C33, C35
	CEJA R47M 50	C15, C17
	CEJA 010M 50	C4, C29, C32
	CEJA 2R2M 50	C19
	CEJA 4R7M 50	C16, C18, 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
	TH103-2	TH1, TH2
	ACN-114	R43, R44 Wire-wound (0.47 x 2/5W)
	★ RH88AVS101-T	VR1, VR2 100 (Idle current)
	RS1LF100J	R69 - R72
	RS1LMF820J	R90
	RS2LMF331J	R95, R96
	RD1/4PMF □□□J	R9 - R12, R23 - R26, R29 - R34
	RD1/4PM □□□J	R41, R42, R47 - R50, R57, R58
	RD1/4PM □□□J	R63, R64, R76, R86
	RD1/4PM □□□J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
	AKE-103	Terminal (SPEAKERS)
	★★ ASR-107	RL1 Relay
	ATH-054	L1, L2 AF choke coil
	PBZ30P060FMC	Screw (3 x 6)

Headphone Jack Assembly

Mark	Part No.	Symbol & Description
	AKN-045	Phone jack (PHONES)

Connection Terminal Assembly

Mark	Part No.	Symbol & Description
	AKB-094	Terminal (PRE AMP, POWER AMP)

Speaker Switch Assembly

Mark	Part No.	Symbol & Description
	★★ SUL8LZYSF	S1 Push switch (SPEAKERS A, B)

Mark	Part No.	Symbol & Description	Mark	Part No.	Symbol & Description
	CEJA 100M 50	C1, C23, C24, C40		★★ PA4006-A (PA4006)	Q7
	CEJA 220M 25	C13, C14, C25, C26, C39		★★ PA4008	Q25, Q26
	CFJA 101M 6	C11, C12		★★ μPC78M05H	Q31
				★★ μPC78M12H	Q32

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-122	VR1, VR2 (10k x 2) BASS, TREBLE
	RD1/4PMF100J	R106
	RD1/8PM □□□J	Other resistors

OTHERS

Mark	Part No.	Symbol & Description
	★ ASS-017	X1 Ceramic resonator
	★ AAV-021	FL tube

Volume Assembly

Mark	Part No.	Symbol & Description
	★ ACT-209	VR3 (250k, 50k x 2) VOLUME, BALANCE
	CEJA 2R2M 50	C9, C10

Tuner Assembly (GWE-212)

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
	★ KV1226-Y	D8
	★ KV1320A-4	D1
	★ S5566	D13, D15 - D18
	★ MZ-047	D20
	★ MZ-157	D19
	★ RD20EB	D22
	★ 1S1555 (1S2473) (US1035)	D2 - D7, D9 - D12, D14, D21
	★★ P001	Q1
	★★ JA101 (2SA1115)	Q28, Q29
	★★ JC501 (2SC2603)	Q9, Q11 - Q15, Q20
	★★ 2SA1115	Q8, Q10
	★★ 2SB507	Q30
	★★ 2SC2786 (2SC535)	Q2, Q4, Q5
	★★ 2SC2668	Q3, Q24
	★★ 2SD880	Q34
	★★ 2SD438/A/	Q33
	★★ 2SK117	Q18
	★★ 2SK129A	Q21, Q22
	★★ 2SK241	Q17
	★★ HA12010	Q27
	★★ LA1247	Q19
	★★ M5218P	Q23
	★★ M54927P	Q16
	★★ PA3007-A (PA3007)	Q6

COILS AND TRANSFORMERS

Mark	Part No.	Symbol & Description	Mark	Part No.	Symbol & Description
	ATC-199	L1 FM antenna coil		ATB-073	L8 AM oscillator coil
	ATC-201	L2 FM RF coil		ATE-053	T1 FM coupling transformer
	ATC-200	L3 FM RF coil		ATE-055	T2 FM detection transformer
	ATC-202	L4 FM oscillator coil		ATB-087	T3 AM antenna coil
	ATH-049	L5 - L7		ATB-091	T4 AM detection transformer
	ATB-093	T5 AM IF transformer		ATF-145	F1 - F3 FM ceramic filter
	ATF-146	F4 Beat eliminate filter		ATF-146	F4 Beat eliminate filter
	ATF-089	F5, F6 Low pass filter		ATF-089	F5, F6 Low pass filter
	ATF-143	F7 AM ceramic filter		ATF-143	F7 AM ceramic filter

CAPACITORS

Mark	Part No.	Symbol & Description
	ACM-014	TC1, TC2, TC3
	ACM-015	TC4, TC5
	ACG-018	C55 Ceramic (390P/50V)
	CGB R47K 500	C13
	CCDCH 020C 50	C65
	CCDCH 030C 50	C12
	CCDCH 100D 50	C64
	CCDCH 220J 50	C5, C66, C67
	CCDRH 060D 50	C1, C2
	CCDRH 150J 50	C8 - C11, C20, C25
	CCDRH 270J 50	C16
	CCDRH 330J 50	C19
	CCDRH 270J 50	C17
	CCDTH 080D 50	C18, C77
	CCDSL 050C 50	C98, C145
	CCDSL 101J 50	C14, C36, C123, C124, C129, C130, C133, C134
	CCDSL 221J 50	C33, C34, C101, C102, C125, C126, C135 - C138, C147, C148
	CKDYB 122K 50	C61, C63, C86, C92, C109 - C112
	CKDYF 223Z 50	C4, C6, C7, C15, C21 - C24, C26 - C29, C31, C37, C38, C60, C62, C68, C70 - C73, C75, C76, C82 - C85, C89, C93 - C96
	CKDYB 681K 50	C30
	CQSH 431J 50	C78
	CQMLA 183J 50	C107, C108
	CQMLA 683J 50	C105, C106
	CQMA 473K 50	C46
	CQMA 182K 50	C49, C50

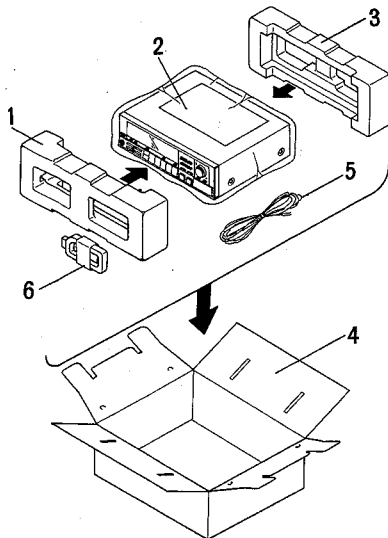
Mark	Part No.	Symbol & Description	Mark	Part No.	Symbol & Description
	CQMA 332K 50	C47, C48, C87		RD1/4PMF □□□J	R17, R18, R135 – R138, R186 – R192, R199, R201 – R204
	CQMA 562K 50	C113, C114		RD1/8PM □□□J	Other resistors
	CQMA 103K 50	C99, C100	OTHERS		
	CEANL R47M 50	C59	Mark	Part No.	Symbol & Description
	CEA R22M 50L	C3, C39, C88		AKA-017	Terminal (ANTENNA)
	CEA 010M 50L	C40, C52, C54		AKB-094	Terminal (TAPE 1, TAPE 2 /ADPT, INPUT)
	CEA 1R5M 50L	C81	★	ASS-018	X1 Crystal resonator
	CEA 2R2M 50L	C80, C91	★★	ASX-175	S2 Remote slide switch (MC/MM)
	CEA 4R7M 50L	C35, C41 – C44, C79, C115, C116 C127, C128, C131, C132, C139, C149, C150		PBZ30P060FMC	Screw (3 x 6)
	CEA 100M 50L	C53, C58, C74, C90, C97, C146	Video Terminal Assembly		
	CEA 220M 50L	C51, C57, C151	Mark	Part No.	Symbol & Description
	CEA 101M 25L	C32, C56, C69, C119, C120, C114		CCDSL 101J 50	C121, C122
	CEA 101M 35L	C143		RD1/8PM □□□J	R141, R143
	CEA 221M 25L	C118		AKB-098	Terminal (VIDEO L/MONO)
	CEA 331M 10L	C45		AKB-102	Terminal (VIDEO R)
	CEA 471M 6L	C140	Switch Assembly		
	CEA 102M 16L	C142	Mark	Part No.	Symbol & Description
	CEA 332M 16L	C141	★★	ASH-015	S1 Slide switch (CHANNEL STEP)
	CEA 472M 6L	C103, C104			
	CEA 221M 25L	C117			

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
★	RHB8A VS103	VR2 (10k, VCO)
★	RHB8A VS503	VR1, VR3 (50k, Separation, auto stop)
	RN1/4PQ □□□□F	R38, R70, R115, R116, R123 – R126

8. PACKING



Parts List

Mark	No.	Part No.	Description
	1.	AHA-346	Front pad
	2.	ARB-569	Operating instructions (English)
	3.	AHA-347	Rear pad
	4.	AHE-191	Packing case
	5.	ADH-005	FM antenna
	6.	ATB-086	Loop antenna

9. ADJUSTMENT

FM Tuner Section

Connect the FM SG to FM 300Ω antenna terminal through a 300Ω dummy antenna.

- Set FUNCTION to FM, and TUNING MODE to Manual.

Step	SG (400Hz, ±75kHz dev.)		SX-60 frequency display	Adjustment point	Adjustment procedure
	Frequency	Level			
1	No signal		108.00MHz	L4	DC25V between TP2 and TP1 (ground)
2			87.50MHz	—	Confirm that DC voltage between TP2 and TP1 is 7V±1V.
3	90MHz	60dB	90.00MHz	L1 – L3	Adjust so that DC voltage between TP22 and TP1 (ground) is maximum.
4	106MHz	60dB	106.00MHz	TC1 – TC3	
5	Repeat steps 3 and 4 until maximum voltage is attained.				
6	98.000MHz*	66dB	98.00MHz	T1	Adjust until DC voltage between TP22 and TP1 (ground) is maximum.
7				T2(CENTER)	DC 0V between TP3 and TP4
8				T2(DIST)	Minimize the distortion at REC 1 terminal
9	Repeat steps 7 and 8 until requirements are satisfied.				
10	98MHz	37dB	98.00MHz	VR1	Adjust so that tuning indicators are illuminated.

* Frequency must be accurate.

FM MPX Section

- Connect the FM multiplex stereo signal generator to the FM SG external modulation terminal.
- Set the output of the FM SG to 98.000MHz (with modulation mode set to external) and tune SX-60 to the frequency (98.00MHz)

Step	FM MPX SG		Adjustment point	Adjustment procedure
	MODULATION	LEVEL		
1	No modulation	66dB	VR2	Adjust signal at TP9 to 76kHz
2	Main (1kHz, L or R, ±33.75kHz dev.) Pilot (19kHz, ±7.5kHz dev.)	86dB	T1 within ±90°	Minimize the distortion at REC 1 terminal
3	Main (1kHz, L or R, ±33.75kHz dev.) Pilot (19kHz, ±7.5kHz dev.)		VR3	Adjust until crosstalk between L and R channel (at REC 1 terminal) is minimum.

AM Tuner Section

- Connect the AM loop antenna to AM antenna terminal.
- Set FUNCTION to AM, TUNING MODE to MANUAL position, CHANNEL STEP to 9kHz position.

Step	AM SG (400Hz, 30% MOD.)		SX-60 frequency display	Adjustment point	Adjustment procedure
	Frequency	Level			
1	No signal		522kHz	L8	DC 2V between TP2 and TP1 (ground)
2			1620kHz	TC5	
3	Repeat steps 1 and 2 until the required voltage is attained.				
4	603kHz	60dB	603kHz	T3	Adjust until voltage between TP22 and TP1 (ground) is maximum.
5	1395kHz	60dB	1395kHz	TC4	
6	Repeat steps 4 and 5 until maximum voltage is attained.				

AMPLIFIER SECTION

1. Turn VOLUME to minimum.
2. Set the SPEAKER A switch to ON.
3. Adjust VR1 so that DC voltage between TP-L and SPEAKERS A L⊕ terminal is 40mV.
4. Adjust VR2 so that DC voltage between TP-R and SPEAKERS A R⊕ terminal is 40mV.

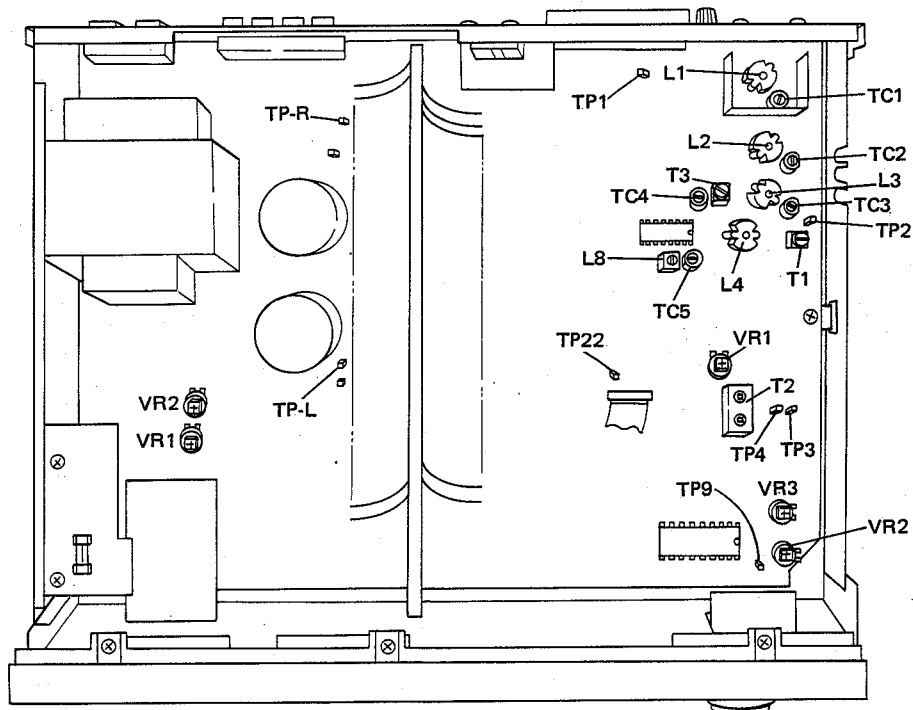


Fig. 9 Adjustment Point

9. RÉGLAGE

Partie tuner FM

- Brancher le générateur de signal FM sur la borne 300 ohms de l'antenne FM en intercalant une antenne fictive de 300 ohms.
- Placer le commutateur FUNCTION sur la position FM, et le mode de syntonisation (TUNING MODE) sur manuel (Manual).

Phase	SG (400Hz, ±75kHz de déviation)		Affichage fréquence SX-60	Point de réglage	Méthode de réglage
	Fréquence	Niveau			
1	Pas de signal		108,00MHz	L4	CC25V entre TP2 et TP1 (terre)
2			87,50MHz	—	S'assurer que la tension CC entre TP2 et TP1 est de 7V±1V.
3	90MHz	60dB	90,00MHz	L1 – L3	Continuer à régler jusqu'à ce que la tension entre TP22 et TP1 (terre) soit maximale.
4	106MHz	60dB	106,00MHz	TC1 – TC3	
5	Recommencer 3 et 4 jusqu'à ce que la tension maximale soit atteinte.				
6	98,000MHz*	66dB	98,00MHz	T1	Continuer à régler jusqu'à ce que la tension CC entre TP22 et TP1 (terre) soit maximale.
7				T2 (CENTRE)	0V CC entre TP3 et TP4.
8				T2 (DIST)	Réduire la distortion au minimum au niveau de la borne REC 1.
9	Recommencer 7 et 8 jusqu'à ce que les spécifications soient atteintes.				
10	98MHz	37dB	98,00MHz	VR1	Procéder au réglage afin que les témoins de syntonisation s'allument.

* La fréquence doit être précise

Section FM MULTIPLEX

- Brancher le générateur de signal multiplex FM stéréo sur la borne de modulation externe du modulateur de signal FM.
- Régler la sortie du générateur de signal FM sur 98,000MHz (le mode de modulation étant sur externe), et régler le SX-60 sur la fréquence 98,000MHz.

Phase	FM MPX SG		Point de réglage	Méthode de réglage
	Modulation	Niveau		
1	Pas de modulation	66dB	VR2	Régler le signal au niveau de TP9 sur 76kHz.
2	Principal (1kHz, D+G, déviation de ±33,75kHz) Pilote (19kHz, déviation de ±7,5kHz)	86dB	T1 (entre ±90°)	Réduire la distortion au minimum au niveau de la borne REC 1.
3	Principal (1kHz, G ou D, déviation de ±33,75kHz) Pilote (19kHz, déviation de ±7,5kHz)		VR3	Continuer à régler jusqu'à ce que les interférences (au niveau de la borne REC 1) entre les canaux droit et gauche soient maximales.

PARTIE TUNER AM

- Brancher l'antenne-cadre AM sur la borne d'antenne AM.
- Placer le commutateur FUNCTION sur AM, le mode de syntonisation sur manuel (MANUAL), et le sélecteur de canal (CHANNEL STEP) sur la position 9kHz.

Phase	AM SG (400Hz, modulation de 30%)		Affichage fréquence SX-60	Point de réglage	Méthode de réglage
	Fréquence	Niveau			
1	Pas de signal		522kHz	L8	CC 2V entre TP2 et TP1 (terre)
2			1620kHz	TC5	CC 25V entre TP2 et TP1 (terre)
3	Recommencer 1 et 2 jusqu'à ce que la tension voulue soit atteinte.				
4	603kHz	60dB	603kHz	T3	Continuer à régler jusqu'à ce que la tension entre TP22 et TP1 (terre) soit maximale.
5	1395kHz	60dB	1395kHz	TC4	
6	Recommencer 4 et 5 jusqu'à ce que la tension maximale soit atteinte.				

PARTIE AMPLIFICATRICE

1. Régler le volume (VOLUME) au minimum.
2. Placer le commutateur du haut-parleur A sur marche (ON).
3. Régler VR1 afin que la tension CC entre TP-L et la borne + gauche (L) du haut-parleur A soit de 40mV.
4. Régler VR2 afin que la tension entre TP-R et la borne + droit (R) du haut-parleur A soit de 40mV.

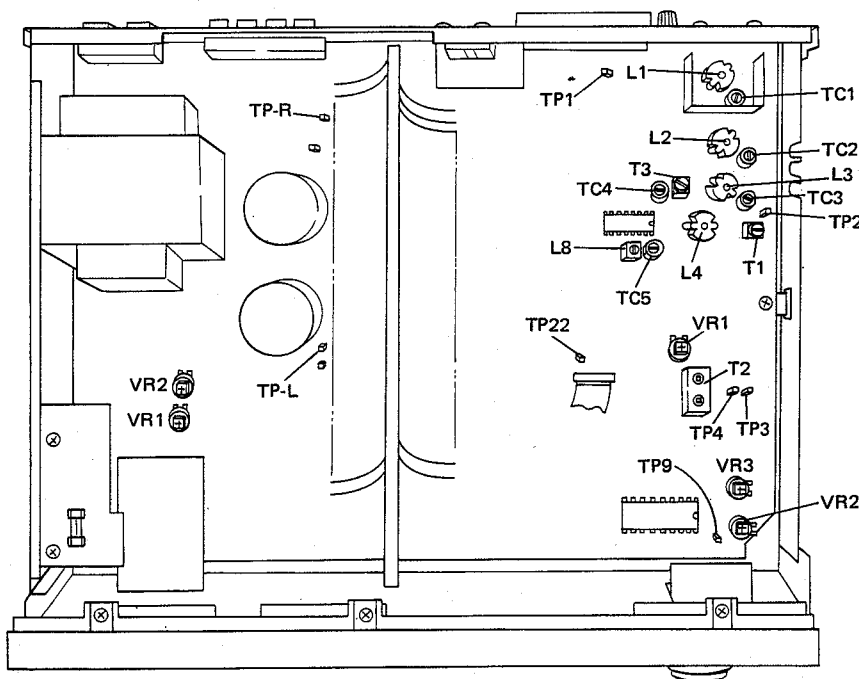


Fig. 9 Point de réglage

9. AJUSTE

Sección del sintonizador de FM

- Conectar un generador de señales de FM (FM SG) al terminal de antena de FM de 300 ohmios mediante una antena ficticia.
- Poner el selector de función (FUNCTION) en la posición FM y el del modo de sintonización (TUNING MODE) en la de Manual.

Paso	SG (400Hz, ± 75 kHz de desv.)		Frecuencí- metro del SX-60	Punto de ajuste	Procedimiento de ajuste
	Frecuencia	Nivel			
1	Sin señal		108,00MHz	L4	25V CC entre TP2 y TP1 (masa)
2			87,50MHz	—	Confirmar que la tensión de CC entre TP2 y TP1 sea de $7V \pm 1V$.
3	90MHz	60dB	90,00MHz	L1 – L3	Ajustar de modo que la tensión de CC entre TP22 y TP1 (masa) sea la máxima.
4	106MHz	60dB	106,00MHz	TC1 – TC3	
5	Repetir los pasos 3 y 4 hasta obtenerse la tensión máxima.				
6	98,000MHz*	66dB	98,00MHz	T1	Ajustar hasta que la tensión de CC entre TP22 y TP1 (masa) sea la máxima.
7				T2 (CENTER)	0V CC entre TP3 y TP4
8				T2 (DIST)	Minimizar la distorsión en el terminal REC 1
9	Repetir los pasos 7 y 8 hasta satisfacerse los requisitos.				
10	98MHz	37dB	98,00MHz	VR1	Ajustar de modo que se iluminen los indicadores de sintonización.

* La frecuencia debe ser precisa.

Sección de multiplex de FM (FM MPX)

- Conectar un generador de señales estereofónicas de multiplex de FM al terminal de modulación exterior FM SG (generador de señales de FM).
- Ajustar la salida del FM SG a 98,000MHz (con el modo de modulación ajustado a externa) y sintonizar el SX-60 a la frecuencia (98,000MHz).

Paso	FM MPX SG		Punto de ajuste	Procedimientos de ajuste
	Modulación	Nivel		
1	Sin modulación	66dB	VR2	Ajustar la señal en YP9 a 76kHz.
2	Principal (1 kHz, Izq. + Der. $\pm 33,75$ kHz de desv.) Piloto (19kHz, $\pm 7,5$ kHz de desv.)	86dB	T1 (dentro de $\pm 90^\circ$)	Minimizar la distorsión en el terminal REC 1.
3	Principal (1 kHz, Izq. y Der., $\pm 33,75$ kHz de desv.) Piloto (19kHz, $\pm 7,5$ kHz de desv.)		VR3	Ajustar hasta que la diafonía entre los canales Izq. y Der. (en el terminal REC 1) sea la mínima.

Sección del sintonizador de AM

- Conectar la antena de cuadro de AM al terminal para antena de AM.
- Poner el selector de función (FUNCTION) en la posición AM, el de modo de sintonización en la posición MANUAL, y el se paso de canal (CHANNEL STEP) en la posición de 9kHz.

Paso	AM SG (400Hz, 30% de mod.)		Frecuencí- metro del SX-60	Punto de ajuste	Procedimientos de ajuste
	Frecuencia	Nivel			
1	Sin señal		522kHz	L8	2V CC entre TP2 y TP1 (masa)
2			1620kHz	TC5	25V CC entre TP2 y TP1 (masa)
3	Repetir los pasos 1 y 2 hasta que se logre la tensión requerida.				
4	603kHz	60dB	603kHz	T3	Ajustar hasta que la tensión entre TP22 y TP1 (masa) sea la máxima.
5	1395kHz	50dB	1395kHz	TC4	
6	Repetir los pasos 4 y 5 hasta obtenerse la tensión máxima.				

SECCION DEL AMPLIFICADOR

1. Girar el control VOLUME a la posición mínima.
2. Poner el selector de altavoces A (SPEAKER A) en ON.
3. Ajustar VR1 de modo que la tensión de CC entre los terminales TP-L y L + SPEAKER A sea de 40mV.
4. Ajustar VR2 de modo que la tensión de CC entre los terminales TP-R y R + SPEAKER A sea de 40mV.

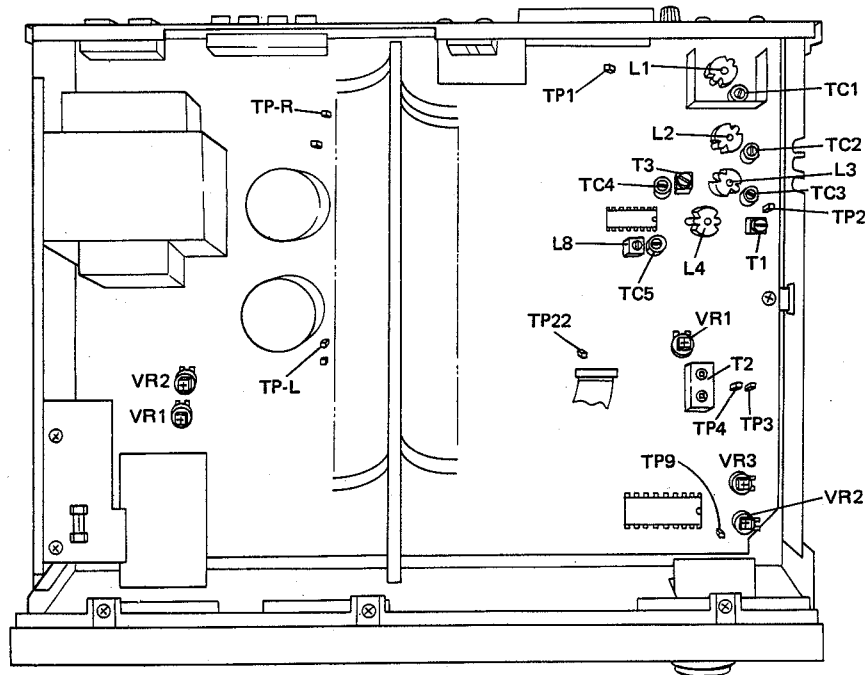


Fig. 9 Punto de ajuste

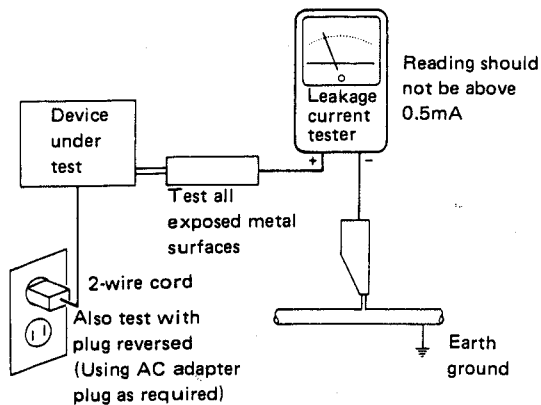
10. SAFETY INFORMATION

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 Δ 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.