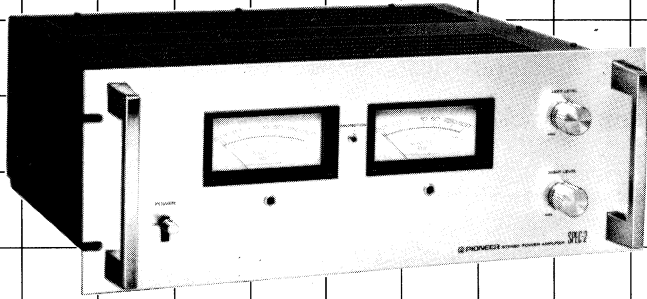


STEREO POWER AMPLIFIER

SPEC-2

OPERATING INSTRUCTIONS

D



SPEC-2 is designed to operate from 120V, 220V or 240V main. Before turning on the power, please confirm the line voltage setting indicated on the side of your unit corresponds to the supply voltage in your area; if not, change the setting as described in **IMPORTANT—LINE VOLTAGE** on page 9.

 **PIONEER**[®]

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FEATURES

State of the Art Power Amplifier

Every effort has been expended to develop and produce a unit which represents the most recent achievements in electronics and audio technologies. The differential first stage, push-pull drive and 2-stage Darlington triple push-pull direct coupled OCL circuitry delivers an astonishing 250 watts continuous power output per channel, (minimum Continuous power output of 250 watts* per channel, min., at 8 ohms from 20 Hertz to 20,000 Hertz with no more than 0.1 % total harmonic distortion.

Thermal variations due to external conditions are compensated by a twin transistor differential amplifier, assuring always stable DC balance. A low distortion push-pull driver stage drives the triple push-pull output stage.

Switch selectable speaker impedance allows the maximum rated output power to be obtained with either 8 ohm or 4 ohm speaker systems.

Toroidal Core Power Transformer

High magnetic efficiency to weight relationship plus superb regulation are the principal advantages of the toroidal core transformer incorporated into the power supply. This is complemented by four large capacitance 15,000 μ F electrolytic capacitors to compose a power supply circuit with the reserve stamina appropriate to a high output power amplifier. The built-in surge killer circuit functions to suppress current overloads which may occur from power transformer rush current and electrolytic capacitor charging, thereby protecting the circuit components and power switch contacts.

Dependable Protection Circuit

Valuable semiconductors and speaker systems are safe-

guarded against possible damage in the event of output terminal shorting or overload, DC potential across the output terminals, or abnormal heat generation. In such events, the protection circuit instantaneously disengages the output terminals and the protection lamp lights to advise of malfunction. Since this circuit is self-resetting, after identifying and correcting the cause of difficulty, the protection lamp will extinguish and normal operation can be resumed. A muting function is also included for suppressing surge noise when operating the power switch.

Level Meters Display Peak Power

The two centrally positioned generously large level meters differ from conventional VU meters in that their wide indicating band allows direct readout from -45dB to +3dB. With respect to an 8 ohm load, the SPEC-2 output from 0.01 to 250 watts can be interpreted. The newly developed logarithmic compression meter circuit, coupled with fast response high precision meter movements, permits peak value indications. In addition to peak output reading, dynamic margin with respect to the SPEC-2 clipping level can also be easily interpreted.

Continuously Variable Input Level Controls

The input level of each channel is continuously adjustable by the front panel input level controls according to the rated output voltage of the employed pre-amplifier. The pre-amplifier can thus be used at its optimum control settings. Advantages are offered with respect to SN ratio and easy volume control operation.

Panel Dimensions Meet EIA Standard

Front panel dimensions are designed to permit mounting in an EIA standard rack. At the same time, the panel layout and finish express a tasteful appreciation of quality when installed in a conventional listening room equipment cabinet.

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

STEREO SYSTEM SET-UP

INSTALLATION PRECAUTIONS

When installing the SPEC-2, avoid the following locations which may lead to reduced performance or malfunctions.

- In direct sunlight, near radiators or other heat sources.
- Locations with poor ventilation, and those subject to excessive humidity or dust.
- Unstable or unlevel surfaces.
- Near alcohols, insect sprays or other inflammable materials.

As nothing has been spared or sacrificed in its design, the SPEC-2 is necessarily massive. Use special care in selecting a sturdy support capable of bearing its 24 kg weight (a little over 54 lbs.) and exercise caution when transporting the unit.

The high output power of the SPEC-2 is accompanied by the unavoidable generation of heat. Do not place other components on top of it and avoid installation in tightly confined cabinets or shelves. Provide at least 10 cm (4 in) clear space above and around the perimeter of the SPEC-2, or employ a cooling fan if this is not possible.

THICK CURTAINS

- Shield from direct sunlight.
- Adjust position and coverage area to control excess sound liveliness in the listening room.

CABINET

- Sturdy composition, durable against weight and vibration.

TAPE DECK

- Be sure to set reel clamps when using.
- Close dust cover when not employing.

TURNTABLE

- Observe that vibrations are not transferred to turntable.
- Keep dust cover closed whenever possible.

- With the left and right speaker systems taken as the base line, the listening position should be slightly to the rear of an equilateral triangle formed with the speakers.

- Sound quality is influenced by furniture composition and distribution.

SPEC-1 (Pre-amplifier)

- Do not use longer connecting cords than necessary.

SPEC-2 (Power Amplifier)

- Observe that speaker connecting cords possess adequate power handling capacity.

TUNER

- Employ an outdoor FM antenna for best reception.

SPEAKER SYSTEMS

- Rear and side panels of both left and right speaker systems should be at the same conditions.
(Low frequencies emerge more easily when the rear panel is in proximity to a wall.)

STORAGE AREA

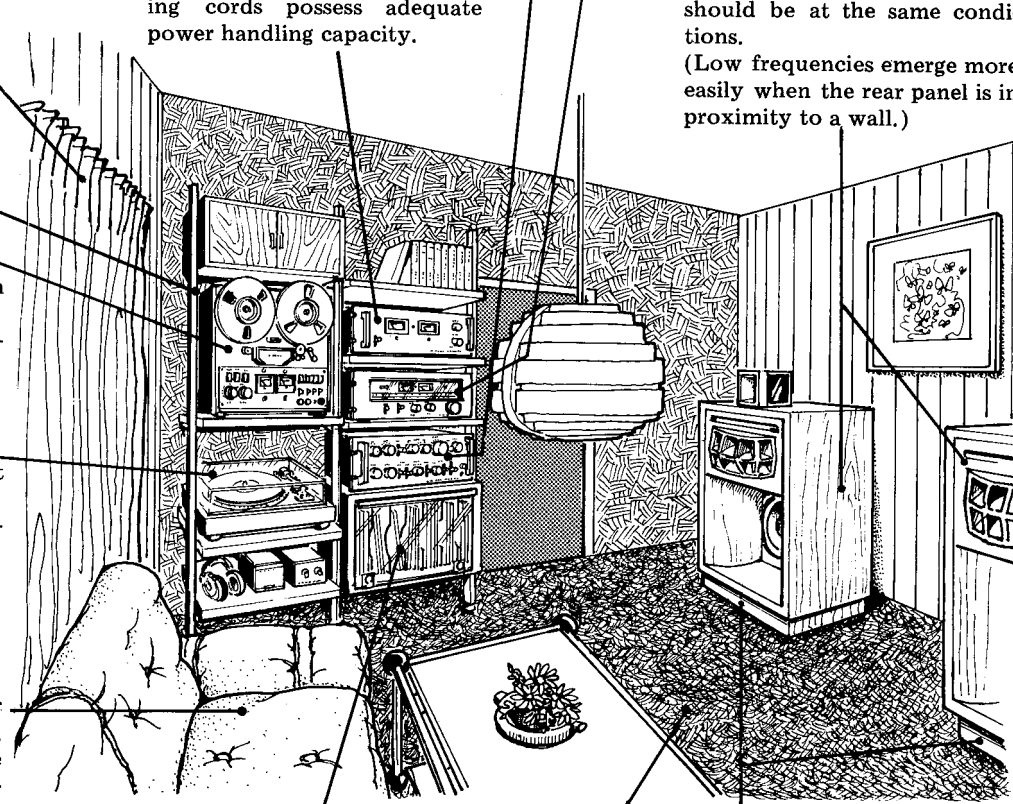
- Protected from dust and grit.
- Store records vertically
- Do not leave recorded tape exposed for extended periods.
- Protect tape from magnetic fields

CARPET

- Effective when placed in front of speaker systems.
- Improves sound absorption.

Install speaker systems so that vibrations are not transferred to the floor.

- For bookshelf type systems, use supporting stands or concrete blocks.



CONNECTIONS

PRE-AMPLIFIER

As shown in Fig. 1, use the accessory connecting cords to connect the INPUT jacks of the SPEC-2 with the PRE OUT jacks of a stereo pre-amplifier. The upper jack is for the left (L) channel and the lower jack for the right (R) channel.

SPEAKER SYSTEMS

Connect the R speaker terminals of the SPEC-2 to the right channel speaker system (at listener's right as viewed from listening position) and the L terminals to the left channel speaker system. See Fig. 2.

- Each channel output consists of plus (⊕: red) and minus (⊖: black) terminals, while the terminals of the speaker systems also possess plus and minus polarities. Be sure to connect plus to plus and minus to minus.
- Be sure to set the SPEAKER IMPEDANCE switch on the rear panel according to the nominal impedance of the speaker systems in use.

NOTE:

The high output power of the SPEC-2 requires cords of ample current handling capacity for connection to the speaker systems. Also be sure to make these connections securely. If the cord current capacity is inadequate, or connections loose, overheating or shorting can occur.

Speaker Terminal Connections

The SPEAKERS terminals can be connected in either of 2 ways, as shown in Fig. 3. Take care when connecting that plus and minus connecting cords do not short and that bare wire does not contact conductive surfaces such as the panel.

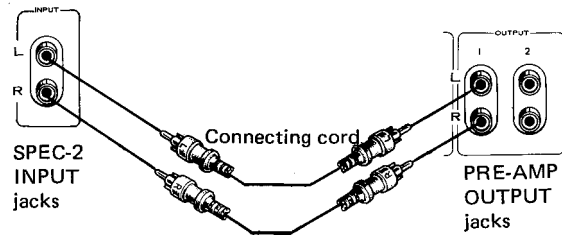


Fig. 1

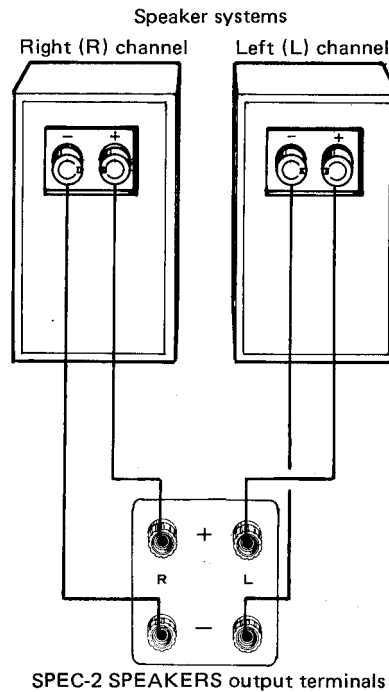
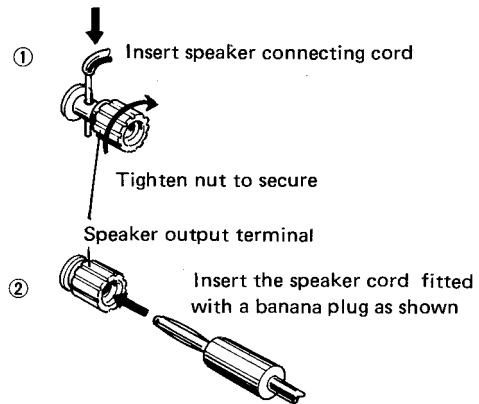


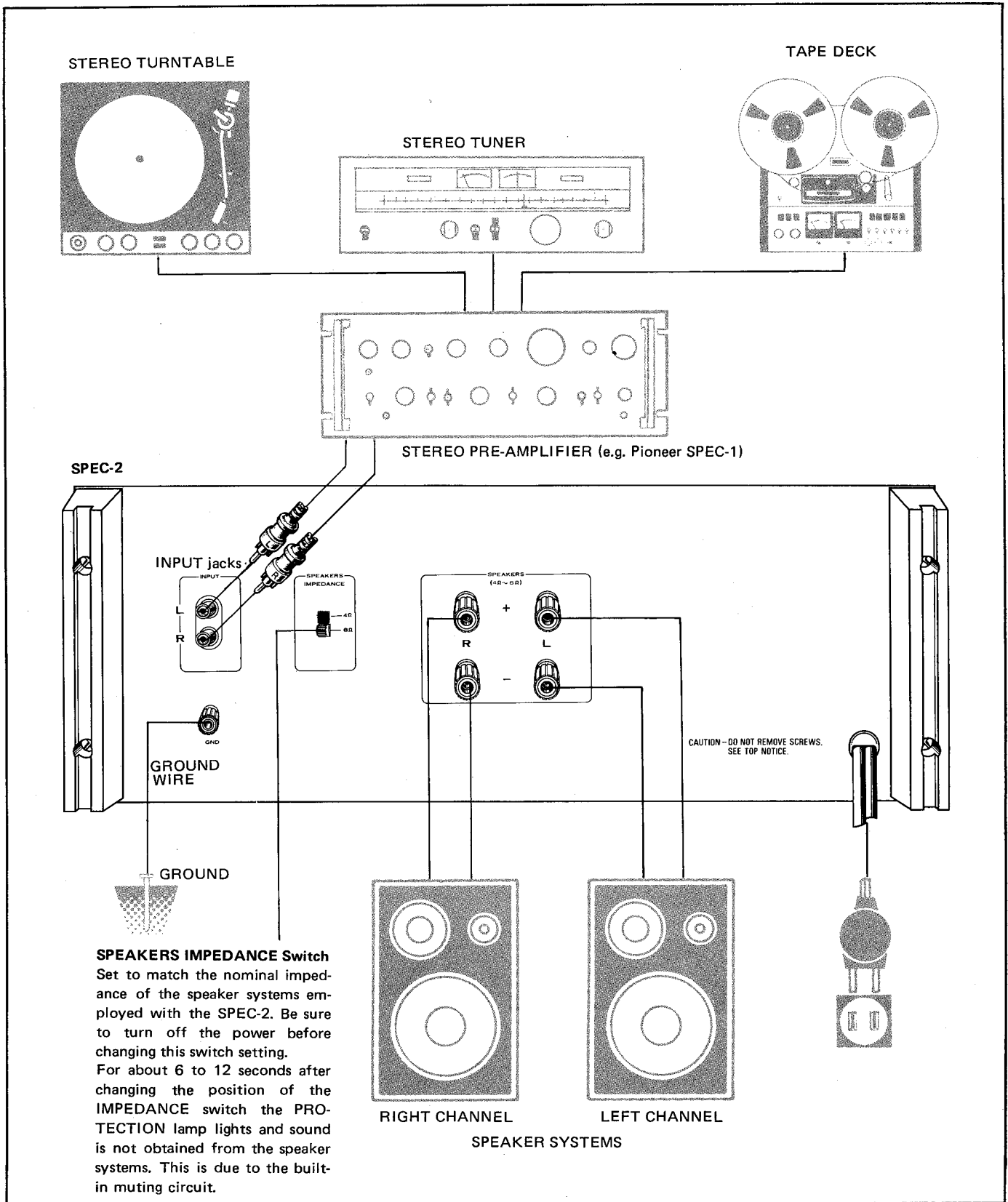
Fig. 2



Speaker terminals and cord connections

Fig. 3

CONNECTION DIAGRAM



FRONT PANEL FACILITIES

PEAK LEVEL METERS

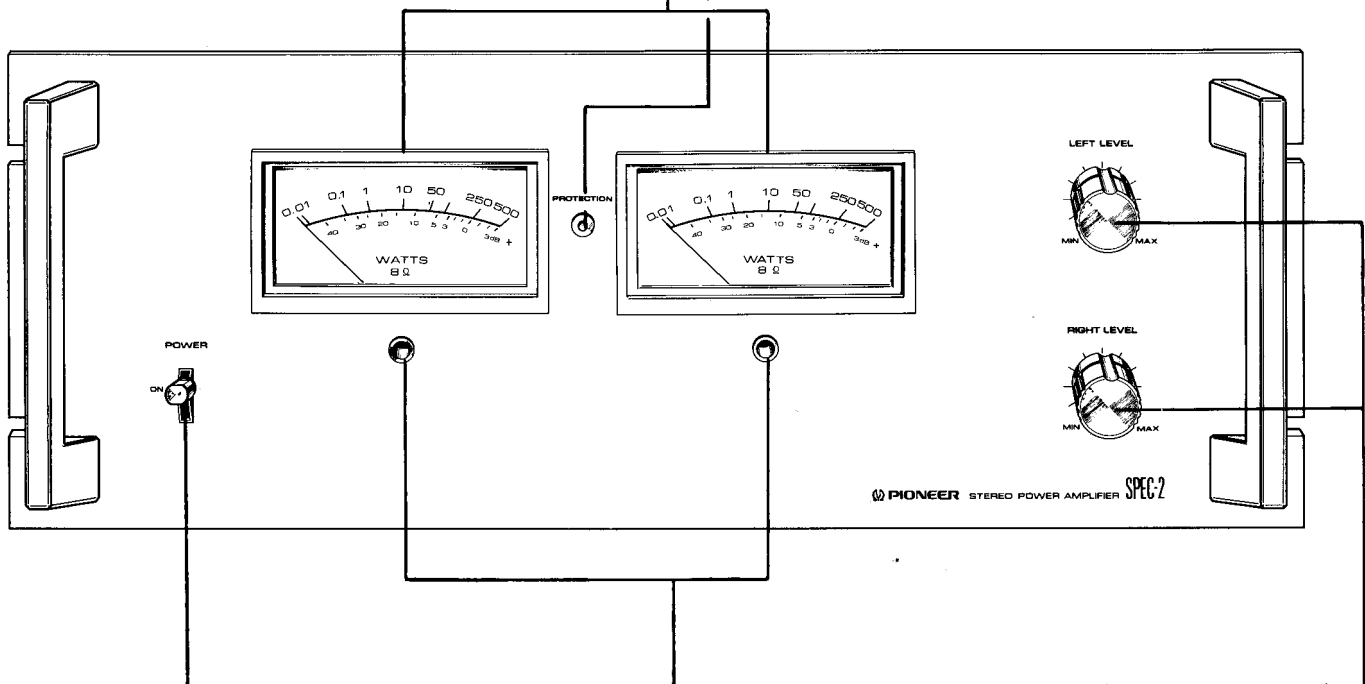
When speaker systems of 8Ω nominal impedance are connected, these provide direct readout of the output power in Watts.

NOTE:

Speaker system impedance varies according to frequency. To obtain a precise measurement of the output power, remove speaker connections and connect 8Ω dummy loads across the SPEAKERS terminals.

PROTECTION INDICATOR

The lamp lights when the protection circuit functions. If the lamp stays on during operation, turn off the POWER switch and check as described in the section "Protection Circuit Operation". After identifying and correcting the source of difficulty, if the lamp still fails to extinguish, contact a Pioneer Authorized Service Center.



POWER SWITCH

Set to ON to energize the SPEC-2. Output will not be obtained until the PROTECTION indicator lamp goes out. This effect is due to the internal muting circuit and does not indicate malfunction.

METER ZERO POINT ADJUSTMENT

INPUT LEVEL CONTROLS (LEFT & RIGHT)

Adjust LEFT and RIGHT controls according to the output level (voltage) of the pre-amplifier connected to the SPEC-2 INPUT (L & R) jacks. Control positions correspond to 2V at MAX (fully clockwise), 4V at center of rotation, and ∞ at MIN (fully counter-clockwise). Normally set these controls to MAX (2V).

- If the minimum output voltage of the employed pre-amplifier does not reach 2V, set the controls to MAX (2V). In this case the effective output indicated in the specifications will not be obtained (for example 1/4 of the specified output can be attained with a pre-amplifier output voltage of 1V).

BEFORE OPERATING

Confirm the following before setting the SPEC-2 POWER switch to ON.

- SPEC-2 power cord is plugged into an AC outlet with more than 1.3kW power handling capacity.
- SPEAKERS IMPEDANCE switch is set according to the rated impedance of the connected speaker systems.
- Speaker system connecting cords possess ample power handling capacity.
- Check that nothing is covering the SPEC-2, heat dissipation is not blocked, and adequate ventilation is provided.
- Confirm output voltage of the connected pre-amplifier and adjust the SPEC-2 input level controls. Normally set controls to the MAX (2V) position.

Set the Pre-amplifier Controls as Follows

1. Volume control to minimum.
2. If a tape monitor switch is provided, set it to SOURCE or OFF when using a component other than a tape deck. Set the switch to ON (or TAPE MONITOR) if employing tape deck.

OPERATION

1. Set the SPEC-2 POWER switch to ON.
2. Turn on the power switches of the pre-amplifier and desired source component (turntable, tuner, tape deck, etc.) and begin play.
3. Adjust volume and tone with the pre-amplifier controls.

EMPLOYING INPUT LEVEL CONTROLS

If the residual noise of the connected pre-amplifier is high, the noise level can be reduced by turning these controls counter-clockwise. These controls are also useful in situations such as composing a multi-amplifier stereo system or comparison listening between two or more power amplifiers. In such cases, the controls can adjust for equal volume levels from the speaker systems. They are also convenient for compensating for differences in speaker system efficiency.

PROTECTION CIRCUIT OPERATION

- For about 6 to 12 seconds after the POWER switch has been turned ON, the PROTECTION lamp lights and sound is not obtained from the speaker systems. This is due to the built-in muting circuit, which prevents surge noise as the POWER switch is activated, and the protection circuit, which protects the speakers from damage in the event that DC current appears at the output.
- The SPEC-2 incorporates a protection circuit to guard against overheating caused by overload, shorting of the speaker terminals or insufficient ventilation. Should any of these conditions arise the protection circuit will operate and the PROTECTION lamp will light. In this case turn off the power, remove the source of the trouble, and resume operation after allowing the unit to cool.
- If the PROTECTION lamp lights continuously due to a cause other than those described above, it may be inferred that an internal malfunction such as transistor damage has activated the protection circuit in order to protect the speakers from damage. In this case, turn off the power and contact a Pioneer Authorized Service Center.

ADDITIONAL SPEC-2 APPLICATIONS

4-CHANNEL STEREO SYSTEM

As illustrated in Fig. 4, a 4-channel stereo system can be built by employing 2 sets of stereo power amplifiers, a pre-amplifier equipped with the required decoders and demodulator (or pre-amplifier plus separate adapters), and 4 speaker systems. In this type of system, by installing the speakers at the front and rear, left and right, greater sound presence and a luxurious concert hall effect can be enjoyed which are unobtainable from 2-channel stereo. Reverberations, audience applause and similar live performance sensations of a concert hall can be savored in your own listening room.

4-channel stereo systems consist of matrix (RM & SQ) and discrete (CD-4) formats.

MULTI-AMPLIFIER SYSTEM

A multi-amplifier stereo system can be constructed by employing two power amplifiers and an electronic crossover network. They are connected between the pre-amplifier and speakers as shown in Fig. 5.

This type of system divides the audio frequency spectrum into separate components, with each component amplified by its own amplifier. Improved intermodulation distortion is a major advantage associated with such systems.

A 2-way multi-amplifier system divides the audio spectrum into two components, while a 3-way system divides it into three components.

INCORPORATION WITH SPEC-1 (PROVIDED WITH SPEAKERS TERMINALS)

The separately sold SPEC-1 pre-amplifier is designed for incorporation with the SPEC-2 power amplifier. This brings pre-amplifier functions to the SPEC-2 and provides speaker terminals for two sets of stereo speaker systems. When 2 sets are installed, they can be selected by a SPEAKERS switch. This feature is convenient for selecting speakers according to the program source or comparison listening.

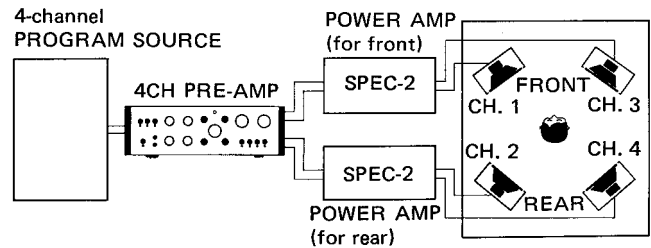


Fig. 4

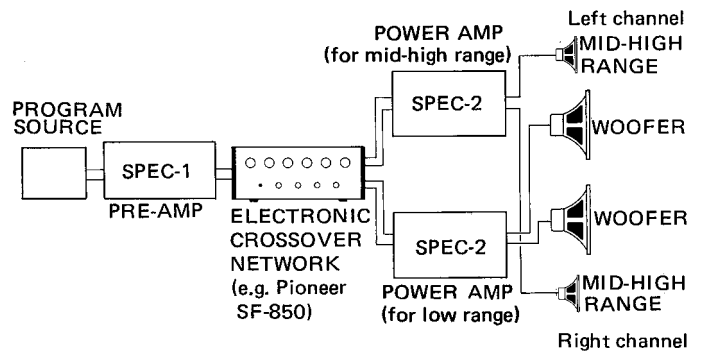


Fig. 5

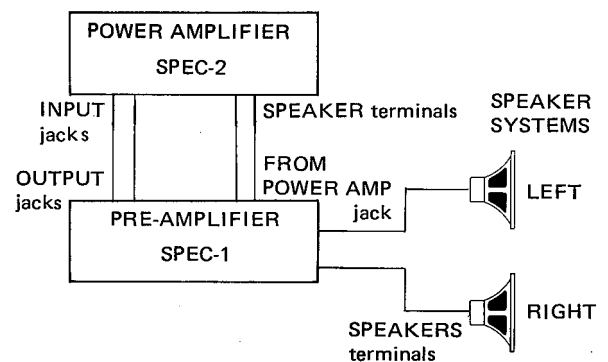


Fig. 6

CONDITIONS FREQUENTLY MISTAKEN FOR MALFUNCTION

In event of suspected malfunction, check the unit according to the following table and confirm proper operation of other connected equipment. If the difficulty cannot be corrected, turn off the power and contact a Pioneer Authorized Service Center.

Symptom	Check Points	Causes and Corrections
No sound	<ul style="list-style-type: none"> ● Peak level meter lamps do not light ● Peak level meters do not deflect ● INPUT jacks or SPEAKER terminal connections open or loose 	<ul style="list-style-type: none"> ● Set POWER switch to ON. ● Turn LEVEL controls clockwise. ● Connect securely.
Intermittant sound	<ul style="list-style-type: none"> ● Occurs at low volume levels ● Amplifier heat is allowed to accumulate 	<ul style="list-style-type: none"> ● INPUT jacks or SPEAKER terminal connections faulty. ● Remove objects from the amplifier vicinity which interfere with heat dissipation.

IMPORTANT—LINE VOLTAGE

The SPEC-2 is provided with a line voltage selector on the left hand side panel (see Fig. A). This is normally pre-set to 220V, so before using for the first time, or if the unit is to be used in a different area, it is important to check the compatibility of the selector setting and fuse rating.

CHANGING THE LINE VOLTAGE SETTING

1. Disconnect the A.C. mains cord.
2. Use a Phillips screwdriver to remove the selector cover (Fig. A).
3. Pull out the selector plug.
4. Replace the plug so that the arrow points to the appropriate line voltage (Fig. B).

CHANGING THE FUSE

Whenever the line voltage is changed the fuse must also be changed in accordance with the table in Fig. C.

1. Disconnect the mains cord.
2. Use a Phillips screwdriver to remove the 12 screws securing the bottom plate.
3. Remove and replace the fuse located at the front left of the SPEC-2 (see Fig. D). It may be helpful to use tweezers for this, due to the confined space.

3 Line Voltage model
~ AC 120V/220V/240Volts
50/60Hz

LINE VOLTAGE SELECTOR
~AC 120V, 220V, 240V
50Hz/60Hz

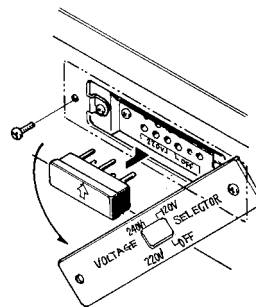
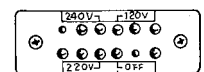
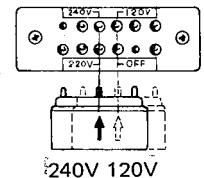


Fig. A



220V OFF Fig. B

Local Line Voltage	Fuse
120V	15A
220V	8A
240V	8A

Fig. C

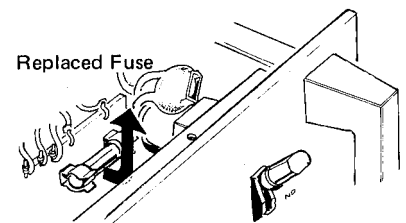


Fig. D

SPECIFICATIONS

Semiconductors

Transistors	57
Diodes	81

Power Amplifier

Circuitry Cascaded differential Amplifier,
Push-pull drive, Triple push-pull, direct coupled OCL.

Continuous power output of 250 watts* per channel,
min., at 8 ohms from 20 Hertz to 20,000 Hertz with
no more than 0.1 % total harmonic distortion.
distortion.

Total Harmonic Distortion at 20 Hertz to 20,000 Hertz	
(Continuous rated power output)	0.1%
(125 watts per channel power output, 8 ohms)	0.05%
(1 watt per channel power output, 8 ohms)	0.05%
Intermodulation Distortion	
(Continuous rated power output)	0.1%
(125 watts per channel power output, 8 ohms)	0.05%
(1 watt per channel power output, 8 ohms)	0.05%
Frequency Response	5 Hertz to 80,000 Hertz ⁺⁰ ₋₁ dB
Input (Sensitivity/Impedance)	2V/50k ohms
Output	
Speaker	4 ohms to 8 ohms
Damping Factor (20 Hertz to 20,000 Hertz, 8 ohms)	50
Hum and Noise (IHF, short-circuited, A network)	110dB

Miscellaneous

Power Requirements ...	AC 120V, 220V, and 240V 50Hz/60Hz
Power Consumption	1,300 watts
Dimensions	480(W) x 186.5(H) x 445(D) mm 18-7/8 x 7-5/16 x 17-7/16 in
Weight: Without Package	24.3kg; 54 lb

Furnished Parts

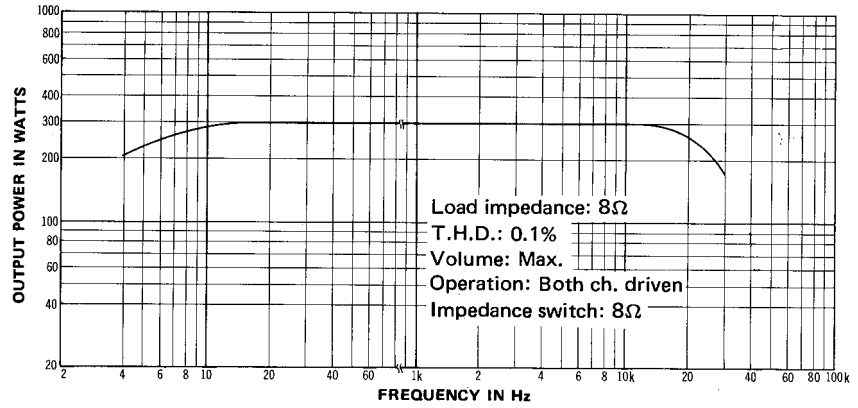
Connection Cord with Pin Plugs	1
Operating Instructions	1

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

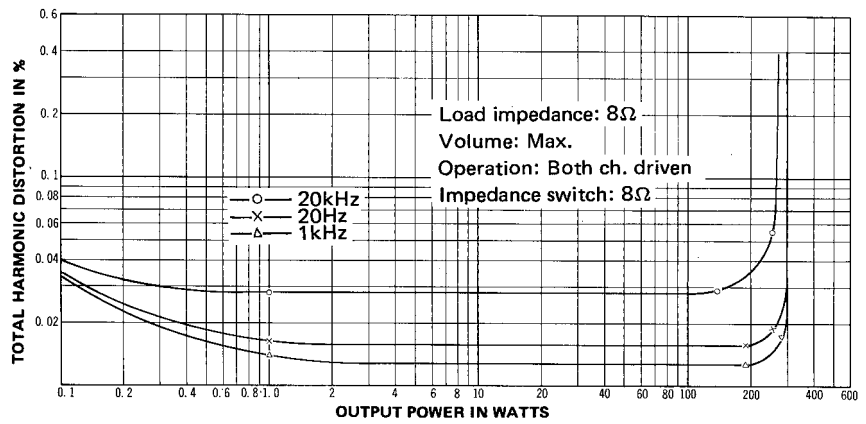
NOTE:
Specifications and the design subject to possible modification without notice due to improvements.

AMPLIFIER CHARACTERISTICS

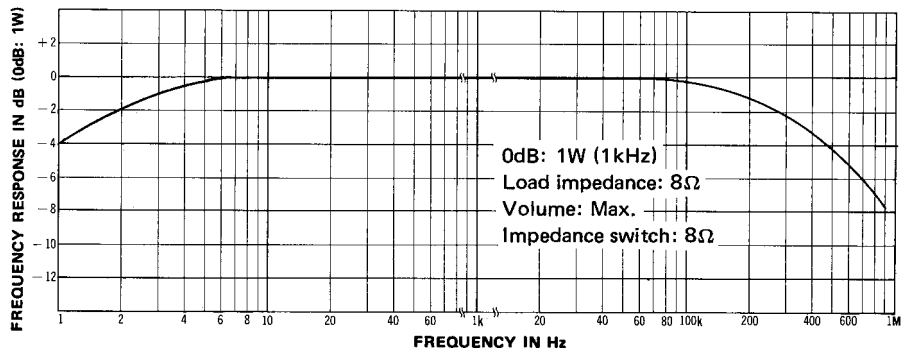
POWER BANDWIDTH



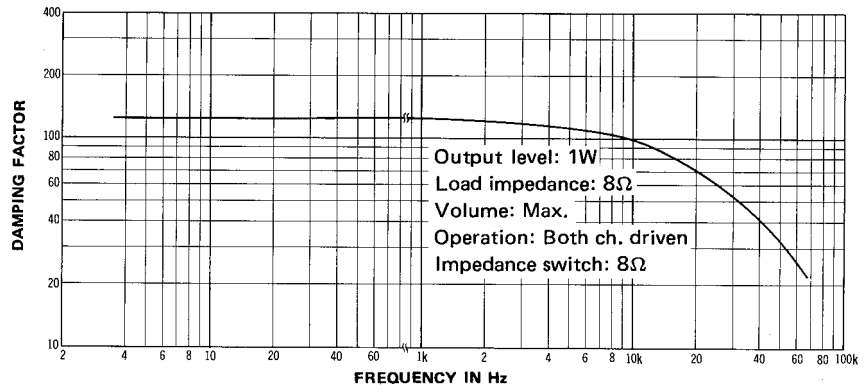
OUTPUT POWER vs. HARMONIC DISTORTION



FREQUENCY RESPONSE



DAMPING FACTOR



INSTALLING IN RACK

Front panel dimensions of the SPEC-2 (external shape, hole diameters, hole positions) are in accordance with the EIA (Electronic Industries Association) standard on "Racks, Panels and Associated Equipment". Therefore, employ a rack that meets this EIA standard.

IN ORDER TO RACK MOUNT

1. Determine rack installation site (see installation precautions on page 3).
2. Install so that rack will not topple when components are mounted. If the installation is permanent, secure the rack to the floor with anchor bolts.
3. When installing two or more power amplifiers, provide more than 10 cm (4 in.) clear space above each unit, and for improved ventilation, use a forced air cooling fan.
4. Employ a rack depth of at least 10 cm (4 in.) greater than the largest depth component.
5. Install heavy components (power amplifiers, etc.) in the bottom positions.
6. Mount an EIA standard blank panel or blower panel in the space above the power amplifier.

INSTALLATION STEPS

1. Remove feet (4 ea.) from units.
2. Install bottom unit first, then proceed to upper units.
3. As shown in Fig. 9, align the front panel holes with those of the rack and secure the unit firmly with screws and washers. If a space occurs between an upper and lower unit, place a supporting object on the lower unit, then secure the upper unit. Afterwards, remove the supporting object.

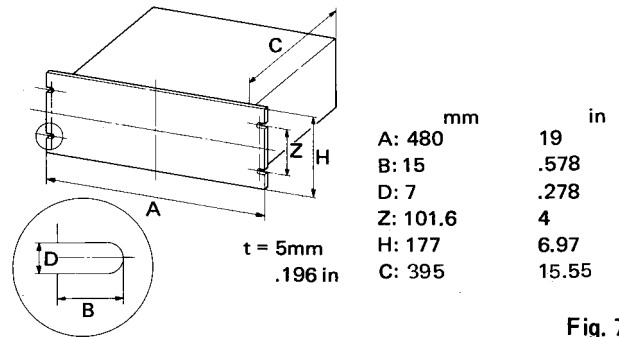


Fig. 7

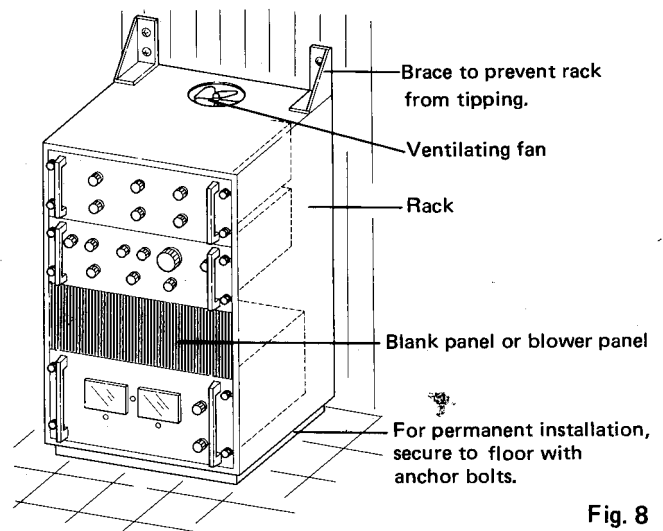


Fig. 8

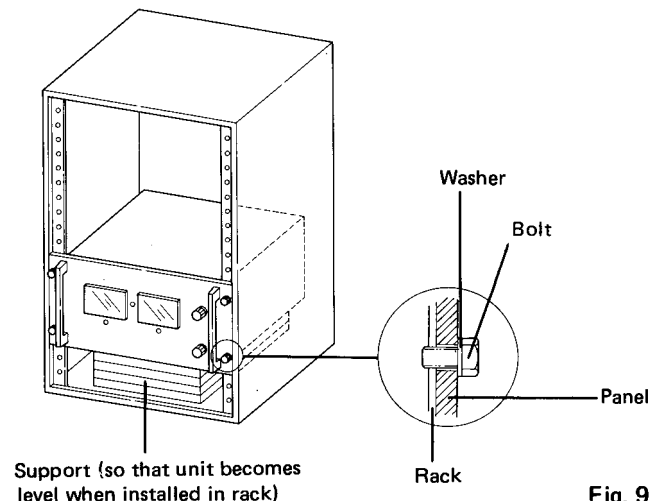


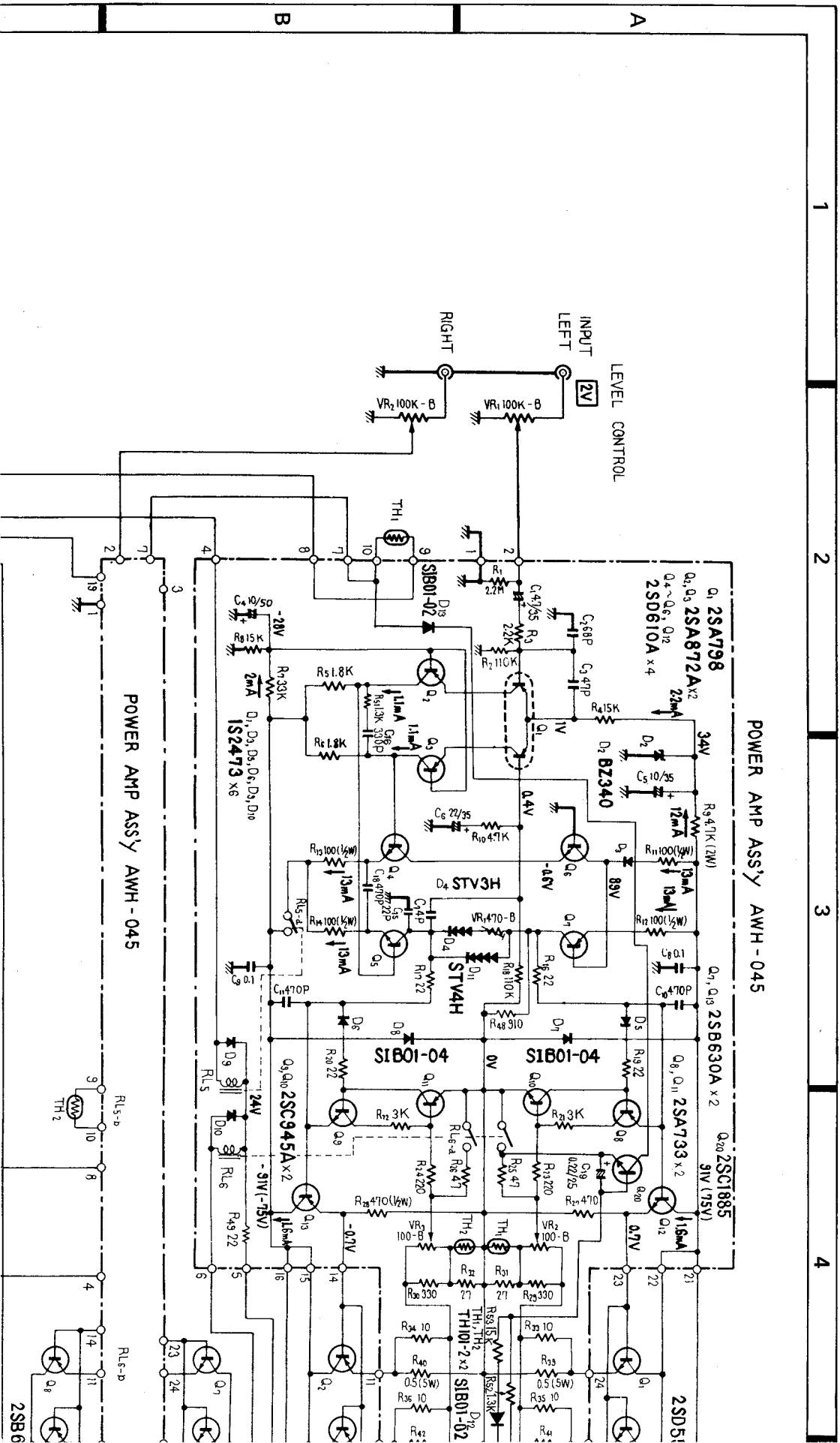
Fig. 9

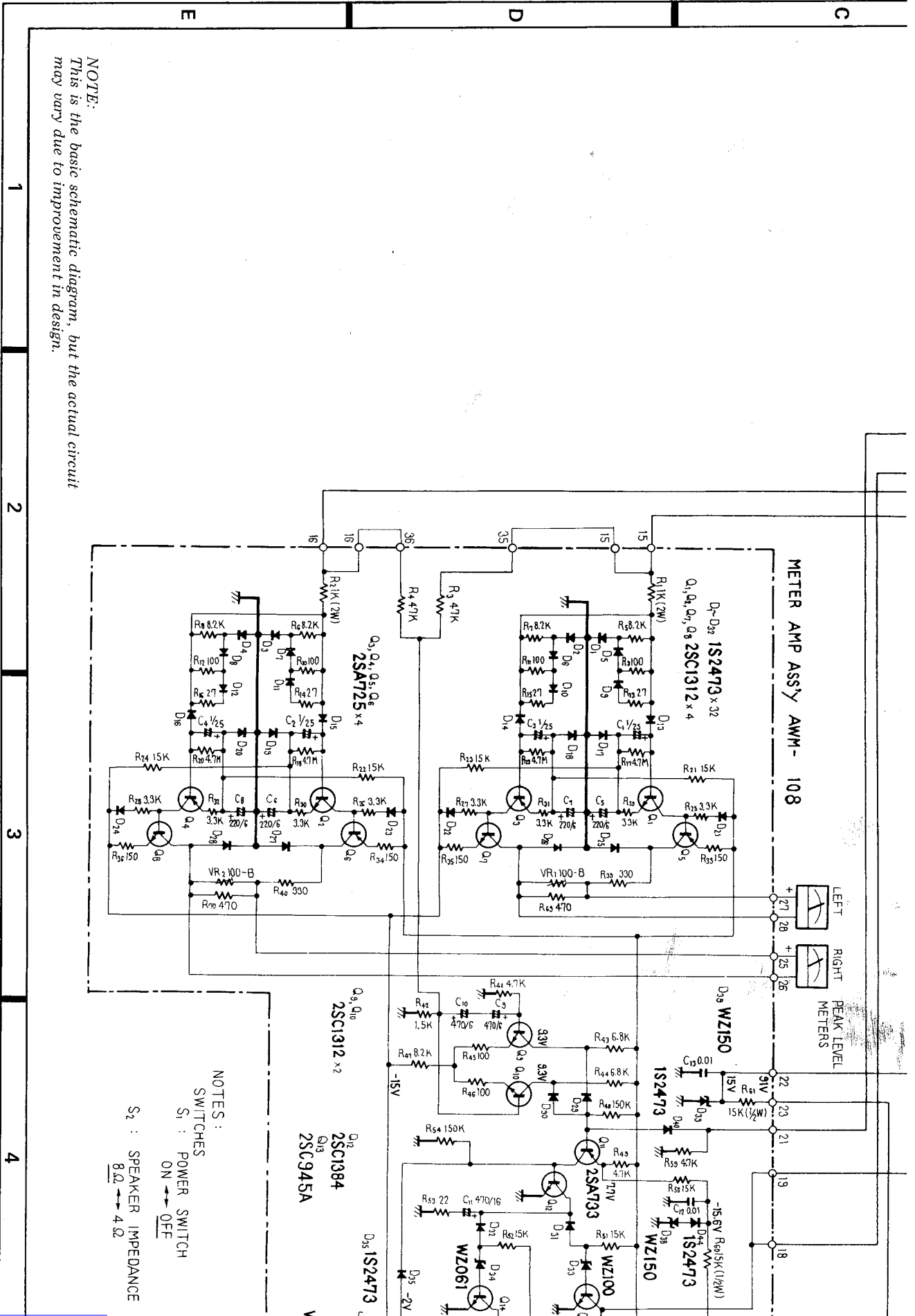
PIONEER ELECTRONIC CORPORATION

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STEREO POWER AMPLIFIER

SPEC-2 D





METER AMP ASS'Y AWM - 108

LEFT PEAK LEVEL METERS
RIGHT PEAK LEVEL METERS

NOTES:
SWITCHES
S1 : POWER SWITCH ON - OFF
S2 : SPEAKER IMPEDANCE 8Ω - 4Ω

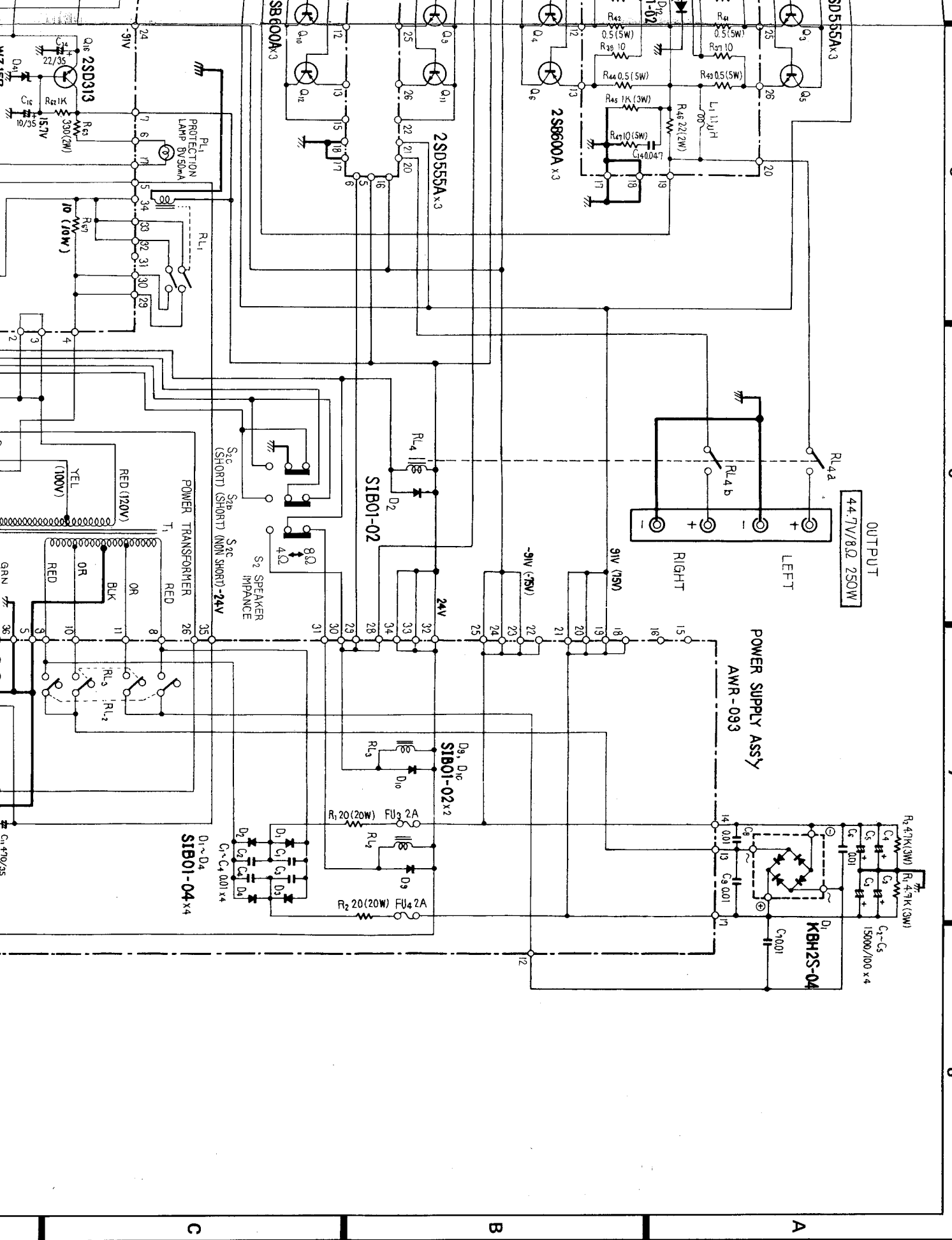
NOTE:
This is the basic schematic diagram, but the actual circuit may vary due to improvement in design.

5

6

7

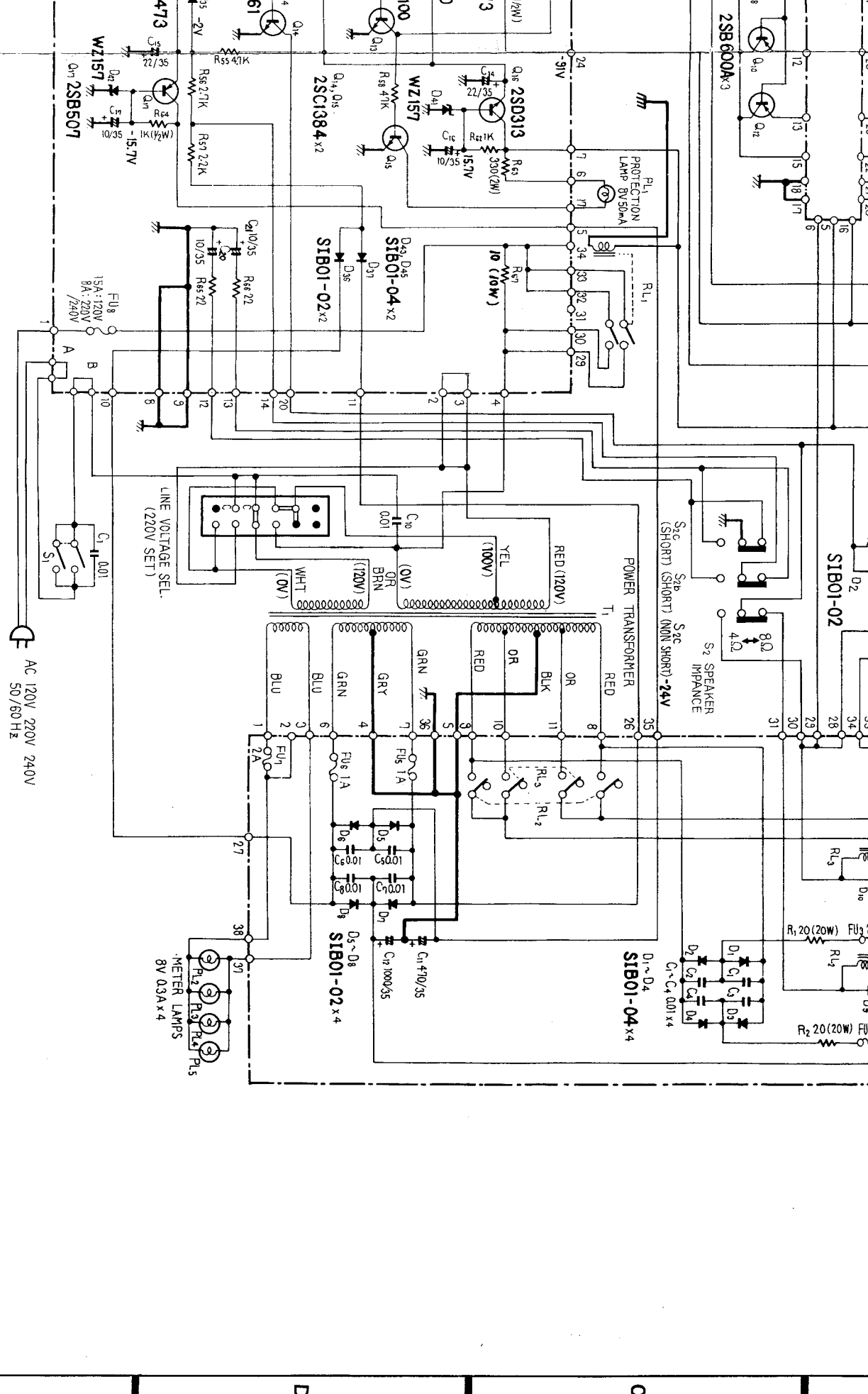
8



C

B

A



RELAYS

- RL₁ PRIMARY SURGE CURRENT CONTROL RELAY
- RL_{2,3} SECONDARY SURGE CURRENT CONTROL AND VOLTAGE SELECTOR RELAYS
- RL₄ OUTPUT CUT-OFF RELAY
- RL₅ MUTING RELAY
- RL₆ CURRENT LIMITOR SENSITIVITY CONTROL RELAY

[V] : SIGNAL VOLTAGE NECESSARY FOR OBTAINING 250W/8Ω OUTPUT POWER (1KHZ).
 V : DC VOLTAGE AT NO INPUT SIGNAL.
 (V) : DC VOLTAGE AT 250W/8Ω OUTPUT POWER.
 — mA : DC CURRENT AT NO INPUT SIGNAL.