

# YAMAHA



Active Servo  
Technology

# AST-A10

*Natural Sound Active Servo Processing Amplifier*

Thank you for purchasing the YAMAHA AST-A10 Active Servo Processing Amplifier.

## FEATURES

- The Active Servo Technology Speaker System is an entirely new concept in hi-fi audio loudspeakers comprising the AST-A10 Active Servo Processing Amplifier and a pair of Active Servo Processing Speakers such as the Yamaha AST-S1 speakers.
- The Active Servo Processing Amplifier has a high performance power amplifier built in. But it does far more than simply supply an amplified signal to drive the speakers: it actually controls the operation of the speakers directly, providing a dramatic improvement in driving and damping force over conventional systems.
- The Active Servo Processing Speakers feature specially tuned enclosures for effective operation even with the smallest amplitude voice coil oscillations, offering a linear response extending down to the lower bass frequencies.
- The Active Servo Technology Speaker System's entirely new drive system and specially designed enclosure make for an absolutely stunning wide range response such as you never would have expected possible with speakers this size.

## Owner's Manual

CENTER

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### IMPORTANT:

Please record the serial number of your unit in the space below.

Model: **AST-A10**

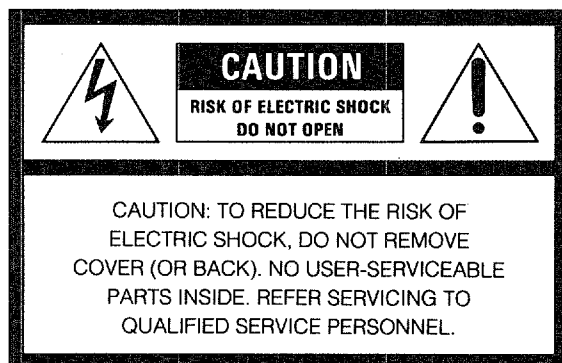
Serial No. \_\_\_\_\_

The serial number is located on the rear of the unit.

Retain this Owner's Manual in a safe place for future reference.



Read this before operating your AST-A10.



● Explanation of graphical Symbols



The lightning flash with arrowhead symbol, within an equilateral triangle is intended to alert you to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert you to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

**WARNING:**

To prevent fire or shock hazard, do not expose this appliance to rain or moisture.

## SAFETY INSTRUCTIONS

- 1. Read Instructions** — All the safety and operating instructions should be read before the appliance is operated.
- 2. Retain Instructions** — The safety and operating instructions should be retained for future reference.
- 3. Heed Warnings** — All warnings on the appliance and in the operating instructions should be adhered to.
- 4. Follow Instructions** — All operating and other instructions should be followed.
- 5. Water and Moisture** — The appliance should not be used near water — for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.
- 6. Carts and Stands** — The appliance should be used only with a cart or stand that is recommended by the manufacturer.

An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.



- 7. Wall or Ceiling Mounting** — The appliance should be mounted to a wall or ceiling only as recommended by the manufacturer.

- 8. Ventilation** — The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
- 9. Heat** — The appliance should be situated away from heat sources such as radiators, stoves, or other appliances that produce heat.
- 10. Power Sources** — The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
- 11. Power-Cord Protection** — Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.
- 12. Cleaning** — The appliance should be cleaned only as recommended by the manufacturer.
- 13. Nonuse Periods** — The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.

**14. Object and Liquid Entry** — Care should be taken so that objects do not fall into and liquids are not spilled into the inside of the appliance.

**15. Damage Requiring Service** — The appliance should be serviced by qualified service personnel when:

- A. The power-supply cord or the plug has been damaged; or
- B. Objects have fallen, or liquid has been spilled into the appliance; or
- C. The appliance has been exposed to rain; or
- D. The appliance does not appear to operate normally or exhibits a marked change in performance; or
- E. The appliance has been dropped, or the cabinet damaged.

**16. Servicing** — The user should not attempt to service the appliance beyond those means described in the operating instructions. All other servicing should be referred to qualified service personnel.

**17. Power Lines** — An outdoor antenna should be located away from power lines.

**18. Grounding or Polarization** — The precautions that should be taken so that the grounding or polarization of an appliance is not defeated.

**19. Speaker Connection** — To reduce the risk of shock or fire and prevent short circuits, strictly follow the instructions for connecting speakers on page 7.

### CAUTION: READ THIS BEFORE OPERATING YOUR AST-A10

- 1 To ensure the finest performance, please read this manual carefully. Keep it in a safe place for future reference.
- 2 If you plan to use this unit to drive Yamaha Active Servo Processing Speakers, be sure that you insert the Active Servo Processing Cartridge which came with the speakers. Once an Active Servo Processing Cartridge has been installed, do not attempt to use speakers other than Yamaha Active Servo Processing Speakers with this unit or to drive other speakers simultaneously with Active Servo Processing Speakers. Doing so could cause permanent damage to amplifier and speakers.
- 3 To use this unit to drive conventional speakers, first insert the AST-K01 "flat amp" cartridge (included).
- 4 Install your unit in a cool, dry, clean place - away from windows, heat sources, and too much vibration, dust, moisture or cold. Avoid sources of hum (transformers, motors). To prevent fire or electrical shock, do not expose to rain and water.
- 5 Do not operate the amplifier upside-down. It may overheat, possibly causing damage.
- 6 Never open the cabinet. If a foreign object drops into the set, contact your dealer.
- 7 Do not place records or other objects on top of the amplifier; this will block the ventilation holes, cause the internal temperature to rise and may result in a failure.
- 8 Do not use force on switches, knobs or cords. When moving the set, first turn the unit off. Then gently disconnect the power plug and the cords connecting to other equipment. Never pull the cord itself.
- 9 Do not attempt to clean the unit with chemical solvents; this might damage the finish. Use a clean, dry cloth.
- 10 Be sure to read the "Troubleshooting" section on page 10 on common operating errors before concluding that your unit is faulty.
- 11 Do not connect audio equipment to the AC outlets on the rear panel if it requires more power than the outlets are rated to provide.

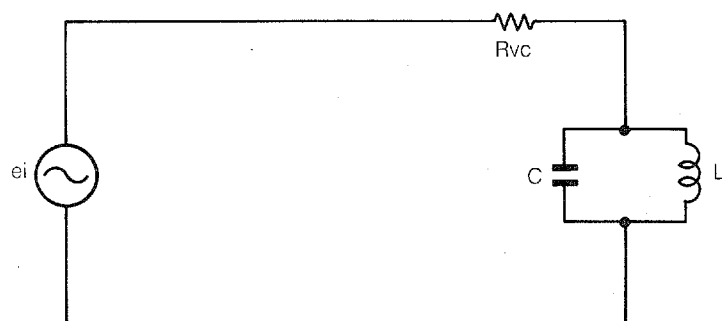
# THE ACTIVE SERVO TECHNOLOGY SPEAKER SYSTEM

## HOW THE ACTIVE SERVO PROCESSING AMPLIFIER WORKS

A dynamic speaker electric equivalent circuit shows a direct connection between the electrical resistance of the voice coil and the motional impedance.

"Motional impedance" is impedance which arises due to the movement of the speaker voice coil. Proportionally more voltage is generated the faster the voice coil moves. Generally, speakers use a constant voltage drive. However, besides drive voltage and motional impedance the electrical resistance of the voice coil must also be taken into account. This resistance limits the driving and damping force which can be obtained with the speaker.

### ■ Dynamic Speaker Electric Equivalent Circuit

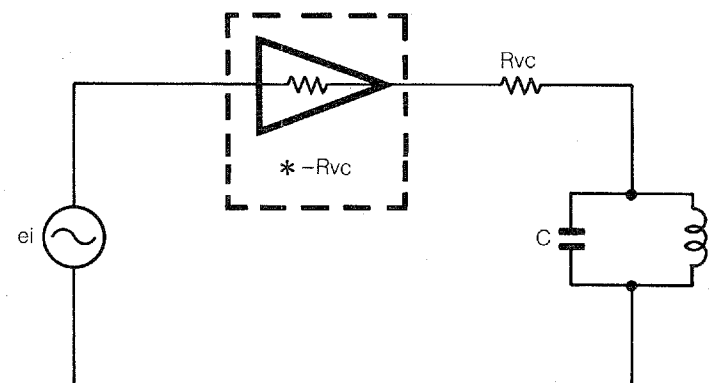


$R_{vc}$ : Voice Coil Resistance  
 $L, C$ : Motional Impedance  
 $e_i$ : Signal Voltage

In contrast to a conventional amplifier, in the Active Servo Processing Amplifier output impedance possesses a negative resistance value. This cancels the electrical resistance of the voice coil. With the voice coil resistance nullified, the motional impedance corresponds directly to the drive voltage as in the theoretical example of the dynamic speaker electric equivalent circuit mentioned above. This provides enhanced driving and damping force, allowing constant velocity movement.

No element possessing a negative resistance value exists in nature, so the Active Servo Processing Amplifier uses circuitry to simulate the same effect. However, the optimum negative resistance value differs with each type of speaker. Therefore, Yamaha puts the circuitry which determines the amount of negative resistance on a separate circuit-board cartridge and includes it with the speakers it matches.

### ■ Active Servo Processing Amplifier Operation



$-R_{vc}$ : Amplifier Negative Resistance  
 $* -R_{vc}$  is applied to cancel out  $R_{vc}$

## THE ACTIVE SERVO PROCESSING CARTRIDGE

The Active Servo Technology Speaker System allows you to obtain optimum performance from Yamaha Active Servo Processing Speakers by driving them with an Active Servo Processing Amplifier, which is specially designed to extract their full sonic potential. In order to do this properly, it would normally be necessary to use a different Active Servo Processing Amplifier possessing slightly different characteristics for each different Active Servo Processing Speaker model. This would mean that each Active Servo Processing Amplifier would lose speaker interchangeability. Yamaha has solved this problem by designing the Active Servo Processing Amplifier so that the power amplifier and power supply blocks are common to all speaker systems. The special circuitry optimized for each individual model of Active Servo Processing Speakers has been incorporated in a circuit-board cartridge which is included with the corresponding Active Servo Processing Speakers.

### FOR EXAMPLE:

The Yamaha AST-S1 Active Servo Processing Speakers come with the AST-KS1 Active Servo Processing Cartridge. In order to drive these speakers with the AST-A10 you only have to insert the AST-KS1 in the slot provided. Your AST-A10 then becomes an Active Servo Processing Amplifier tailored specially to the AST-S1 Active Servo Processing Speakers.

### THE AST-K01 FLAT AMP CARTRIDGE (INCLUDED)

An AST-K01 "flat amp" cartridge is included with this amplifier.

Installing the AST-K01 cartridge will enable you to use the AST-A10 as a conventional power amplifier.

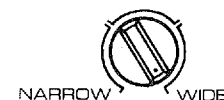
Therefore, if you wish to use the AST-A10 to drive conventional speakers, be sure to install the AST-K01 cartridge instead of the Active Servo Processing Cartridge.

## THE BASS RANGE CONTROLLER

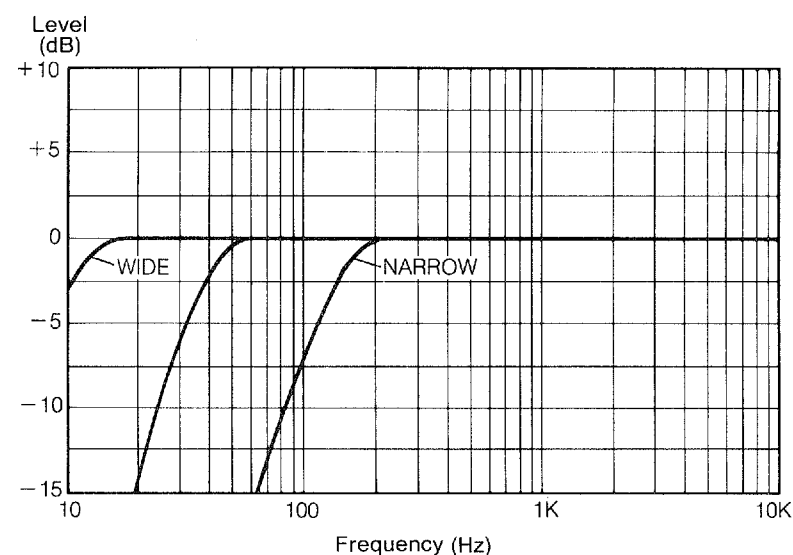
The Active Servo Technology Speaker System reproduce a wide frequency range, with linear response extending much lower than with conventional speakers of the same size. For this very reason, the low bass may be a little too overwhelming in some circumstances (when listening in very "live" rooms with hard flat walls) or with program sources with an overemphasized low range.

To compensate for such situations, the AST-A10 is equipped with a bass range controller. Turn the control knob under the front panel door counter-clockwise to attenuate excessive low bass which can add unwanted sonic colorations.

If the bass sounds fine to you, leave the control knob in the "WIDE" position.

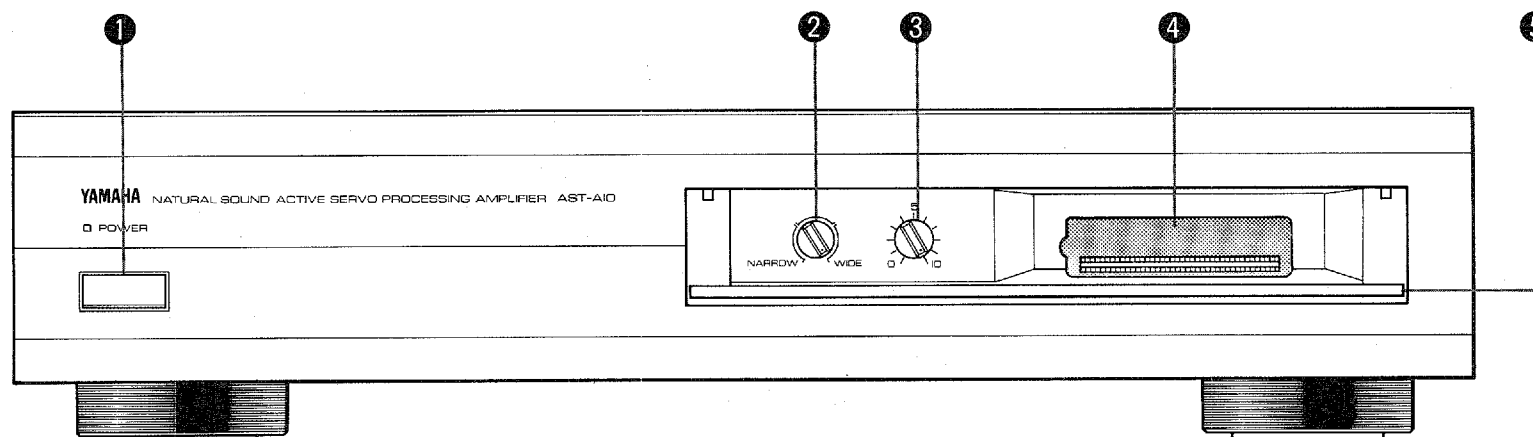


### ■ Bass Range Controller Characteristics



# FRONT PANEL DESCRIPTION

## FRONT PANEL



### 1 POWER switch

This switch turns the amplifier alternately on and off. The POWER indicator lights when power is turned on.

### 2 BASS RANGE CONTROLLER knob

Use this knob to set the cut-off frequency of the 12 dB/octave continuous low-cut filter possessing a cut-off slope. The cut-off frequency increases when the knob is turned counterclockwise. See the section, "THE ACTIVE SERVO TECHNOLOGY SPEAKER SYSTEM," on pages 3 and 4 for details.

### 3 INPUT LEVEL control knob

Use this knob to adjust the level of the input signal. Turn clockwise to increase the level. (You can usually leave it in the "10" position and use the preamplifier volume control to adjust the volume.)

### 4 Cartridge Holder

1) Insert here the Active Servo Processing Cartridge which comes with the Active Servo Processing Speakers (AST-S1, etc.) you wish to use with the AST-A10.

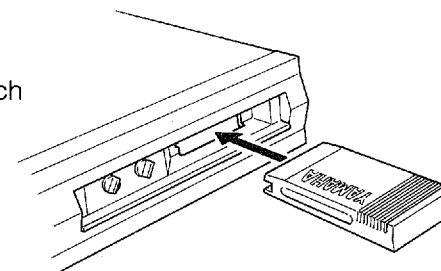
- Make sure that the last digits of the cartridge model number match the last digits of the speaker system model you are using.

For example:

Cartridge ..... AST-KS1

Speaker system ..... AST-S1

2) Insert the AST-K01 "flat amp" cartridge here if you wish to use the AST-A10 to drive a conventional speaker system. Once the AST-K01 cartridge is installed, the AST-A10 becomes a conventional power amplifier. (See "CONNECTING A CONVENTIONAL SPEAKER SYSTEM" on page 9 for details.)



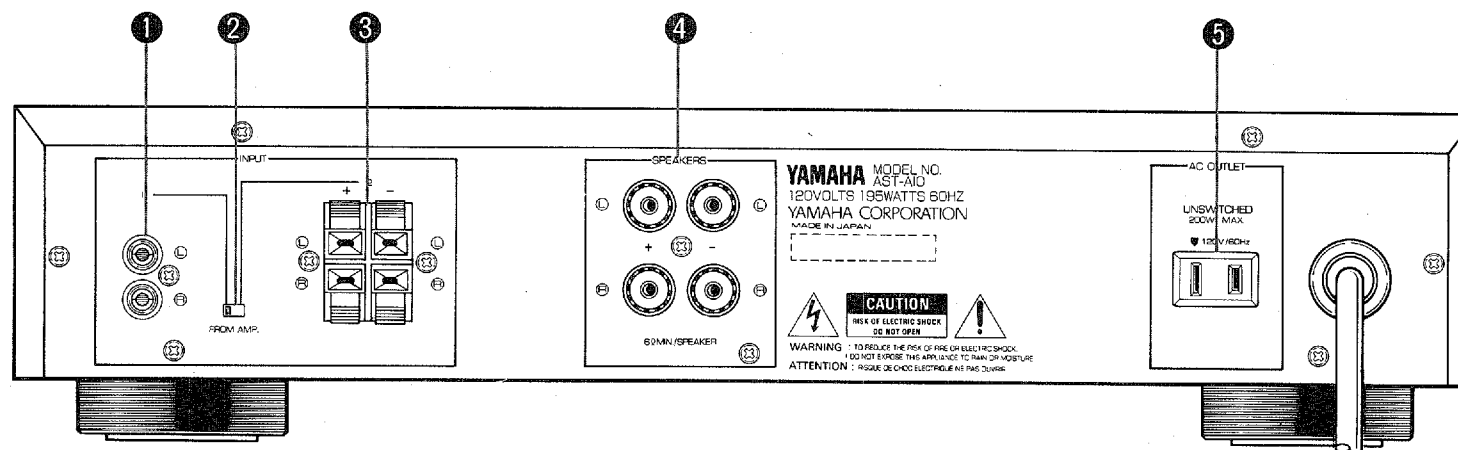
### 5 Front Panel Door

Press on the lower portion of the door to open. Push upward to close.



# REAR PANEL DESCRIPTION

## REAR PANEL



### ① INPUT 1 terminals

These terminals are usually used for connecting a preamplifier to the AST-A10. Connect the preamplifier output terminals to these terminals using pin plug audio cables.

- If you have an integrated amplifier equipped with PRE OUT terminals, use pin plug audio cables to connect them to these terminals.

### ② INPUT selector switch (FROM AMP)

Set this switch to the position 1 or 2, corresponding to the INPUT terminal used.

### ③ INPUT 2 terminals

Use these terminals to connect speaker terminals of an integrated amplifier, etc. to the AST-A10.

- Connect the speaker terminals of the integrated amplifier, etc. to these input terminals using speaker cables. Take care not to mix up the L, R, + and - connections. To connect, press the terminal lever with your finger and insert the bare wire portion of the speaker cable, then release.

### ④ SPEAKER terminals

Take care not to mix up the L, R, + and - connections.

To connect, turn the terminal screw counterclockwise and insert the bare wire portion of the speaker cable into the hole. Turn the screws clockwise to tighten.

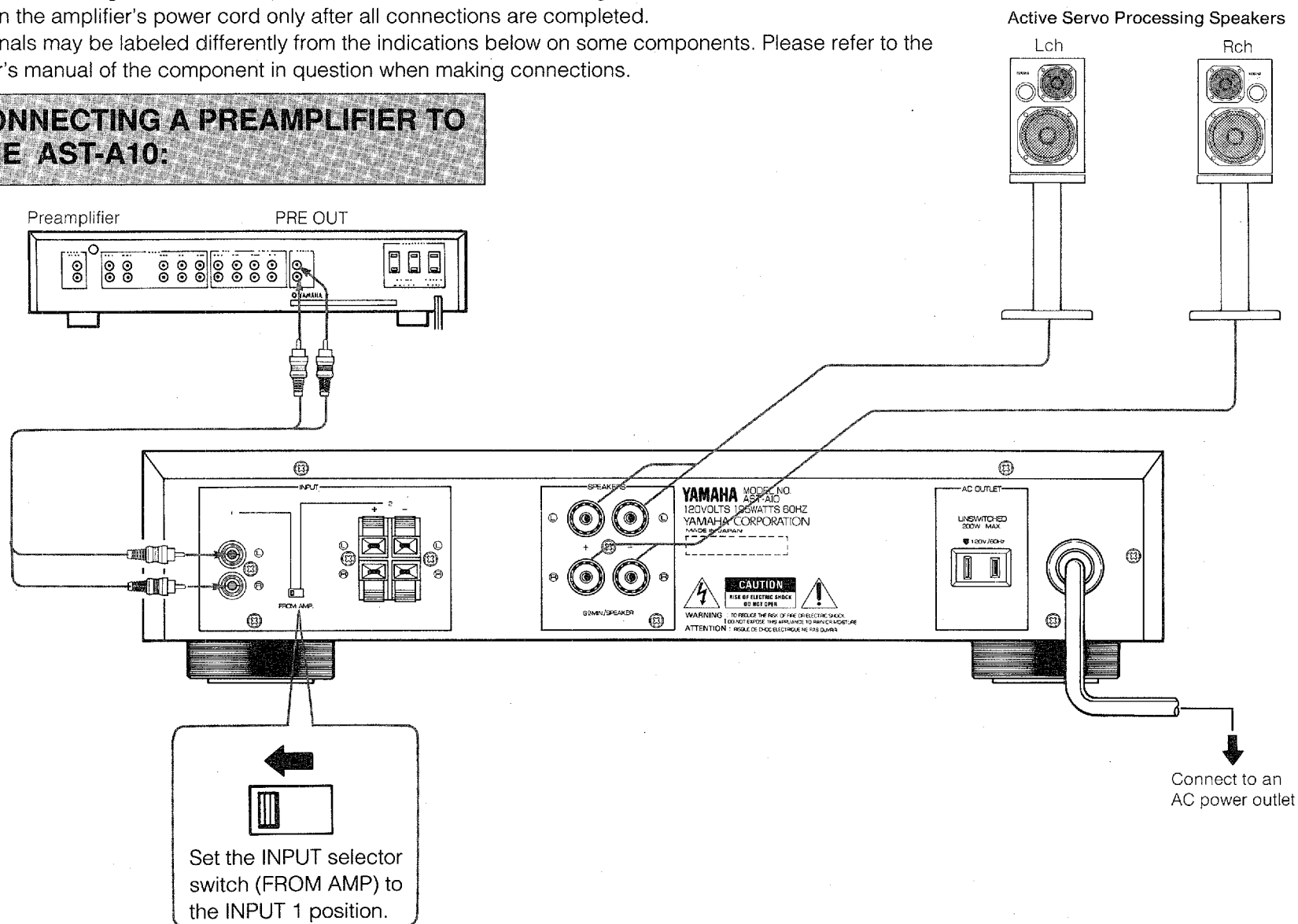
### ⑤ UNSWITCHED AC OUTLET

This outlet is independent of the front panel POWER switch and supplies AC power even when the amplifier is switched off. This outlet can be used for connecting audio equipment with a maximum power consumption of 200W.

# CONNECTIONS TO THE ACTIVE SERVO PROCESSING SPEAKERS

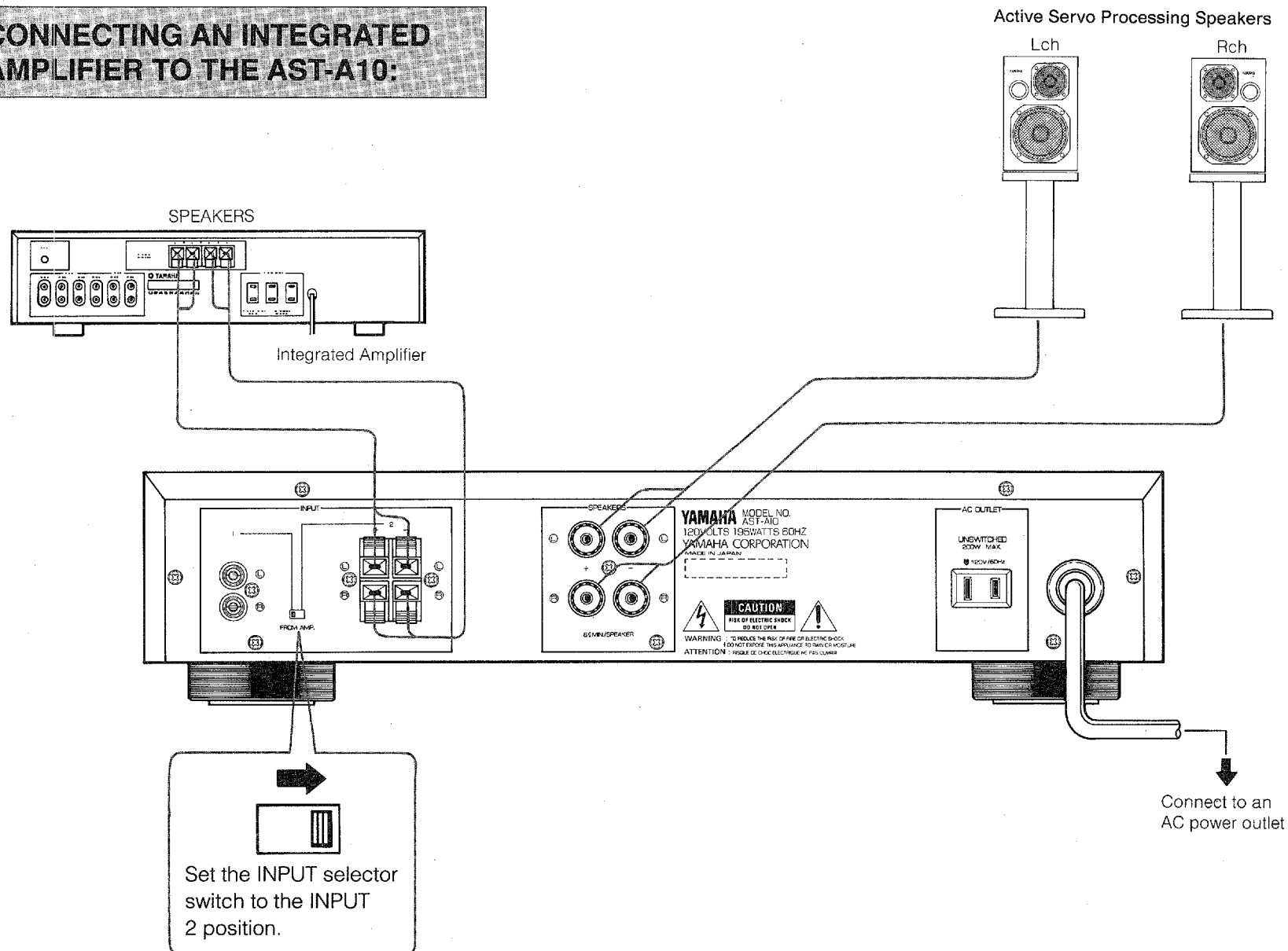
- Be sure that you insert the Active Servo Processing Cartridge (AST-KS1, etc.) that comes with the Active Servo Processing Speakers (AST-S1, etc.) in the cartridge holder.
- Before connecting, turn off all components and be sure the left and right channel cables are not reversed.
- Plug in the amplifier's power cord only after all connections are completed.
- Terminals may be labeled differently from the indications below on some components. Please refer to the owner's manual of the component in question when making connections.

## ① CONNECTING A PREAMPLIFIER TO THE AST-A10:





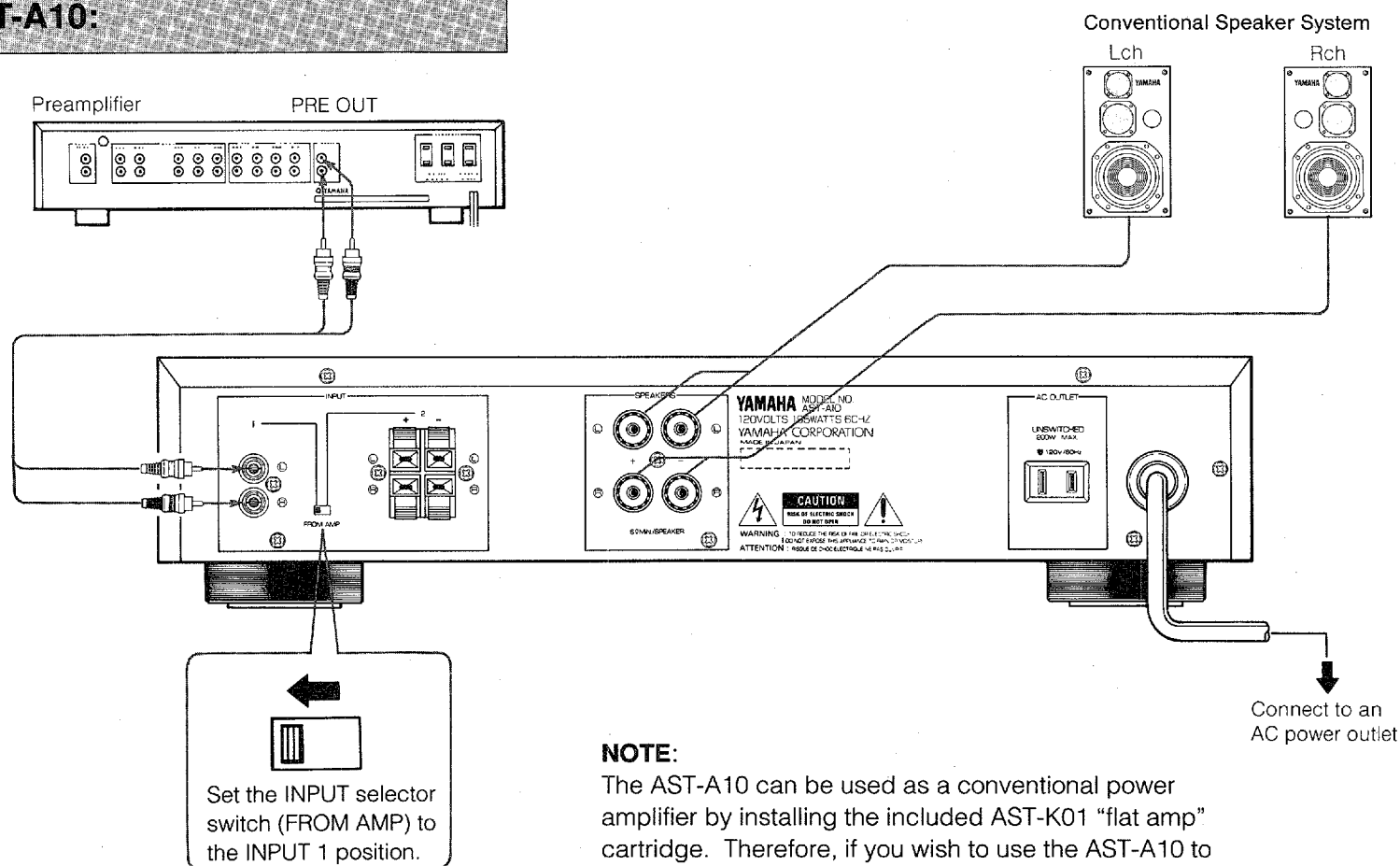
## ② CONNECTING AN INTEGRATED AMPLIFIER TO THE AST-A10:



# CONNECTIONS TO A CONVENTIONAL SPEAKER SYSTEM

- Be sure that you insert the “flat amp” cartridge (AST-K01) that comes with this unit in the cartridge holder.
- Before connecting, turn off all components and be sure the left and right channel cables are not reversed.
- Plug in the amplifier's power cord only after all connections are completed.
- Terminals may be labeled differently from the indications below on some components. Please refer to the owner's manual of the component in question when making connections.

## CONNECTING A PREAMPLIFIER TO THE AST-A10:



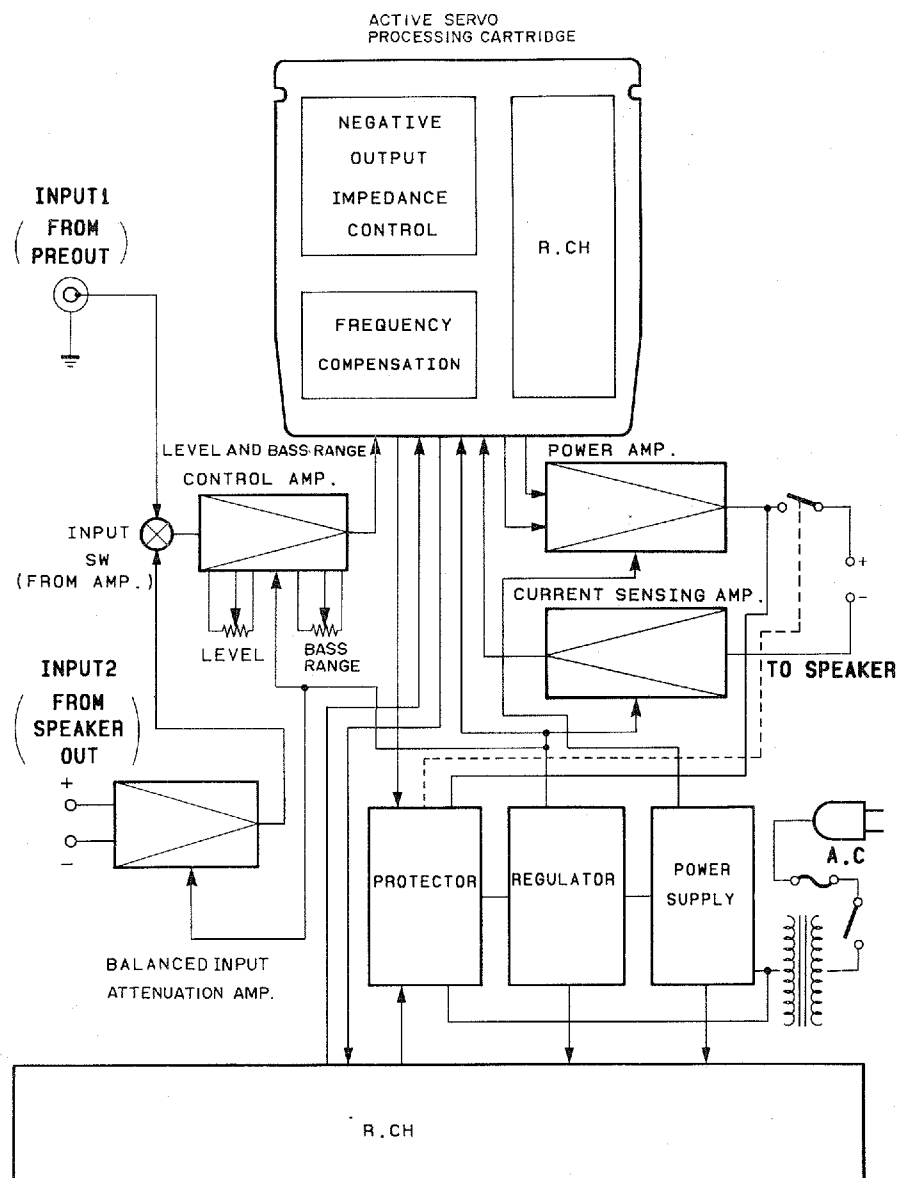
# TROUBLESHOOTING

Before assuming that your AST-A10 is faulty, please check the following troubleshooting list which details the corrective action you can take yourself without having to call a service engineer. If you have any doubts or questions, contact your nearest Yamaha dealer.

PROBLEM	CAUSE	REMEDY
<b>No power even when the POWER switch is in the on position.</b>	The power cord is not properly plugged in to the AC outlet.	Make sure the power cord is plugged all the way into the AC outlet.
<b>No sound from speakers.</b>	The INPUT LEVEL control knob is turned all the way to the left (counterclockwise).	Turn the INPUT LEVEL control knob to the right (clockwise).
	The INPUT selector switch is set to the wrong position.	<ul style="list-style-type: none"> <li>• If you are using the INPUT 1 terminals, switch the INPUT selector switch to the left (INPUT 1) position.</li> <li>• If you are using the INPUT 2 terminals, switch the INPUT selector switch to the right (INPUT 2) position.</li> </ul>
	The cartridge is not inserted in the cartridge holder.	<ul style="list-style-type: none"> <li>• For Active Servo Processing Speakers, insert the Active Servo Processing Cartridge (AST-KS1, etc.), which came with the speakers, into the cartridge holder.</li> <li>• For a conventional speaker system, insert the "flat amp" cartridge (AST-K01), which came with this unit, into the cartridge holder.</li> </ul>
	The interconnections or speaker cables are not properly connected.	Check connections of audio and/or speaker cables once again.
	The preamp or integrated amplifier is not set correctly.	Check the amplifier switch settings.
<b>A noticeable hum is generated.</b>	The audio cables are not properly plugged in.	Insert the interconnection plugs securely into their jacks.
<b>Sound is distorted.</b>	The phase (+, -) of the speakers and the amplifier are opposite.	Reconnect speakers so that the phase (+, -) is correct.
	The cartridge does not match the speakers.	<ul style="list-style-type: none"> <li>• For Active Servo Processing Speakers, insert the Active Servo Processing Cartridge (AST-KS1, etc.), which came with the speakers, into the cartridge holder.</li> <li>• For a conventional speaker system, insert the "flat amp" cartridge (AST-K01), which came with this unit, into the cartridge holder.</li> </ul>



# BLOCK DIAGRAM



# SPECIFICATIONS

## Rated Inputs

<b>INPUT 1</b> .....	0.7V (1 kHz)
<b>INPUT 2</b> .....	10 V (1 kHz)

## Input Impedance

<b>INPUT 1</b> .....	20 k ohms
<b>INPUT 2</b> .....	4.4k ohms

**Rated Output** ..... 70W + 70W (6 ohms) equivalent

**Dynamic Power** ..... 100W + 100W (6 ohms) equivalent

**Power Supply** ..... AC 120V, 60 Hz

**Power Consumption** ..... 195W

## AC Outlet

**Unswitched x 1** ..... 200W

**Dimensions (W x H x D)** ..... 435 x 96 x 372mm (17-1/8" x 3-3/4" x 14-5/8")

**Weight** ..... 8.5 kg (18 lbs 11 oz)

**Accessory** ..... Flat Amp Cartridge (AST-K01) x 1

\* Specifications are subject to change without notice due to product improvements.

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