

RAMSA

U.S.A. VERSION

SUBWOOFER SYSTEM

WS-A240

(Subwoofer)

WS-SP2A

(Subwoofer Processor)

Operating Instructions



Panasonic®

Please read these instructions completely before operating this equipment.

GENERAL

The RAMSA Subwoofer System consists of the model WS-A240 Subwoofer and the model WS-SP2A Subwoofer Processor.

The WS-A240 is a bass-reflex type loudspeaker system incorporating a 12" (30-cm) driver unit. It is designed to be used as a modular subwoofer component along with the WS-SP2A subwoofer processor, which includes signal processing for subwoofers and the main loudspeakers.

WS-A240 subwoofers are small in size for their output capability, and may be combined in compact arrays to take maximum advantage of mutual coupling effects for high output applications. The compact dimensions of the WS-A240 allow it to be unobtrusively installed in virtually any environment.

The WS-A240 will accept a continuous program input of 400W. The WS-SP2A provides high-pass protection from infrasonic frequencies, very low frequency (VLF) signal processing, and a choice of three different signal processing functions for two channels of main loudspeaker systems.

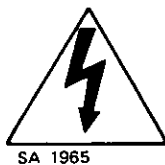
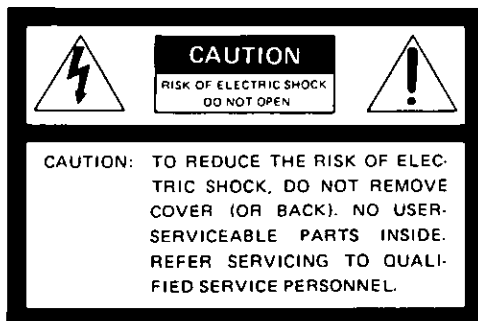
The WS-A240 enclosure is molded from a resin that is virtually indestructible and incorporates a recessed handle, interlocking stacking ribs and internal mounting hardware for convenient transport and installation. A metal grill cover provides protection for the driver component.

The WS-SP2A is designed specifically for use with the WS-A240 loudspeaker system in VLF (subwoofer) applications. Two balanced inputs and four unbalanced outputs are provided. Output channels A and B include three selectable signal processing modes for use with different main loudspeaker units.

The subwoofer output is derived from an isolated sum of the A and B inputs, and includes a high pass filter, signal processing for the WS-A240 and selectable low pass filters with 24dB per octave Bessel response for each of three different main loudspeaker types. The VLF (subwoofer) output includes a fixed gain stage to optimize sensitivity in the VLF range. The WS-SP2A Subwoofer Processor also provides a full-range summed output, which may be used to drive distributed system power amplifiers.

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The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user 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 the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

The serial number of this product may be found on the bottom of the unit.

You should note the serial number of this unit in the space provided and retain this book as a permanent record of your purchase to aid identification in the event of theft.

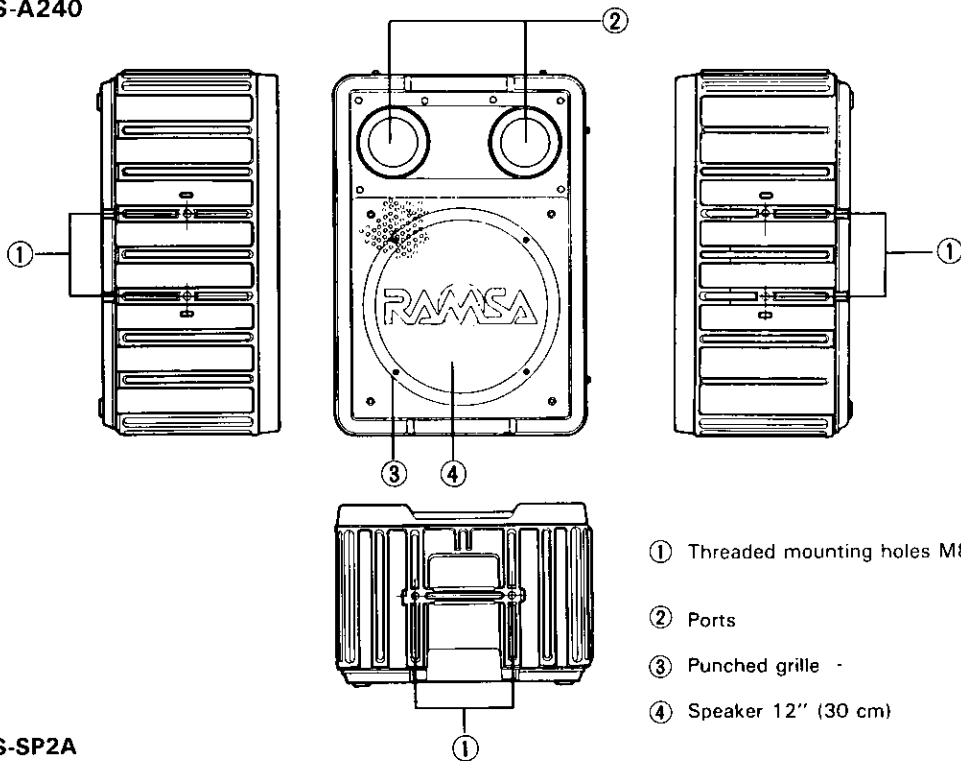
Model No. _____

Serial No. _____

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

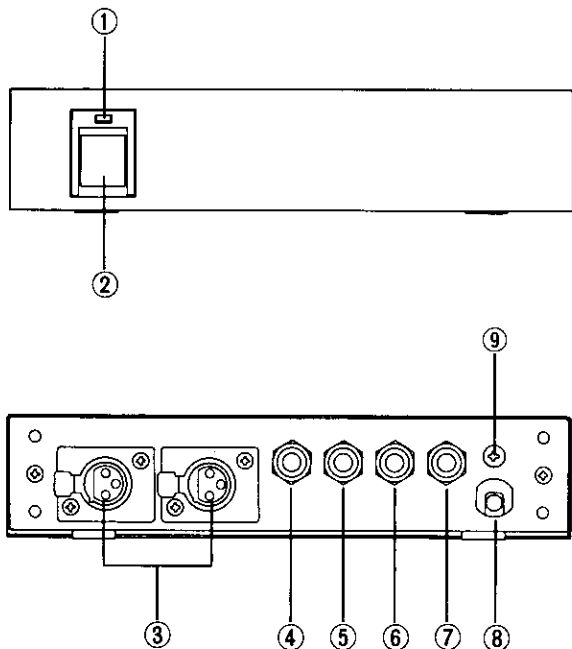
NAMES OF COMPONENTS

• WS-A240



- ① Threaded mounting holes M8 x 19 mm
- ② Ports
- ③ Punched grille
- ④ Speaker 12" (30 cm)

• WS-SP2A



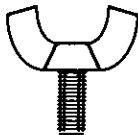
- ① Power ON indicator lamp
- ② Power switch [POWER]
- ③ Input connector [INPUT A, B]
+4 dB, 20k Ω balanced XLR-type
- ④ Output phone jack [OUT A]
+4 dB, 600 Ω unbalanced
- ⑤ Output phone jack [OUT B]
+4 dB, 600 Ω unbalanced
- ⑥ Output phone jack [VLF OUT]
+4 dB, 600 Ω unbalanced
- ⑦ Output phone jack [A + B OUT]
+4 dB, 600 Ω unbalanced
- ⑧ Power cable
- ⑨ Ground Terminal [GND]

LOUDSPEAKER INSTALLATION

The WS-A240 is equipped with six M8 x 25 threaded inserts that are molded into the enclosure. All attachments to the enclosure should use these fittings. For stand mounting, two thumbscrews are provided with the WS-A240, which should be handtightened only. For suspended applications, forged shoulder eye-bolts are recommended. DO NOT substitute any other fitting for these critical load-bearing components.



Forged eye-bolt



Thumbscrew
RAMSA Part No. XVP8F25FZ

When mounting WS-A240 loudspeakers to a wall or ceiling, either by hanging or with brackets, they should be securely attached to the building structure. This requires knowledge of building construction and load-bearing capacities. If this information is unknown, installers should seek the advice of an architect or structural engineer before attempting such attachments.

The loudspeaker systems can be mounted vertically or horizontally. When mounting horizontally, remove the four screws fitting the front grill, rotate the grill 90 degrees and re-install. Do not operate the WS-A240 without the protective grill in place.

When multiple WS-A240s are to be installed, best performance will be realized when units are mounted in close proximity to one another. Because high sound levels at low frequencies will be realized, special care should be observed to assure that structural resonances and vibrations do not impair the sound quality.

BEFORE CONNECTION

Switch off power amplifier(s) before connecting the loudspeaker(s). After loudspeaker connection, be certain that high level audio signals are not present before switching the amplifiers on.

The nominal impedance of the WS-A240 is 8 ohms. Two loudspeakers in parallel will have a nominal impedance of 4 ohms, which is the lowest impedance most amplifiers are capable of driving. Be certain that the number of loudspeakers connected in parallel does not result in a load impedance that is below the rating of the amplifier.

Use the largest wire gauge speaker cable that is practical to minimize DC resistance and losses due to cable length. Note that the lower the impedance of the total speaker load, the greater the losses in the wire.

Observe loudspeaker polarity. The plus [+] and minus [-] terminals of each loudspeaker are marked red and black, respectively. A positive-going signal applied to the red terminal will result in forward movement of the loudspeaker diaphragm.

When two or more speakers are used, make sure that the polarities of these speakers are the same.

POWER HANDLING CAPACITY

The rated power capacity of the WS-A240 is 400 watts in accordance with the test procedure outlined in EIA (Electronic Industries Association) RS-426-A. This test method employs white noise through RC high pass and low pass filters to simulate the energy-frequency spectrum of typical program material. It is an excellent indicator of the thermal power capacity of a loudspeaker system.

Because the WS-A240 is a subwoofer, it is subject to mechanical power limitations, especially at very low frequencies. The WS-SP2A Subwoofer Processor includes a high pass filter that protects the WS-A240 from excessive mechanical displacement at sub-audio frequencies. The WS-SP2A should be used with WS-A240s at all times.

CAUTION:

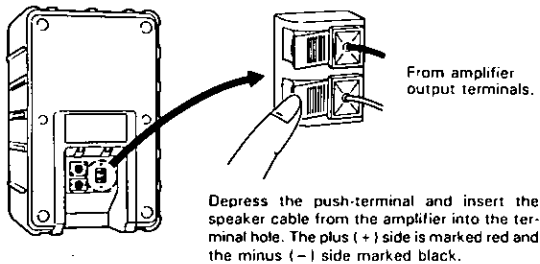
Certain signals may result in excessive displacement of the driver diaphragm, thereby damaging the loudspeaker. The following conditions of operation should be avoided at all times:

1. Shock noise caused by energizing or de-energizing mixing consoles and peripheral equipment when the WS-SP2A and the amplifiers are powered up.
2. Shock noise resulting from the connection or disconnection of input/output connectors with the system powered up.
3. The use of condenser or omnidirectional microphones for vocal applications without appropriate breath-pop screens and/or high pass filters.
4. The switching on/off of phantom microphone power with level controls up.
5. Continuous operation at very low frequencies from an oscillator, synthesizer or other program source when doubling distortion is evident in the loudspeaker.

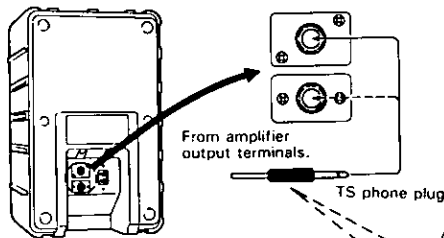
CONNECTION OF SPEAKER CABLES

There are two types of speaker input terminals which should be selected according to applications. (The three terminals are internally connected in parallel.)

• Use of push-terminals

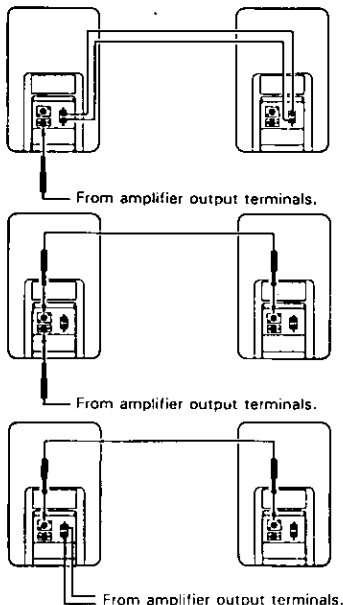


• Use of phone jacks



• Installation of additional speakers

Connect the speakers in parallel as shown below.



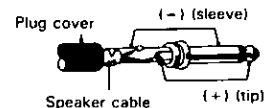
NOTES:

- The cable which fits in the hole of the push-terminal, should have a diameter not larger than 7/64" (2.6 mm). To ensure proper fit to the terminal, a cable diameter of less than 5/64" (2 mm) is recommended.
- The sheath of the speaker cable should not be inserted into the terminal hole.
- When the speaker cable is of a stranded type, the core conductor should be twisted before inserting it into the terminal hole.

NOTES:

- Connect the speaker cable to a tip-sleeve (TS) phone plug, then connect it to either jack.
- The other jack is then used when installing an additional speaker in parallel.

The speaker uses a TS phone plugs as an input terminal. When connecting, make sure that the polarity of the TS phone plug matches the polarity of the amplifier output terminals (speaker terminal) as shown in the illustration.



When two speakers are connected in parallel, the combined impedance becomes 4 ohms. In this case, the speakers should be connected to an amplifier which is designed to drive a load impedance of 4 ohms or less.

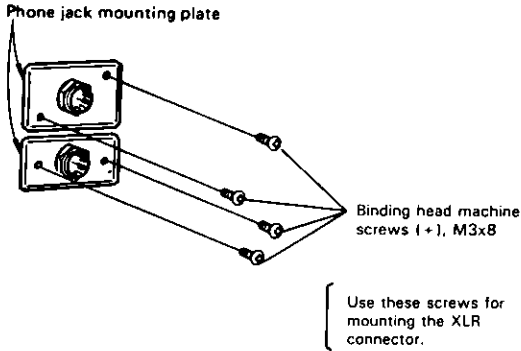
NOTES:

- When three or more speakers are connected in parallel, the combined impedance becomes 3 ohms or less which requires a special type of amplifier. Therefore, do not use more than two speakers for parallel connection.
- If the combined impedance of the speakers is lower than the specified impedance on the amplifier to be used, the sound from the speakers may be distorted or the amplifier may be damaged.
- When two speakers are used in parallel, make sure that the polarities of these speakers are the same.

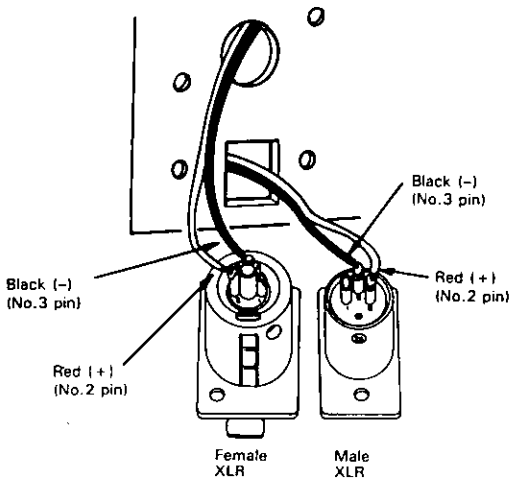
USE OF XLR CONNECTORS

This speaker may be fitted with an XLR connector which is often used for professional applications.

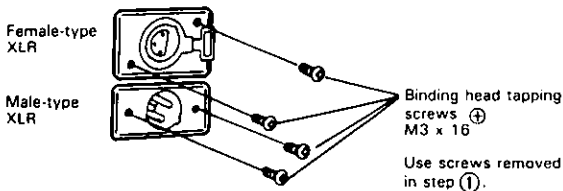
- Remove the phone jack mounting plate and pull it forward. Disconnect the wiring.



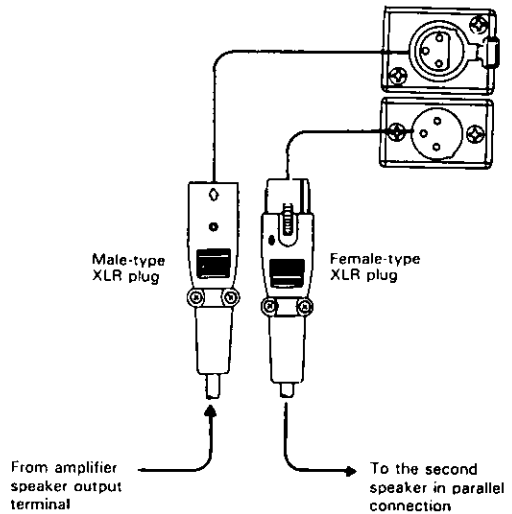
- Solder the leads that were disconnected in step 1 as shown below (⊕ on pin 2, ⊖ on pin 3), mount a female-type XLR on the top and a male-type XLR on the bottom.



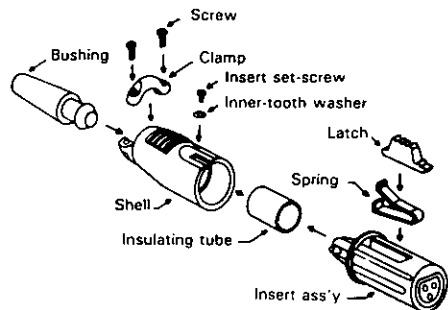
- Secure the XLR connectors with the screws which were removed in step 1, as illustrated.



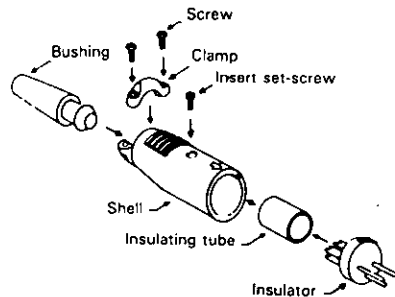
For connection, use XLR plug.



Disassembly diagram of typical Female XLR plug

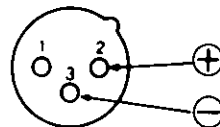


Disassembly diagram of typical Male XLR plug

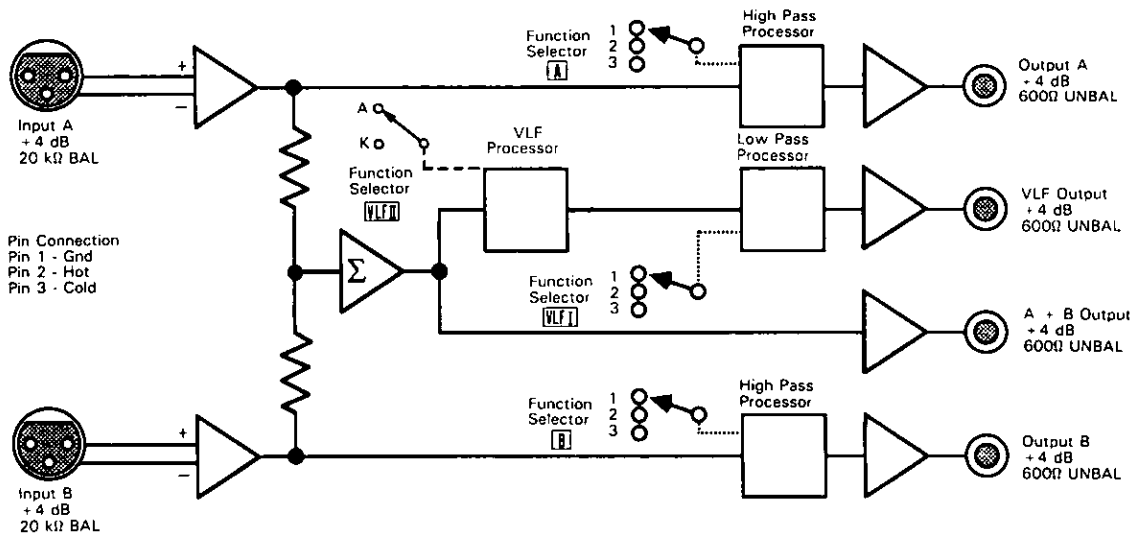


NOTE:

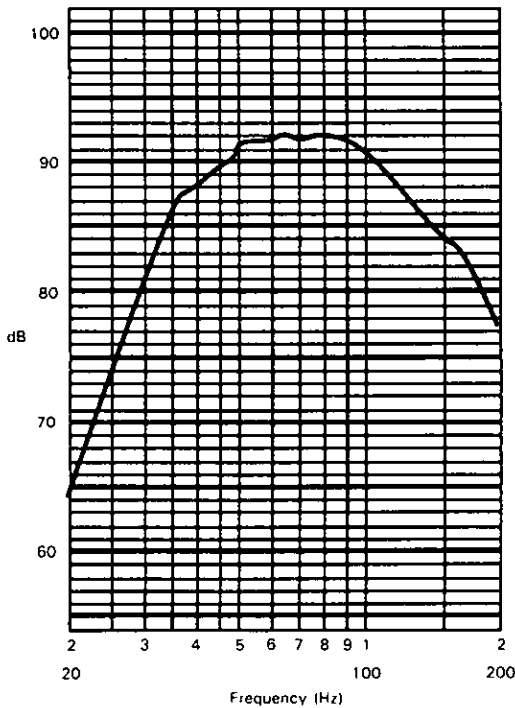
- When using XLR connectors, observe the polarity as shown below.



WS-SP2A BLOCK DIAGRAM



TYPICAL SYSTEM PERFORMANCE



The WS-SP2A performs both bandpass definition and signal processing within the bandpass. The frequency response chart at left shows typical performance of one WS-A240 under half-space conditions using the WS-SP2A Subwoofer Processor adjusted for signal processing mode three. The input signal was adjusted for a nominal 2.83 volts (1 watt at 8 ohms) at 80 Hz.

The WS-A240 voice coil was specifically designed to handle high current at low frequencies, resulting in a thermal power capacity of 400 watts (EIA RS-426-A). The mechanical suspension components have been carefully selected and balanced to enable an unusually large (12 mm) peak displacement capability. The result is an extremely compact subwoofer system of exceptional performance.

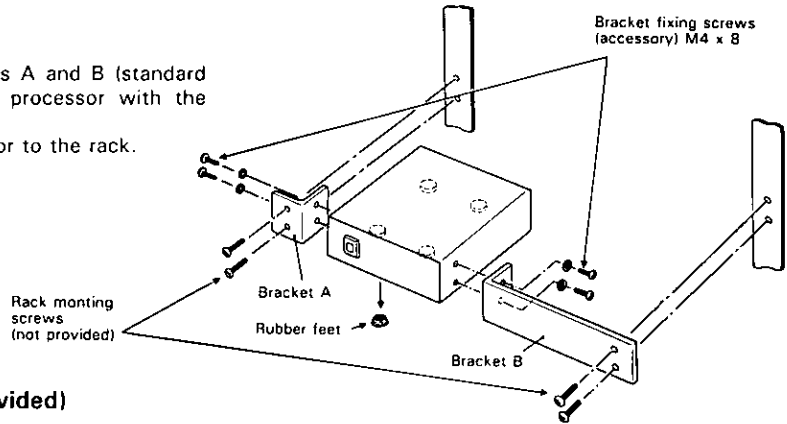
Multiple WS-A240s may be combined in very compact arrays served by a single WS-SP2A Subwoofer Processor, with an accompanying increase in efficiency and extension of low frequency output due to mutual radiation effects (see Typical Applications).

RACK MOUNTING BRACKETS

A. 1 Unit Mounting

1. Remove 4 rubber feet.
2. Fix the rack mounting brackets A and B (standard accessory) to the Subwoofer processor with the attached screws.
3. Mount the Subwoofer processor to the rack.

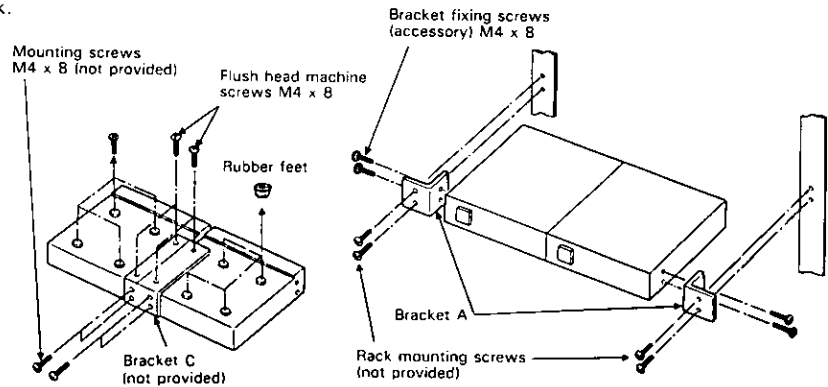
Bracket A: part No. A2SA1036A4
Bracket B: part No. A2SA1037B3



B. 2 Units Mounting (not provided)

1. Remove 8 rubber feet.
2. Fix two processors with bracket C and screws.
3. Fix the rack mounting brackets to the both sides of the processor with the attached screws.
4. Mount the processor to the rack.

Bracket A: part No. A2SA1036A4
Bracket C: part No. A2SA1038A4

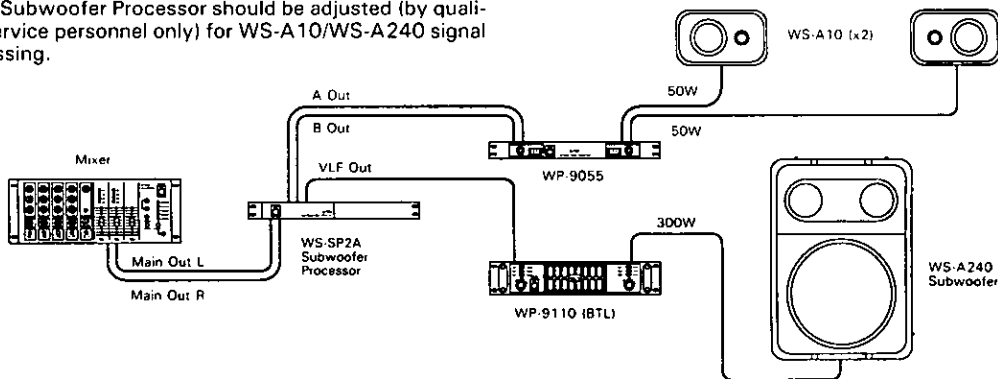


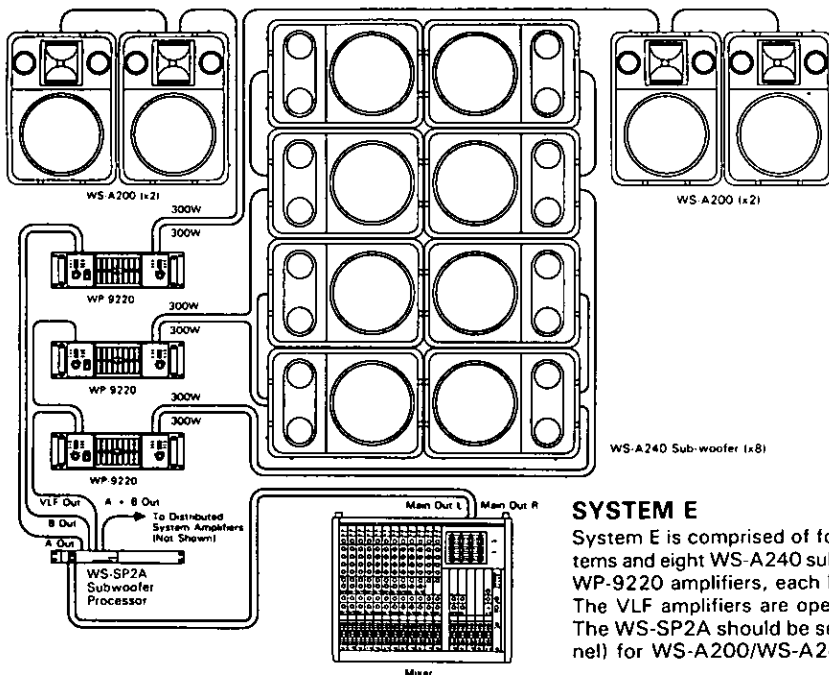
Caution: Don't use screws longer than 8 mm.

TYPICAL APPLICATIONS

SYSTEM A

Illustrated are two WS-A10 Compact Speaker Systems in a two channel configuration, powered by one WP-9055 amplifier. The single WS-A240 Subwoofer is powered by one WP-9110 amplifier in the bridge (BTL) mode. The WS-SP2A Subwoofer Processor should be adjusted (by qualified service personnel only) for WS-A10/WS-A240 signal processing.





SYSTEM E

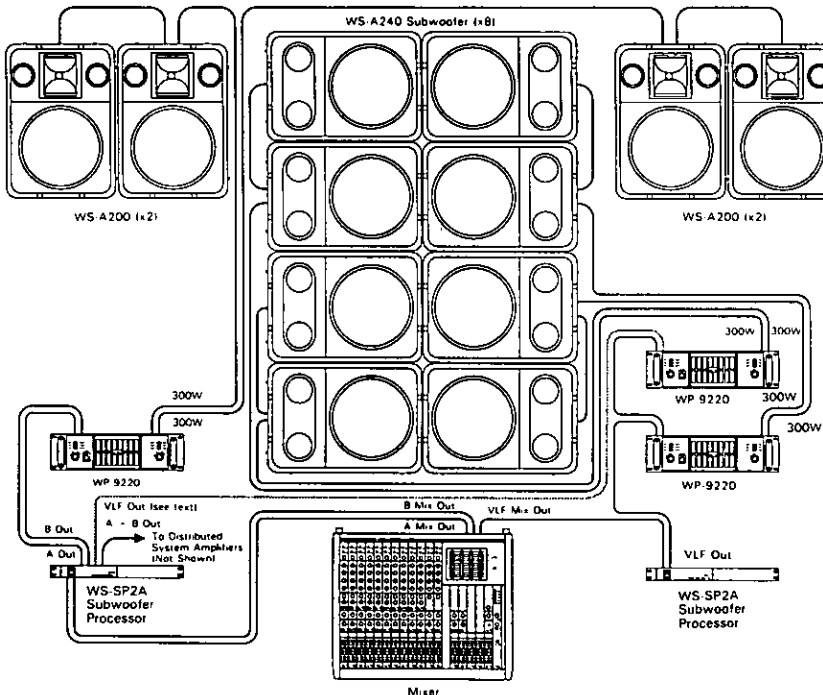
System E is comprised of four WS-A200 loudspeaker systems and eight WS-A240 subwoofers. It is powered by three WP-9220 amplifiers, each loaded to 4 ohms per channel. The VLF amplifiers are operated in the dual mono mode. The WS-SP2A should be set (by qualified service personnel) for WS-A200/WS-A240 signal processing.

SYSTEM F

This system is identical to System E, but configured with two WS-SP2A Subwoofer Processors so that the VLF signals are a separate sub-mix controlled from the mixing console. This affords the ability to selectively introduce signals into the VLF mix, which may be balanced in level against the program mix for special effects. Both VLF amplifiers are operated in the dual mono mode.

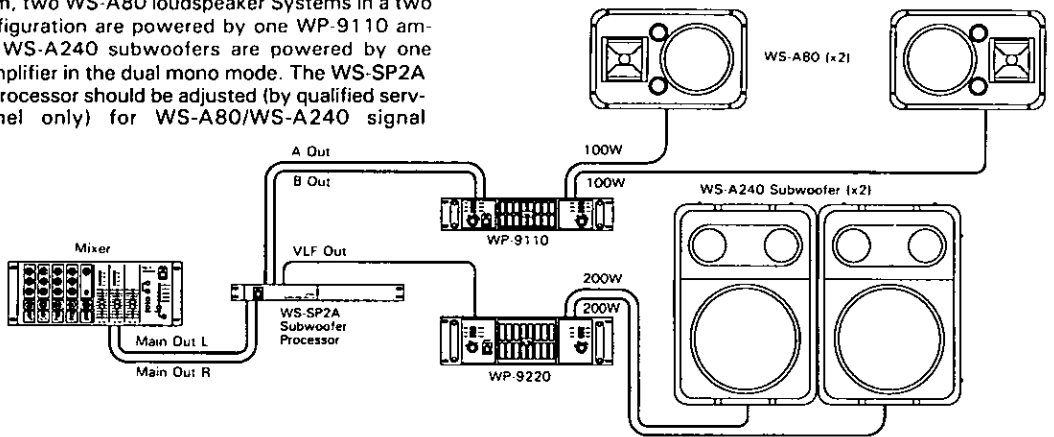
A variation of this design would employ both processors for VLF processing, with the signal derived from the A and B

mix channels driving part of the VLF amplifiers and loudspeakers in a fixed-gain relationship with the main program channels, and the balance of the subwoofers controlled by a separate sub-mix from the console. The additional connection is shown in gray. In this example, (2) WS-A240s are operated from the A and B mix, and their amplifier input mode switch is in the dual-channel position. An optional VLF signal processing device, such as a sub-harmonic synthesizer, may be added to the VLF mix output ahead of the WS-SP2A Subwoofer Processor for special effects.



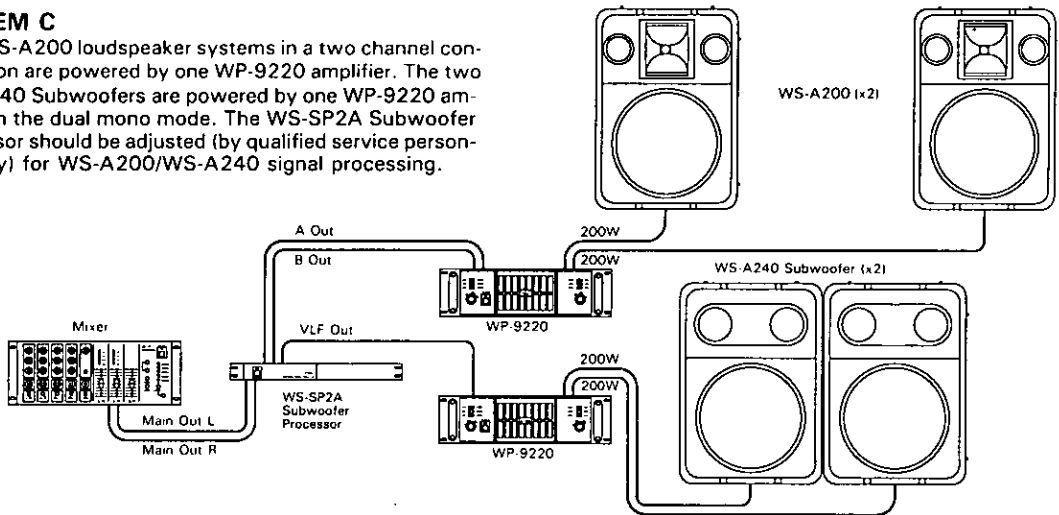
SYSTEM B

In this system, two WS-A80 loudspeaker Systems in a two channel configuration are powered by one WP-9110 amplifier. Two WS-A240 subwoofers are powered by one WP-9220 amplifier in the dual mono mode. The WS-SP2A Subwoofer Processor should be adjusted (by qualified service personnel only) for WS-A80/WS-A240 signal processing.



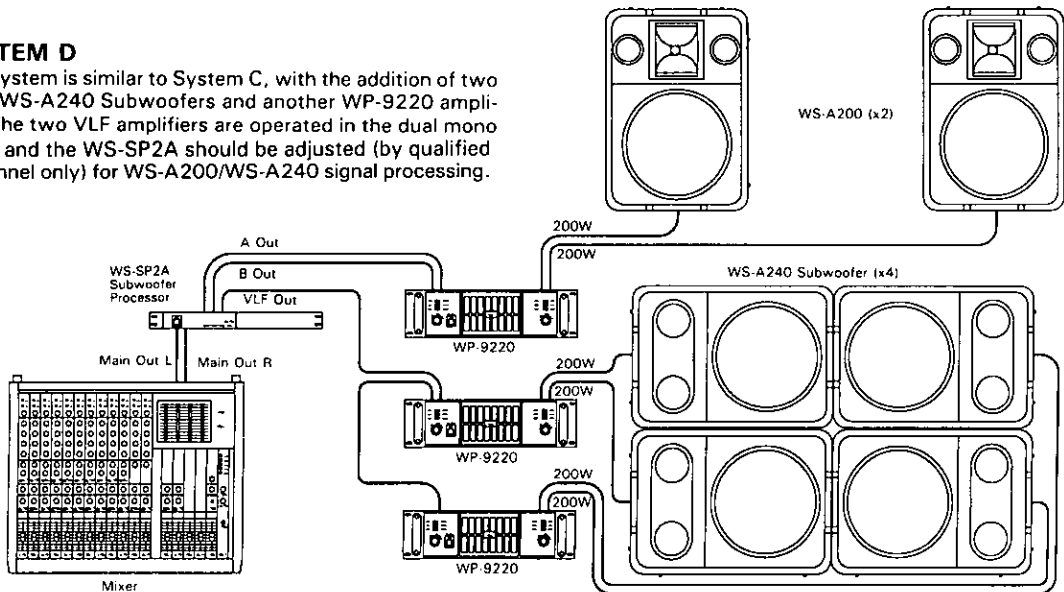
SYSTEM C

Two WS-A200 loudspeaker systems in a two channel configuration are powered by one WP-9220 amplifier. The two WS-A240 Subwoofers are powered by one WP-9220 amplifier in the dual mono mode. The WS-SP2A Subwoofer Processor should be adjusted (by qualified service personnel only) for WS-A200/WS-A240 signal processing.



SYSTEM D

This system is similar to System C, with the addition of two more WS-A240 Subwoofers and another WP-9220 amplifier. The two VLF amplifiers are operated in the dual mono mode and the WS-SP2A should be adjusted (by qualified personnel only) for WS-A200/WS-A240 signal processing.



SYSTEM COMPARISON CHART

System	Main Loudspeakers	Subwoofers	Main Amplifier	Subwoofer Amplifier(s)	Program Level (SPL) ¹	Program Peaks (SPL) ¹	VLF Level (SPL) ²	VLF Peaks (SPL) ²
A	(2) WS-A10	(1) WS-A240	(1) WP-9055	(1) WP-9110	101 dB @ 1m	111 dB @ 1m	110 dB @ 1m	116 dB @ 1m
B	(2) WS-A80	(2) WS-A240	(1) WP-9110	(1) WP-9220	108 dB @ 1m	118 dB @ 1m	114 dB @ 1m	120 dB @ 1m
C	(2) WS-A200	(2) WS-A240	(1) WP-9220	(1) WP-9220	117 dB @ 1m	127 dB @ 1m	114 dB @ 1m	120 dB @ 1m
D	(2) WS-A200	(4) WS-A240	(1) WP-9220	(2) WP-9220	117 dB @ 1m	127 dB @ 1m	120 dB @ 1m	126 dB @ 1m
E-F	(4) WS-A200	(8) WS-A240	(1) WP-9220	(2) WP-9220	119 dB @ 1m	129 dB @ 1m	125 dB @ 1m	131 dB @ 1m

1. From available amplifier power, 10dB crest factor assumed, both channels driven.
2. From available amplifier power above 40Hz, 6dB crest factor assumed due to limited band pass.

WS-A240 SPECIFICATIONS

Type: Bass reflex type
 Impedance: 8 ohms
 Frequency Response: (WS-A240 used with WS-SP2A) ± 3 dB, 35 Hz to main loudspeaker transition frequency
 Power Capacity: 400 watts measured in accordance with EIA RS-426A
 Sound Pressure Level: 91 dB (1W/1m, half-space), 85 dB (1W/1m, spherical free field)
 Reference Efficiency: 0.83% (half-space)
 Volume displacement: $6.0 \times 10^{-4} \text{m}^3$ (0.021 ft³); equivalent to 125 dB at 100 Hz at 1m
 Speaker: 30 cm cone speaker
 Dimensions: 15-9/16" (395mm)[W] x 21-15/16" (557mm)[H] x 10-3/4" (272.5mm)[D]
 Weight: 35 lbs. (16 kg.)
 Finish: Enclosure: Resin molded, black
 Front Panel: Punched grill, black

WS-SP2A SPECIFICATIONS

Type: Line-level Subwoofer Processor
 Input: Two, electrically balanced: Input A, Input B (female XLR type), +4 dB, 20 kohms
 Outputs: Four, unbalanced:
 Output A (high pass processed), 1/4-inch, +4 dB,
 Output B (high pass processed), 1/4-inch, +4 dB,
 VLF output (sum of A and B, band pass processed), 1/4-inch +4 dB,
 A + B output (sum of A and B all pass), 1/4-inch, +4 dB.
 Maximum Output Level: +20 dB
 Minimum Load Impedance: 600 ohms
 Gain (Pink noise): Unity
 Output Noise Level: -95 dB or less (IHF A WTD)
 Distortion: Outputs A, B, A+B; 0.05% or less (+4 dB at 1 kHz)
 VLF Outputs; 0.05% or less (+4 dB at 35 Hz, VLF II switch is at the A position)
 Cross Talk: 60 dB or more at 10 kHz
 Turn-on Delay: Approx. 3 to 5 seconds
 Power Requirements: 120V AC, 60 Hz, 126 mA (12W)
 Dimensions: 8-5/16" (W) x 1-3/4" (H) x 8-5/16" (D)
 210 mm (W) x 44.5 mm (H) x 210 mm (D)
 Weight: Approx. 4 lbs (1.8 kg)
 Finish: Matte black

INFORMATION FOR QUALIFIED SERVICE PERSONNEL

CAUTIONS:

These Servicing instructions are for use by qualified personnel only. To avoid electric shock do not perform any servicing other than that contained in the Operating Instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

CAUTIONS:

Before proceeding with disassembly, be sure to turn off the power and unplug the power supply cord from the AC outlet.

SELECTING THE OPTIMUM SIGNAL PROCESSING

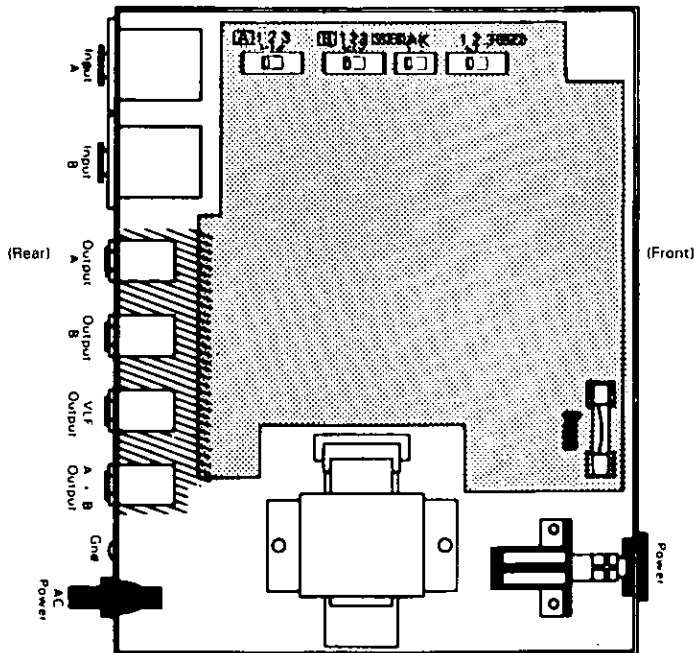
The WS-SP2A Subwoofer Processor is shipped from the factory with the internal signal processing switches set in position 1 for VLF I, output A and B and position A for VLF II switches. This provides optimum bandpass processing for the RAMSA model WS-A200 loudspeakers when used with WS-A240 subwoofers. Other main loudspeaker systems may require different switch settings. Although the signal processing in the WS-SP2A has been optimized for various RAMSA loudspeaker systems, the WS-A240 and WS-SP2A may be successfully used with other brands of main loudspeakers by observing these instructions. The following procedure will enable the selection of optimum signal processing when other than RAMSA WS-A200 main loudspeaker systems are to be used.

If the WS-SP2A is installed in a system, switch off all power amplifiers and disconnect the input and output signal

connectors. If the WS-SP2A is mounted in a rack, remove the instrument and place it on a convenient work surface. Be certain that the AC power cord is disconnected from the AC power supply outlet.

Remove the top cover. The drawing below shows the location of the three switches that select the internal signal processing options. The switches affect only the VLF and channel A and B outputs—the A + B output is not affected by the signal processing.

Select the switch settings for the signal processing that is appropriate for the installation from the table on next page. When the WS-SP2A is used in a VLF (subwoofer) only mode, switch position 1 for VLF I, output A and B is recommended.

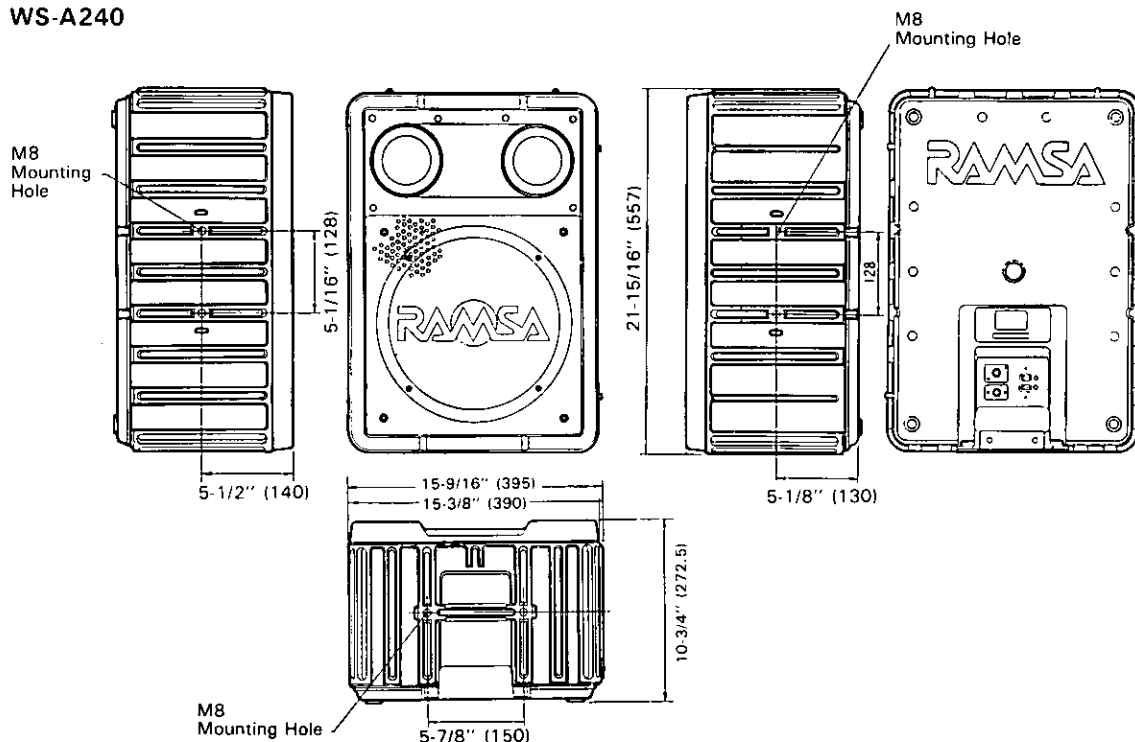


RECOMMENDED FUNCTION SELECTOR SETTING		
SUBWOOFER	MAIN SPEAKER	FUNCTION SELECTOR POSITION
WS-A240	WS-A200	
	WS-A80	
	WS-A10	

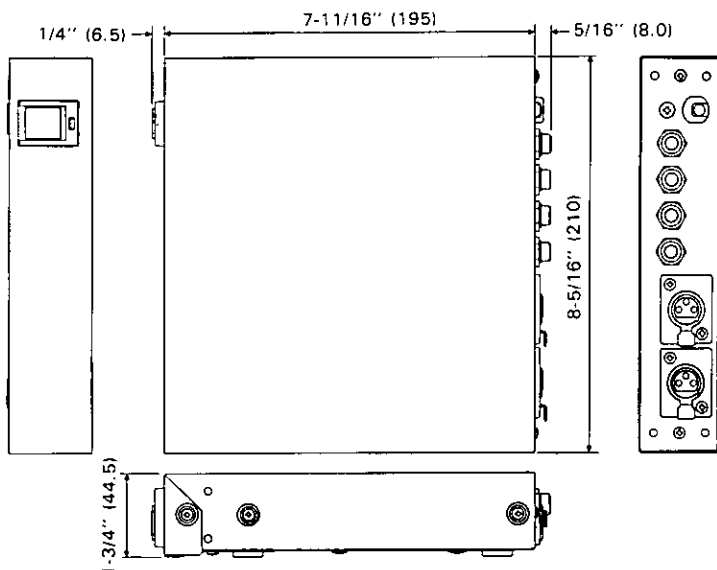
- CAUTION:**
- REFER TO OPERATING INSTRUCTIONS BEFORE SETTING THE FUNCTION SELECTORS
 - SET "K" POSITION OF VLF II SWITCH FOR LOUDSPEAKER SYSTEM WS-K40 (only for WS-SP2AE and WS-SP2AC)

APPEARANCE

• WS-A240



• WS-SP2A



Panasonic®

Panasonic Industrial Company
 Audio-video System Group
 Professional Audio Department
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Matsushita Electric of Canada Limited
 Industrial Audio Department
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 (416) 624-5010

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