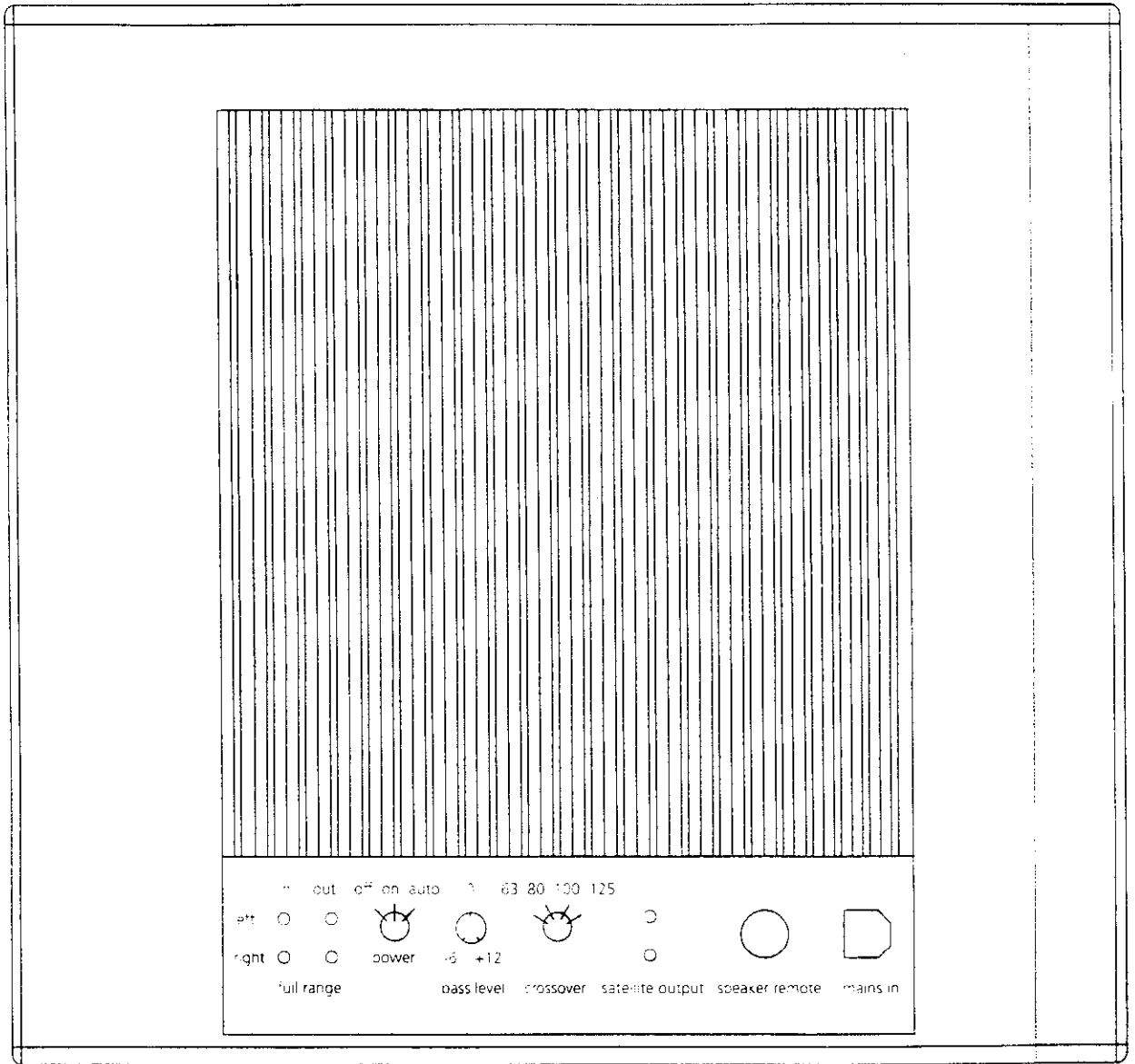


SW5

Powered subwoofer
Owner's manual

a/d/s/ analog and
digital systems



SW5 back view with amp
in place



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.



Caution: To reduce the risk of electric shock, do not remove cover or back. No user-serviceable parts inside. Refer servicing to qualified service personnel.



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.

Warning: To prevent fire or shock hazard do not expose this unit to rain or moisture. This unit should be situated away from heat sources such as radiators, heat registers, stoves or other heat sources. It should be placed below the amplifier when stacked.

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Introduction

Thank you for purchasing the *a/d/s/* SW5 powered subwoofer system. The SW5 augments bookshelf or miniature loudspeakers, adding an octave or more of deep bass output. Because the SW5 takes over the job of reproducing the large excursion, deep bass portion of the signal, the burden on the smaller speakers is greatly reduced: they can play at higher levels with lower distortion. The combination of the SW5 and smaller satellite speakers give the subwoofer/satellite system the bass reach and output level of the largest loudspeakers, in a smaller, more easily placed format.

The SW5 connects to nearly any audio system. The atelier-sized module contains a down-firing 12" woofer and a chassis that holds the electronics package, which consists of a user-adjustable electronic crossover, a sophisticated equalizer with dynamic control and a high power (350 Watt) amplifier.

The 12" down-firing woofer couples efficiently to the room, making low distortion bass output possible even at high sound pressure levels. The woofer has an edge-wound, rectangular copper wire voice coil for high efficiency and strength. The Stiffite[®] cone is able to move large volumes of air without flexing or bending, while the controlled butyl rubber surround provides superior control of cone motion and long excursion for lowest distortion.

The woofer is driven by a single-channel high power amplifier. The amplifier is capable of very large peak currents for freedom to maintain accurate control of cone motion. The equalizer circuit gives the SW5 system its flat frequency response down to 30Hz and it incorporates dynamic control over the response to maintain high output level without damage to the woofer.

The electronic crossover separates the woofer's drive signal from the satellite signals that is returned to the original system amplifier and speakers. The crossover has 4-pole, Linkwitz-Riley response shapes for best system power and phase response. The crossover frequency can be adjusted to one of four values to correctly match the satellite speakers.

As are all *a/d/s/* products, the SW5 is designed to give a very high level of performance and to provide years of trouble-free operation. Please read this manual thoroughly before connecting and using the SW5.

Thank you,
Analog and Digital Systems, Inc.

Unpacking

Since you are reading this manual, you have opened the carton. Please read through this procedure before going any further. The SW5 is wrapped in plastic for dust protection and then is packed in foam shells inside the shipping carton. The SW5, though small, is quite heavy. Do not attempt to lift the SW5 out of the carton; instead, turn the open carton over, so that you can lift it clear of the SW5, as follows:

- Set the SW5 carton on a carpeted floor (or a large pad) with its top up and open.
- Hold the top flaps down against the outsides of the carton and carefully tip the carton onto one side.
- Hold one of the inner shells to prevent the SW5 from slipping part way out of the carton and carefully tip the carton over so that the open top rests on the floor.
- Lift the carton clear of the shells.
- Being careful not to drop or tumble the SW5, remove the shells and the plastic wrap. The woofer cone is protected by a metal grille, but do not put the SW5 "grille-down" onto another object.
- Screw the four feet into their sockets in the bottom of the SW5. Leave a little space between the top of each foot and the bottom of the SW5 so that you can easily adjust the foot for proper height. Carefully lift or turn the SW5 over onto its feet.

Controls and features

Shipping carton We suggest you save the carton and packing material for future use. Moving or shipping the SW5 in anything other than its factory carton can result in costly damage which is not covered by the warranty.

Owner's record Please fill out and mail the Owner's Registration Card that is packed with the SW5. Save your sales receipt for future reference. It is your best record of purchase date. You may want to attach it to this manual.

full range in jacks receive stereo signals from the **left, right** preamp outputs of a receiver or audio control center. These jacks can also receive output from the speaker outputs of a receiver or amplifier when no preamp outputs are available.

full range out jacks send the full range stereo signals to other amplifiers or to another SW5 in the system. The SW5 has a unity-gain buffer amplifier to drive these outputs, and so allows long cable runs.

power three-position switch controls the AC power to the SW5. In the **off** position, the power to the SW5 remains off, regardless of audio signal presence or the power status of a connected a/d/s/ receiver or audio control center.

In the **on** position, the power to the SW5 remains on as long as the power cord is plugged into a live outlet. When the SW5 is connected to an a/d/s/ receiver or audio control center through the **speaker remote** jack, leaving the switch in the on position lets the SW5 automatically turn on and off with the receiver.

In the **auto** position, the power to the SW5 automatically switches on whenever an audio signal appears at the **full range in** jacks, and switches off a few minutes after audio signal at the jacks ceases.

bass level control adjusts the bass output from the SW5 relative to the signal level of **satellite output** jacks. The control range spans 18dB to provide for differing satellite speaker sensitivities and varying gain levels of amplifiers used to drive the satellite speakers.

crossover four-position switch simultaneously adjusts the crossover frequency of both the low-pass signal reproduced by the SW5 and the high-pass signal sent to the satellite output jacks. The four crossover frequencies are **63, 80, 100, and 125Hz**.

satellite output jacks send the high-pass stereo signals from the electronic crossover to the stereo amplifier that drives the satellite speakers.

speaker remote 8-pin DIN jack connects to an a/d/s/ receiver, audio control center or amplifier for multiple speaker and power control switching. The SW5 is internally set to always be connected to the receiver's speaker + switching controls. However, this can be modified by a qualified technician for speaker's operations.

mains in jack connects through the power cord to an AC power outlet.

power cord plugs into the IEC-type mains socket on the SW5 and into a standard AC power outlet.

finned amplifier chassis provides a secure mechanical platform for the various electronic circuits and also provides efficient heat radiation to keep the woofer amplifier cool.

adjustable feet let the SW5 be leveled on uneven floors and also provide the necessary 19mm (3/4") clearance between the SW5's bottom and carpets of various pile heights.

atelier size module lets the SW5 be combined with other atelier storage modules for a completely unobtrusive installation.

Placement and connections

Placing the SW5 Because deep bass frequencies are completely omnidirectional and are not localizable by listeners, the SW5 may be located nearly anywhere in the same space with the satellite speakers. The only requirement, due to both its weight and its acoustic design, is that the SW5 be placed on the floor. Do not stack the SW5 on other atelier modules or cabinets of any kind. Some critical listeners prefer that a subwoofer be located in the same plane as the satellite speakers, but this is not necessary for satisfactory use of the SW5.

Buzzes and rattles Because of its high acoustic output capability at very low frequencies, the SW5 can stimulate a number of odd responses from objects in the listening room or from the room itself. Windows and doors may rattle or buzz, objects placed on tables may move about, and the walls themselves may respond to the low frequency pressures generated by the SW5. Since very low frequencies have extremely long wavelengths, such acoustic side-effects are independent of the specific location of the SW5 in the listening room.

Some effects are more location specific, such as those caused by the vibrations transmitted through the SW5's enclosure. For example, do not set loose objects on top of the SW5. To prevent severe acoustic feedback, do not set an analog turntable or a stack of equipment containing a turntable on top of the SW5. Setting a compact disc player on the SW5 may result in tracking problems or data errors. Purely electronic equipment such as amplifiers or receivers are less likely to be affected by the SW5 than are the mechanical pieces. Do not let the back of the SW5 touch a wall or other backing. Keep the sides of the SW5 from touching adjacent cabinets.

When the SW5 is part of an atelier storage module system, try to place the SW5 at one end of the system, spaced slightly away from the adjacent module, so that they are not actually touching. This location minimizes the potential for cabinet buzzes. When the SW5 must be in the middle of a module system, place felt pads between the SW5 and the adjacent modules at their contact points. Modules may be stacked on the SW5, but be sure that the four small plastic footpads are inserted in the foot-holes of the upper modules.

Experiment with your intended setup to see if problems result before you make a commitment to a permanent installation.

Relation to other equipment All of these connections are simplified by placing the SW5 near the receiver, but there is no practical limit to placing the SW5 anywhere in the same area as the other equipment. Plan for routing the connecting cables where they won't be stepped on or crushed. Because of connecting cable capacitance effects, the SW5 should not be more than 100' from the receiver.

Leveling and bottom clearance The adjustable feet of the SW5 let you level and stabilize the SW5 regardless of the normal variations of a floor. It is important that all four feet make equal contact with the floor. Further, the bottom of the SW5 must be a minimum of 19mm (3/4") above the surface of rugs or other floor coverings. Since thick rugs or rugs on thick pads tend to sink under the weight of the SW5, it is best to wait a while after setting the SW5 in place to make a final height and level adjustment.

Cables The SW5 is supplied with cables to make the connections. The cables supplied are:

- 2 each: 3m (10') stereo cable with phono plugs at each end
- 1 each: 3m (10') control cable with 3-pin DIN plugs on each end.
- 1 each: 3m (10') AC power cord.

In addition, accessory adapters are available. They have wire leads at one end, to connect to the speaker terminals of a receiver, and female phono jacks at the other end, to connect to the supplied stereo cables. These adapters are available through your *a/d/s/* dealer.

When a cable is longer than needed, coil up the excess length and secure it with a wire tie to keep it neat and out of the way. Coiling the stereo and control cables, singly or together, has no effect on performance.

When the supplied cables are too short, see your *a/d/s/* dealer. Longer accessory cables are available from *a/d/s/*. Custom cables will be needed for some installations.

Using the cable slot in the cabinet

The SW5's cabinet has a cable slot in the back which can be used to hide cable runs from equipment stacked on the SW5. The slot is covered by a plastic strip which hides the cables. You can remove the strip by sliding it up out of the cable slot. Dress the cables in the slot and then slide the cover strip back in place.

Power connection Due to its potentially high power consumption, the SW5's power connection should be to the wall outlet, **not** to an outlet on the receiver or audio control center. When the SW5 is part of an *a/d/s/* R4 or CC4 system, the power switching is controlled by the R4 or CC4 through the **speaker remote** cable; the SW5's power switch is left in the **on** position. When the SW5 is used with another receiver or preamp/amp combination, the **auto** power switching feature of the SW5 can be used to provide automatic power on/off control.

System configurations and signal connections

The SW5 can be inserted into an existing system or included as part of a new system. More than one SW5 can be used when large amounts of bass energy are desired.

The SW5 has been designed to work with *a/d/s/* stereo components, but may be used with receivers, preamps and amplifiers from any manufacturer. Only connections to *a/d/s/* components are described here. Consult your dealer for information about using the SW5 with other equipment.

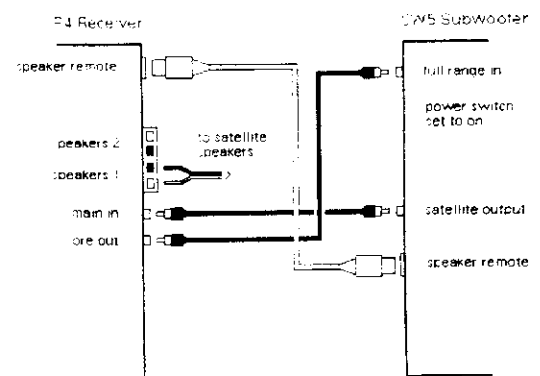
Where connections to a receiver are described, the connections could equally well be made to a preamp/ amplifier combination. For example, when the receiver described is an *a/d/s/* R4, the connections are the same, or very similar, for a CC4 and PA4 combination.

When making connections, be sure that the power is turned off at all components or that they are unplugged from the AC power outlets.

In general, your system will be like one of the following systems:

Receiver with pre out, main in jacks; SW5 and speakers as the primary system This system typically is an *a/d/s/* R4 and two *a/d/s/* speakers to which an SW5 is added. The amplifiers in the receiver drive the speakers as before, but now they are satellites:

- Connect the speakers to the R4's (PA4's) **speaker 1** terminals.
- Remove the jumpers that connect the R4's **pre out** and **main in** jacks. Put them in an envelope or small zip-lock type bag, and put them in a safe location for possible future use.
- Use a stereo cable to connect the R4's (CC4's) **pre out** jacks to the SW5's **full range in** jacks. Connect left channel to left channel, and right to right.
- Use the other stereo cable to connect the SW5's **satellite output** jacks to the R4's (PA4's) **main in** jacks.
- Use the 8-pin DIN cable to connect the R4's (PA4's) **speaker remote** jack to the SW5's **speaker remote** jack. Match the keys in the cable connector shells to the keyways in the jacks.

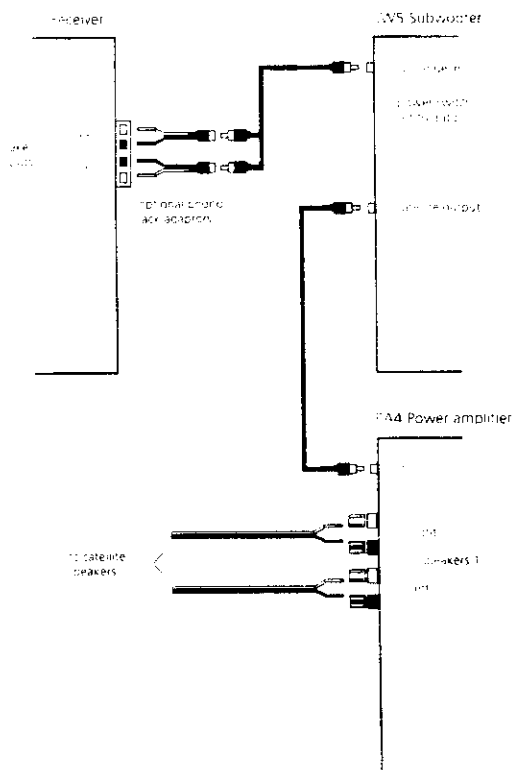


Receiver with pre out, main in jacks; SW5 and speakers as the primary system

Receiver without pre out, main in jacks; SW5 and speakers as the primary system This system is typically based on an a/d/s/ R1 and two a/d/s/ miniature or bookshelf speakers, with an SW5 added. Power control for the SW5 is best achieved by using the **auto** setting of the power switch. The amplifiers in the receiver supply signal to the SW5 only, and a second power amplifier like the a/d/s/ PA4 is added to drive the satellite speakers:

- Connect accessory phono cable adapters to the receiver's speaker output terminals. Connect one adapter to the left channel and one adapter to the right channel. Connect the red wire of each adapter to the corresponding **spkr, red** or + terminal and the black wire to the **ground, black** or - terminal.
- Connect a stereo cable to the two adapters and to the SW5's **full range in** jacks. Connect left channel to left channel, and right to right.
- Connect the other stereo cable to the SW5's **satellite output** jacks and to the separate amplifier's **input** jacks.
- Connect the speakers to the separate amplifier.
- Use the receiver's speaker switching controls to turn on **only** the speaker terminals to which the phono cable adapters and SW5 are connected.

SW5 and satellite speakers as a remote system This system will typically be R4-based with main and remote speakers. When the SW5 and the satellite speakers are remote from the R4, the R4's amplifiers will be used to drive the full-range main speakers or other speakers, and cannot be used to power the satellites. A separate amplifier, like the a/d/s/ PA4, is used to power the satellites. Since the SW5 is always controlled by speaker 1 switching at the R4, the satellites must also be connected to the speaker 1 terminals of an a/d/s/ power amplifier:



Receiver without pre out, main in jacks; SW5 and speakers as the primary system

- Replace each R4 **pre out/main in** jumper with a Y-adaptor that has two male phono plugs and one female phono jack. Plug one Y-adaptor's male plugs into the R4's **pre out** and **main in** jacks for the left channel. Repeat with the other Y-adaptor in the right channel jacks.
- Connect a stereo cable to the female jacks of the Y-adaptors at the R4. Connect the other end of the stereo cable to the SW5's **full range in** jacks.
- Use a stereo cable to connect the SW5's **satellite output** jacks to the **input** jacks of the separate amplifier.
- Connect the satellite speakers to the separate amplifier's **speaker 1** output terminals.
- Connect the 8-pin DIN control cable to the R4's **speaker remote** jack and to one of the separate amplifier's **speaker remote** jacks.
- Connect an additional 8-pin DIN control cable from the amplifier's other **speaker remote** jack to the SW5's **speaker remote** jack.

Connecting more than one SW5 in one subwoofer/satellite system

You can use more than one SW5 in the same subwoofer/satellite system by connecting them in parallel:

- Connect the **full range out** jacks of one SW5 to the **full range in** jacks of the second
- Connect the **satellite output** jacks of one SW5 to the receiver or amplifier. Leave the satellite output jacks of the other SW5 unconnected.
- Connect the 8-pin DIN cable from the receiver to an *a/d/s/* adaptor and DIN cables from the adaptor to each SW5.
- Set the crossover and power switches to the same settings on both SW5s.
- Always set the two **bass level** controls to the same settings. When you adjust one, adjust the other by the same amount.

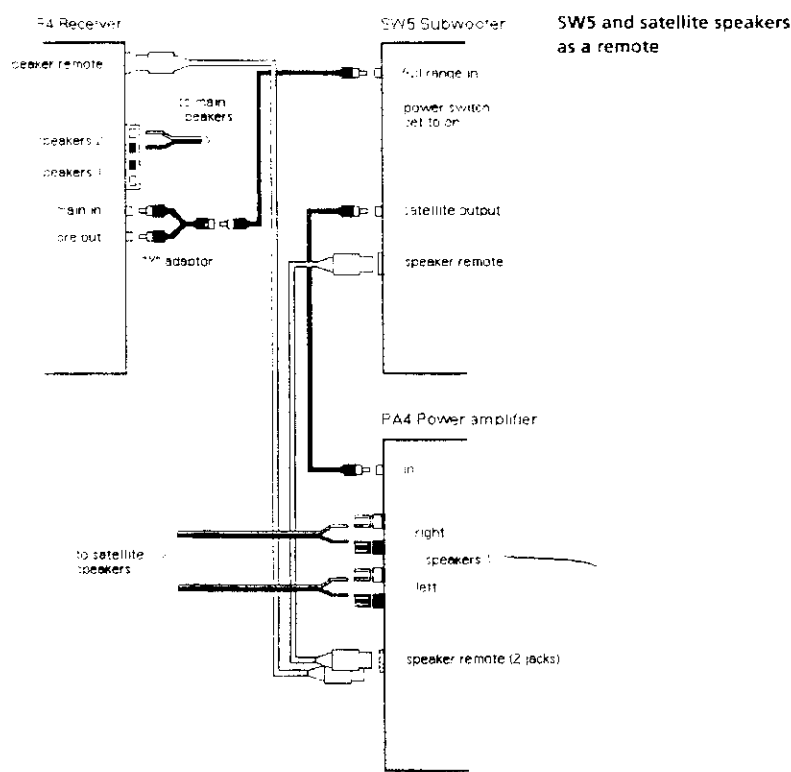
Connecting the SW5 to augment large speakers

You can use the SW5 to augment the deep bass output of large speakers rather than replacing their bass output. In this system the SW5's satellite output jacks are left unconnected, since the large speakers are being used full-range. Make the SW5's input and DIN cable connections to suit your system as described in the previous paragraphs.

Using other speakers along with the SW5/satellite system

In some system configurations, you want to have additional full-range speakers hooked up with the SW5/satellite system. For example, you may want to use the SW5/satellite system as the main system and full-range speakers for a second (remote) system. For this system, make the connections as though the SW5/satellite system is a remote system as described in the preceding section; the only difference is the physical location of the various speakers and the SW5.

Another option is to use the receiver to drive speakers in addition to the satellites. When the receiver's amplifiers are used to drive the satellite speakers, any other speakers also connected to the receiver will play when they are selected, but without the deep bass, which is filtered out by the SW5's electronic crossover. In large rooms you may well want to use four satellite speakers with one or more SW5s. Using the receiver's speaker terminals and speaker switching in this way is just fine. However for range operation of second speakers, a second power amplifier **must** be connected to the SW5's **full range out** jacks (or paralleled with the SW5 at the R4's **pre out** jacks) and the second speakers connected to the second amplifier.

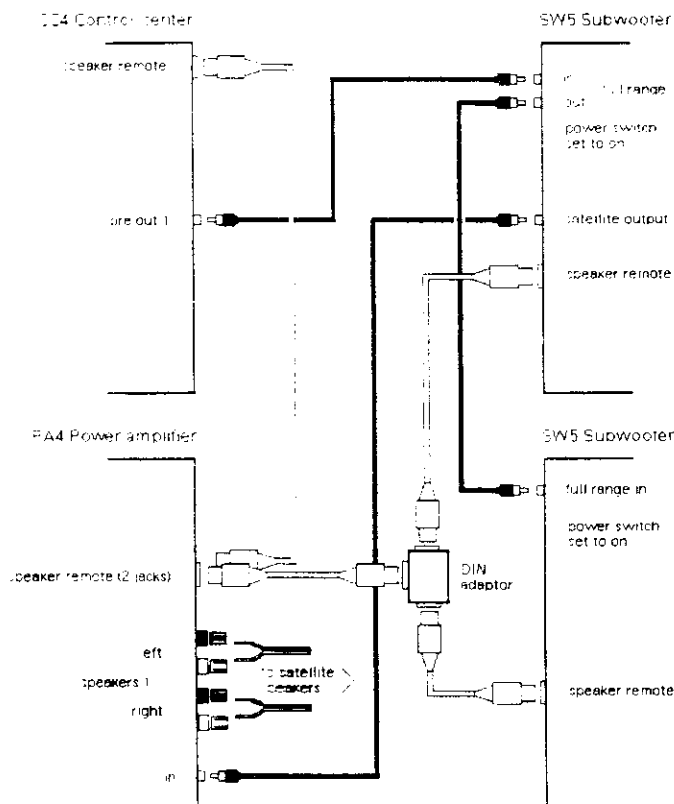


A more complicated system is one in which the receiver has no preamp outputs and you want to drive the SW5 from one set of its speaker terminals and a second pair of speakers from a second set of its speaker terminals. In this case a separate amplifier must be used to drive the satellite speakers in the SW5 system. The complication occurs when the multiple sets of speaker terminals are internally connected in series inside the receiver. There will be no problem **if you use only one** of the sets of speaker terminals at a time — one or the other, but **never both**. Similarly, there will be no problem **if** the sets of speaker terminals are connected together in parallel inside the receiver when both sets of speakers are on.

There **is** a problem if the sets of speaker terminals are connected together in series inside the receiver when both sets are on. This is the case with many moderate power receivers. When the speaker terminals are wired in series, any current flowing through one set of speakers must also flow through the other set. The SW5 presents a very high impedance which reduces the current to a low value, which in turn means that the other speakers cannot play loudly enough to be heard. The solution is to parallel the SW5 inputs with low resistances so enough current flows to make the other speakers play. In order for this kind of connection to work, these two things must done:

1 The accessory phono cable adapters must be connected to the set of speaker terminals whose black or - terminals are always connected to chassis ground, regardless of the speaker switch settings. This can be verified with an Ohmmeter or continuity tester when all speaker cables have been disconnected from the receiver and **both** sets of speakers have been turned on at the receiver's speaker selector switch.

2 Each phono cable adapter must be paralleled with a power resistor of 4 to 10 Ohms resistance and at least 10 Watt rating. In most cases, 10Ω, 10W resistors will work. When the system is played for long periods at high outputs, the resistors will get quite warm and should be kept from physical contact with other objects. At moderate or normal levels, there should be no problem. Consult with your a/d/s/ dealer about this kind of arrangement.



Connecting more than SW5 in one subwoofer/satellite system

Operation

Using the power switch The power switch settings have been described in both the Controls and features section and the Placement and connections section. It is preferable to control the power through the *a/d/s/* receiver or audio control center by connecting the SW5 to the receiver with the DIN control cable and set the SW5 power switch to **on**, since the whole system will turn on or off together.

In some installations, running the control cable may be difficult and you may elect to use the **auto** feature. If you are using a receiver that does not have the speaker remote control provision then using the auto feature is the best choice. This feature detects the audio signal and turns on the SW5's power. The detection and switching cause a delay of a few seconds, possibly cutting off the first notes from a compact disc source.

When you are leaving the system unattended for long periods, such as during a vacation, it is a good idea to unplug the SW5 at the wall outlet. Unplugging is usually easier than getting to the back of the SW5 to set the power switch **off**.

Selecting the crossover frequency In addition to reproducing lower frequencies than most speakers can manage, the SW5 takes over the task of reproducing all of the frequency content of the music below the selected crossover point. The advantage to this is that the work done by the woofers in the satellite speakers is greatly reduced, and consequently their distortion is lower and they are able to play more loudly.

To reap the advantage of reducing the work load of the satellite woofers and a significant extension of the maximum output from the system, the SW5's crossover point must be set to approximately one octave above the satellite speakers' system resonance frequency; effectively reducing the satellite woofer excursion by a factor of four.

Determining the satellite speaker resonance is beyond the resources of most users. A reasonable approach to selecting the crossover frequency is to double the lower frequency limit found in the satellite speaker specifications and select the nearest setting of the SW5's crossover switch.

For example, the *a/d/s/* C115 has a low frequency specification of 60Hz. Doubling this frequency and choosing the nearest setting results in a crossover point of 125Hz on the SW5. Similarly, the *a/d/s/* CM6 has a low frequency specification of 50Hz. Again, doubling this frequency and choosing the nearest setting results in a crossover point of 100Hz on the SW5. Many small speakers have low frequency cutoffs higher than 60Hz. For these systems, such as the *a/d/s/* C200, use the 125Hz setting on the SW5.

When you want to use the SW5 to achieve deeper bass and you don't care about extending the maximum output from the system, you may experiment with using lower settings of the crossover switch. The advantages of a lower crossover frequency are that the possibility of localizing the bass output is reduced and that the crossover point is moved to a potentially less audible part of the spectrum.

A few larger speakers, with 10" or larger woofers, are able to reproduce deep bass frequencies. These speakers can benefit from using the SW5 as a means of augmenting rather than replacing their bass output capability. Use the SW5's 63Hz setting and do not connect the satellite output jacks.

Adjusting the bass level control

The SW5's **bass level** control provides a way to match the acoustic output of the SW5 to the level produced by the satellite amplifier/speaker combination. When you use an *a/d/s/* amplifier and speakers, initially set the **bass level** control to the **0** position, with the knob pointer straight up. Play a large variety of music and adjust the bass level control one or two index marks

either side of **0** until you find the setting that best suits your taste. Experiment freely with the bass level control; you may well prefer more or less deep bass than the nominal matching level offers.

When you are using other amplifiers and/or speakers, the procedure is similar but the reference level may not be **0**. The SW5's **0** setting matches the satellite amp and speakers when:

- The amplifier has a voltage gain of 30dB (~30x).
- The speakers have a sensitivity (efficiency) of 88dB/W/m.

Given an amplifier gain of 30dB, the SW5 can match satellite speaker sensitivities over a range of 76 to 94dB/W/m. Given a speaker sensitivity of 88dB/W/m, the SW5 can match amplifier gains from 18dB (8x) to 36dB (63x).

If your speakers are more efficient, increase the bass level setting by the difference between the speaker's rated sensitivity and 88dB. If your speakers are less efficient, reduce the bass level by the difference. For example, if your speakers are rated at 90dB/W/m, initially adjust the bass level setting approximately one index mark higher than **0**, then adjust to your preference.

Similarly, if the amplifier has a gain higher than 30dB, initially increase the bass level by the difference between the amp's gain in dB and 30. If the amp has lower gain, reduce the setting by the difference. The voltage gain usually is not found in receiver or amplifier specifications. Ask your dealer or the manufacturer for this information.

Of course you can adjust the bass level control for the sound that pleases you without ever knowing the amp gain or the speaker sensitivity. The SW5's bass level control has sufficient range to cover most combinations.

Maintenance

Normal maintenance of the SWS consists of keeping the unit clean and dust-free. Use a soft cloth or brush to remove dust without scratching or marring the finish. Do not use strong cleaners or solvents of any kind.

Do not allow any moisture to enter the SWS. Wipe up any spills immediately. If you suspect that moisture has entered the SWS, take it immediately to an authorized a/d/s/ service agency for evaluation.

In case of difficulty

Most difficulties with high fidelity equipment are caused by loose or poor connections, bad connecting cables or lack of understanding of the unit's operation. Often, problems show up after a change is made to the system, or after the system is moved. Carefully check all connections, and label all connecting cables and wires when you disconnect any equipment.

On the following page are some common difficulties with suggested remedies. If these remedies don't help, contact your a/d/s/ dealer for assistance. If you want to contact the factory directly, write or call:

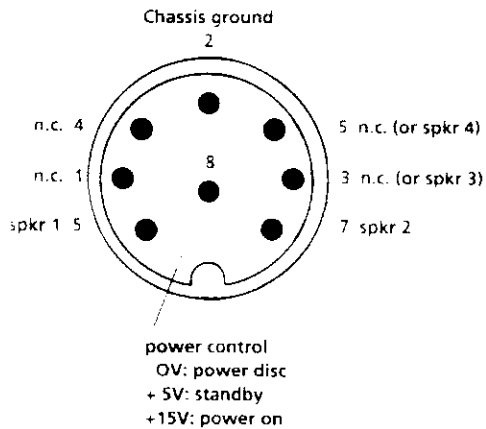
Customer Service Department
Analog and Digital Systems, Inc.
One Progress Way
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Customer Service receives calls between 9AM and 5PM, Eastern time.

Appendix

a/d/s/ speaker remote

connections The a/d/s/ atelier component system uses 8-pin DIN jacks and cables for remote control of power and speaker switching at the amplifiers, powered speakers and subwoofers. The pinout of the receiver's (or audio control center's) speaker remote jack is:



speaker remote 8-pin DIN jack pin locations viewed from the front of the jack

Of the eight pins in this jack/cable system, the SW5 uses only pins 2, 6 and 8—the ground, speaker 1 and power control pins, respectively.

The SW5 audio output is on when pin 6 is pulled low, to ground (active low).

The SW5 power switching responds to the following logic levels at pin 8:

0VDC Cable disconnected or controlling unit unplugged from power outlet

+5VDC Controlling unit connected and in stand-by, power-off state

+15VDC Controlling unit connected and in operating, power-on state

- When the SW5 power switch is off, the SW5 is off, regardless of pin 8.
- When the SW5 power switch is on and pin 8 is at 0VDC, the SW5 is on.
- When the SW5 power switch is on and pin 8 is at +5VDC, the SW5 amplifier is off but all low level circuitry (the crossover, buffers and equalizer) is on.
- When the SW5 power switch is on and pin 8 is at +15VDC, the SW5 is on.

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