

AL4 / AL5 / AL6  
automotive  
loudspeakers  
instruction manual

**a/d/s/**

Analog and Digital Systems  
One Progress Way  
Wilmington, MA 01887  
USA

319-0426

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## introduction

Thank you for purchasing an a/d/s/ AL Series loudspeaker system.

The a/d/s/ AL Series speaker systems consist of two tweeters, two woofers, two crossover networks and all the hardware necessary for a typical installation.

The proprietary copolymer used for the AL Series soft-dome tweeter combines high strength with near perfect internal damping. The dome is bonded to a Kapton® former. The voice coil is wound in a single layer using a conformal coating of adhesive. The value of this technology is evident from the smooth response and low distortion that characterize this driver.

The AL Series tweeter employs a patented quick-connect / disconnect bayonet mounting system. All electrical connections are automatically made and phased through contacts on the circuit board mounted in the bayonet and the attached speaker wire.

A new diaphragm material is used for the AL Series woofers. It, too, is a copolymer, but distinctly different from the material of the dome. The compound curve of the cone helps to minimize radial resonance modes. The long precision-wound voice coil moves in a narrow gap for the control and long excursion necessary to reproduce today's digital sound.

The a/d/s/ AL series speaker systems feature a separate crossover network for each channel to maximize installation flexibility. Each has an LCR network in a rugged housing. The AL series crossovers are computer optimized and use low-D.C. resistance, high-current coils and close tolerance, high-Q capacitors.

The input / output terminals are the positive acting wire clamp type. They allow quick and easy connection with virtually any wire while providing extremely strong connections.

Tweeter level adjustments can be made with a jumper wire on the crossover circuit board.

The AL series crossovers also incorporate a special solid state tweeter protection device. If the system is driven to levels that might cause damage, this device interrupts the signal to the tweeter. It resets automatically when power goes back to safe operating levels.

# installation and connection

## Who should do the installation?

The quality of the installation will affect the system's performance and reliability, not to mention appearance. When you consider that you will be making irreversible modifications to your automobile, you may decide to seek professional installation services. The dealer from whom you purchased your AL series speakers may provide such services, or will be able to recommend a professional installer in your area. A professional installation can reduce the risk of damage to either your car or your audio components. If you do choose to install the audio system yourself, we recommend that you carefully follow the guidelines.

## installation tips and warnings

Study the layout of your automobile thoroughly before you drill or cut any holes. **Take extra care when working near gas tanks, gas lines, brake or hydraulic lines and electrical wiring.**

Keep the woofers and the tweeters away from metal filings and shavings. Once foreign objects are stuck to the magnets or tweeter dome, it will be virtually impossible to remove them. Keep the tweeters in their protective bags until final mounting to prevent metal dust or chips from passing through the grille and accumulating on the dome.

Exercise caution when handling any of the AL series drivers when the grilles are removed. A slip of the hand with a screwdriver or other tool can result in irreparable damage to the cone or dome. Do not touch the cone or dome.

Do not install the component where they will be subject to excessive heat, moisture or dust; or where they will be kicked or repeatedly bumped or brushed.

Make absolutely sure that the woofer is connected to the low-pass output, and the proper outputs of the crossover network. If these connections are reversed, low-frequency signals will be fed to the tweeter. If this happens, the tweeter will likely be damaged. Such damage is not covered by the warranty.

When removing or installing the grille on the AL series speakers be careful not to brush the woofer's rubber surround or the tweeter dome with the edge of the grille. Cutting or tearing the surround or dome will significantly affect performance.

Never run wiring outside or beneath the vehicle where it can be damaged by road hazards or the moving parts of the vehicle. Use existing wire channels, sill, panels, and molding strips inside the automobile to hide the wiring for neat appearance and safety.

Make sure your radio/cassette player and/or other equipment is turned off while connecting the AL series speaker terminals. Turn on the various components and slowly advance the volume control **only** after checking and double checking all connections.

**NOTE:** If sound is weak and distorted, immediately turn down the volume and see the Troubleshooting section of this manual.

# planning the installation

The modular configuration of the AL series systems makes it possible to mount the individual units in locations usually considered impractical or impossible. In choosing mounting locations for these components, keep the following suggestions in mind:

Mount the crossover networks where they are accessible. That will make it easy to connect the speaker wire and adjust the tweeter level jumper wire. If the speakers are far from the power amplifier mount the crossover networks near the speakers. This will reduce the amount of wire you need to run through the car.

Choose driver and crossover mounting sites which allow you to route wiring behind the speakers and beneath the interior surface trim. Routing of the wire from the rear of the tweeter bayonet assembly must be carefully considered. The tweeter can be mounted on virtually any reasonably flat surface in the car.

The sound from the woofer and tweeter of each channel should reach the listener at the same time and from the same direction. It is not necessary to locate the tweeter immediately adjacent to the woofer. But if the two units are too far apart, the sound they produce may lose coherency.

A woofer mounted on the front door, for example, could have its corresponding tweeter mounted on the dashboard near the door. It would be inappropriate, however, to mount the tweeter on the dashboard or front door with the woofer on the rear deck.

The AL series bass / midrange speakers produce maximum undistorted bass output when mounted on a rigid surface and in an enclosure which is acoustically isolated from the passenger compartment. The front doors are often the best locations for the woofers. In some cases you may be able to mount the woofers in the front kick panels if the areas behind the panels are reasonably large. In other cases, it may be possible to use existing openings or "knock-outs" provided by the auto manufacturer for factory options. Thin panels or shelves must be reinforced with fiberboard or sheet metal. Steps should also be taken to eliminate air leaks in and around the mounting surface.

Use the dimensions listed in the Specifications section of this manual and the supplied templates when planning the installation. Be sure you have enough clearance behind the mounting panel. When installing speakers on a rear deck, watch out for trunk lid hinges and springs. If you are mounting speakers in doors, be sure they will not interfere with the window operating mechanism. Check the intended installation location with the window down as well as up.

We recommend that all speaker connections be made with eighteen gauge or heavier wire. (The smaller the gauge number, the heavier the wire).

Label the free ends of all wires before routing so they can be quickly and accurately identified. It is especially important to avoid reversing the woofer and the tweeter connections.

## tweeter installation

The preparation of the mounting surface for the tweeter involves drilling three holes. Two holes are for the mounting screws. Their centers must be spaced  $\frac{3}{4}$ " / 20mm apart. The drill size depends on the mounting method you use. A  $\frac{1}{8}$ " / 3mm drill is recommended if you plan to use the #8 x  $\frac{3}{4}$ " sheet metal screws provided with the hardware kit. A  $\frac{1}{4}$ " / 6mm hole in the center is for the wire attached to the bayonet to pass through.

Use the template provided to locate the hole centers; or if you wish, you can use the tweeter bayonet as a template for marking the drilling centers. Cut carpeting or fabric away from the hole locations to prevent tangling of fibers in the drill bit.

**Note:** The orientation of the three holes determines the installed position of the tweeter. The a/d/s/ nameplate on the tweeter will end up opposite the "notch" in the rim of the bayonet assembly. For example, if you want the nameplate to face up, mount the bayonet with its holes in a horizontal line and the notch facing down. Or if you want the nameplate to face to the right, mount the bayonet with its holes in a vertical line and the notch to the left.

### Bayonet mounting

Insert two #8 x  $\frac{3}{4}$ " sheet metal screws through the holes in the bayonet and align them with the holes in the mounting surface. Pass the end of the wire attached to the bayonet through the center hole of the mounting surface. Take up the slack in the wire and bring the bayonet to the mounting surface. Screw the assembly into place. Be sure the mounting screws are driven in straight, so the heads sit flush on the bayonet surface. This ensures the tweeter will seat properly on the bayonet.

**Note:** Do not remove the tweeter grille until after the tweeter is mounted on the bayonet assembly, and you are ready to insert the locking key.

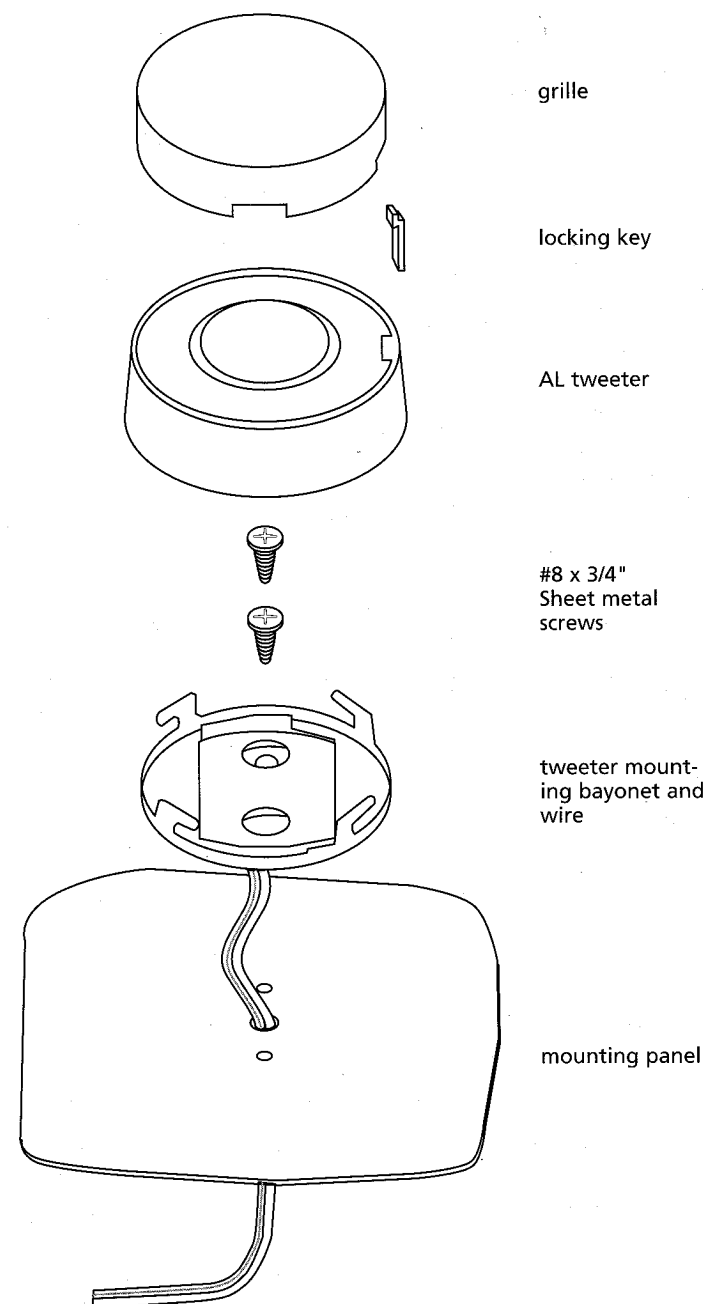
The flush-mount accessories included with your system provides for either fully flush installation or angled flush installation.

### Installation requirements for flush mounting

Check the intended installation site to be sure that there is sufficient depth behind the mounting surface for the rear cup and mounting screws. The minimum depth required behind the back of the mounting surface is  $\frac{3}{4}$ ". If necessary, the 8-32 x  $\frac{3}{4}$ " mounting screws can be cut to length once the details of the mounting are determined.

The front cup mounts into the mounting surface through a  $2\frac{1}{4}$ " diameter hole. Be careful that the hole does not exceed  $2\frac{7}{16}$ " diameter at any point so that the rim of the front cup will completely cover the edge of the hole.

## Tweeter installation



## Fully-Flush Installation

### • Bayonet and cup assembly

Figure 1 shows the orientation of bayonet, the front cup, the washers and the rear cup. Insert the 8-32 x  $\frac{3}{4}$ " pan head screws through the out board holes of the tweeter's bayonet and through the non-dimpled holes of the front cup. Place the front cup and its contents into the mounting hole.

Place enough washers over the protruding screws on the back of the front cup so that their combined thickness is somewhat less than the thickness of the mounting surface. This will insure adequate "pinching" of the mounting surface between the front and rear cups without the danger of deforming the rear cup when the screws are tightened securely.

Pull the signal wire through the center hole of the rear cup and place the rear cup over the front cup, washers and screws. Run the screws into the threaded inserts of the rear cup by hand and then tighten the screws securely.

### • Tweeter installation and removal

Place the tweeter into the front cup and over the bayonet as described below. Tighten the tweeter on the bayonet by turning it clockwise. You may find it convenient to insert a stiff piece of wire, such as the end of a large paper clip, into the locking key hole of the tweeter as an aid to turning the tweeter to the locked position.

## Angled-flush installation

### • Bayonet, bracket and spring assembly

Figure 2 shows the orientation of the tweeter's bayonet, the angle bracket and the spring. Thread the bayonet's wire through the center hole in the angle bracket. Be sure that the protruding retaining clips of the angle bracket point away from the bayonet.

Insert two M4 x 4.8mm screws through the out-board holes in the circuit board side of the bayonet so that the screw heads nest in the holes of the circuit board. Place the angle bracket over the protruding screws against the rear of the bayonet. Orient the bracket so that its large retaining clip is on the same side of the line of the screw holes as is the a/d/s/ logo on the circuit board in the bayonet.

figure 1

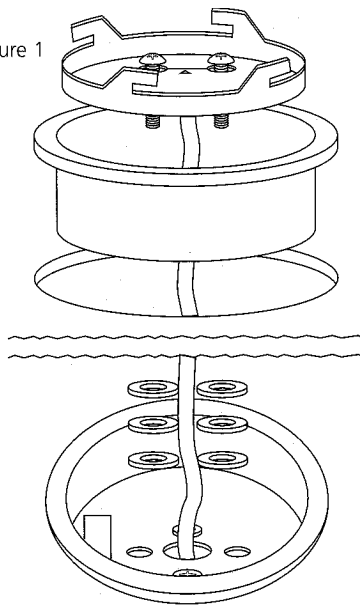
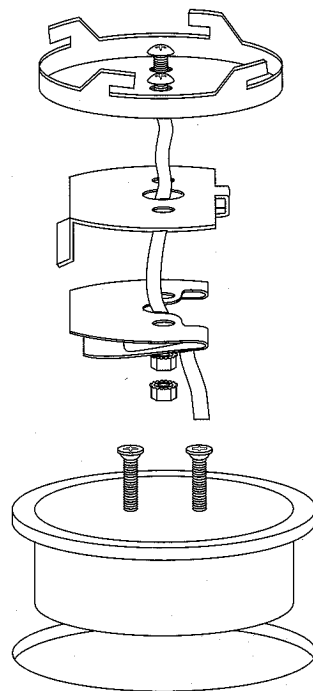


figure 2



Place the face of the spring with holes in it over the screws so that the "V" of the spring opens toward the angle bracket's large retaining clip. Run two M4 nuts on the screws and tighten them securely.

Install the tweeter on the bayonet as described. The a/d/s/ logo on the side of the tweeter should be in front of the large retaining clip. It is not re-assemble the bracket and spring on the bayonet after rotating them one half turn.

We suggest that you try fitting the tweeter/spring assembly into the front cup several times before the cup is installed in the mounting surface so that you can get the feel of the procedure. Follow the instructions for installation in Tweeter assembly installation and removal, following

### • Front and rear up assembly

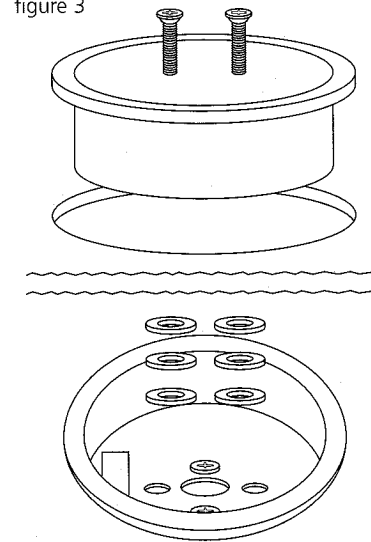
Figure 3 shows the orientation of the front cup, the washers and the rear cup. Insert the 8-32 x  $\frac{3}{4}$ " flat head screws through the dimpled holes of the front cup. Place the front cup into the mounting hole.

Place enough washers over the protruding screws on the back of the front cup so that their combined thickness is somewhat less than the thickness of the mounting surface. This will insure low pinching of the mounting surface between the front and rear cups without the danger of deforming the rear cup when the screws are tightened securely.

Place the rear cup over the front cup, washers and screws. Run the screws into the threaded inserts of the rear cup by hand and then tighten the screws securely. When installed, the tweeter will angle away from the rectangular slot in the front cup. Turn the cup assembly to point the tweeter the way that you want before tightening the screws.

Tweeter assembly installation and removal. Thread the bayonet's connecting wire through the center holes of the installed mounting cups. Place the tweeter assembly into the front cup so that the angle bracket's large retaining clip enters the cup's rectangular slot. Figure 4 shows the correct orientation. Be sure that the wire feeds completely into the hole and that no wire is caught between the bayonet assembly and the cup.

figure 3



Push the tweeter straight in against the spring. Tilt the side of the tweeter opposite its a/d/s/ logo into the cup so that the angle brackets small retaining clip enters the small hole in the cup. Release the tweeter; the springs tension will lock it in place.

Remove the tweeter by pushing the protruding, logo side of the tweeter into the cup until the small retaining clip pops out of its hole. Pull the tweeter straight out of the cup.

### Blind installation

In a blind installation, the rear of the mounting surface is inaccessible. Give some thought to the electrical connections. You may be able to fish the bayonet signal wire to the crossover network location after installation of the tweeter assembly. You may need to fish a signal wire from the crossover network location to, and then through, the mounting hole and the rear cup before the cup is inserted through the mounting hole. You can then connect the signal wire to the bayonet wire. Make sure the connection is physically small enough to pass back through the hole in the rear cup.

Once you have decided the signal wire connections, pass the rear cup through the mounting hole, using Figure 5 as a guide. Figure 5 also shows how to attach a line to the rear cup to hold it in position while the washers and front cup are installed. Proceed as described in Fully-flush installation, or Angled flush installation, preceding.

### Tweeter mounting

Note that once the bayonet is attached to the mounting surface, there is only one position in which the tweeter can be properly seated on the bayonet.

To attach the tweeter to the bayonet, align the a/d/s/ nameplate slightly counter-clockwise from the a/d/s/ logo on the circuit board. Gently push the tweeter onto the bayonet and twist clockwise until it moves no further. Do not force the unit if it does not turn freely. If the tweeter is set over the bayonet lugs incorrectly, the tweeter body will not fully seat on the bayonet and it will not turn.

To remove the tweeter, simply turn it counter-clockwise, and pull the tweeter away from the bayonet.

### Securing the tweeter

It is easy to lock the tweeter onto the bayonet, so that it cannot be removed simply by untwisting. This also prevents the tweeter from unseating from the bayonet because of normal automotive vibration and shock.

figure 4

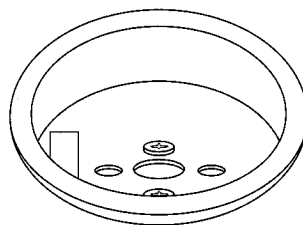
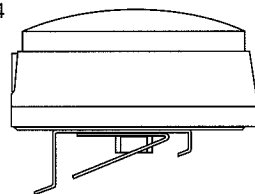
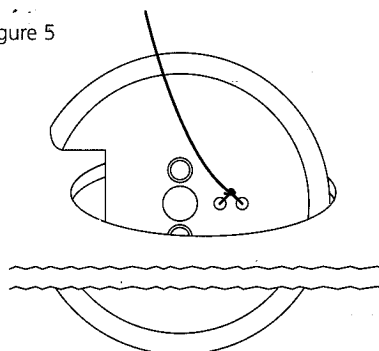


figure 5



### Securing the tweeter – continued

Once the tweeter has been attached to the bayonet, remove its protective grille by pulling directly out. If you cannot remove the grille with your fingertips, carefully use the tip of a ballpoint pen or other blunt stylus to pull it loose. Be careful not to separate the grille material, especially at the edge.

Insert the tweeter locking key into the slot in the rim of the tweeter housing. The slot is opposite the a/d/s/ nameplate. Press the locking key into the slot, with the groove in the key facing outward, until the top of the key is flush with the tweeter housing.

Replace the grille by pressing it onto the tweeter. DO NOT touch the dome.

To unlock the tweeter from the bayonet, remove the grille and pull out the locking key.

### Optional recessed mounting of the tweeter

The AL series tweeters can easily be recess mounted or angle mounted with the Recess Mount Kit (AK3). It can be ordered through your a/d/s/ dealer.

## woofer installation

Remove the trim panels and inspect the installation locations before you cut and drill the holes required to mount the woofer. Removing the panel will also make it much easier to route wiring inside the door. Look for original equipment speaker installation cutouts that can often be used to install the AL series woofers with little or no modifications. Use the template supplied to help you locate and mark the holes needed to install the speakers.

If the planned installation location is in a door panel be sure the speaker will not interfere with the window lowering mechanism. Be sure that the speaker wires clear all moving parts inside the door.

For each woofer you will need to cut one large hole and drill four small holes around the circumference. If the mounting surface is covered by carpet or fabric, use a knife or razor to cut the material away from the holes and cutting path. This prevents material or fibers from becoming tangled in the drill bit or cutting blade.

If you are using the sheet metal screws provided in the hardware kit, drill the four speaker mounting screw holes with a 1/8" / 3mm drill.

Clean the work areas of all filings and shavings with a vacuum cleaner before you proceed with woofer mounting.

## Woofer mounting

Remove the metal mesh grilles from the grille rings by pushing them out from the back. The grille is simply press-fit into place.

Route the supplied wire from the woofer installation locations to the crossovers. Pull the wire through the installation hole and attach the terminals on the ends to the terminals on the speakers. Connect the striped wire to the positive (+) terminal, which is marked with a red dot. See the information in the Phasing section of this manual and the wiring diagrams. Push the wire back into the area behind the installation location and be sure it will not interfere with the speaker.

When installing the speakers drive the four supplied #8 x 1 1/4" sheet metal screws by gradually tightening them in turn. Drive the screws in until the speaker is well seated, but take care to not over-tighten the screws.

Each of the three AL series woofers is installed in a slightly different way. See the following information and installation drawings.

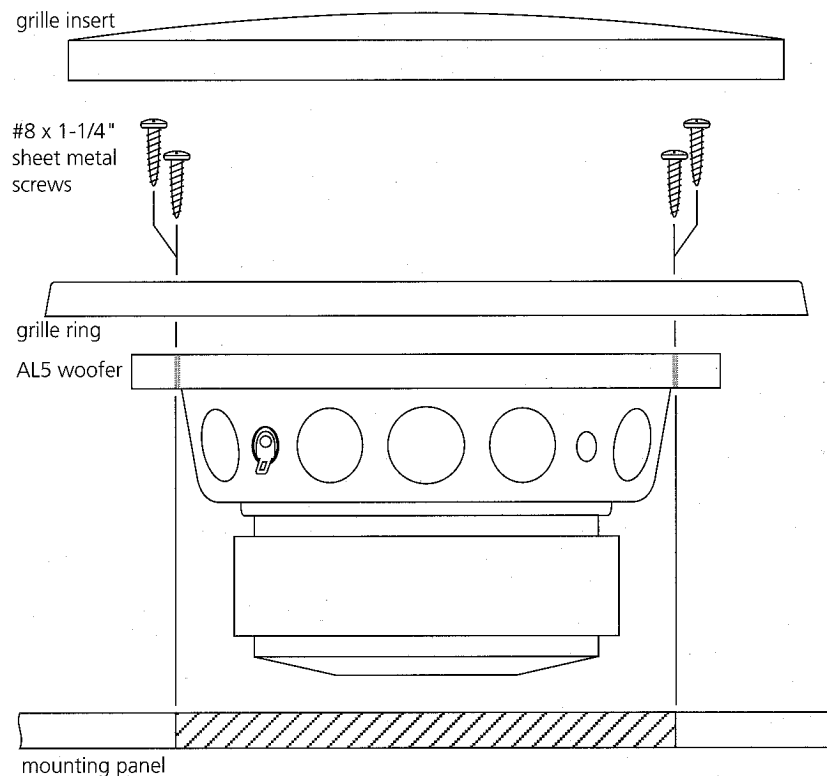
**AL4 woofer** Place the AL4 woofer in the installation hole and align the mounting screw holes with the hole in the panel. Place the grille ring over the speaker flange and align its mounting screw holes. Drive in the four speaker mounting screws. Push the perforated metal grille insert back into the grille ring.

**AL5 woofer** The AL5 woofer has a special grille ring that allows it to be mounted in three common original equipment speaker mounting cutouts. The back of the grille ring has a channel that accepts the front flange of the woofer. The mounting screw holes used most often are the ones in the flange of the speaker. When these holes are used the mounting screws go through the grille ring and the flange of the speaker and into the mounting panel. If the alternative four screw mounting hole set, or three mounting screw hole set is used, the flange of the speaker is clamped between the grille ring and the mounting panel by the mounting screws. The screws do not go through the flange of the speaker. When the speaker is securely mounted push the perforated metal grille insert back into the grille ring.

**AL6 Woofer** The AL6 woofer is placed in the grille ring from the front. Place the speaker and grille ring in the installation hole. Align the mounting screw holes and drive in the four mounting screws. Push the perforated metal grille insert back into the grille ring.

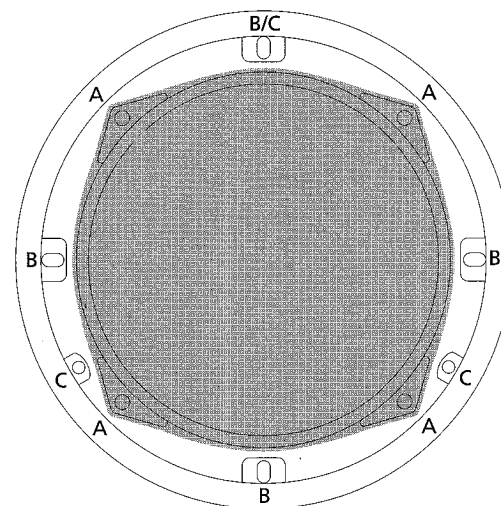
## AL4 and AL5 woofer installation

Note: The AL5 woofer mounting is illustrated. The AL4 woofer mounts the same way.

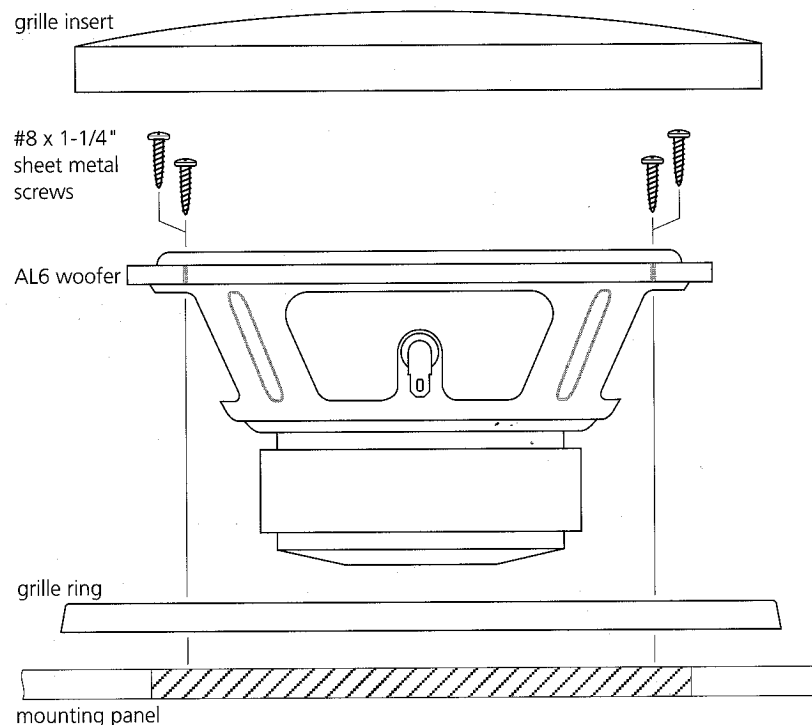


## AL5 installation options

This is the back of the AL5 grille ring. The gray area shows the part of the ring covered by the speaker frame. The screw holes marked "A" are the most commonly used. The four screw holes labeled "B" and the three screw holes labeled "C" are other common OEM hole patterns. Note that one hole is used for both the "B" and "C" hole sets.



## AL6 woofer installation



## crossover installation

Carefully route the wires from the AL tweeter and woofer to the crossover mounting location. The crossover installation location should be reasonably accessible to allow easy connection of the wires and tweeter level adjustment. If the crossover must be mounted in an inaccessible location make the speaker wire connections and the tweeter level adjustments before the final installation. Be sure the installation location has adequate clearance to allow the removal and replacement of the cover.

Mounting the crossover requires removing the top cover of its housing. Grasp the top cover at the front and back. Compress the cover slightly and lift it off the bottom of the housing.

Mounting the AL system crossover network requires two holes  $1\frac{9}{16}$ " / 40mm apart in a flat or nearly-flat surface. Set the crossover in the installation location and use it as a template to mark the mounting screw hole locations. If you are using the #8 x  $1\frac{1}{4}$ " screws provided, drill the pilot holes with a  $\frac{1}{8}$ " / 3mm bit.

Align the mounting holes in the bottom half of the crossover unit with the holes you have drilled at the installation site. Pass the two #8 x  $1\frac{1}{4}$ " metal screws through the holes in the crossover unit, and tighten them until the assembly is firmly in place. As before, do not over-tighten; this is especially important if the mounting surface is not perfectly flat.

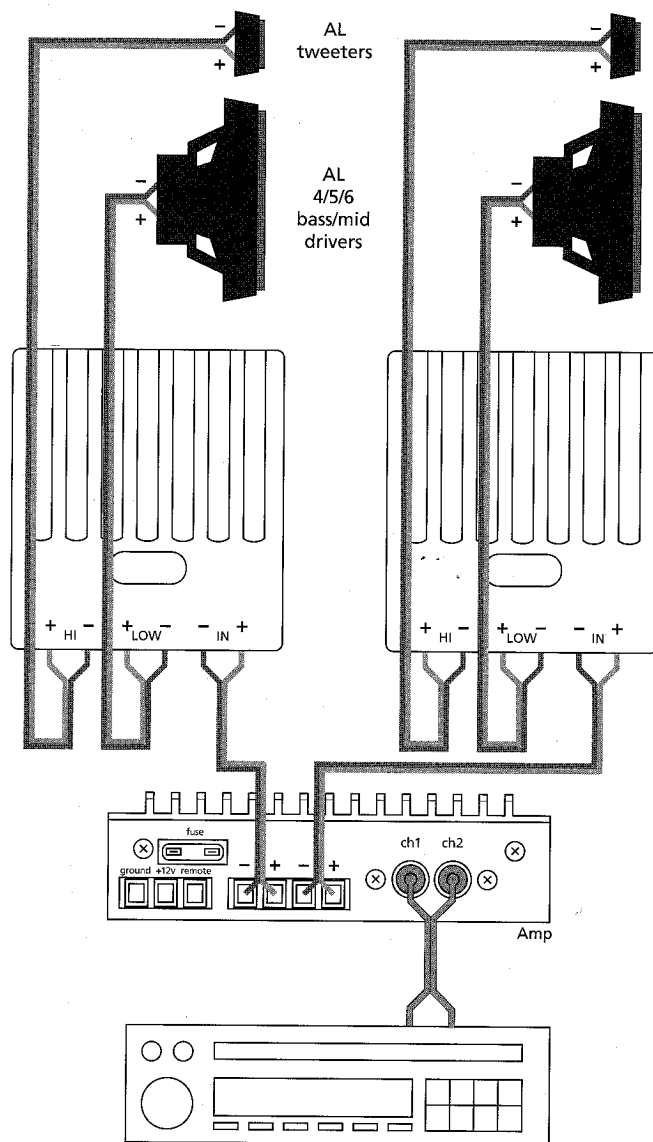
After all the connections, and any tweeter level adjustments necessary, have been made snap the top cover back in place.

**Note:** Regarding bi-amplification – At some point you may wish to replace the passive crossovers included in the AL speakers with an active electronic crossover. Because of the complex and precise contours of the crossover network included with your a/d/s/ loudspeaker, this bi-amplification should be done **only** with an a/d/s/ electronic crossovers. Use of other crossover networks for bi-amplification will compromise the performance and/or reliability of your a/d/s/ loudspeakers. Information on the proper laboratory optimized programming modules for the above crossovers is available from your authorized a/d/s/ dealer.

## phasing

It is essential to maintain consistent phasing (polarity) for all amplifier-to-crossover and crossover-to-speaker connections. The wire attached to the tweeter mounting bayonet, and the wire supplied for the crossover-to-woofer connection, has a stripe or ridges on the insulation of one of the conductors. The wire you use for the amplifier-to-crossover connection may have similar markings, or ridges molded into the insulation, or have clear insulation with different colored wire conductor. In this manual we will follow the convention of using the striped or ribbed conductor for all the positive connections. The important thing is to be consistent in the way you make every speaker, crossover and amplifier connection.





## connecting the system

Trim the speaker wire as needed. Strip about no more than 1/4" (6mm) of the insulation from the ends. Twist the exposed strands thoroughly to prevent any loose strands from causing a short circuit. If possible "tin" wire with a soldering iron. Unscrew the wire clamp it in place. Note the polarity markings on the crossover circuit board. Connect the ribbed or color-striped wires into the positive (+) terminals, and the plain wire into the minus (-) terminals.

### Connections to crossover network and radio or amplifier

Route the wires connected to the input terminals on the front of the crossover network to the power amplifier (or, if you are not using a separate power amplifier, the in-dash radio/tape or CD player). Connect the wires to the amplifier outputs as recommended by the manufacturer of the unit. Make sure there are no stray strands of wire which could cause a short circuit. Observe left / right and polarity markings.

## adjustments

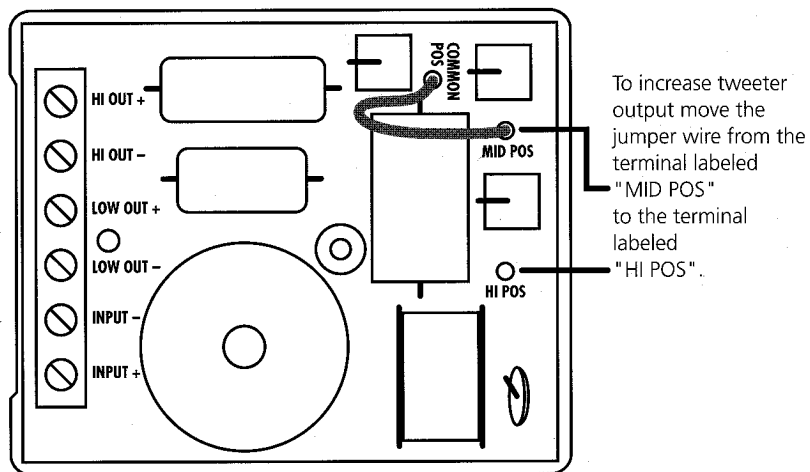
When you have finished the physical installation and electrical connections, you may test the system. Turn on your radio/tape or CD player, but leave the volume control very low. Tune in a station or play a CD or tape, and check the individual drive units to make sure they are all operating. If you hear poor sound, distortion, or no sound, immediately turn off the system and see *Troubleshooting*. Operate the balance and fader controls to make sure all connections have been properly made. When you are satisfied with the basic installation, proceed with the final adjustments.

### High frequency level

Differing installations require different amounts of high frequency output. If the AL series tweeters are mounted relatively close to the listener, you may wish to reduce their output. If they are mounted farther away from the listener, or if the interior of the car is extremely absorptive, you may want increased high-frequency output. The AL series crossovers have a jumper wire that lets you adjust the high frequency output.

Listen carefully to some wide range, high-quality program material, paying particular attention to the bass/treble balance. Turn the system down and move the tweeter level jumper wires in the crossovers to one of the other terminals to raise or lower the output of the tweeter. Listen to the same selection and decide if the treble/bass balance of the system is more natural or not. Repeat the process if further adjustment is needed.

This illustration shows the crossover with the tweeter level jumper in the factory standard "mid" position.



To reduce the tweeter output, remove the jumper wire completely. Keep it in a safe place for possible future use.

**Note:** Each AL series speaker has a specially designed crossover. The crossover for you speaker may have slightly different components. The position of the tweeter level jumper connector is the same on all models.

## troubleshooting

The following is a brief guide to some typical problems, their probable causes, and recommended remedies. Should you encounter difficulties beyond the scope of this troubleshooting guide, consult your a/d/s/ dealer or your car stereo installer. There are no user-serviceable parts in the AL series systems. Do not attempt your own repairs. Any repairs to the system must be made by a/d/s/ or an authorized a/d/s/ service facility.

### No sound, low or distorted sound

Check all 12-volt power connections to your radio/tape or CD player and power amplifier. Check all power fuses related to the sound system.

Check all audio connections between the head unit and amplifier, between the amplifier and the crossover, and between the crossovers and the speakers. If only one channel is out, try interchanging cables between channels to try to isolate the problem. If the sound is distorted or faint, the problem may be a bad connection or faulty ground. With the volume turned down, wiggle all wire connections to try to find an intermittent connection. Replace any faulty wiring and reconnect loose wires.

If none of these steps solves the problem, one or more of your car stereo components may be defective. Have the system checked by qualified personnel.

### Poor tonal balance

If the sound on the initial test is thin and weak, immediately turn down the volume and check the woofer and tweeter connections to the crossovers to be sure they are correct. Try adjusting the high-frequency level jumper wires again.

Make sure you are getting a high-quality signal from your radio/tape or CD player. Check all the tone controls, equalizer settings, tape or CD selector, and noise reduction settings. Occasionally, a car tape player may not have the proper head alignment to play tapes or commercial pre-recorded tapes you've recorded at home. This results in poor high-frequency response. If you suspect your tape or CD player, have a car stereo installer test the unit.

Poor tonal balance may result if one or more of the drive units is not operating. While playing a high-quality music program (or FM inter-station noise) at low level, put your ear right up to each drive unit in turn and listen for output.

Finally, if you suspect a damaged driver, consult your a/d/s/ dealer or installer for assistance.

If you want to consult the factory, write or call our customer service department:

Customer Service Department  
Analog and Digital Systems, Inc.  
One Progress Way  
Wilmington, MA 01887  
617.729.1140

## driver dimensions

	Minimum Cut Out Size	Maximum Grille Diameter	Maximum Height Above Panel	Minimum Depth Behind Panel
AL4 bass/mid	3 <sup>3</sup> / <sub>4</sub> " (96mm)	5 <sup>3</sup> / <sub>16</sub> " (132mm)	1 <sup>1</sup> / <sub>16</sub> " (18mm)	1 <sup>5</sup> / <sub>8</sub> " (42mm)
AL5 bass/mid	4 <sup>1</sup> / <sub>2</sub> " (115mm)	6 <sup>5</sup> / <sub>8</sub> " (169mm)	1 <sup>3</sup> / <sub>16</sub> " (21mm)	2 <sup>5</sup> / <sub>8</sub> " (67mm)
AL6 bass/mid	5 <sup>1</sup> / <sub>8</sub> " (131mm)	7 <sup>1</sup> / <sub>2</sub> " (191mm)	1 <sup>1</sup> / <sub>16</sub> " (27mm)	3" (77mm)
AL tweeter - standard mount	N/A	2 <sup>1</sup> / <sub>8</sub> " (54mm)	1 <sup>1</sup> / <sub>8</sub> " (29mm)	*see note
- with flush mounting accessory	2 <sup>1</sup> / <sub>4</sub> " (58mm)	2 <sup>5</sup> / <sub>8</sub> " (67mm)	7 <sup>1</sup> / <sub>16</sub> " (12mm)	7 <sup>7</sup> / <sub>8</sub> " (23mm)

**\*Note:** The standard mounting of the AL tweeter requires only enough clearance behind the mounting panel for the penetration of the bayonet mounting screws and room for the wire that extends from the back of the bayonet mount.

# specifications

## Frequency response

AL4	85Hz to 21kHz, $\pm 3$ dB
AL5	50Hz to 21kHz, $\pm 3$ dB
AL6	45Hz to 21kHz, $\pm 3$ dB

## Sensitivity

AL4	86dB with 2.83 volt RMS pink noise measured at 1 meter
AL5	90dB with 2.83 volt RMS pink noise measured at 1 meter
AL6	90.5dB with 2.83 volt RMS pink noise measured at 1 meter

## Impedance

4 Ohms, nominal

## Recommended amplifier power

AL4	15 to 80 watts RMS
AL5	15 to 100 watts RMS
AL6	15 to 150 watts RMS

## Tweeter

1" (25mm) diameter copolymer dome, with a single layer, high-temperature coil on a Kapton® form, and a precision-ground neodymium magnet structure.

## AL4 Woofer

4" (104mm) copolymer cone with a butyl-rubber surround, a non-magnetic basket, and a 1" high temperature Kapton® voice coil form.

## AL5 Woofer

5 1/4" (131mm) copolymer cone with a butyl-rubber surround and a 1" high temperature Kapton® voice coil form.

## AL6 Woofer

6 1/2" (170mm) copolymer cone with a butyl-rubber surround and a 1" high temperature Kapton® voice coil form.

## Crossover

Symmetrical, second order computer optimized all pass design in a separate enclosure. Three position tweeter level adjustment.

## Crossover frequency

2500Hz

## Warranty Information

There are two things you must do to ensure trouble free service in the event you need warranty repairs.

- 1 - Keep your original sales receipt in a safe place. A copy of the receipt will be required to obtain warranty service.
- 2 - Be sure your retail dealer has written the date, the model number, and the serial number of the product on the receipt.

To give yourself an extra measure of protection, make a separate record of the information about your purchase and keep it in a safe place. In the event you misplace the sales receipt, your dealer may be able to give you a copy.

Take a moment now to read the terms of your warranty. Check to be sure your sales receipt is dated and has the product model number on it. Then put it away in a safe place.

### When shipping a product in for service:

- Enclose a copy of your original sales receipt that has the date, the product model number and serial number (if applicable) written on it.
- Always ship products in the complete original packing material.
- Avoid shipping products via the Postal service. If you must use the Postal service, be sure to register and insure the package.

### a/d/s/ Limited Warranty

Analog and Digital Systems, Inc. (a/d/s/) warrants to the original consumer purchaser of the a/d/s/ products described in this manual, that the product will be free from defects in materials and workmanship for a period of one (1) year after the date of purchase. If the product is installed by an authorized a/d/s/ retail dealer, the warranty is extended to (3) three years, a/d/s/ sole obligation under this warranty shall be to provide, without charge, parts and labor necessary to remedy the defects, if any, that appear during the warranty period.

This warranty is the sole and exclusive express warranty given with respect to the product. All other express warranties are hereby excluded. Neither a/d/s/ nor the authorized dealer who sells the product is responsible for indirect, incidental, or consequential damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

**IMPORTANT** - Keep your original sales receipt. Be sure the retail dealer has written on it the date, model number, and serial number (if applicable) of the product. This information is required for warranty service.

### This warranty is limited to:

- Products purchased from authorized a/d/s/ retail dealers in the United States. a/d/s/ will supply a list of authorized dealers on request.

### In order to obtain warranty service you must:

- Return the product, freight prepaid, to the a/d/s/ dealer from which it was purchased, an authorized a/d/s/ independent service agency, or to a/d/s/. If necessary you may call a/d/s/ Customer Service for the names and addresses of authorized independent service agencies in your area.
- Provide proof of purchase in the form of a copy of your original sales receipt. The date, model number, and serial number (if applicable) of the product must be written on the sales receipt.

### This warranty does not cover:

- Damage that is a result of misuse, abuse, accident (including but not limited to damage by water), faulty hookup, defective or maladjusted associated equipment, or the use of the product with equipment for which it was not intended.
  - Cosmetic defects that appear more than thirty (30) days after the date of purchase. Cosmetic damage caused by improper handling is also excluded.
  - Products that are used for commercial purposes.
  - The cost of removing or reinstalling the product.
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- Damage that occurs while the product is being shipped to whoever will service it. See the information above regarding shipping procedures.

### This warranty is void if:

- The product identification or serial number label is removed or defaced in any way.
- The product is serviced or repaired by any one other than a/d/s/ or an authorized a/d/s/ dealer or service agency.

**a/d/s/**

Sound. As it should be.