



PowerAcoustik
U.S.A.

INTRODUCTION MANUAL

DIAGNOSTIC SERIES AMPS

**MOSFET 4-CHANNEL POWER AMPLIFIER
WITH ELECTRONIC CROSSOVER AND
VARIABLE SUB CONTROL**

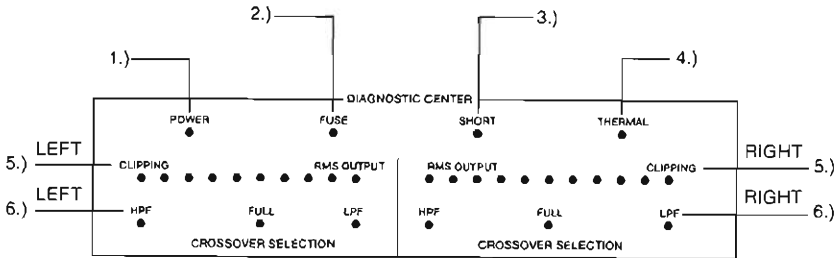
4DS•400 400 WATTS

4DS•600 600 WATTS

INTRODUCTION

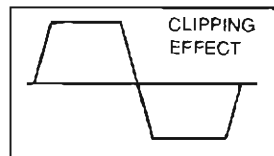
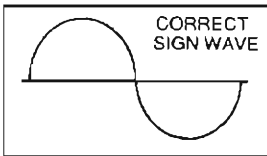
The new diagnostic series amplifiers are designed to give you years of hifidelity sound reproduction, as well as total flexibility in stealth mounting applications. You are obviously an enthusiast, or you wouldn't have purchased, one of our new competition series products. The following diagrams and explanations should help set up this unique new concept.

Diagram "A" Diagnostic panel



- 1) Power on indicator (L.E.D. on when amp is in use).
- 2) Fuse status indicator (Lights only when one or more fuses are blown.)
- 3) Short indicator (Lights only when a short circuit has occured either in a speaker wire or a speaker is blown).
- 4) Thermal indicator (Lights only when amp shuts down due to temperature exceeding 160 degree fahrenheit.) The unit is Designed to turn back on after safer levels have been achieved.
- 5) R.M.S. output indicator (This ten step graduated meter will indicate power supply status in increments of 10% per L.E.D. up to full saturation levels when clipping will occur. At this point you have exceeded the full dynamic headroom of the supply. See diagram "B" below). These four channel amps have twin indicators for front and rear channels.
- 6) Crossover selection (You may choose from one of three selections: Hi pass/full range/ Low pass with variable sub boost). The indicator light will indicate which selection you have chosen. Only that selection will light for front and rear channel status.

Diagram B



If you are incorporating more than one amplifier. Please consider adding a P.W.M. preamp E.Q. to boost head unit signals, so you can obtain maximum power, with minimum power supply strain. You will find that you can reduce your gains to about 50% and achieve the same output wattage to your speakers which will leave lots of dynamic headroom for strong bass transients. A P.W.M. E.Q. will deliver four times the voltage to your amps and reduce the possibility of engine due to ground loop problems associated with inexpensive equalizers.

OPERATING CONTROLS AND FEATURES

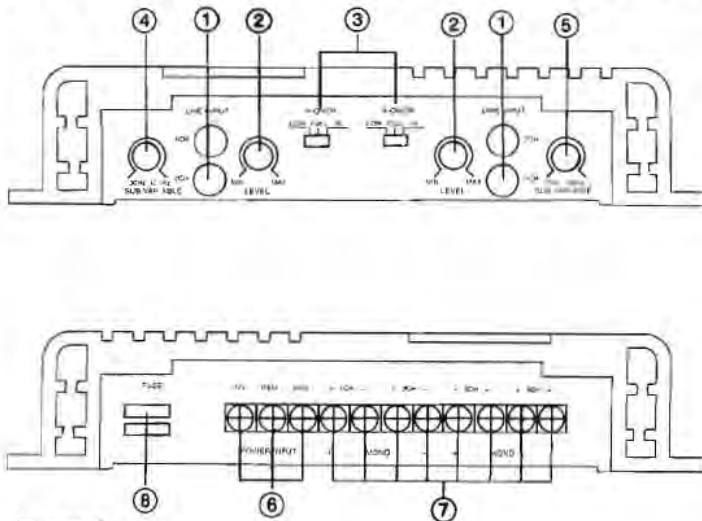


Figure 1

1. LINE INPUTS. Low level input is provided by jacks.
2. INPUT LEVEL control. It matches the sensitivity of the amplifier input to the output level of the head unit.
3. CROSSOVER SWITCH. When switch is in LOW position, amp output is low pass, for subwoofers. When in FULL position, output is full range. When in HIGH position, output is high pass, and frequency is fixed at 120 Hz.
4. CROSSOVER CONTROL. Adjusts crossover frequency of LOW PASS (SUBWOOFER) output only, from 30Hz to 120KHz, for 1CH & 2CH.
5. CROSSOVER CONTROL Adjusts crossover frequency of LOW PASS (SUBWOOFER) output only, from 30Hz to 120Hz, for 3CH & 4CH
6. The Power Input and Control Terminals. See Figure 3 - Wiring Details.
7. The Speaker Output Terminals. See Speaker Connections section.
8. Primary Fuse. Provides protection against abnormally high current due to overloaded Speaker Output Terminals or internal fault. The fuse rating is 25 or 40 amp depending on the model.

INSTALLATION

The units are normally mounted in the trunk of a vehicle and directly drives the rear speakers. See Figure 2. Select a flat surface and locate the chassis so the controls and connection points are accessible. Use the amplifier chassis as a template to mark the four mounting hole locations - then set it aside. A 1/8" drill size is recommended but take care in drilling these holes to avoid damage to the fuel tank or hydraulic lines which may be hiding just below the chosen mounting surface. If you cannot be certain, then consult with a local car dealer familiar with your model.

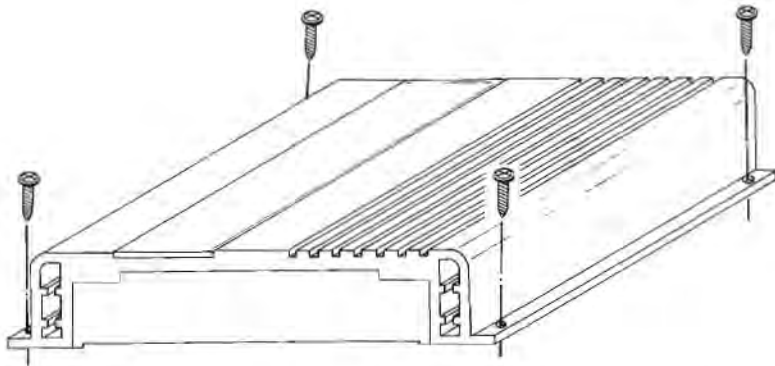


Figure 2 - MECHANICAL INSTALLATION

The black sheetmetal screws provided are intended to pass thru the clearance holes in the upper heat radiator and engage with the lower section. Four black rubber washers with adhesive backing are also provided. Fix them to the amplifier bottom surface centered on each hole prior to mounting. They help to compensate for an uneven mounting surface and improve airflow under the unit.

WIRING DETAILS (See Figure 3)

- **Power Ground (GND).** This Terminal is connected directly to the vehicle chassis using a heavy duty stranded wire of 10 GAUGE size or larger (lower gauge number). The standard color would be Black. Trim this Black wire so the length is just enough to reach a nearby chassis bolt head. Sand away any paint for a solid electrical connection.
- **Main Power (+ 12V).** This Terminal is connected directly to the (+) terminal post of the vehicle battery. Again, it should be heavy duty 10 GAUGE stranded wire but with an inline fuse holder capable of accepting a 50 AMP fast blow fuse. This fuse should be located as close to the battery post as possible.

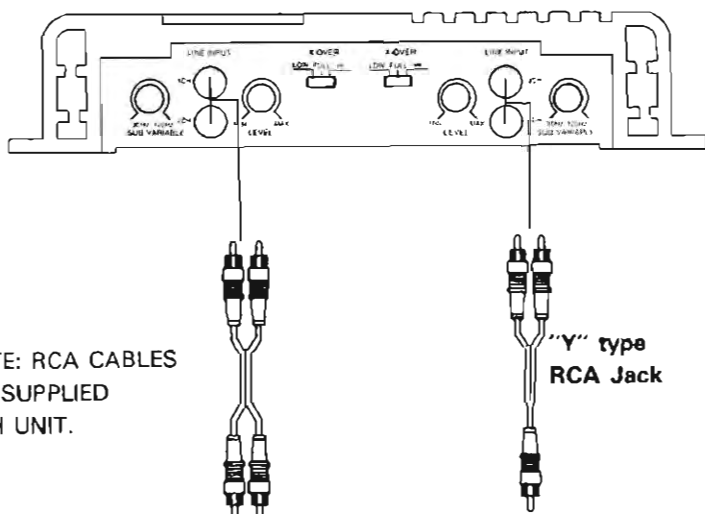
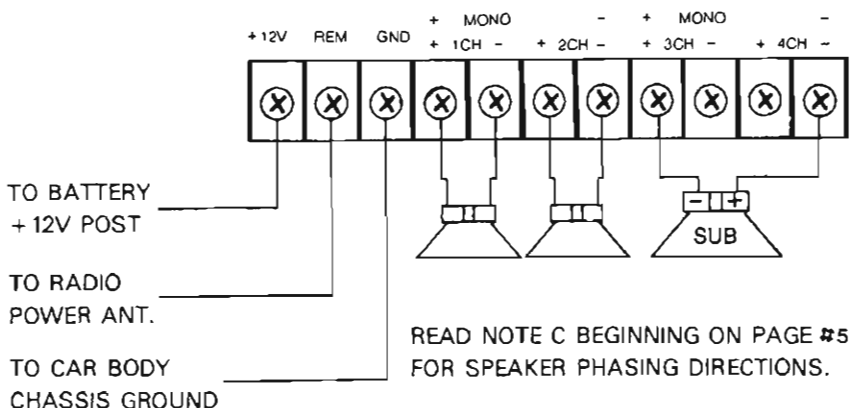
This heavy wire (Red is the standard color) has a long journey from the engine compartment to the trunk and there is always some risk that it may become shorted to the chassis somewhere along its length. By locating the fuse at the battery side of the wire, you insure that it will blow if a cable short occurs at any point. The fuses included in the amp chassis do not protect against cable shorts.

The task of hiding a heavy gauge wire under your carpeting may prove difficult in some cases. If uncertain how to proceed, seek the assistance of a professional Autosound installer. Also, use cable clamps as required to keep this wire away from moving engine parts or hot surfaces. Do not insert this inline fuse until all connections are completed and inspected.

- **REMOTE (REM).** The units are turned on by applying +12 volts to this Terminal. This terminal does not draw heavy current like the two Power Terminals so a thinner connecting wire is acceptable. Stranded 18 GAUGE is fine and the standard color is Yellow. If the radio is equipped with a Power Antenna control wire, it can drive this terminal. If the Power Antenna wire is already in use, you can still splice into it. With this method, the unit will turn on automatically with the radio.

If there is no Power Antenna wire, then connect REMOTE to a + 12 volt source that is switched Off when the vehicle Ignition is off. This will assure that the amplifier does not drain the battery when the engine is not running. Connection can be made at the vehicle fuse block using the IG or ACC terminals. Do not use the cigarette lighter circuit because this is normally On at all times.

- Signal Input Connections. Left and Right Line Level Input Signals are applied to the Line In Phono Jacks (See Figure 1, item 1). These are normally taken from the Line Out jacks of the indash radio or intermediate signal processor such as a passive equalizer. Extension cables with phono plugs on both ends are required. These can be purchased in a variety of lengths at any audio shop at nominal cost.



RCA LOW LEVEL INPUT LEADS*

(to radio/source unit
low level outputs)

Figure 3. WIRING DETAILS

- **Speaker Connections.** The details depend on which of the three Output Modes you will use and also whether or not you are using the internal Crossover System.

Figure 3 shows the proper speaker and input connections for the 3 channel mode which means two stereo channels at normal power and one mono channel at higher power. In this illustration, Channels 1 and 2 (1 CH & 2 CH) are operating in the stereo configuration while Channels 3 and 4 have been bridged to form a single, mono, high power output.

- A. Note that the two speakers (Left and Right) have been connected to the 1 CH and 2 CH output terminals and the single speaker has been "bridged" across the 3 CH and 4 CH outputs following the upper "MONO" graphic.
- B. Also note on the input side that 1 CH and 2 CH are being driven with two independent Left and Right Signals while 3 CH and 4 CH are being driven with the same mono signal. For Low Level, you will need an RCA Phono "Y" adapter as shown to drive 3CH and 4CH with a common signal.
- C. The terminals on the speakers should be marked as (+) and (-) or a color dot to indicate (+). The amplifier output terminals are also marked (+) and (-). The normal connection polarity is (+) to (+) and (-) to (-) as shown in the figure. This assures that the cones of all the speakers are moving in and out together so all sound fields will reinforce rather than cancel.

The exception to this rule occurs when you use the Low Pass and High Pass Filter sections (Items 4 in Fig 1) to form a true Crossover system. This is the most common configuration so it is important that you become aware of it.

Low and High Pass Filters introduce considerable phase shift at the cutoff frequency and they are in opposite directions. If these signals are allowed to drive the speakers directly, there will be serious cancellation near the fixed crossover frequency of 100 Hz.

The solution is to reverse the speaker connections for either the speakers using the 1 CH/2 CH group or the speakers using the 3 CH/4 CH group but not for both groups.

In the example shown in Figure 3, the 1 CH/2 CH group is operating in the stereo, high pass mode because:

- The 1 CH/2 CH Inputs are being driven with two different signals.
- The Crossover Selector Switch for the 1 CH/2 CH group is set to HI.
- Left and Right Speakers are each connected to the 1 CH or 2 CH outputs.

The 3 CH/4 CH group is operating in the bridged mono, low pass mode because:

- The 3 CH/4 CH Inputs are being driven with the same signal.
- The Crossover Switch for the 3 CH/4 CH group is set to LOW.
- A single Subwoofer is connected to the 3 CH/4 CH Outputs following the upper MONO graphics but the polarity has been reversed as (+) to (-) and (-) to (+).

This reversal causes the Sub, Left and Right Speakers to work together near the 100 Hz region where both groups are producing equal output.

D. The Four Channel mode is arranged by configuring 3 CH/4 CH the same as 1 CH/2 CH in Figure 3.

The Two Channel Mode is arranged by configuring 1 CH/2 CH the same as 3 CH/4 CH in Figure 3.

If you use Low Pass for one group and High Pass for the other, then reverse the speaker polarity connections for one group. Otherwise, make all connections as (+) to (+) and (-) to (-).

**DO NOT CONNECT ANY SPEAKER OUTPUT TERMINAL
TO VEHICLE GROUND OR BATTERY (+)!**

FINAL STEPS (See Figure 1)

- With the Ignition still OFF and before inserting the inline fuse in the heavy +12 volt cable near the battery, carefully inspect all connections.
- Locate the two Input Sensitivity Controls (Items 3 - LEVEL) and preset them to 50% rotation.
- Complete the +12 volt connection by inserting the inline fuse in the holder that you provided. A small spark would be normal as the amplifier filter capacitors charge up. If the fuse blows, then there is a major fault! Check if fuse on the amplifier end panel are also blown. If yes, the fault is in the amplifier. If not, the heavy 12V cable is shorted to the vehicle somewhere.
- If OK so far, turn the Ignition Switch to the Accessory position and turn on your Source Unit (indash radio) but keep the volume down. Verify that the Red Power On LED (Item 5) has turned on. If not, check the Remote and heavy GND connections.
- Advance the Source Unit's volume. You should be getting sound now. If not, check the units Signal Input connections. If OK at this point, rotate the Source Balance control to confirm proper Left-to-Right action. If reversed, either the input or output connections could be the cause.
- If any of the speaker connections are shorted together, the units will sense this as soon as you begin to drive it and respond by shutting down all channels. The Red LED will turn off even if the Source unit is still on.
Then it will turn on again to see if the short has been cleared. It will continue to pulsate until you turn off the Source and correct the cause of the short. The speaker that produced little or no sound while the amplifier was pulsating is probably the culprit so start there.
- Set the radio Tone or Equalizer controls to their normal positions. Advance the Volume to see if the maximum desired listening level can be reached. If yes, then no further adjustment is required. If not, then advance the INPUT LEVEL controls slowly until satisfied. Do not set more gain than actually needed because low-level noise from the Source will also be amplified more.
- If you have been running at high volume for an extended time in hot weather, the units may overheat to the point where it must shut itself off to prevent component damage. This will happen if the outer surface of the Heat Radiator reaches about 185 degrees F (85 degrees C). That is much too hot for bare skin so if the unit shuts down unexpectedly, do not touch the unit! You will feel the radiant heat just by coming near it.

The unit will come back on by itself in a few minutes. When it does, you should reduce the volume level or it will just shut down again.

NOISE SUPPRESSION

Three types of noise problems may occur due to the addition of a Power Amplifier. Generally, the noise was there all along but may not have been noticed until the amplifier raised its level.

White Noise is a hissing sound heard at low volume levels or during quiet passages. It is even more noticeable with the engine off. The best way to avoid this problem is by setting units LEVEL Controls to the lowest workable position and operate the Source at a higher volume setting.

Alternator Whine is a steady tone whose pitch increases with engine speed. It is actually produced by your vehicle's charging system. This unwelcome tone can enter your source unit thru its power connections and produce a small output at the speaker or line outputs. An external amplifier must accept it as a normal input signal and possibly raise it to an audible level. The solution given above for white noise is also helpful here. If not, a supplementary power line filter for the source unit may be necessary.

Ignition Noise is radio frequency interference produced by your engine's ignition system that can radiate into your antenna and cause a popping sound during FM reception, especially if the particular FM signal is weak. It always goes away during CD or Tape modes. It has nothing to do with the units but the addition of an external amp and high performance speakers can make it sound more annoying. There are specific things that your car dealer or autosound specialist can do under the hood to reduce this radiated interference.

SPECIFICATIONS

Output Power

	4 Ohms RMS	2 Ohms RMS	Bridged
4DS-400	: 60 watts x 4	75 watts x 4	200 watts x 2
4DS-600	: 85 watts x 4	95 watts x 4	300 watts x 2

Frequency Response

@ 1 watt full range : 20 Hz to 30 kHz, +0/-1 dB.

Crossover : SEPARATE Low + High Pass Filters

—CH1/2 High Pass	120 Hz FIXED
Low Pass	30 Hz ~ 120 Hz Variable
—CH3/4 High Pass	120 Hz FIXED
Low Pass	30 Hz ~ 120 Hz Variable

Crossover Rate : 12 dB/octave

Signal/Noise Ratio : Better than 90 dB A-Weighted.

Input Impedance (ohms) : 10K Low Level, 200 High Level.

Input Sensitivity : 100 mV to 1 volts Low Level.
0.5 volt to 5 volts High Level.

Power Requirements : 11 to 16 VDC, negative ground.

Accessories included : Mounting hardware, high level input cable. All power control and low level input cables must be purchased separately.

Dimensions (L x W x H)

inches	: 4DS-400	4DS-600
	: 12.2 x 9.7 x 2.0	14.2 x 9.7 x 2.0
mm.	: 310 x 246 x 49	360 x 246 x 49
Weight	: 7.5 lbs, 3.4 kgs	8.6 lbs, 3.9 kgs