D E D I C A T E D

DAX

A C T I V E C R O S S O V E R

Owner's Manual

APOGEE ACOUSTICS, INC.

TABLE OF CONTENTS

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INTRODUCTION

The DAX is a two channel Dedicated Active Crossover designed specifically to be used with the Diva, Duetta Signature, and Caliper Signature speakers. It provides exceptional tuning flexibility which enables users to sculpt a tonal balance to meet their exact listening requirements. The DAX will accommodate a wide range of preamplifier and amplifier characteristics.

Unique features which are Apogee exclusives include six window numerical digital read-out delineating woofer, midrange/tweeter, balance, and rake angle levels. These controls facilitate ergonomic operation and easy adjustment. The rake angle control provides proper integration of the speakers' midrange/tweeter transducers with the audio system and listening environment.

INSTALLATION

WARNING: DISCONNECT ALL POWER AND CABLES TO THE DAX BEFORE MAKING ANY ADJUSTMENTS!

1) DAX ADJUSTMENT SWITCHES (See Diagram #1)

Inside the DAX there are two output printed circuit boards for the left and right channels. There are a number of switches on each output board which are used to select gain settings for matching amplifiers with different output levels, filter shapes for the selected Apogee loudspeaker, balanced or single-ended inputs, and various input loading settings.

If your authorized Apogee dealer has already performed these adjustments for you, proceed to section 2 on page 5.

REMEMBER!: WHEN ADJUSTING SWITCHES ON DAX OUTPUT BOARDS, CONCURRENT CHANGES MUST BE MADE FOR LEFT AND RIGHT CHANNEL OUTPUT BOARDS!

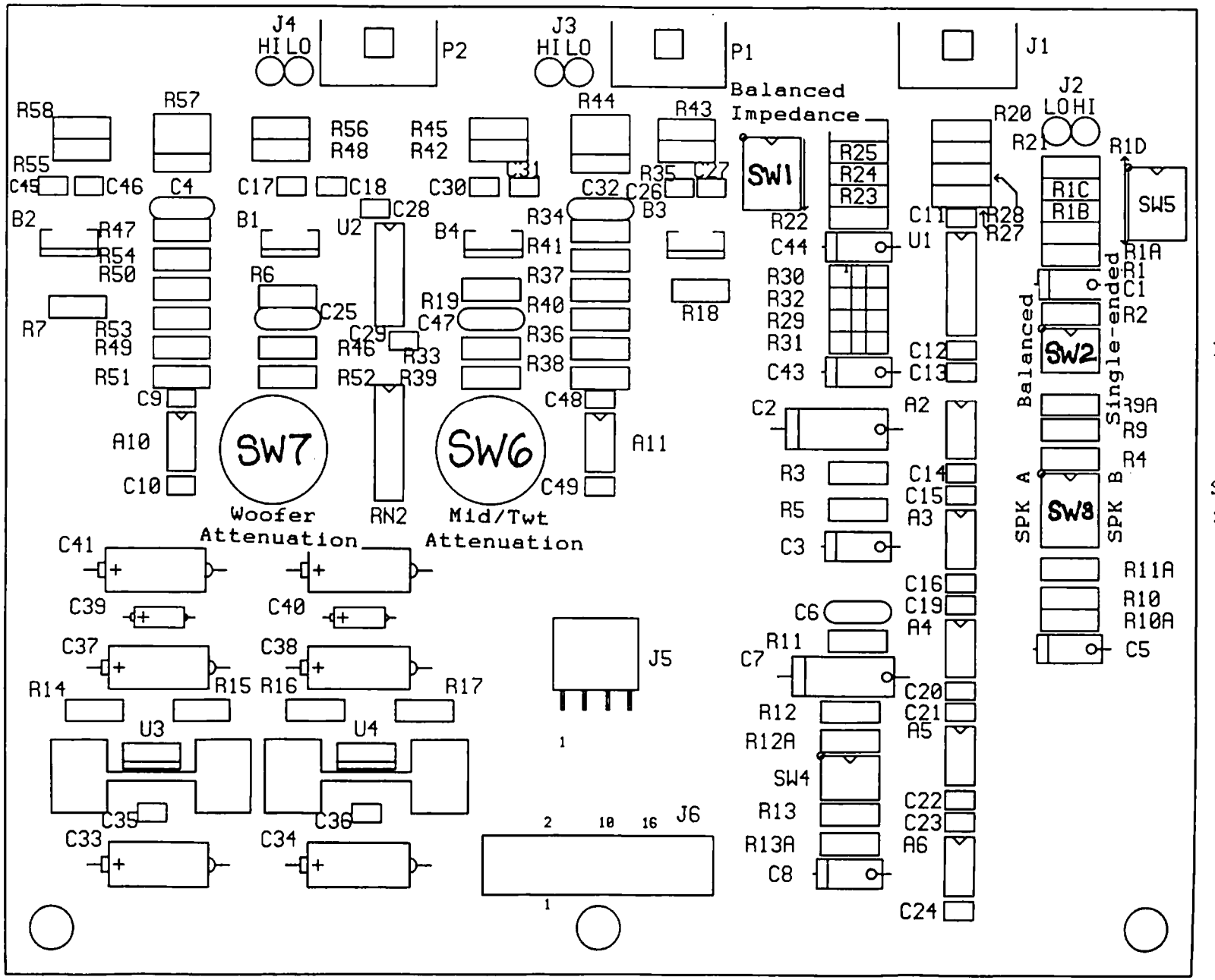
Amplifier Gain Matching

Make sure that no cables, including power cord, are connected to the DAX. Remove the top cover of the DAX main unit by removing ten machine screws with the allen wrench provided. Viewing the printed circuit boards from the front of the DAX, ie. facing the digital display, you will see 3 printed circuit boards: one wide printed circuit board attached to the front panel and two, left and right channel, output printed circuit boards attached to the rear panel. You will only be changing switches on the DAX Output Boards.

Locate switch #6(SW6) & switch #7(SW7), towards the left center of the output boards(Refer to Diagram #1). These switches allow gain matching between amplifiers with different gain. (Gain dB = 20 X log (output voltage/input voltage)). Please consult your power amplifier manual or manufacturer for this information.

DIAGRAM #1: DAX OUTPUT BOARD

REAR PANEL



Single-ended Impedance

Input Selection

Speaker Selection

FRONT PANEL

SW7 attenuates the woofer output in 1 dB steps from 0 to -6 dB. SW6 attenuates the midrange/tweeter level in 1 dB steps, as well. For example, if you are using a power amplifier with a 20 dB gain on the woofer and another power amplifier with a 23 dB gain on the midrange/tweeter, you would attenuate SW6 to position number 3 which corresponds to -3 dB. These levels are purposely not displayed on the front panel so that a reading of 0 dB for the woofer and midrange/tweeter on the digital display corresponds to a flat setting where the level of the midrange/tweeter and woofer are equal.

Speaker Selection

Switch #3(SW3) is used to select the appropriate filter shape for two of the three speakers; either the Diva and Duetta Signature, or the Caliper Signature and Diva. Please check the form in the DAX packing carton with the factory preset values to make sure you received your specified speaker model selection. SW3, on the middle right edge of the printed circuit board, can be toggled to the left for Speaker A or to the right for Speaker B. Refer to Table 1 for Apogee speaker designation depending on the two speaker choices received. NOTE: This must be done for both crossover boards!

TABLE 1

Speaker Combination	Speaker A	Speaker B
Duetta/Diva	Duetta Signature	Diva
Caliper/Diva	Caliper Signature	Diva

Balanced or Single-ended Input

Switch #2(SW2) is used to select either balanced or single-ended (regular RCA) input. SW2 is located right above SW3 on the right edge of the printed board. Toggled towards the right, or nearest edge of the board, selects the single-ended input. Toggled to the left, or away from the nearest edge of the board, selects the balanced input. Both single-ended and balanced outputs are operational at all times and any combination may be used.

Impedance Loading (See Table 2)

Switch #5(SW5) is used to select the input impedance loading for the single-ended input. Switch #1(SW1) is used to select the input impedance loading for the balanced input. SW5 is located in the upper right hand corner of the printed circuit board as you face the front of the DAX. The label is not visible on the printed circuit board, as it is hidden under the switch. SW1 is located to the left of SW5. There are four small rocker bars in the switch, labeled 1-4. Only one toggle position is used for each setting. Be sure the other switches are off. The DAX is preset at the factory for 80,000 ohms, single-ended, and 10,000 ohms, balanced(All 4 rockers in the OFF

position). Please consult the manufacturer of your preamplifier or signal source for setting closest to the "ON" value.

Table 2

Switch #5(SW5), Single-ended		Switch #1(SW1), Balanced	
Rocker #(ON)	Value	Rocker #(ON)	Value
#1	5,000 ohms	#1	600 ohms
#2	10,000 ohms	#2	1,200 ohms
#3	20,000 ohms	#3	2,500 ohms
#4	40,000 ohms	#4	5,000 ohms
#1-4 OFF	80,000 ohms	#1-4 OFF	10,000 ohms

2) Loudspeaker Biamplification Wiring Diagrams

The following speaker wiring changes must be performed to permit operation of the Apogee speakers with the DAX active crossover. The wiring changes are simple and readily performed.

WARNING!: BEFORE MAKING ANY WIRING CHANGES, DISCONNECT ALL POWER TO THE AUDIO SYSTEM.

DIVA (See Diagram #2)

The Diva is a three way speaker and the DAX is a two way active crossover. It is necessary to use the standard Diva passive crossover for the tweeter. The tweeter HI, LOW, NORMAL switch remains active while the rest of the switches are not.

The DAX comes with a modification kit for the Diva passive crossover when purchased for use with the Diva. The kit includes (2) midrange coils designated "L5", (2) WHITE wires for woofer ground, (2) GREY wires for midrange ground, a 3/8" socket wrench for removing the nuts on the binding posts, and an allen wrench for removing the bottom cover of the passive crossover electronics box. If your Diva's serial number is before #10360, a little soldering is required and you will need a fairly powerful soldering iron.

WARNING: IF YOU ARE NOT MECHANICALLY INCLINED, HAVE YOUR APOGEE DEALER PERFORM THESE MODIFICATIONS.

Remove all cables from the Diva passive crossover. Carefully turn the Diva passive crossover upside down and remove the bottom cover by unscrewing ten machine screws with the allen wrench provided. Refer to Diagram #2 regarding the following procedures. Table 3 summarizes terminal and wire connections.

DIAGRAM #2: DAX MODIFICATION KIT FOR DIVA PASSIVE CROSSOVER ELECTRONICS BOX

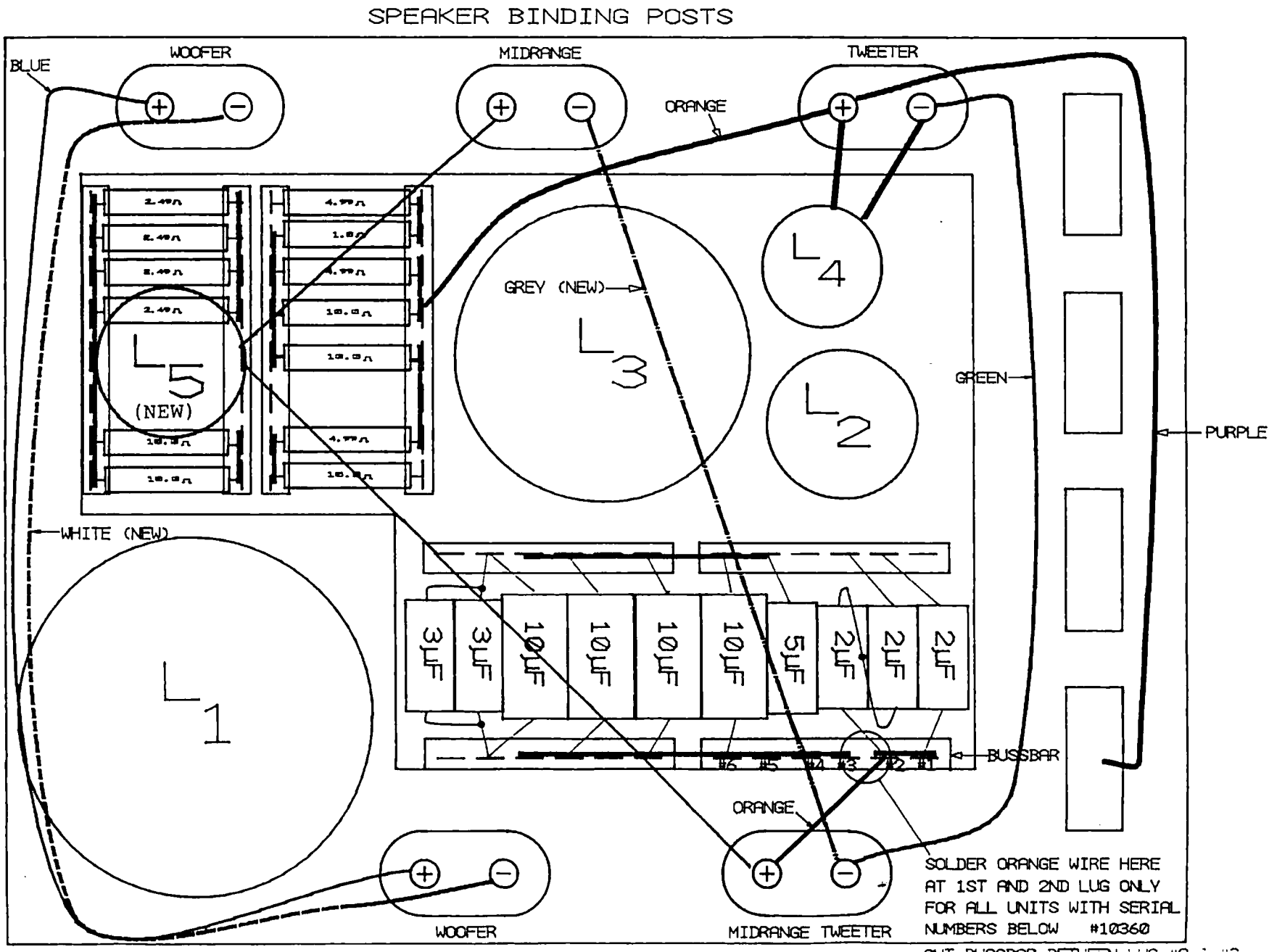


Table 3: DIVA

Binding Posts	WOOFER(SPK) RED	WOOFER(SPK) BLACK	MIDRANGE(SPK) RED	MIDRANGE(SPK) BLACK	TWEETER(SPK) RED	TWEETER(SPK) BLACK
Standard Wiring (Passive X-over)	RED, YELLOW, BLUE	BLACK	RED, YELLOW, L3	GREEN, L3	ORANGE, PURPLE, L4	GREEN, L4
Active Crossover	BLUE	WHITE	L5	GREY	ORANGE, PURPLE L4	GREEN, L4

Binding Posts	WOOFER(AMP) RED	WOOFER(AMP) BLACK	MIDRANGE/TWEETER(AMP) RED	MIDRANGE/TWEETER(AMP) BLACK
Standard Wiring (Passive X-over)	L1	BLACK	ORANGE	(2) GREEN
Active Crossover	BLUE	WHITE	ORANGE L5	GREEN, GREY

Woofer Wiring:

a. Remove and insulate RED and YELLOW wires from WOOFER RED SPEAKER BINDING POST and leave BLUE wire connected. Insulate wire with heatshrink tubing or electrical tape. Remove heatshrink from other end of unconnected BLUE wire.
b. Remove and insulate solid copper L1 coil wire from WOOFER RED AMPLIFIER BINDING POST and connect loose end of BLUE wire to WOOFER RED AMPLIFIER BINDING POST.
c. Remove and insulate BLACK wire from WOOFER BLACK AMPLIFIER AND SPEAKER BINDING POSTS.
d. Connect WHITE wire included in the kit between WOOFER BLACK AMPLIFIER AND SPEAKER BINDING POSTS.

Midrange/Tweeter Wiring:

a. Remove and insulate solid copper L3 coil, RED and YELLOW wires from MIDRANGE RED SPEAKER BINDING POST.
b. Connect new midrange coil L5, included in the kit, between MIDRANGE/TWEETER RED AMPLIFIER BINDING POST and MIDRANGE RED SPEAKER BINDING POST. [Use the short lead for the speaker binding post and the long lead for the amplifier binding post.] Secure L5 to outer edge resistor bank, as shown in Diagram #2, with two tie-wraps included in kit. Leave ORANGE wire connected.
c. Remove and insulate solid copper L3 coil wire and GREEN wire from MIDRANGE BLACK SPEAKER BINDING POST. Remove and insulate short GREEN wire from MIDRANGE/TWEETER BLACK AMPLIFIER BINDING POST. Leave long GREEN wire connected between MIDRANGE/TWEETER BLACK AMPLIFIER BINDING POST and TWEETER BLACK SPEAKER BINDING POST.
d. Connect GREY wire included in the kit between MIDRANGE BLACK SPEAKER BINDING POST and MIDRANGE/TWEETER BLACK AMPLIFIER BINDING

POST.

e. All Divas with serial numbers before # 10360, resolder short ORANGE wire originating from MIDRANGE/TWEETER RED AMPLIFIER BINDING POST from LUG #6 of the BUSSBAR to LUG #1 and #2(Refer to Diagram #2).
d. Finally, cut the BUSSBAR with a heavy wire cutter between LUG #2 and #3. Make sure that there is a good size gap between these two lugs so that they are electrically isolated.

DUETTA SIGNATURE

Table 4: DUETTA SIGNATURE

	WOOFER(SPK)		MIDRANGE/TWEETER(SPK)	
Binding Posts	RED	BLACK	RED	BLACK
Standard Wiring (Passive Crossover)	HEAVY GAUGE COPPER WIRE	GREY, BLACK	PURPLE	BROWN, LIGHT GAUGE COPPER WIRE
Active Crossover	RED	BLACK	BLUE	BROWN

Remove the nameplate on the back of each speaker by removing four phillips head screws at the corners. The nameplate holds the speaker binding posts on which the speaker wire is connected.

Woofer Wiring:

a. Remove and insulate solid copper wire from WOOFER RED BINDING POST.
b. Remove and insulate GREY wire from WOOFER BLACK BINDING POST. Resecure BLACK wire on WOOFER BLACK BINDING POST.
c. Locate unconnected BLUE and RED wires coiled together. Remove the heatshrink from unconnected RED wire and install on WOOFER RED BINDING POST.

Midrange/Tweeter Wiring:

a. Remove and insulate PURPLE wire from MIDRANGE/TWEETER RED BINDING POST.
b. Remove heatshrink from unconnected BLUE wire and install on MIDRANGE/TWEETER RED BINDING POST.
c. Remove and insulate solid copper wire from MIDRANGE/TWEETER BLACK BINDING POST.
d. Resecure BROWN wire on MIDRANGE/TWEETER BLACK BINDING POST.

Replacing Wires and Nameplates:

a. Check the wires and lugs to be certain that they do not short out to the nameplate or to each other. Be sure that the wires are not sharply bent.
b. Use electrical tape or heatshrink tubing where instructions call

for insulating a given lug or wire.
c. Place the nameplates back in their original positions and secure with screws.

CALIPER SIGNATURE

The Caliper Signature is not set-up to be easily modified by the customer. Therefore, we recommend that your authorized Apogee dealer perform this modification.

3) Selecting a Location for Your DAX

The DAX has a separate power supply that should be located away from the main unit and any other signal sources such as the preamp. Ideally, in order to minimize interconnect cable runs from your preamp to your amplifiers, the DAX should be located fairly close to your power amplifiers, but not right on top or next to them. However, the most obvious consideration in choosing a location is user accessibility.

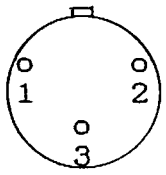
The DAX should be kept away from stray magnetic fields which can be caused by A.C. outlets, televisions, computers, and power supply transformers.

4) Input/Output Connections

The rear of the DAX is marked with left and right connections for both balanced and unbalanced(single-ended) input and outputs. Either the balanced, unbalanced(single-ended) or a combination of the two outputs may be used.

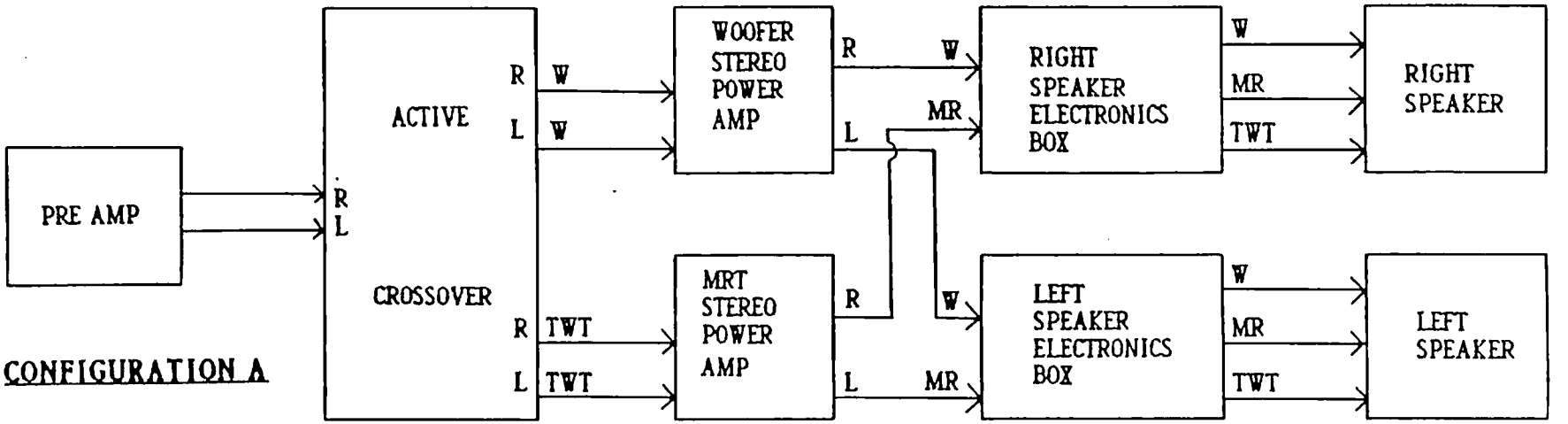
Notice that the balanced inputs are female and the outputs male. The vast majority of manufacturers with balanced equipment use this convention. However, there does not seem to be any convention when it comes to the wiring of the 3-pin XLR connectors. We have chosen pin #1 to be common, pin #2 to be the negative signal, and pin #3 to be the positive signal. Reversing pin #2 and #3 is equivalent to an absolute phase reversal.

MAKE SURE THAT ALL DAX XLR CONNECTORS ARE WIRED AS FOLLOWS:

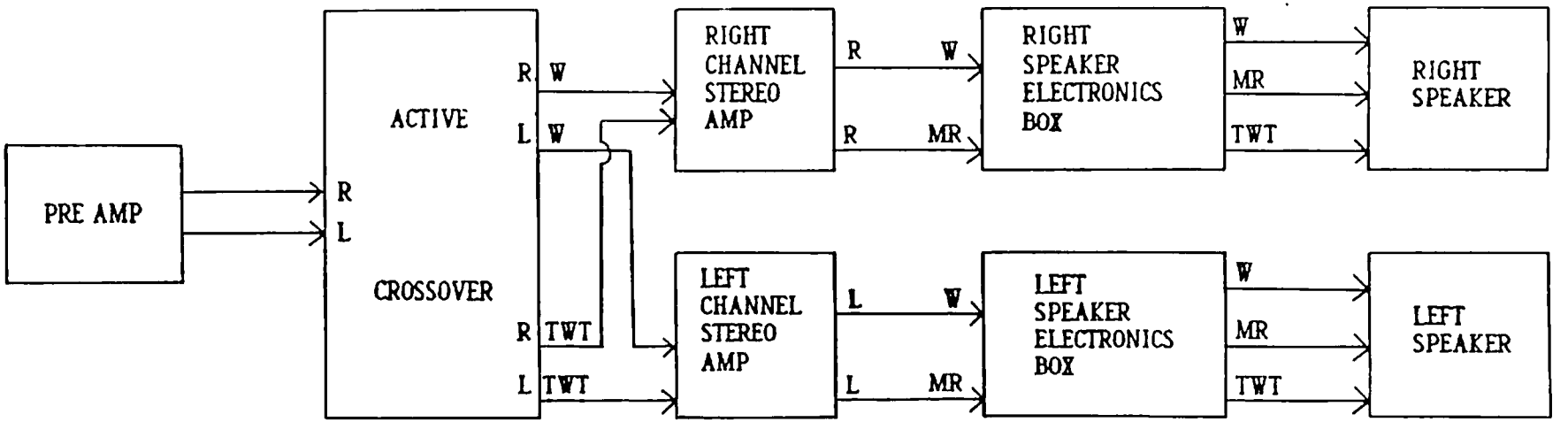


PIN 1: COMMON (Shield)
PIN 2: NEGATIVE (LO) Signal
PIN 3: POSITIVE (HI) Signal

In the owner's manual for the Diva and Duetta Signature, there is a diagram showing two different configurations for biamplification. (Refer to Diagram #3) Either Configuration A or B may be utilized. The selection of the most satisfactory configuration is based on a number of system considerations such as the amplifier, interconnect



CONFIGURATION A



CONFIGURATION B

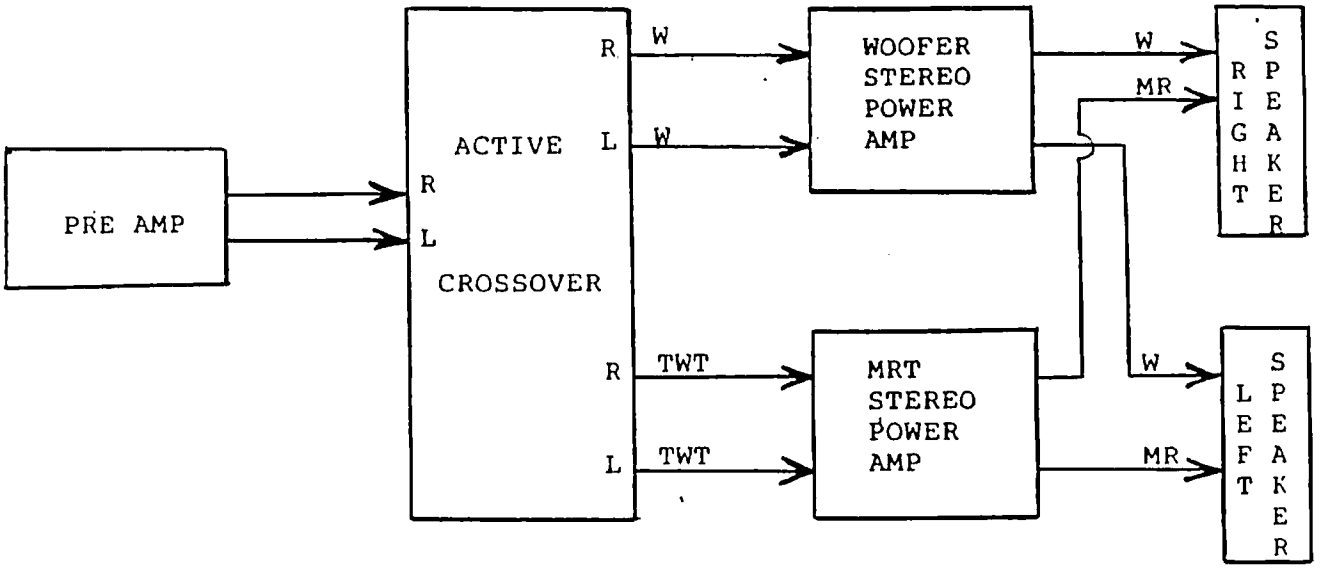
BI-AMPED ACTIVE CROSSOVER WIRING

NOTE:
R - RIGHT CHANNEL
L - LEFT CHANNEL
W - WOOFER
MR - MIDRANGE

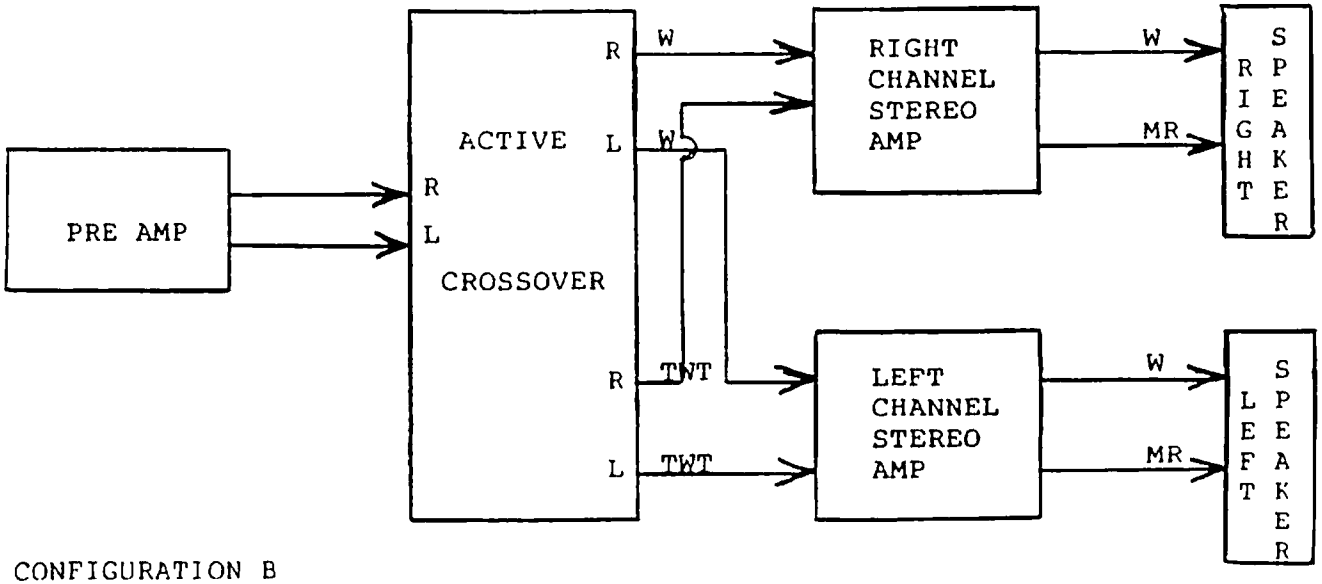
NOTE:
INPUT LINE

OUTPUT LINE

DIAGRAM No. 3 (DIVA)



CONFIGURATION A



CONFIGURATION B

BI-AMPED ACTIVE CROSSOVER WIRING

NOTE: INPUT LINE →

OUTPUT LINE —

DIAGRAM 3 (CALIPER/DUETTA)

and cable characteristics and overall acoustic properties resulting from the selected configuration.

a. Connect preamplifier output to DAX INPUT. Connect DAX WOOFER OUTPUT to the woofer amplifier input and DAX MIDRANGE/TWEETER OUTPUT to midrange/tweeter amplifier input.
b. Connect left channel woofer amplifier output to the terminal labeled "Woofer" Amplifier Binding Post on the Diva Electronics Box and on the Duetta Signature and Caliper Signature nameplates.
c. Connect left channel midrange/tweeter amplifier output to the terminal labeled "Midrange/Tweeter" Amplifier Binding Posts on the Diva Electronics Box and on the Duetta Signature and Caliper Signature nameplates.

d. Follow same procedure for the right channel.

5) Power Supply Connections

Connect the 5 pin XLR with its umbilical cable attached to the power supply to the connector marked POWER in the middle of the DAX back panel.

Before plugging the power cord into an A.C. outlet, make sure the correct voltage setting is selected on the back of the power supply. This is indicated on the bottom of the power supply and the packing carton. If you need to change the voltage setting, consult your Apogee dealer.

Should you blow a fuse, replace with a fuse of similar rating: ie. 250V, 0.5 amps. To gain access to fuse and voltage selector, simply pop out fuse holder on back of power supply, located below the POWER label, with a small screwdriver.

WARNING!

TO AVOID SERIOUS ELECTRICAL SHOCK, DO NOT REMOVE THE COVER OF THE POWER SUPPLY WHILE IT IS PLUGGED IN. THERE ARE NO USER SERVICEABLE PARTS INSIDE.

TURN THE DAX ON BEFORE TURNING ON THE AMPLIFIERS! THIS PREVENTS ANY TRANSIENTS THAT MAY DAMAGE THE RIBBONS AND YOUR SYSTEM.

FRONT PANEL CONTROLS AND DIGITAL DISPLAY

On the DAX front panel there are eight knobs and six LED readouts. There are left and right WOOFER and MIDRANGE/TWEETER attenuation knobs with a corresponding dB level readout. There are left and right WOOFER--MIDRANGE/TWEETER FINE BALANCE knobs. There are left and right RAKE ANGLE knobs with unitless numeric readout.

1) Woofer and Midrange/Tweeter Attenuation:

The woofer may be attenuated in 1 dB steps from 0 to -6 dB by turning the WOOFER knob counter-clockwise. The digital display will indicate

the corresponding level. The MIDRANGE/TWEETER knob operates in the same fashion.

2) Woofer and Midrange/Tweeter Fine Balance:(WF--MRT with scale symbol)

If smaller attenuation increments of 0.2 dB are desired, turn the WF--MRT balance knob(designated by the scale symbol) in the direction of the adjacent Woofer or Midrange/Tweeter attenuation knob that you wish to attenuate in 0.2 dB steps. For example, you wish to attenuate the right woofer -2.2 dB. Simply turn the right(you will see a little R on the far right edge of the front panel) WOOFER attenuation knob two clicks to the left, counterclockwise, and then turn the WF--MRT BALANCE knob one click to the left, counterclockwise. The digital display will readout -2.2 dB under the illuminated woofer legend.

3) Rake Control Angle:

The RAKE control angle knob adjusts the tonal balance above 1 kHz in a linear fashion. It is easy to visualize this as a hinging action at various angles. +1 on the digital readout under rake angle corresponds to a 0.5 dB boost referenced at 5 kHz, hinged at 1 kHz. There are +/- 4 steps, each step is equivalent to a +/- 0.5 dB step at 5 kHz. This feature allows the user to tone down bright recordings or liven up dead listening rooms and vice-versa. Experimentation is recommended.

DISPLAY BRIGHTNESS SWITCH

Located on the back panel of the DAX is a switch which controls the light intensity of the digital display. There are two choices: bright and dim.

CARE AND CLEANING

WARNING: BEFORE CLEANING, SHUT OFF ALL POWER.

The DAX and its power supply are hard anodized. This is a high quality aluminum finish. The benefits are its lustre and durability. Scratches will come right out with commercially available Scotch Brite or fine steel wool. Fingerprints and dirt are best removed by a glass cleaner or mild soap and water.

Specifications:

Description: Dual channel, non-inverting, dual passband electronic crossover

Crossover Frequency: 330 Hz *

Crossover Filter Slope: 6 dB per octave gradually increasing to 12 dB per octave

Signal to Noise Ratio: -90 dB(A) *

Total Harmonic Distortion: 0.01% *

Nominal Input Level: 1 volt RMS

Maximum Input Level: 5 volts RMS

Input Connections:
Balanced: gold plated female Neutrik XLR
Single-ended: gold plated Tiffany RCA style

Output Connections:
Balanced: gold plated male Neutrik XLR
single-ended: gold plated Tiffany RCA style

Gain:
Balanced: gain=2, Single-ended: gain=1
Left and right channels have internal gain adjustments controls to compensate for power amps with unequal gains.
Range: 0 to -6 dB in 1 dB steps

Input Impedance: Switch Selectable Loading
Balanced: 600, 1.2k, 2.5k, 5k, or 10k ohms
Single-ended: 5k, 10k, 20k, 40k, 80k ohms

Output Impedance: 6 ohms

Controls:
Woofer and Midrange/Tweeter level attenuation: 0 to -6 dB in 1dB steps
Woofer and Midrange/Tweeter Balance: 0.2 dB steps
Rake control angle: +/- 2 dB at 5 kHz in 0.5 dB steps, hinged at 1 kHz

Display: 6 LED numeric readout with bright or dim lighting selection
Displays left and right woofer level, midrange/tweeter level, and rake angle

Dimensions and Weight:
DAX crossover box: 2 1/2"(H) X 18"(W) X 12 3/4"(D)
9.5 lbs.
Power Supply box: 2 1/2"(H) X 6 1/2"(W) X 11"(D)
5.5 lbs.

Power Requirements:

120/240 VAC +/- 10%, 50/60 Hz, 0.5/0.25 Amps, 60 Watts

OR

100/200 VAC +/- 10%, 50/60 Hz, 0.5/0.25 Amps, 60 Watts

* Measured using an Audio Precision System One Signal Analyzer.

APOGEE ACOUSTICS, INC.

LIMITED 5-YEAR WARRANTY

APOGEE ACOUSTICS, INCORPORATED warrants to the purchaser that the DAX Dedicated Active Crossover is free of defects in material and workmanship for a period of 5 years from date of purchase.

To obtain this warranty, the original purchaser must mail to APOGEE ACOUSTICS within thirty (30) days from the date of purchase this warranty registration form completed, dated and signed by both the purchaser and the selling dealer together with a copy of the bill of sale or other proof of purchase of the product. APOGEE ACOUSTICS will then validate the warranty to the original purchaser. This warranty is subject to the following conditions and limitations. This warranty applies only to the original purchaser. The warranty is void and inapplicable if the product has been handled other than in accordance with the instructions in the Owner s Manual, abused, misused, or altered in any way, damaged by accident or neglect or in being transported, or the defect is due to the product being repaired or tampered with by anyone other than APOGEE ACOUSTICS or an authorized APOGEE ACOUSTICS repair center.

The warranty does not cover normal maintenance.

APOGEE ACOUSTICS, INC. shall not be responsible in any way for consequential or indirect damages or liabilities resulting from any breach of this warranty or any implied warranty relating to said product.

The DAX system must be packed in an APOGEE shipping container that is in good condition and shipped to the designated APOGEE repair center or factory. **All freight and insurance costs shall be prepaid by the owner.** A returned product should be accompanied by the warranty and a written description of the defect.

Some states do not allow exclusion of limitations 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 have other rights which vary state to state.

This is a limited warranty only and there are no express or implied warranties of any kind not set forth above, unless your particular state law provides otherwise. There is no implied warranty of fitness for the purpose, nor is there any implied warranty of merchantability.

Date:_____ DAX Serial Number:_____

Dealer:_____ Purchaser:_____