

## KEY SYSTEM FEATURES

- DSP Controlled; 18/24 Bit
- 2 In / 4 Out
- Three Configurations: STEREO 2-WAY, 3-WAY/SUB+1, 4-WAY
- Factory Presets for Various Combinations of Altec Lansing DTS Loudspeaker Systems
- Independent Limiters, Parametric EQs, Shelving EQs, Alignment Delays, Phase Controls, and Level Adjusts are Available to Tailor Any Factory Preset
- Master Delay
- Mono Subwoofer Capability
- Electronically Balanced XLR Inputs and Outputs with Transformer Option
- Remote Memory Select by Contact-Closure
- 2 x 16 Character LCD Display
- Level Indicators for Each Input and Output
- Universal Input Switching Power Supply

## KEY SPECIFICATIONS

<b>Frequency Response:</b>	20 Hz to 20 kHz; ±0.3 dB typical.
<b>THD:</b> (+4 dBu output)	<0.01%, typical.
<b>Dynamic Range:</b>	>100 dB, typical.
<b>Input:</b>	
No. of channels:	2.
Topology:	Electronically balanced; transformer option.
Nominal level:	+4 dBu.
Maximum level:	+21 dBu.
Input impedance:	20 kohms.
CMRR:	>70 dB, typical.
Connector:	Female XLR-3 pin type.
<b>Output:</b>	
No. of channels:	4.
Topology:	Electronically balanced; transformer option.
Nominal level:	+4 dBu.
Maximum level:	+21 dBu.
Output impedance:	100 ohms.
Minimum load impedance:	600 ohms.
Connector:	Male XLR-3 pin type.

## DESCRIPTION

The ALTEC LANSING **4024A** is a multifunctional digital signal processor to set up and optimize active multi-way DTS loudspeaker sound systems. Being part of the DTS family, it specifically controls various arrangements of the DTS loudspeaker systems. This 19" rack unit only occupies one rack space and is based on linear 18 bit AD/DA hardware with Sigma Delta converters and a 24 bit DSP. AD conversion occurs by means of 64-times oversampling; DA conversion with 8-times oversampling.

The following system configurations are possible: 2-way stereo, 3-way mono + direct, and 4-way mono. Thirty-two factory presets are provided for proper cross-over frequency, equalization, and alignment delay for virtually every DTS loudspeaker system. In most cases, all the user needs to do is select the loudspeaker types from the display menu and set the limiters to correspond with the system power amplifiers. In some modes, the user may tailor some of the equalization and delay

parameters with the adjustable parametric and shelving equalizers, and alignment delay controls. Also included are independent digital limiters, level attenuators, signal phase controls, master delay, and 3-way mono subwoofer output function with fully controlled user interface. A remote memory select allows one of eight programs in each configuration to be loaded by simple contact closures connected to a 9-pin remote connector on the rear panel.

The **4024A** features a lockout function that protects against unauthorized operation. Other features include a stereo input level control with VU meters, output level controls with VU meters, turn on/off transient suppression, and electronically balanced inputs and outputs with isolation transformer options. The universal input switching power supply accepts voltages from 90 to 250 Vac, 50/60 Hz.

The **4024A** Digital Signal Processor is the perfect complement to the Duplex® Technology System series of loudspeakers.

# 4024A SPECIFICATIONS

## Testing Conditions:

- 0 dBu = 0.775 Vrms
- Measurements are referred to a 1 kHz, +4 dBu sinewave input signal unless otherwise noted.
- Measurement bandwidth is limited to 22 Hz to 22 kHz unless otherwise noted.
- No isolation transformers installed.
- Line voltage maintained at 120 Vac, 60 Hz.

<b>Propagation Delay:</b>	2 ms.
<b>Data Format:</b>	18 bit linear; 24 bit internal.
<b>Sampling Frequency:</b>	46.875 kHz.
<b>Internal Memory:</b>	24 user RAM locations (8 per configuration).
<b>Level Indicators:</b>	
Input:	8 segment LED indicators including CLIP for each.
Output:	6 segment LED indicators including CLIP for each.
Response:	No peak (600 dB/s), Slow (60 dB/s), Peak hold (600 dB/s).
<b>Master PEQ:</b>	
Frequency Response:	20 to 20,000 Hz.
Q:	0.4 to 20.
Gain:	-12 to +12 dB (1 dB steps).
<b>Limiter:</b>	
Threshold:	0 dBu to +21 dBu (in 1 dB steps).
Decay time:	0 to 50 dB/s (in 1 dB/s steps).
Hold time:	0 to 100 ms (in 1 ms steps).
<b>Output Alignment Delay:</b>	-10 to +10 ms (in 1 ms steps)**; ref: Master Delay setting.
<b>Output Phase:</b>	Not inverted, inverted.
<b>Level Attenuator:</b>	Off, -20 to 0 dB (in 1 dB steps).
<b>Master Delays (every mode):</b>	2 to 1000 ms (in 1 ms steps)**.
<b>Output 4 Delay (3-Way/Sub+1):</b>	2 to 1000 ms (in 1 ms steps)**.
<b>Delay Unit:</b>	ms, $\mu$ s, feet, inch, meter, centimeter**.

## Output 1 Parameters:

(Stereo 2-Way Ch 1 Lo output; 3-Way/Sub+1 Lo output; 4-Way Lo output)	
Low cut frequency:	20 to 50 Hz.
Low cut response:	Off, -6 dB/oct, -12 dB/oct, Q0.7, Q0.8, Q1.0, Q1.2, Q1.5, Q2.0*.
Low shelving frequency:	20 to 200 Hz.
Low shelving gain:	-12 to +12 dB (1 dB steps).
Parametric EQ frequency:	20 to 2500 Hz (Stereo 2-Way). 20 to 500 Hz (3-Way/Sub+1; 4-Way).
Parametric EQ Q:	0.4 to 20.
Parametric EQ gain:	-12 to +12 dB (1 dB steps).
Low pass frequency:	50 to 2500 Hz (Stereo 2-Way). 50 to 500 Hz (3-Way/Sub+1; 4-Way).
Low pass response:	Off, -6 dB/oct, BS12, BT12, LZ12, BS18, BT18, BS24, BT24, LZ24*.

## Output 2 Parameters:

(Stereo 2-Way Ch 1 Hi output; 3-Way/Sub+1 Mid output; 4-Way Lo-Mid output)	
High pass frequency:	50 to 2500 Hz (Stereo 2-Way). 50 to 500 Hz (3-Way/Sub+1; 4-Way).

High pass response:	Off, -6 dB/oct, BS12, BT12, LZ12, BS18, BT18, BS24, BT24, LZ24*.
Parametric EQ frequency:	50 Hz to 20,000 Hz (Stereo 2-Way, 2 PEQ sections). 50 to 5000 Hz (3-Way/Sub+1; 4-Way).
Parametric EQ Q:	0.4 to 20.
Parametric EQ gain:	-12 to +12 dB (1 dB steps).
Low pass frequency:	250 to 5000 Hz (3-Way/Sub+1; 4-Way).
Low pass response:	Off, -6 dB/oct, BS12, BT12, LZ12, BS18, BT18, BS24, BT24, LZ24* (3-Way/ Sub+1; 4-Way).
High shelving frequency:	1000 to 10,000 Hz (Stereo 2-Way).
High shelving gain:	-12 to +12 dB (1 dB steps) (Stereo 2-Way).

## Output 3 Parameters:

(Stereo 2-Way Ch 2 Lo output; 3-Way/Sub+1 Hi output; 4-Way Hi-Mid output)	
Low cut frequency:	20 to 50 Hz (Stereo 2-Way).
Low cut response:	Off, -6 dB/oct, -12 dB/oct, Q0.7, Q0.8, Q1.0, Q1.2, Q1.5, Q2.0* (Stereo 2-Way).
Low shelving frequency:	20 to 200 Hz (Stereo 2-Way).
Low shelving gain:	-12 to +12 dB (1 dB steps) (Stereo 2-Way).
High pass frequency:	250 to 5000 Hz (3-Way/Sub+1; 4-Way).
High pass response:	Off, -6 dB/oct, BS12, BT12, LZ12, BS18, BT18, BS24, BT24, LZ24* (3-Way/ Sub+1; 4-Way).
Parametric EQ frequency:	20 to 2500 Hz (Stereo 2-Way). 250 to 20,000 Hz (3-Way/Sub+1, 2 PEQ sections). 250 to 10,000 Hz (4-Way).
Parametric EQ Q:	0.4 to 20.
Parametric EQ gain:	-12 to +12 dB (1 dB steps).
Low pass frequency:	50 to 2500 Hz (Stereo 2-Way). 1000 to 10,000 Hz (4-Way).
Low pass response:	Off, -6 dB/oct, BS12, BT12, LZ12, BS18, BT18, BS24, BT24, LZ24* (Stereo 2- Way; 4-Way).
High shelving frequency:	1000 to 10,000 Hz (3-Way/Sub+1).
High shelving gain:	-12 to +12 dB (1 dB steps) (3-Way/Sub+1).

## Output 4 Parameters:

(Stereo 2-Way Ch 2 Hi output; 3-Way/Sub+1 Direct output; 4-Way Hi output)	
High pass frequency:	50 to 2500 Hz (Stereo 2-Way). 1000 to 10,000 Hz (4-Way).
High pass response:	Off, -6 dB/oct, BS12, BT12, LZ12, BS18, BT18, BS24, BT24, LZ24* (Stereo 2- Way; 4-Way).
Parametric EQ frequency:	50 Hz to 20,000 Hz (Stereo 2-Way, 2 PEQ sections). 1000 to 20,000 Hz (4-Way, 2 PEQ sections).
Parametric EQ Q:	0.4 to 20 (Stereo 2-Way; 4-Way).
Parametric EQ gain:	-12 to +12 dB (in 1 dB steps) (Stereo 2-Way; 4-Way).
High shelving frequency:	1000 to 10,000 Hz (Stereo 2-Way; 4- Way).
High shelving gain:	-12 to +12 dB (in 1 dB steps) (Stereo 2-Way; 4-Way).

## Remote Memory Select:

D-Sub 9-pin connector.

**Power Requirements:** 90 - 250 Vac; 50/60 Hz; 30 W.

**Ground Lift:** Lifts signal common from chassis ground.

**Dimensions:**  
Height: 19.0 inches (48.3 centimeters).  
Width: 1.75 inches (4.4 centimeters).  
Depth: 10.9 inches (27.6 centimeters).

**Weight:** 8.5 lbs (3.9 kgs).

**Included Accessories:** Rack-mount hardware kit; IEC power cord; operating instructions; (2) 6.8 kohm resistors.

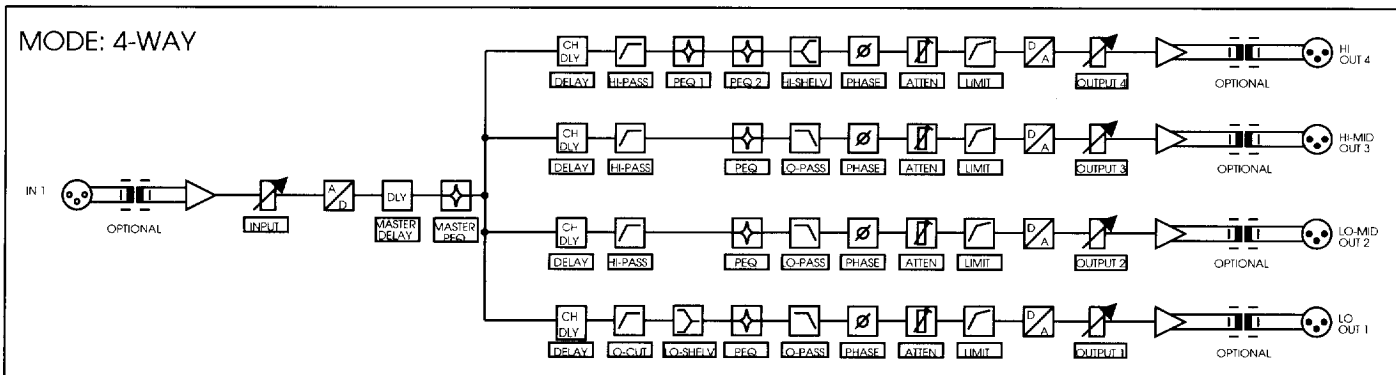
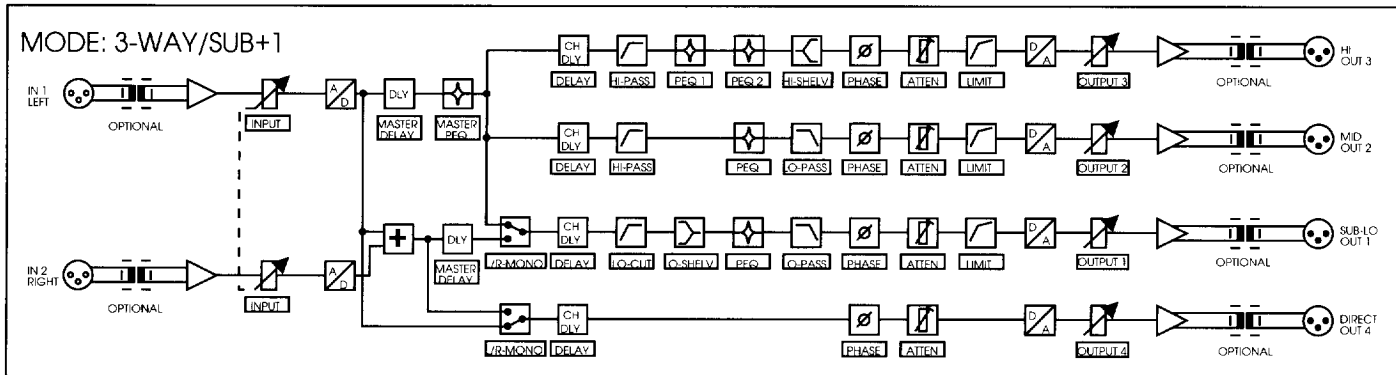
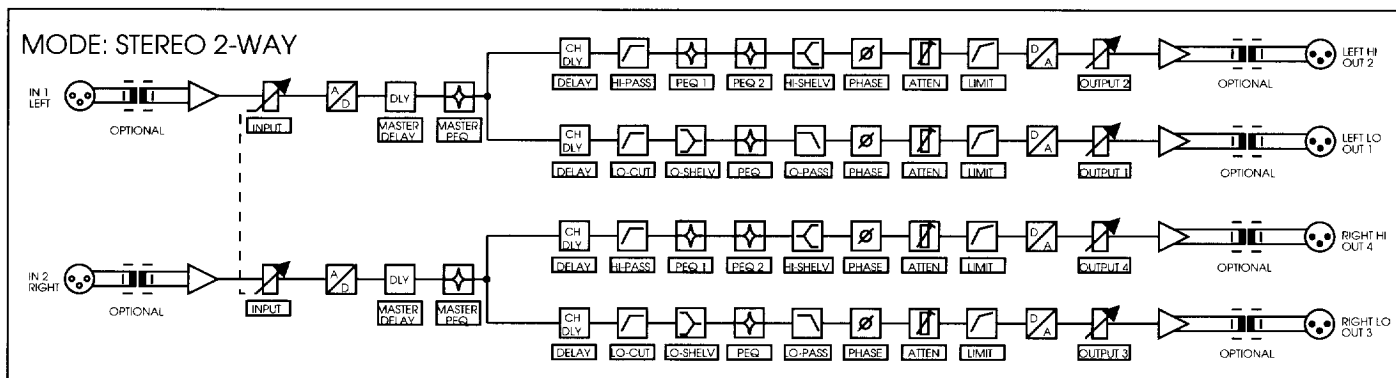
**Optional Accessories:** **15550A** plug-in input isolation transformer.  
**15560A** plug-in output isolation transformer.

- \* Q0.7: Characteristic attenuated by 3 dB at low cut frequency.
- Q0.8: Characteristic attenuated by 2 dB at low cut frequency.
- Q1.0: Characteristic 0 dB at low cut frequency.
- Q1.2: Characteristic boosted by 1.5 dB at low cut frequency.
- Q1.5: Characteristic boosted by 3.5 dB at low cut frequency.
- Q2.0: Characteristic boosted by 6.0 dB at low cut frequency.
- BS12: -12 dB/oct Bessel characteristic.
- BT12: -12 dB/oct Butterworth characteristic.
- LZ12: -12 dB/oct Linkwitz/Riley characteristic.
- BS18: -18 dB/oct Bessel characteristic.
- BT18: -18 dB/oct Butterworth characteristic.
- BS24: -24 dB/oct Bessel characteristic.
- BT24: -24 dB/oct Butterworth characteristic.
- LZ24: -24 dB/oct Linkwitz/Riley characteristic.

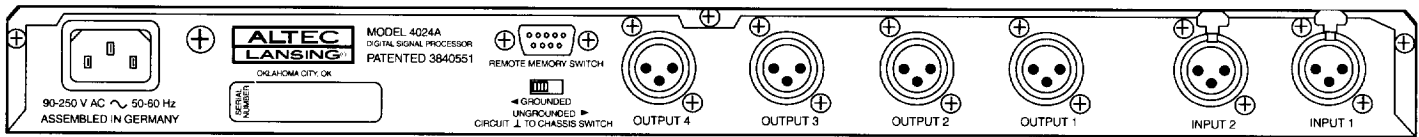
\*\* The units in all delay parameters conform to the "DELAY UNIT" parameter.

Altec Lansing continually strives to improve products and performance. Therefore specifications are subject to change without notice.

## Block Diagram of 4024A



## Back Panel of 4024A



## ARCHITECT'S AND ENGINEER'S SPECIFICATIONS

The processor shall be an 18/24 bit digital device with over 100 dB of dynamics. The processor shall provide crossover functions for stereo 2-way or mono 3/4-way DTS loudspeaker system configurations. Factory loaded software presets shall provide parameters for various DTS loudspeaker system arrangements. The unit shall also include control function lockout, turn on/off transient suppression, and universal input switching power supply.

Each output shall have independent limiting and related parametric functions, alignment delay, signal phase control, parametric EQ, and level attenuation. The LOW and HI outputs shall also have shelving EQs. A Master delay shall be provided to control all outputs. In the 3-way configuration, accommodations shall be made for a mono subwoofer output and a full-range direct output.

The front panel shall include a stereo input level control, individual output level controls, VU meters for each input and output, a 2 x 16 alphanumeric backlit LCD, function keys for software interface, and a power switch.

The rear panel shall include two female XLR

connectors for inputs, four male XLR connectors for outputs, a ground lift switch, and an IEC power connector. A 9-pin connector shall also be included for remote memory select via contact closures.

The inputs and outputs shall be electronically balanced with internal isolation transformer options.

The processor shall meet or exceed the following criteria: frequency response of 20 Hz to 20 kHz,  $\pm 0.3$  dB; total harmonic distortion (1 kHz, +4 dBu output) less than 0.01%; dynamic range greater than 100 dB; balanced input impedance of 20 kohms; maximum input level of +21 dBu; maximum output level of +21 dBu at 1 kHz; balanced output impedance of 100 ohms. The processor shall operate on input line voltages between 90 and 250 Vac, 50/60 Hz, selected by a universal input switching power supply. The chassis shall be steel painted black with white nomenclature. The chassis shall have a height of 1.75 inches (4.4 cm), a width of 19.0 inches (48.3 cm), and a depth of 10.9 inches (27.6 cm). The unit shall weigh approximately 8.5 pounds.

The processor shall be the ALTEC LANSING Model **4024A**.



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*the sound of experience.*

# 4024A

## Digital Signal Processor

# Operating and Service Instructions



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# Table of Contents

1	INSTALLATION .....	1
1.1	Rack Mounting .....	1
1.2	Ventilation .....	1
2	SIGNAL CONNECTIONS .....	1
2.1	Input Signal Connections .....	1
2.1.1	Connecting Balanced Lines .....	1
2.1.2	Connecting Unbalanced Lines .....	1
2.2	Output Signal Connections .....	1
2.2.1	Connecting Balanced Lines .....	1
2.2.2	Connecting Unbalanced Lines .....	1
3	OPERATION .....	1
3.1	Front Panel Controls and Functions .....	1
3.2	Rear Panel Features .....	3
4	SYSTEM CONFIGURATIONS AND MODES .....	4
4.1	System Configurations .....	4
4.1.1	Stereo 2-Way Mode .....	4
4.1.2	Mono 3-Way/Sub+1 Mode .....	4
4.1.3	Mono 4-Way Mode .....	4
4.2	Preset Mode .....	4
4.3	Full Edit Mode .....	6
5	INSTALLING OPTIONAL INPUT AND OUTPUT LINE TRANSFORMERS .....	6
6	SPECIFICATIONS .....	8
7	SERVICE INSTRUCTIONS .....	11
7.1	Electrical .....	11
7.2	In Case of Problems .....	11
7.3	Factory Service .....	11
7.4	Technical Assistance .....	11
	Block Diagram .....	9
	Factory Loaded Presets .....	12

## 1 INSTALLATION

### 1.1 Rack Mounting

The 4024A may be installed in a standard 19 inch (483 mm) equipment rack. It requires one rack unit (1.75 inches or 44.5 mm) of vertical rack space and secures to the rack cabinet with the four screws and washers provided in the hardware kit.

### 1.2 Ventilation

The 4024A must be adequately ventilated to avoid an excessive temperature rise. It should not be used in environments where the ambient temperature exceeds 60°C (140°F). If the air temperature exceeds 60°C, the equipment should be spaced at least one rack unit apart, or a blower installed to provide sufficient air movement within the cabinet.

## 2 SIGNAL CONNECTIONS

### 2.1 Input Signal Connections

#### 2.1.1 Connecting Balanced Lines

Connect the positive (+) side of the line to pin 2 of the female XLR-3 pin connector and the negative (-) side of the line to pin 3 of the female XLR-3 pin connector. In keeping with standard wiring practices, the shield should not be connected at this end; it should only be connected to pin 1 of the male XLR-3 pin connector or ground of the sending end. Refer to Figure 1.

#### 2.1.2 Connecting Unbalanced Lines

Connect the "hot" wire to pin 2 of the female XLR-3 pin connector and the returning shield wire to pin 1 of the female XLR-3 pin connector. To avoid a 6 dB drop in level, connect pin 3 to pin 1 of the female XLR-3 pin connector. Refer to Figure 1.

### 2.2 Output Signal Connections

#### 2.2.1 Connecting Balanced Lines

Connect the positive (+) side of the line to pin 2 of the male XLR-3 pin connector and the negative (-) side of the line to pin 3 of the male XLR-3 pin connector.

In keeping with standard wiring practices, the shield should be connected at this end; it should not be connected to pin 1 of the male XLR-3 pin connector or ground of the receiving end. Refer to Figure 2.

#### 2.2.2 Connecting Unbalanced Lines

Connect the "hot" wire to pin 2 of the male XLR-3 pin connector and the shield wire to pin 1 of the male XLR-3 pin connector. To avoid a 6 dB drop in level, connect pin 3 to pin 1 of the female XLR-3 pin connector. Refer to Figure 2.

## 3 OPERATION

### 3.1 Front Panel Controls and Functions

Refer to Figure 3.

#### 1. INPUT Level Control

This control adjusts the gain of the input amplifier to accommodate the wide range of signal levels present by the endless variety of signal sources. Correctly setting this control results in the best signal-to-noise ratio, the greatest dynamic range, and freedom from overload distortion.

#### 2. Input Level Meters

These LED input level meters are included to provide a relative indication of each input level with reference to the maximum input level.

#### 3. LIMIT Indicators

These LEDs illuminate when the individual output level has exceeded the limiter threshold setting, thus indicating limiter operation.

#### 4. Output Level Meters

These output level meters provide a relative indication of each output level with reference to the maximum output level.

#### 5. Backlit Liquid Crystal Display

This display is used for visual interface between the user and the 4024A. See Figure 4 for the main display and its attributes.

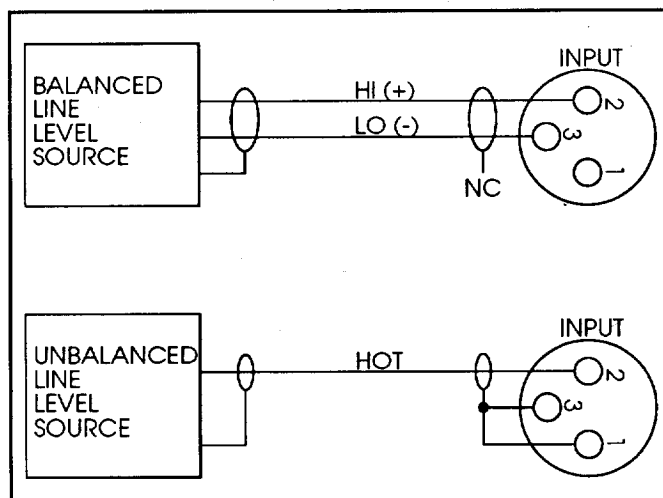


Figure 1: Female XLR-3 Pin Connector

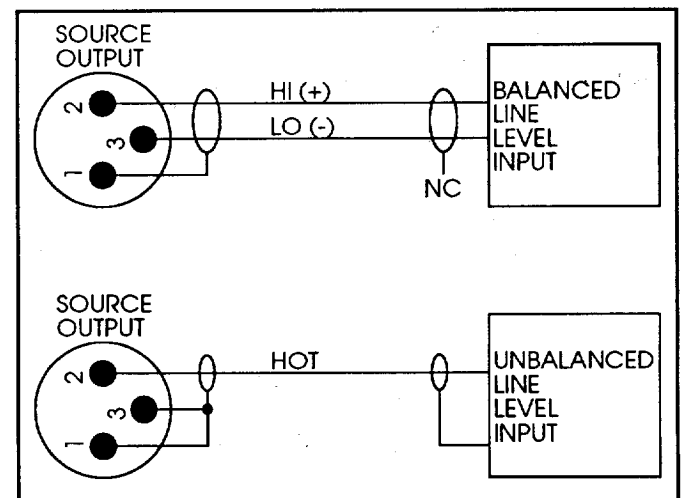


Figure 2: Male XLR-3 Pin Connector

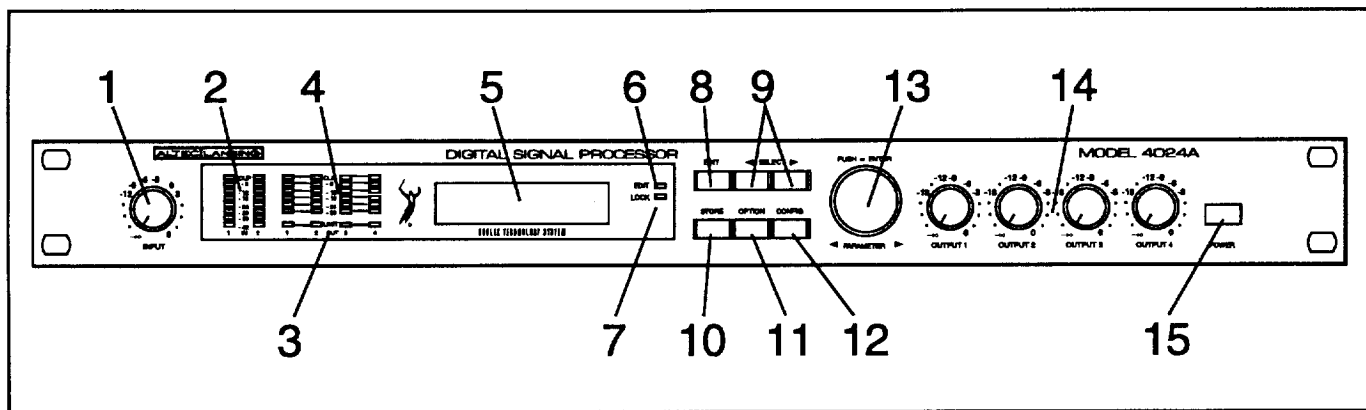


Figure 3: Front Panel

6. EDIT LED

This LED illuminates when the 4024A is in the EDIT mode. It begins to flash when any parameter value is changed with the PARAMETER knob. To exit out of the EDIT mode without permanently changing any parameters, push the ENTER knob. Otherwise, perform the STORE procedure.

7. LOCK LED

This LED flashes when the LOCK mode is accessed. It stays illuminated when the 4024A is locked. See the OPTION key below.

8. EDIT Key

This key changes the operation to EDIT mode. After pressing this key, the first parameter of the active program is shown on the display and the EDIT LED is illuminated. Further parameters are accessible via the SELECT keys. The value of each parameter shown can be changed via the PARAMETER knob. To exit the edit mode, press the EDIT key again. If the value of any parameter is changed, the EDIT LED will begin flashing. This indicates that the loaded program has been edited. To turn off the blinking LED, simply reload the program title that is displayed by pushing the ENTER knob or perform the STORE procedure to overwrite the current program. See Figure 5 for the display attributes in the edit mode.

9. SELECT Keys

These keys select the previous or next program number and name (activated by pushing the ENTER knob). In the EDIT mode, they are used to select the various parameters. In the OPTION mode, the option functions are selected.

10. STORE Key

With this key, an edited program can be stored to the memory. After editing a program, press STORE and a memory location destination number can be selected. Once the desired destination number is selected by turning the PARAMETER knob, press ENTER and confirm with the STORE key again. In the storing procedure, the title of the program can be changed. To do this, press STORE then step the cursor into the title area by using the SELECT keys. Change the characters by turning the PARAMETER knob. Pressing ENTER while the cursor is in the title

area will place a space in that character position. After the title is edited, step back to the memory location designation number at the left of the display and press ENTER and STORE to confirm. Press any other key to cancel the storing procedure. See Figure 6 for the display attributes in the store mode.

11. OPTION Key

Pressing the OPTION key allows information and optional settings like Contrast, Lock, Delay Unit, VU Display Mode, and Software Version to be accessed. Use the SELECT keys to choose each option and turn PARAMETER knob for changing the displayed option's value. Press the OPTION key again to return to the main display.

To lock the 4024A:

- press OPTION and the SELECT keys to access the LOCK mode, the LOCK LED will be flashing;
- turn the PARAMETER knob to the desired code number 000 - 999;
- press STORE
- confirm locking operation by pressing the ENTER knob, the LOCK LED is fully illuminated;
- or cancel with any other key.

To unlock the 4024A:

- press OPTION and the SELECT keys to access the LOCK mode, the LOCK LED will be flashing;
- turn the PARAMETER knob to the appropriate code number 000 - 999;

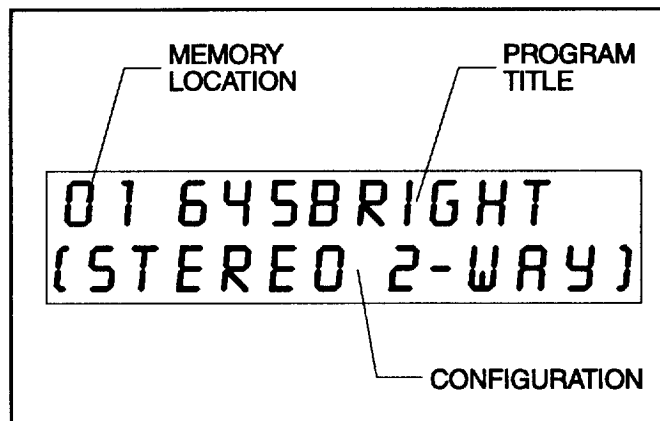


Figure 4: Liquid Crystal Display



- press STORE to unlock, the LOCK LED is off;
- or cancel with any other key.

For unlocking the 4024A without entering the code number (lock override):

- press STORE and CONFIG simultaneously for about 6 seconds during power on

### 12. CONFIG Key

This key selects the configuration of the processor. The possible configurations are STEREO 2-WAY, 3-WAY/SUB+1, and 4-WAY. After pressing this key, turn the PARAMETER knob to change the configuration. Press the CONFIG key again to return the main display. Press the ENTER knob to load the desired memory location and configuration. See Figure 7 for the display attributes in the configuration mode.

A preset program can also be loaded from this menu. To do so, press the CONFIG key and then the ENTER knob. Next, turn the PARAMETER knob to select the preset program. Press the ENTER knob to load the preset program. The loaded preset program will not erase the program that was in the formerly displayed memory location unless the STORE procedure is performed. If the former program is desired simply press the ENTER knob again and it will be loaded. Refer to Section 4 for more information.

### 13. PARAMETER/ENTER knob

Turning this knob selects the previous or next program number and name. In the EDIT mode, this knob changes the values of the parameters shown on the display. Pushing this knob loads and activates a new or preset program.

## 3.2 Rear Panel Features

Refer to Figure 8.

### 1. AC Line Input Connector

This connector provides the unit with ac power via the included detachable power cord.

### 2. Remote Memory Select Connector

This connector permits simple contact closures to remotely download pre-programmed user memory locations. This connector will affect user memories 1 through 8 in the loaded configuration. This connector cannot be used to select configurations. Figure 9 shows a wiring diagram of an interface used with the remote memory select connector. Pins 1-8 correspond with memory locations 1-8. Connecting any one of these pins to pin 9 (common) will load the program that has been stored in the corresponding memory location. This remote feature will operate even when the 4024A is locked. This allows stored programs to be downloaded while securing the parameter settings.

### 3. Ground Lift Switch

This switch is used to lift the signal common from chassis ground.

### 4. Output Connectors

These male XLR-3 pin connectors provide connection to the inputs of subsequent line level equipment rated at 600 ohms or higher input impedance. Refer to Section 2.2 for proper output connections.

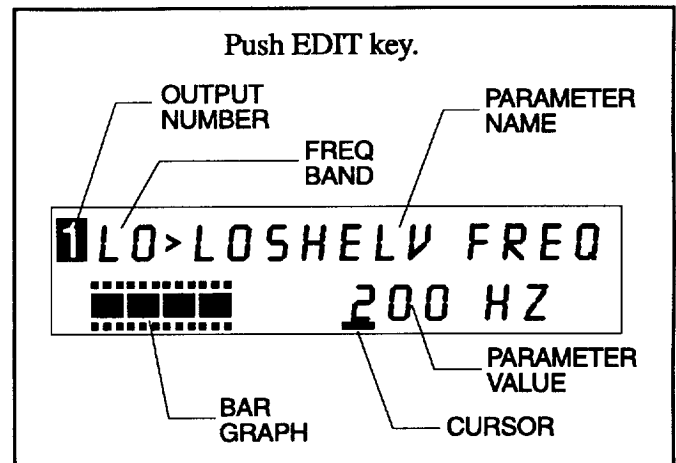


Figure 5: Edit Mode

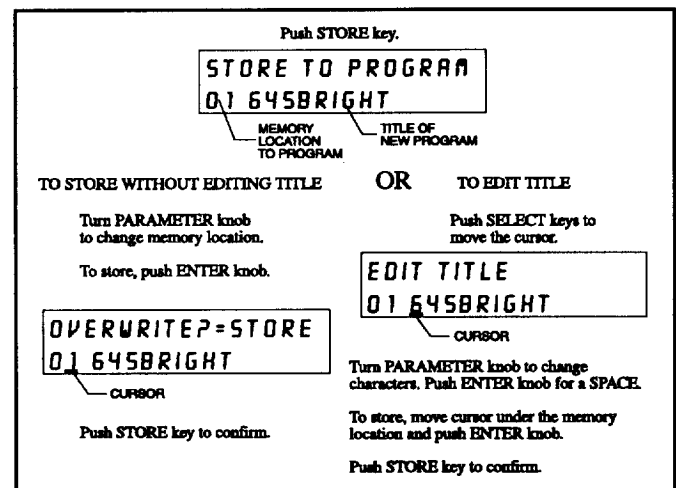


Figure 6: Store Mode

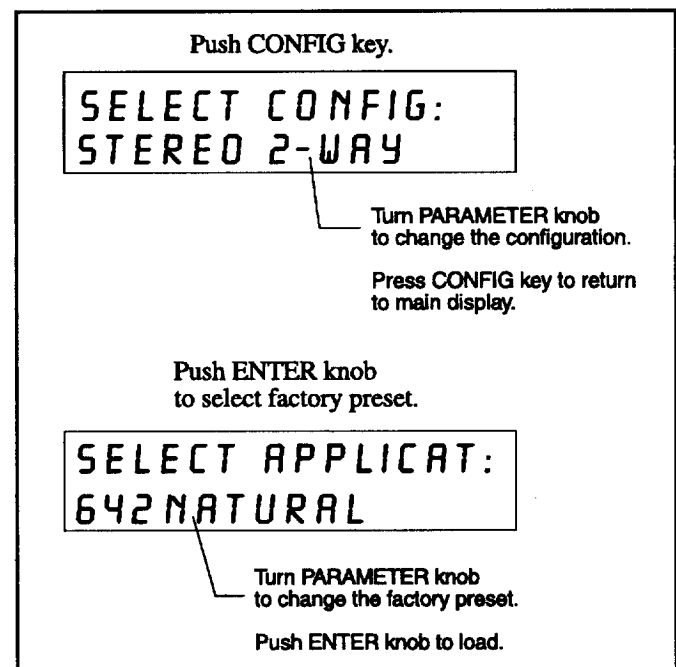


Figure 7: Configuration Mode

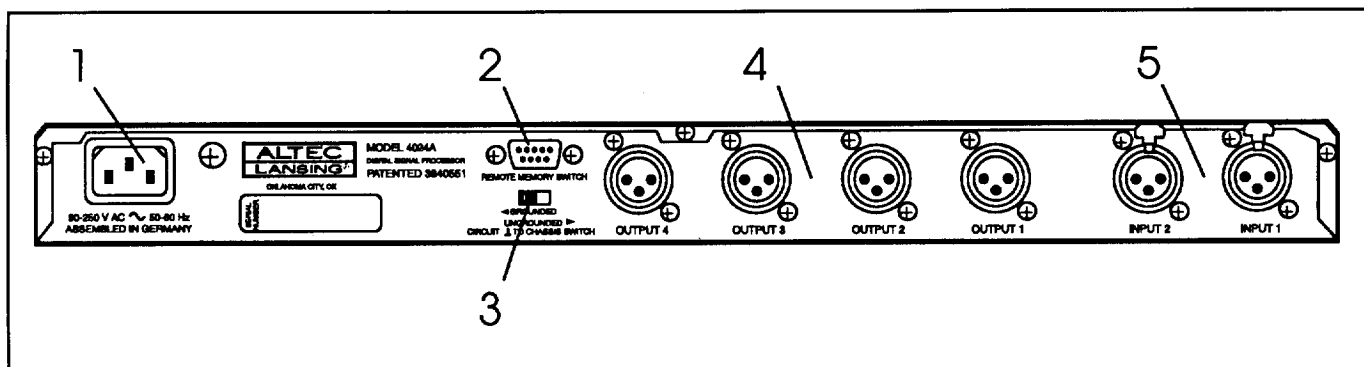


Figure 8: Rear Panel

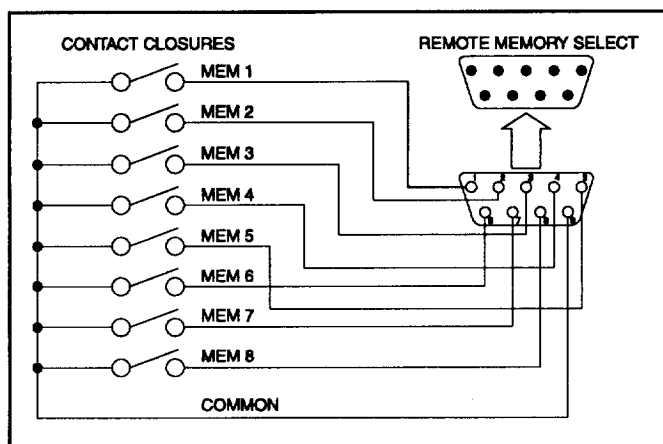


Figure 9: Remote Memory Select Connector

5. **Input Connectors**  
 These female XLR-3 pin connectors provide for line level connections to the unit. Refer to Section 2.1 for proper input connections.

## 4 SYSTEM CONFIGURATIONS AND MODES

### 4.1 System Configurations

#### 4.1.1 Stereo 2-Way Mode

The 4024A can be used for stereo 2-way configuration. See Figure 10 for proper connection information. When the 4024A is placed in the STEREO 2-WAY mode, the input signal in INPUT 1 is split between OUTPUT 1 (low frequency band) and OUTPUT 2 (high frequency band). The input signal in INPUT 2 is split between OUTPUT 3 (low frequency band) and OUTPUT 4 (high frequency band). To change the configuration of the 4024A, use the CONFIG key (see Section 3.1).

#### 4.1.2 Mono 3-Way/Sub+1 Mode

In this mode, the 4024A can be set up for a stereo subwoofer system or a mono subwoofer system. To set up the unit for a stereo subwoofer, change the configuration of the 4024A to the 3-WAY/SUB+1 mode using the CONFIG key (see Section 3.1). Load any of the 3-way factory presets (see Section 4.2). Initiate the edit mode with the EDIT key and page through the parameters with the SELECT keys to the LO + CH4 MODE parameter. Change this parameter to L/R. The input signal in INPUT 1 is split between OUTPUT 1

(low frequency band), OUTPUT 2 (middle frequency band), and OUTPUT 3 (high frequency band). OUTPUT 4 is a full range direct output. INPUT 2 is not used. See Figure 11 for a stereo 3-way system with stereo subwoofers.

To set up the unit for a mono subwoofer, change the configuration of the 4024A to the 3-WAY/SUB+1 mode using the CONFIG key (see Section 3.1). Load any of the 3-way factory presets (see Section 4.2). Initiate the edit with the EDIT key and page through the parameters with the SELECT keys to the LO + CH4 MODE parameter. Change this parameter to Mono. Now the signal from OUTPUT 1 is the sum of low frequency bands of INPUTS 1 and 2. The signals from OUTPUT 2 is the middle frequency band from INPUT 1, and the signal from OUTPUT 3 is the high frequency band from INPUT 1. OUTPUT 4 is a full range mono output of the sum of input signals into INPUTS 1 and 2. See Figure 12 for a stereo 3-way system with a mono subwoofer.

#### 4.1.3 Mono 4-Way Mode

In the 4-way mode, each output is a frequency band of the signal into INPUT 1. OUTPUT 1 is the low frequency band, OUTPUT 2 is the low-middle frequency band, OUTPUT 3 is the high-middle frequency band, and OUTPUT 4 is the high frequency band. See Figure 13 for 4-way system.

### 4.2 Preset Mode

The 4024A defaults to the preset mode upon power up. Factory preset programs have been loaded into the permanent memory of the 4024A. Each of these presets are provided for specific DTS models of loudspeakers and/or combinations of DTS models. The loudspeaker model numbers are included in the title of the preset. Each title begins with the loudspeaker model number(s) and ends with either "BRIGHT" or "NATURAL". The BRIGHT presets are equalized to have extended high and low frequencies for a bright, punchy sound. These presets would most likely be used for music applications. The NATURAL presets are equalized with the high frequencies somewhat limited for a warm, smooth sound. The presets would likely be used for speech and vocal applications. If the specific preset does not fit the application, a limited amount of equalization is accessible via the edit mode (see Section 3.1). A tailored preset can be stored without changing the factory loaded preset. To save and change the title of the tailored preset follow the storing procedure in Section 3.1.

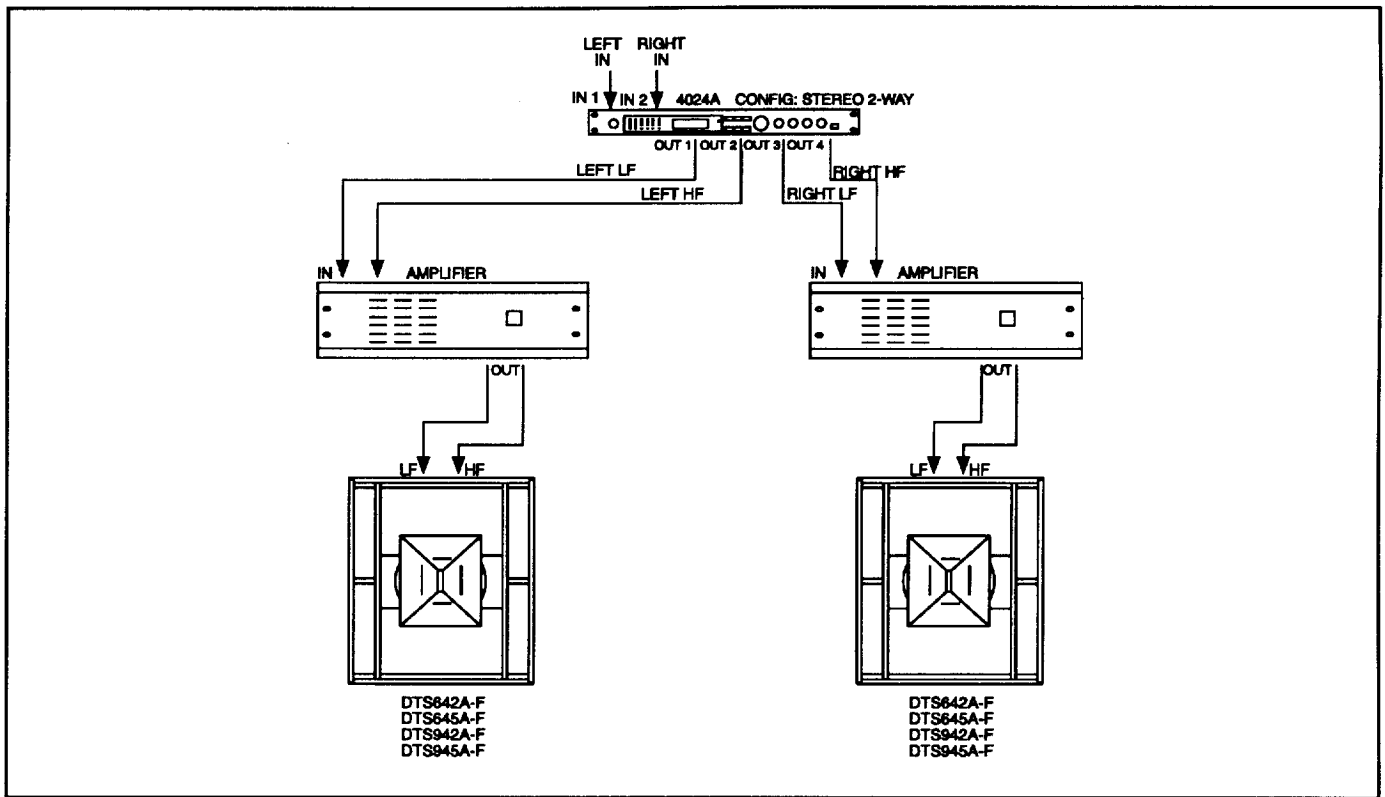


Figure 10: Stereo 2-Way Mode

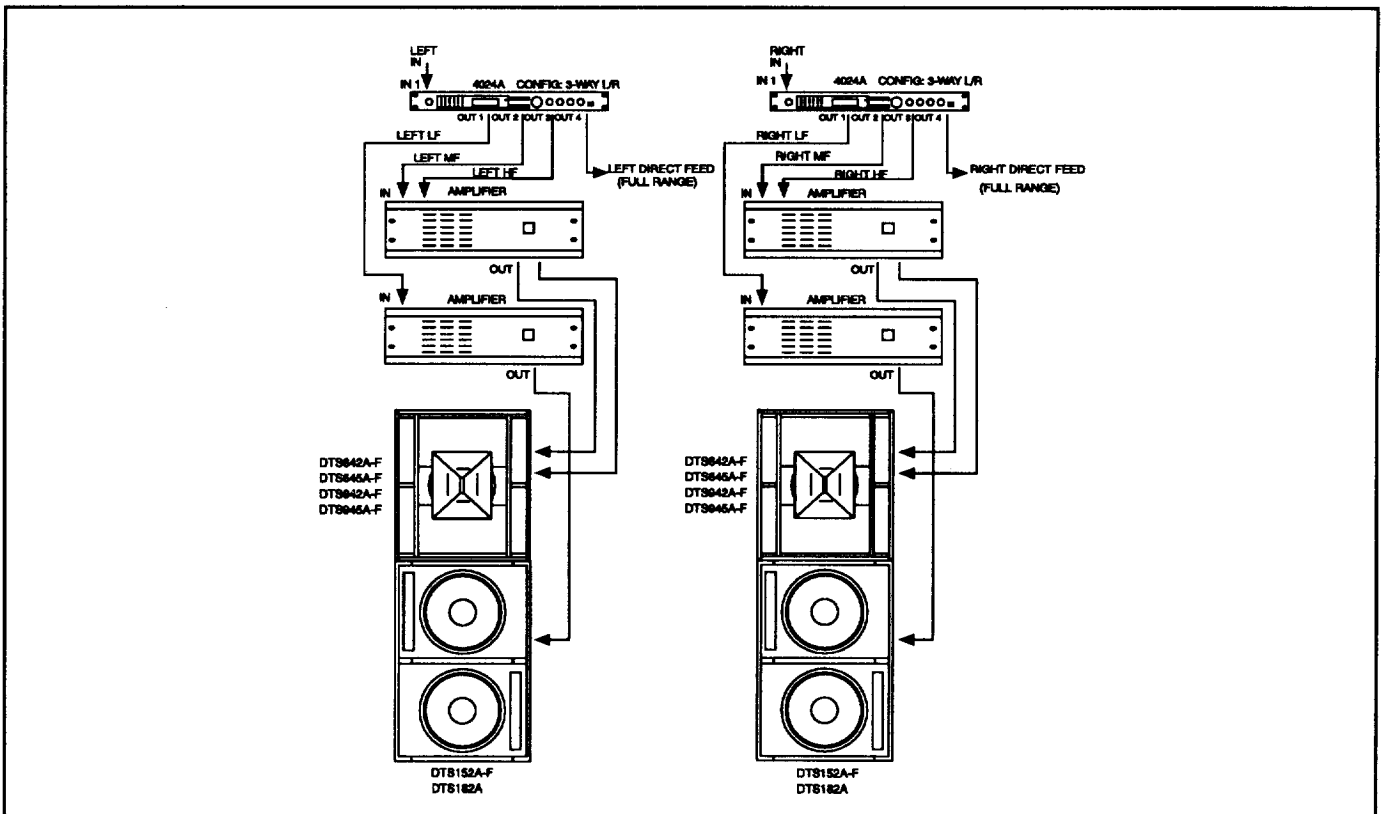


Figure 11: Stereo 3-Way Mode

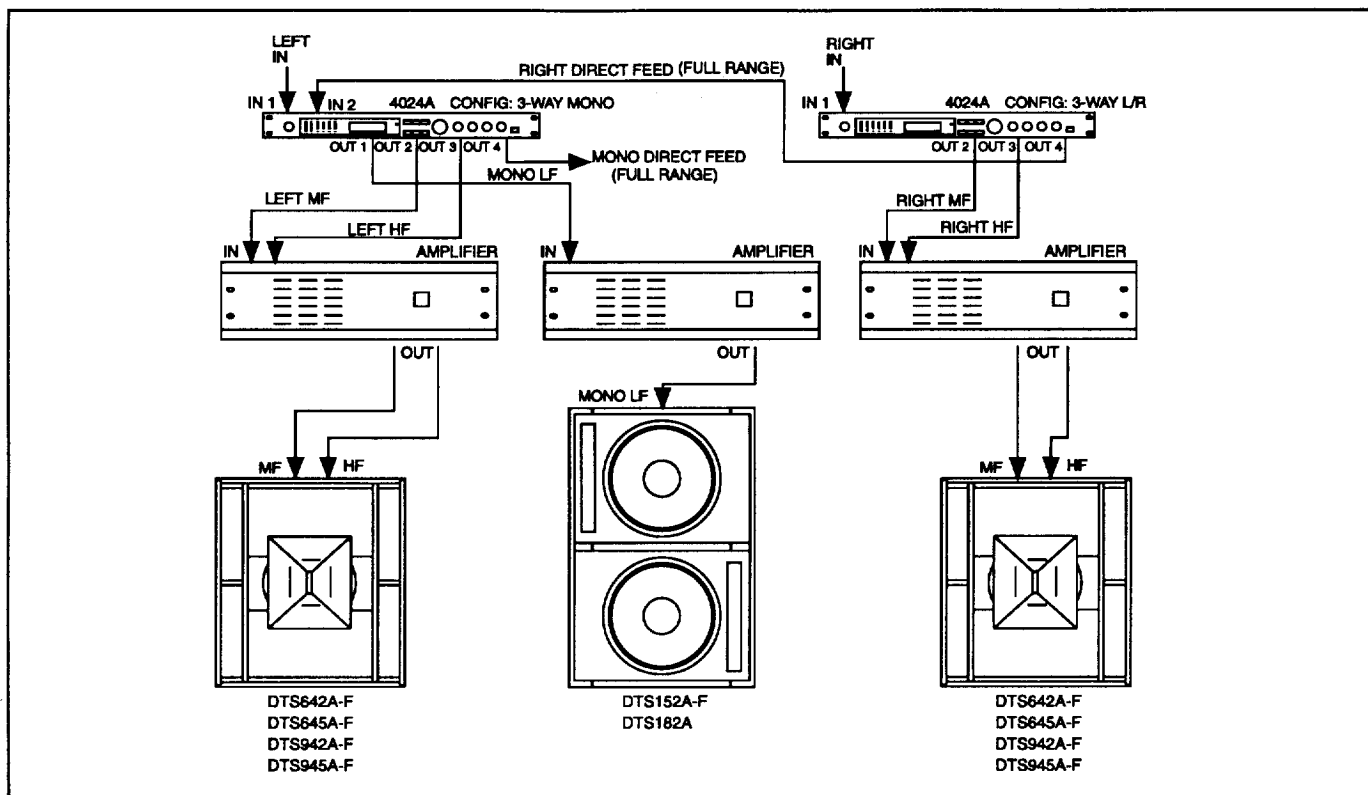


Figure 12: Stereo 3-Way with Mono Subwoofer

In the 3-Way and 4-Way presets below, the alignment delay parameters have initially been programmed for a vertically stacked aligned system with the front edges of each loudspeaker cabinet arranged along the same vertical plane. If your application does not align the DTS loudspeakers in this arrangement, the delay parameters will need to be changed. Follow the edit procedure in Section 3.1.

The factory loaded presets are listed on page 12. The title for each of the 4024A's configurations and the corresponding DTS loudspeaker(s) usable for each preset is shown. Also listed, in parentheses, beside some of the DTS loudspeakers are the corresponding contractor version loudspeakers that may be used with the same preset program.

#### 4.3 Full Edit Mode

The 4024A may be placed into the full edit mode by pressing the EDIT key upon power up and holding it until the EDIT LED flashes once. In this mode, the user has access to all parameters, so any system configuration of parameters can be set and stored. The factory stored presets cannot be changed in permanent memory, however they may be downloaded, changed, and stored into any of the eight user memory locations available in each of the unit's configurations.

### 5 INSTALLING OPTIONAL INPUT AND OUTPUT LINE TRANSFORMERS

The Model 15550A line transformer is available to provide isolation for the inputs if necessary. The Model 15560A line transformer is available to provide isolation for the outputs if necessary. Use the following procedure to install the 15550A and the

15560A line transformers. Refer to Figure 14 during this installation procedure.

1. Disconnect the 4024A from the AC power source.
2. Remove and save the ten screws securing the top cover.
3. Locate the transformer mounting areas near the rear of the unit on top of the pc board.
4. Cut the two jumpers for each transformer to be installed.
5. If installing a 15550A, insert resistor R104 for Input 1 and R204 for Input 2 in its reserved location. Use the included 6k8 Ω resistors.
6. If installing a 15560A, two electrolytic capacitors need to be bypassed for each output transformer installed. To bypass these capacitors, place a solder bridge across the pair of solder pads provided beside each capacitor. These capacitors are as follows: Output 1 -- C324 and C326; Output 2 -- C338 and C340; Output 3 -- C424 and C426; Output 4 -- C438 and C440.
7. Pressing firmly, insert each transformer into the solderless pin receptacles inside its desired mounting area. The orientation of the pin receptacles is keyed so that the transformer can be inserted in only one direction.
8. Install the top cover with the ten screws previously removed.

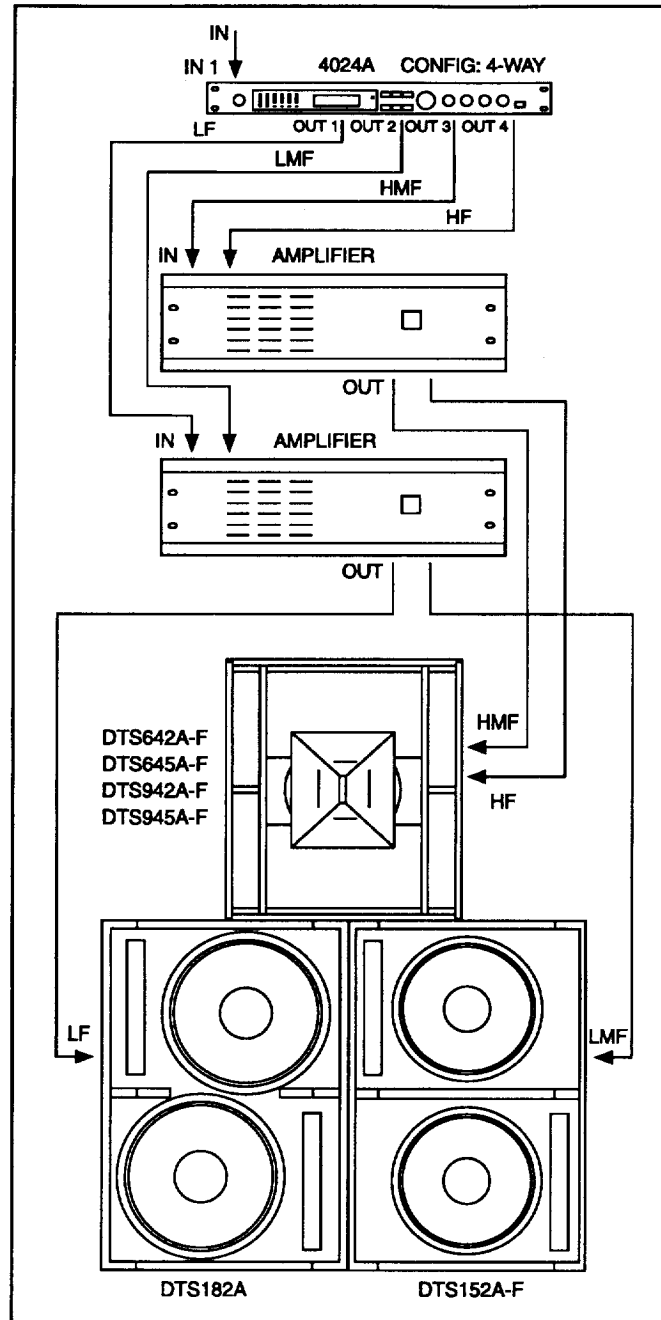


Figure 13: Stereo 4-Way Mode

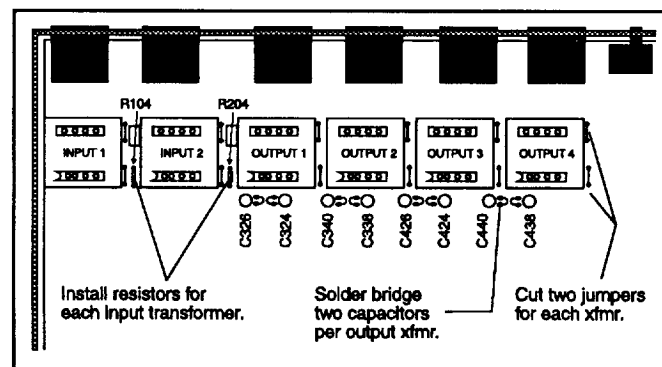


Figure 14: Installation of Optional Transformers

**6 SPECIFICATIONS**

**Testing Conditions:**

- 0 dBu = 0.775 Vrms.
- Measurements are referred to a 1 kHz, +4 dBu sine wave input signal unless otherwise noted.
- Measurement bandwidth is limited to 22 Hz to 22 kHz unless otherwise noted.
- No isolation transformers installed.
- Line voltage maintained at 120 VAC, 60 Hz.

**Frequency Response:** 20 Hz to 20 kHz, ±0.3 dB, typical.

**THD:** <0.01%, typical.  
(+4 dBu output)

**Dynamic Range:** >100 dB, typical.

**Input:**  
Number of channels: 2.  
Topology: Electronically balanced; transformer option.  
Nominal level: +4 dBu.  
Maximum level: +21 dBu.  
Input impedance: 20 kohms.  
CMRR: >70 dB, typical.  
Connector: Female XLR-3 pin type.

**Output:**  
Number of channels: 4.  
Topology: Electronically balanced; transformer option.  
Nominal level: +4 dBu.  
Maximum level: +21 dBu.  
Output impedance: 100 ohms.  
Minimum load impedance: 600 ohms.  
Connector: Male XLR-3 pin type.

**Propagation Delay:** 2 ms.

**Data Format:** 18 bit linear; 24 bit internal.

**Sampling Frequency:** 46.875 kHz.

**Internal Memory:** 24 user RAM locations (8 per configuration).

**Level indicators:**  
Input: 8 segment LED indicators including CLIP for each.  
Output: 6 segment LED indicators including CLIP for each.  
Response: No peak (600 dB/s), Slow (60 dB/s), Peak hold (600 dB/s).

**Master PEQ:**  
Frequency Response: 20 to 20,000 Hz.  
Q: 0.4 to 20.  
Gain: -12 to +12 dB (1 dB steps).

**Limiters:**  
Threshold: 0 dBu to +21 dBu (in 1 dB steps).  
Decay time: 0 to 50 dB/s (in 1 dB/s steps).  
Hold time: 0 to 100 ms (in 1 ms steps).

**Output Alignment Delays:** -10 to +10 ms (in 1 ms steps)\*\*;  
ref: Master Delay setting.

**Output Phase:** Not inverted, inverted.

**Output Level:** Off, -20 to 0 dB (in 1 dB steps).

**Master Delays (every mode):** 2 to 1000 ms (in 1 ms steps)\*\*.

**Output 4 delay (3-Way/Sub+1):** 2 to 1000 ms (in 1 ms steps)\*\*.

**Delay Unit:** ms, μs, feet, inch, meter, centimeter\*\*.

**Output 1 Parameters:**  
(Stereo 2-Way Ch 1 Lo output; 3-Way/Sub+1 Lo output; 4-Way Lo output).  
Low cut frequency: 20 to 50 Hz.  
Low cut response: Off, -6 dB/oct, -12 dB/oct, Q0.7, Q0.8, Q1.0, Q1.2, Q1.5, Q2.0\*.  
Low shelving frequency: 20 to 200 Hz.  
Low shelving gain: -12 to +12 dB (1 dB steps).  
Parametric EQ frequency: 20 to 2500 Hz (Stereo 2-Way).  
20 to 500 Hz (3-Way/Sub+1; 4-Way).  
Parametric EQ Q: 0.4 to 20.  
Parametric EQ gain: -12 to +12 dB (1 dB steps).  
Low pass frequency: 50 to 2500 Hz (Stereo 2-Way).  
50 to 500 Hz (3-Way/Sub+1; 4-Way).  
Low pass response: Off, -6 dB/oct, BS12, BT12, LZ12, BS18, BT18, BS24, BT24, LZ24\*.

**Output 2 Parameters:**  
(Stereo 2-Way Ch 1 Hi output; 3-Way/Sub+1 Mid output; 4-Way Lo-Mid output).  
High pass frequency: 50 to 2500 Hz (Stereo 2-Way).  
50 to 500 Hz (3-Way/Sub+1; 4-Way).  
High pass response: Off, -6 dB/oct, BS12, BT12, LZ12, BS18, BT18, BS24, BT24, LZ24\*.  
Parametric EQ frequency: 50 Hz to 20,000 Hz (Stereo 2-Way, 2 PEQ sections).  
0 to 5000 Hz (3-Way/Sub+1; 4-Way).  
Parametric EQ Q: 0.4 to 20.  
Parametric EQ gain: -12 to +12 dB (1 dB steps).  
Low pass frequency: 250 to 5000 Hz (3-Way/Sub+1; 4-Way).  
Low pass response: Off, -6 dB/oct, BS12, BT12, LZ12, BS18, BT18, BS24, BT24, LZ24\* (3-Way/Sub+1; 4-Way).  
High shelving frequency: 1000 to 10,000 Hz (Stereo 2-Way).  
High shelving gain: -12 to +12 dB (1 dB steps) (Stereo 2-Way).

**Output 3 Parameters:**  
(Stereo 2-Way Ch 2 Lo output; 3-Way/Sub+1 Hi output; 4-Way Hi-Mid output).  
Low cut frequency: 20 to 50 Hz (Stereo 2-Way).  
Low cut response: Off, -6 dB/oct, -12 dB/oct, Q0.7, Q0.8, Q1.0, Q1.2, Q1.5, Q2.0\* (Stereo 2-Way).  
Low shelving frequency: 20 to 200 Hz (Stereo 2-Way).  
Low shelving gain: -12 to +12 dB (1 dB steps) (Stereo 2-Way).  
High pass frequency: 250 to 5000 Hz (3-Way/Sub+1; 4-Way).  
High pass response: Off, -6 dB/oct, BS12, BT12, LZ12, BS18, BT18, BS24, BT24, LZ24\* (3-Way/Sub+1; 4-Way).  
Parametric EQ frequency: 20 to 2500 Hz (Stereo 2-Way).  
250 to 20,000 Hz (3-Way/Sub+1, 2 PEQ sections).  
250 to 10,000 Hz (4-Way).  
Parametric EQ Q: 0.4 to 20.  
Parametric EQ gain: -12 to +12 dB (1 dB steps).  
Low pass frequency: 50 to 2500 Hz (Stereo 2-Way).  
1000 to 10,000 Hz (4-Way).  
Low pass response: Off, -6 dB/oct, BS12, BT12, LZ12, BS18, BT18, BS24, BT24, LZ24\* (Stereo 2-Way; 4-Way).  
High shelving frequency: 1000 to 10,000 Hz (3-Way/Sub+1).  
High shelving gain: -12 to +12 dB (1 dB steps) (3-Way/Sub+1).

# Operating and Service Instructions for the Altec Lansing 4024A Digital Signal Processor

## Output 4 Parameters:

(Stereo 2-Way Ch 2 Hi output; 3-Way/Sub+1 Direct output; 4-Way Hi output).

- High pass frequency: 50 to 2500 Hz (Stereo 2-Way).  
1000 to 10,000 Hz (4-Way).
- High pass response: Off, -6 dB/oct, BS12, BT12, LZ12,  
BS18, BT18, BS24, BT24, LZ24\*  
(Stereo 2-Way; 4-Way).
- Parametric EQ frequency: 50 Hz to 20,000 Hz  
(Stereo 2-Way, 2 PEQ sections).  
1000 to 20,000 Hz  
(4-Way, 2 PEQ sections).
- Parametric EQ Q: 0.4 to 20 (Stereo 2-Way; 4-Way).
- Parametric EQ gain: -12 to +12 dB (in 1 dB steps)  
(Stereo 2-Way; 4-Way).
- High shelving frequency: 1000 to 10,000 Hz  
(Stereo 2-Way; 4-Way).
- High shelving gain: -12 to +12 dB (in 1 dB steps)  
(Stereo 2-Way; 4-Way).

**Remote Memory Select:** D-Sub 9-pin connector.

**Power Requirements:** 90 - 250 Vac; 50 - 60 Hz; 30 W.

**Ground Lift:** Lifts signal common from chassis ground.

## Dimensions:

- Height: 19.0 inches (48.3 cm)
- Width: 1.75 inches (4.5 cm)
- Depth: 10.9 inches (27.6 cm)

**Weight:** 8.5 lbs. (3.9 kgs).

## Included Accessories:

Rack-mount hardware kit; IEC power cord; operating instructions; (2) 6k8 ohm resistors.

## Optional Accessories:

**15550A** plug-in input isolation transformer.  
**15560A** plug-in output isolation transformer.

- \* Q0.7: Characteristic attenuated by 3 dB at low cut frequency.
- Q0.8: Characteristic attenuated by 2 dB at low cut frequency.
- Q1.0: Characteristic 0 dB at low cut frequency.
- Q1.2: Characteristic boosted by 1.5 dB at low cut frequency.
- Q1.5: Characteristic boosted by 3.5 dB at low cut frequency.
- Q2.0: Characteristic boosted by 6.0 dB at low cut frequency.
- BS12: -12 dB/oct Bessel characteristic.
- BT12: -12 dB/oct Butterworth characteristic.
- LZ12: -12 dB/oct Linkwitz/Riley characteristic.
- BS18: -18 dB/oct Bessel characteristic.
- BT18: -18 dB/oct Butterworth characteristic.
- BS24: -24 dB/oct Bessel characteristic.
- BT24: -24 dB/oct Butterworth characteristic.
- LZ24: -24 dB/oct Linkwitz/Riley characteristic.

\*\*The units in all delay parameters conform to the "DELAY UNIT" parameter.

Altec Lansing continually strives to improve products and performance. Therefore specifications are subject to change without notice.

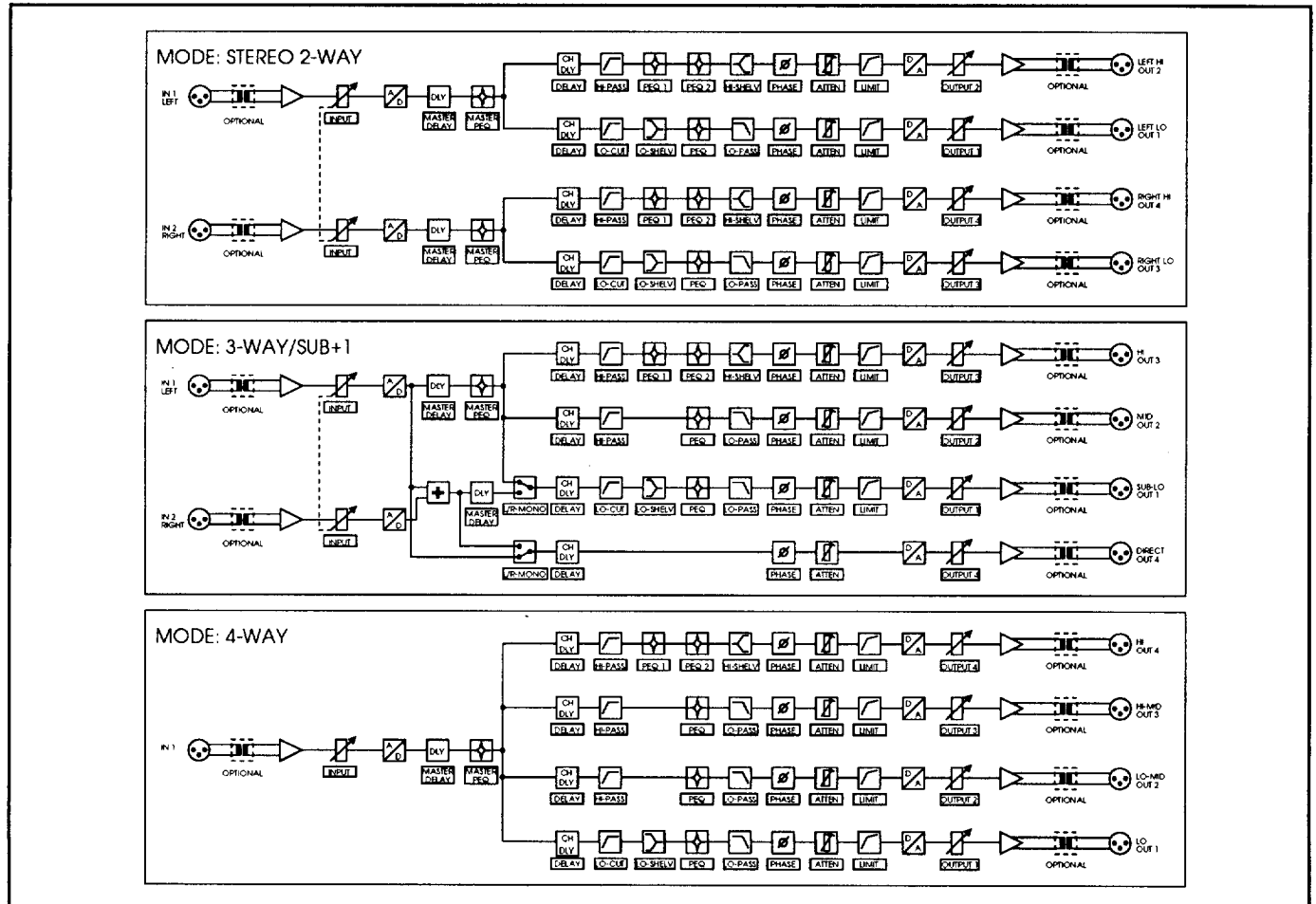


Figure 15: Block Diagram of 4024A



**4024A  
Digital Signal Processor**

**SERVICE INSTRUCTIONS**

**\*\*\*CAUTION\*\*\***

No user serviceable parts inside. Hazardous voltage and currents may be encountered within the chassis. The service information contained within this document is for use only by ALTEC LANSING'S authorized warranty stations and qualified service personnel. To avoid electric shock, DO NOT perform any servicing other than that contained in the Operating Instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.



## **7 SERVICE INSTRUCTIONS**

**CAUTION:** No user serviceable parts inside. Hazardous voltages and currents may be encountered within the chassis. The service information contained within this document is for use only by ALTEC LANSING authorized warranty stations and qualified service personnel. To avoid electrical shock **DO NOT** perform any servicing other than that contained in the Operating Instructions unless you are qualified to do so. Otherwise, refer all servicing to qualified service personnel.

**NOTE:** Modifications to ALTEC LANSING products are not recommended. Such modifications shall be at the sole expense of the person(s) or company responsible, and any damage resulting therefrom shall not be covered under warranty or otherwise.

### **7.1 Electrical**

The universal switching power supply in the **4024A** adapts to input voltages from 90 to 250 Vac 50/60 Hz. To reduce risk of fire, replace only with same type fuse.

### **7.2 In Case of Problems**

Check the following items:

1. Verify that the unit is properly connected to an AC power source and that the source is active.
2. Verify that the input connections are properly made. Refer to Figure 1.
3. Verify that the output connections are properly made. Refer to Figure 2.
4. Check the input and output cables for proper wiring and continuity.
5. Check the signal source.
6. If the following message appears after switching the unit on:  
  
*"Service Required Chng. Int. Battery"*  
  
please refer to Section 7.3 for factory service information.

**WARNING:** *User programs may be lost when the battery is low.*

### **7.3 Factory Service**

If factory service is required, ship the unit prepaid to:

ALTEC LANSING Customer Service/Repair  
10500 West Reno Avenue  
Oklahoma City, OK 73127 USA

Enclose a note describing the problem in as much detail as possible. Include other helpful information such as test conditions, where used, how used, etc.

### **7.4 Technical Assistance**

For applications assistance and/or technical information, write or call:

ALTEC LANSING Technical Assistance  
P.O. Box 26105  
Oklahoma City, OK 73126-0105 USA  
Phone: (405) 324-5311  
FAX: (405) 324-8981

## Factory Loaded Presets

### STEREO 2-WAY (Preset Titles in Italics)

*645BRIGHT* ..... used with **DTS645A-F (9864A)** loudspeaker  
*645NATURAL* ..... used with **DTS645A-F (9864A)** loudspeaker  
*642BRIGHT* ..... used with **DTS642A-F (9264A)** loudspeaker  
*642NATURAL* ..... used with **DTS642A-F (9264A)** loudspeaker  
*945BRIGHT* ..... used with **DTS945A-F (9894A)** loudspeaker  
*945NATURAL* ..... used with **DTS945A-F (9894A)** loudspeaker  
*942BRIGHT* ..... used with **DTS942A-F (9294A)** loudspeaker  
*942NATURAL* ..... used with **DTS942A-F (9294A)** loudspeaker

### 3-WAY/SUB+1 (Preset Titles In italics)

*645/152BRIGHT* ..... used with **DTS645A-F (9864A)** and **DTS152A-F** loudspeakers  
*645/152NATURL* ..... used with **DTS645A-F (9864A)** and **DTS152A-F** loudspeakers  
*642/152BRIGHT* ..... used with **DTS642A-F (9264A)** and **DTS152A-F** loudspeakers  
*642/152NATURL* ..... used with **DTS642A-F (9264A)** and **DTS152A-F** loudspeakers  
*645/182BRIGHT* ..... used with **DTS645A-F (9864A)** and **DTS182A** loudspeakers  
*645/182NATURL* ..... used with **DTS645A-F (9864A)** and **DTS182A** loudspeakers  
*642/182BRIGHT* ..... used with **DTS642A-F (9264A)** and **DTS182A** loudspeakers  
*642/182NATURL* ..... used with **DTS642A-F (9264A)** and **DTS182A** loudspeakers  
*945/152BRIGHT* ..... used with **DTS945A-F (9894A)** and **DTS152A-F** loudspeakers  
*945/152NATURL* ..... used with **DTS945A-F (9894A)** and **DTS152A-F** loudspeakers  
*942/152BRIGHT* ..... used with **DTS942A-F (9294A)** and **DTS152A-F** loudspeakers  
*942/152NATURL* ..... used with **DTS942A-F (9294A)** and **DTS152A-F** loudspeakers  
*945/182BRIGHT* ..... used with **DTS945A-F (9894A)** and **DTS182A** loudspeakers  
*945/182NATURL* ..... used with **DTS945A-F (9894A)** and **DTS182A** loudspeakers  
*942/182BRIGHT* ..... used with **DTS942A-F (9294A)** and **DTS182A** loudspeakers  
*942/182NATURL* ..... used with **DTS942A-F (9294A)** and **DTS182A** loudspeakers

### 4-WAY (Preset Titles in Italics)

*645/52/82BRTE* ..... used with **DTS645A-F (9864A)**, **DTS152A-F**, and **DTS182A** loudspeakers  
*645/52/82NTRL* ..... used with **DTS645A-F (9864A)**, **DTS152A-F**, and **DTS182A** loudspeakers  
*642/52/82BRTE* ..... used with **DTS642A-F (9264A)**, **DTS152A-F**, and **DTS182A** loudspeakers  
*642/52/82NTRL* ..... used with **DTS642A-F (9264A)**, **DTS152A-F**, and **DTS182A** loudspeakers  
*945/52/82BRTE* ..... used with **DTS945A-F (9894A)**, **DTS152A-F**, and **DTS182A** loudspeakers  
*945/52/82NTRL* ..... used with **DTS945A-F (9894A)**, **DTS152A-F**, and **DTS182A** loudspeakers  
*942/52/82BRTE* ..... used with **DTS942A-F (9294A)**, **DTS152A-F**, and **DTS182A** loudspeakers  
*942/52/82NTRL* ..... used with **DTS942A-F (9294A)**, **DTS152A-F**, and **DTS182A** loudspeakers