

MANUAL DO USUÁRIO

AUDIO DIGITAL PROCESSOR

MK-6.2PA-DSP



Por favor, leia o Manual do Usuário antes de utilizar o produto e
guarde-o para futuras pesquisas.



CUIDADO – RISCO DE CHOQUE ELÉTRICO, NÃO ABRA O APARELHO

CUIDADO: Este produto está de acordo com a regulções FCC quando os cabos selados e conectores são usados para conectar outros dispositivos. Para prevenir interferência eletromagnética com aplicativos elétricos, como rádios e televisões, utilize cabos selados e conectores próprios para ligação.

RAIO DE LUZ: alerta ao usuário sobre a presença de “voltagem perigosa” com produtos próximos, que podem causar risco de choque elétrico devido a magnitude.

PONTO DE EXCLAMAÇÃO: este símbolo alerta ao usuário da importância das instruções de operação e manutenção (serviços).

Siga todas as instruções contidas neste manual.

Limpeza: o produto precisa ser limpo apenas com um pano macio seco. Não utilize cera, materiais químicos, inseticidas, estes produtos podem corroer a estrutura externa.

Anexos: não utilize produtos anexos ao aparelho.

Líquidos: não utilize esse produto perto de compartimentos de água ou ambientes de muita umidade.

Acessórios: não instale este produto com suportes não adequados. Utilize como suporte apenas produtos recomendados pelo fabricante.

Carrinho: O produto e o carrinho devem ser movidos com extremo cuidado. Paradas fortes, força excessiva e desnivelamento do piso podem tombar o produto.

Ventilação: O produto é provido de aberturas para ventilação e evitar o super aquecimento e estas aberturas não podem ser bloqueadas. Para utilização em cases é necessário um case desenvolvido especificamente para manter a temperatura do produto dentro da conformidade de funcionamento.

Fonte de Energia: Este produto deve ser operado de acordo com a etiqueta na lateral dele. Confira a fonte de energia do ambiente antes de conectar o aparelho a fonte de energia.

Local de Instalação: sempre instale o produto em superfícies estáveis.

Longos Períodos sem Uso: O cabo de energia do aparelho deve ser desconectado da fonte de energia.

Aterramento e Polarização:

- Este produto é equipado com um cabo e plugue com corrente alternativa de polarização e com o terceiro pino adequado para aterramento, podendo ser conectado a tomada em apenas um sentido. Nunca altere o plugue é recomendado adequar a tomada para utilização do produto, por favor entre em contato com um electricista profissional.

Proteção do Cabo de Energia: Não posicione o cabo onde ele possa ser prensado, pisado ou danificado.

Antena de Aterramento Externo: Se uma antena externa ou um cabo de sistema for conectado ao aparelho certifique que eles estejam aterrados corretamente.

Relâmpados: Para prover mais segurança durante uma tempestade com relâmpagos, desligue o aparelho remova o plugue da tomada e desconecte a antena e cabos de sistema.

Linhas de Energia: A antena externa não pode ser instalada em cima de cabos de energia e similares.

Sobrecarga: não sobrecarrega as tomadas do ambiente, cabos de extensão e similares a fim de evitar riscos de fogo e choque elétrico.

IMPORTANT SAFETY INSTRUCTIONS



CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN



ATTENTION: RISQUE DE CHOC ELECTRIQUE - NE PAS OUVRIR

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE

The symbols shown above are internationally accepted symbols that warn of potential hazards with electrical products. The lightning flash with arrowpoint in an equilateral triangle means that there are dangerous voltages present within the unit. The exclamation point in an equilateral triangle indicates that it is necessary for the user to refer to the owner's manual.

These symbols warn that there are no user serviceable parts inside the unit. Do not open the unit. Do not attempt to service the unit yourself. Refer all servicing to qualified personnel. Opening the chassis for any reason will void the manufacturer's warranty. Do not get the unit wet. If liquid is spilled on the unit, shut it off immediately and take it to a dealer for service. Disconnect the unit during storms to prevent damage.

SAFETY INSTRUCTIONS

NOTICE FOR CUSTOMERS IF YOUR UNIT IS EQUIPPED WITH A POWER CORD.

WARNING: THIS APPLIANCE MUST BE EARTHED.

The cores in the mains lead are coloured in accordance with the following code:

GREEN and YELLOW - Earth BLUE - Neutral BROWN - Live

As colours of the cores in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- The core which is coloured green and yellow must be connected to the terminal in the plug marked with the letter E, or with the earth symbol, or coloured green, or green and yellow.
- The core which is coloured blue must be connected to the terminal marked N or coloured black.
- The core which is coloured brown must be connected to the terminal marked L or coloured red.

This equipment may require the use of a different line cord, attachment plug, or both, depending on the available power source at installation. If the attachment plug needs to be changed, refer servicing to qualified service personnel who should refer to the table below. The green/yellow wire shall be connected directly to the unit's chassis.

CONDUCTOR		WIRE COLOR	
		Normal	Alt
L	LIVE	BROWN	BLACK
N	NEUTRAL	BLUE	WHITE
E	EARTH GND	GREEN/YEL	GREEN

WARNING: If the ground is deficient, certain fault conditions in the unit or in the system to which it is connected can result in full line voltage between chassis and earth ground. Severe injury or death can then result if the chassis and earth ground are touched simultaneously.

ELECTROMAGNETIC COMPATIBILITY

This unit conforms to the Product Specifications noted on the Declaration of Conformity. Operation is subject to the following two conditions:

- this device may not cause harmful interference, and
- this device must accept any interference received, including interference that may cause undesired operation.

Operation of this unit within significant electromagnetic fields should be avoided.

- use only shielded interconnecting cables.

WARNING FOR YOUR PROTECTION PLEASE READ THE FOLLOWING:

KEEP THESE INSTRUCTIONS

READ ALL WARNINGS

FOLLOW ALL INSTRUCTIONS

THE APPARATUS SHALL NOT BE EXPOSED TO DRIPPING OR SPLASHING LIQUID AND NO OBJECT FILLED WITH LIQUID, SUCH AS VASES, SHALL BE PLACED ON THE APPARATUS.

CLEAN ONLY WITH A DRY CLOTH.

DO NOT BLOCK ANY OF THE VENTILATION OPENINGS. INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

DO NOT INSTALL NEAR ANY HEAT SOURCES SUCH AS RADIATORS, HEAT RESISTERS, STOVES, OR OTHER APPARATUS (INCLUDING AMPLIFIERS) THAT PRODUCE HEAT.

ONLY USE ATTACHMENTS/ACCESSORIES SPECIFIED BY THE MANUFACTURER.

UNPLUG THIS APPARATUS DURING LIGHTNING STORMS OR WHEN UNUSED FOR LONG PERIODS OF TIME.

Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or third prong are provided for your safety. If the provided plug does not fit your outlet, consult an electrician for replacement of the obsolete outlet.

Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

Use only with the cart stand, tripod bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.



Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

POWER ON/OFF SWITCH: The Power switch used in this piece of equipment DOES NOT break the connection from the mains.

MAINS DISCONNECT: The plug shall remain readily operable. For rack-mount or installation where plug is not accessible, an all-pole mains switch with a contact separation of at least 3mm in each pole shall be incorporated into the electrical installation of the rack or cabinet.

FOR UNITS EQUIPPED WITH EXTERNALLY ACCESSIBLE FUSE RECEPTACLE: Replace fuse with same type and rating only.

MULTIPLE-INPUT VOLTAGE: This equipment may require the use of a different line cord, attachment plug, or both, depending on the available power source at installation. Connect this equipment only to the power source indicated on the equipment rear panel. To reduce the risk of fire or electric shock, refer servicing to qualified service personnel or equivalent.

This equipment is intended for rack mount use only.

Introduction

0.1 Defining the *MK-6.2PA-DSP* ii

Section 1 - Getting Started

1.1 Rear Panel2
 1.2 Front Panel2
 1.3 Quick Start3

Section 2 - Editing Functions

2.1 Basic Navigation Modes..... 11
 2.2 Button Array Overview..... 11
 2.3 Navigating the EQ Section (GEQ/PEQ)..... 12
 2.4 Navigating the Subharmonic Synthesizer Section... 12
 2.5 Navigating the Crossover Section..... 13
 2.6 Navigating the Feedback Suppression Section .. 13
 2.7 Navigating the Comp/Limiter Section 14
 2.8 Navigating the Speaker Alignment Delay
 Section..... 14
 2.9 Navigating the Utility Section 15
 2.10 Navigating the Wizard Section 15

Section 3 - Operating the

3.1 Program Definition.....16
 3.2 Navigating Factory Programs.....17
 3.3 Editing Factory Programs.....18

Section 4 - Application Guide

4.1 2X6 Crossover..... 19

Appendix

A.1 Factory Reset 20
 A.2 Quick Key Options..... 20
 A.3 Specifications..... 21
 A.4 Auto EQ Optimization Tips 21
 A.5 Crossover Diagrams..... 22
 A.6 Block Diagram 23
 A.7 System Setup and Gain Structure 24
 A.8 Prog List 25

INTRODUCTION

Drive your PA to a whole new level of performance with the MK-6.2PA-DSP Complete Equalization & Loudspeaker Control System. The MK-6.2PA-DSP from the Professional Products represents a complete integration of the key elements that help ensure optimal loudspeaker system management in PA-specific applications. Capitalizing on the legendary 480 DriveRack technology, the MK-6.2PA-DSP is able to provide its user with top-tier, pro-level loudspeaker management specifications, yet still remain appealing to the budget-conscious audiophile who requires a tried and true utilitarian workhorse. With its all-inclusive, no-compromise design, the MK-6.2PA-DSP has been systematically developed and designed to grow with your system needs for years to come.

0.1 Defining the MK-6.2PA-DSP

The MK-6.2PA-DSP is the most effective way to manage all aspects of Loudspeaker management for Public Address system applications. The MK-6.2PA-DSP essentially becomes the only device that you will need between the mixer and the power amps. The following are just some of the features of the MK-6.2PA-DSP

MK-6.2PA-DSP features:

- **Stereo Feedback Elimination with 12 feedback notch filters**
- **Dual 28-band Graphic EQ**
- **Classic Compressor**
- **120A Sub-harmonic Synthesizer**
- **2x3, 2x4, 2x5, 2x6 Crossover Configurations**
- **Stereo Multi-band Parametric EQ**
- **Stereo Output Limiters**
- **Alignment Delay**
- **Pink Noise Generator**
- **Auto-EQ with 28-Band RTA**
- **Speaker and Power Amp Tunings with Setup Wizard**
- **25 User Programs / 25 Factory Programs**
- **2 Channel XLR Input and 6 Channel XLR Output**
- **Front panel RTA-M XLR input with phantom power**
- **24-Bit ADC/24-Bit DAC, >110 dB Dynamic Range**
- **TypeIV® Conversion System**
- **Full Graphic LCD Display**

By including every form of processing necessary to drive the signal from the mixer to the power amp, the MK-6.2PA-DSP allows you to eliminate all other processing devices normally found in large and cumbersome traditional drive rack systems of the past.

The MK-6.2PA-DSP Loud Speaker Management System includes two balanced XLR inputs, as well as six balanced XLR output connectors.

1.1 Rear Panel Connections



IEC Power Cord Receptacle

The MK-6.2PA-DSP comes with a power supply that will accept voltages ranging from 100V-120V at frequencies from 50Hz-60Hz. An IEC cord is included. EU version accepts 220V-240V at frequencies from 50Hz-60Hz.

Outputs 1-6

The output section of the MK-6.2PA-DSP offers six electronically balanced XLR connectors.

Inputs 1-2

The input section of the MK-6.2PA-DSP offers two electronically balanced XLR connectors.

+4/-10dBv Switch

This switch changes the level from either +4 or -10dBv.

Ground Lift Switch

The ground lift switch lifts the pin 1 chassis ground of both input XLR connectors.

1.2 Front Panel



RTA Input Jack

This balanced XLR input is used for the connection of an RTA microphone, which allows the user to “Pink” and optimize the EQ settings of any room through the use of the Auto EQ in the Wizard setup assistant.

RTA MIC Input Selector

Pressing the RTA MIC input button will engage the front panel RTA input XLR connector.

Data Wheel

The Data wheel of the MK-6.2PA-DSP is used to scroll through the program menu, load programs, select parameters and edit parameter values.

LCD Display

The backlit LCD display of the MK-6.2PA-DSP provides the user with all of the vital processing information of the MK-6.2PA-DSP including: signal routing, effect block editing and Wizard Setup functions. The display will also notify the user if any internal clipping is taking place within the unit. The following message will appear: **CLIP**.

Function Buttons

The function buttons of the MK-6.2PA-DSP allow direct access to all editing and navigating functions of the MK-6.2PA-DSP. The functions of the aforementioned buttons are as follows:

- <PREV PG> - is used to navigate back through the various pages of any module block.
- <NEXT PG> - is used to navigate forward through the various pages of any module block.
- <EQ> - is used to move to the EQ modules. Successive presses will move you through the EQ modules in the input section and through EQ modules located in the output section.
- <SUBHARMONIC> - This button is used to move to the Subharmonic Synthesizer module.
- <XOVER> - is used to move to the Crossover module.
- <FEEDBACK> - is used to move to the feedback elimination module.
- <COMP/LIMITER> - is used to move to the Compressor or Limiter modules.
- <DELAY> - is used to move to the Delay module.
- <PROGRAM> - is used to enter program mode when pressed.
- <UTILITY> - is used to access the the Utility menu.
- <STORE> - is used to store any program changes.
- <WIZARD> - is used to enter the Wizard section which includes: SYSTEM SETUP, AUTO EQ WIZARD and AFS WIZARD.

Input Meters

The MK-6.2PA-DSP provides the user with two independent six segment Lightpipe™ input meters that range from -30 to +20 dBu. These meters monitor the signal level right after the input module.

Threshold Meters

The threshold meters indicate that the threshold level has been exceeded within the Limiter section, and gain reduction may be taking place within the specific output channel.

Output Meters

The MK-6.2PA-DSP provides the user with six independent six-segment Lightpipe™ output meters that range from -30 to +20 dBu.

Power Switch

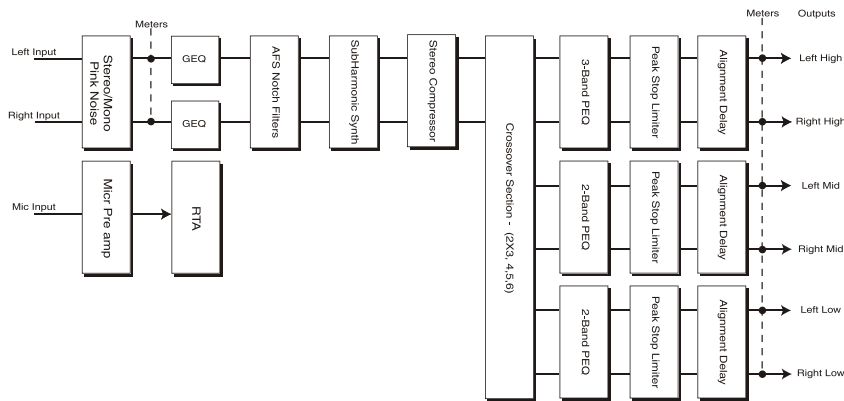
The Power Switch turns the MK-6.2PA-DSP on and off. **Note:** MAK Professional Products strongly recommends that power amplifiers connected to the MK-6.2PA-DSP, should be powered down prior to cycling the power on the MK-6.2PA-DSP.

1.3 Quick Start

For those of you that wish to jump right in, the following information has been provided to act as a quick start guide for optimizing performance of the MK-6.2PA-DSP.

Signal Path Block Diagram

The following diagram shows the logical and intuitive signal path of the input, effect modules, and output of the MK-6.2PA-DSP



Connections

- When setting up the MK-6.2PA-DSP, make connections as follows:
- Always make connections prior to applying power to the unit.
- Connect the output from the sending device (mixer) to either of the two XLR inputs connectors shown below.
- Make output connections from any one of the six output XLR connectors shown below to the input of the selected power amps.



- If you will be “pinking” the room through the use of the RTA, connect the selected RTA microphone to the front-panel XLR input, and press the RTA input button.
- **IMPORTANT-** It is imperative that the power amps are turned off prior to cycling power to the **MK-6.2PA-DSP**. Always make sure that your power amps are the last item turned on and the first turned off.

Once all of the connections have been made and the unit is powered up, you can navigate through the entire signal path of the MK-6.2PA-DSP from the front panel of the unit. The display provides you with a clear and concise overview of each aspect of the signal path from the input to the output section.



The features of the front panel of the MK-6.2PA-DSP are as follows from left to right.
RTA MIC Input- This XLR input is used for the connection of a RTA microphone.

The RTA MIC input button is used to engage the RTA input connector. **LCD Display**- All operational information of the MK-6.2PA-DSP is displayed here. The display will also notify the user if any internal clipping is taking place within the unit. The following message will appear: **CLIP**. **Data Wheel** - The data wheel is used to scroll through the program menu of the MK-6.2PA-DSP. The Data Wheel is also used to perform editing functions to effects and utility menu features. **Button Array** - Operational editing is done using this 12 button array. A complete description of each button's functionality is listed below. **Input meters**- These two 6-segment LED meters monitor the input level of the MK-6.2PA-DSP directly after the input mixer. **Output meters** - These six 6-segment meters monitor the output levels of the MK-6.2PA-DSP directly after the output gain stage. **Threshold meters** - These six 1-segment meters (when lit) show that threshold level of the limiters has been exceeded.



MK-6.2PA-DSP Wizard

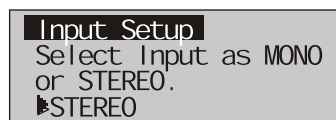
Now that you have made all of your audio connections and have made yourself familiar with the front-panel navigation of the unit, you can easily optimize your system through the use of the MK-6.2PA-DSP Wizard setup system. This feature of the MK-6.2PA-DSP allows for quick and hyper-accurate venue setups. The menu section of the Wizard offers System setup, Auto EQ and AFS (Advanced Feedback Suppression). The following will walk you through your venue setup.

- From program mode, press the **<WIZARD>** button and the display will appear as follows:



System Setup

- The arrow will indicate the selected Wizard setup. To select any one of the three options, rotate the **<DATA>** wheel. If you are performing the System setup, press either the **<NEXT PG>** button or the **<DATA>** wheel and the display will appear as follows:




- Simply rotate the **<DATA>** wheel to select either a Mono or Stereo input configuration. Once you have selected your input option, press the **<NEXT PG>** button and the display will appear as follows:

Graphic EQ Setup
 Select GEQ as Dual
 Mono or Stereo
 ▶Dual Mono

- Simply rotate the **<DATA>** wheel to select either a Dual Mono or Stereo linked 28-band Graphic EQ. Once you have selected your EQ option, press the **<NEXT PG>** button and the display will appear as follows:

Main Speaker
 Select Main PA 
 JBL SRX
 ▶SR4702X Passive

- Rotate the **<Data>** wheel to select any one of the numerous custom-tuned MAIN speaker options available. If the speaker being used is not specified in the menu, select CUSTOM. Once you have selected your Main speaker option, press the **<NEXT PG>** button and the display will appear as follows:

Sub Speaker 
 Select Sub PA
 ▶None


- Rotate the **<Data>** wheel to select any one of the numerous custom-tuned SUB speaker options available. Once you have selected your SUB speaker option, press the **<NEXT PG>** button and the display will appear as follows:

High Amplifier
 Select an amplifier
 ▶Crwn MacroTech 1202

- You are now prompted to select a power amp by rotating the **<DATA>** wheel to select any one of the numerous custom-tuned Amplifier options available. Note that the top line of the display will either read High, Mid or Low depending on your selected speaker setup selections. Once you have selected your Amp tuning option (depending on the amp type), you will select the specified amplifier sensitivity setting if applicable.

High Amplifier
 Select Sensitivity
 Crwn MacroTech 1202
 ▶0.775 Volts

- Rotate the **<DATA>** wheel to select the amplifier manufacturer's specified amplifier sensitivity setting. Once set, press the **<NEXT PG>** button, and you will now be given the option of optimizing your amp levels with the DriveRack PA. The page will appear something like this:

High Amp Level
 Adjust level
 same as your amp 
 ▶25

- You will now rotate the **<DATA>** wheel to match the same setting as your amplifier of choice. Note that based on your amp selection, the MK-6.2PA-DSP will initially display the recommended setting of that particular amp for obtaining maximum headroom. This is done to match unity gain from the MK-6.2PA-DSP and your amplifier. Note that if Sub Speakers are included in the speaker selection, you will be asked if the sub woofer is bridged or mono. For more information regarding Amplifier gain settings, please refer to the *System Setup and Gain Structure* information located in the appendix section.
- Once you have completed your amp level settings, you will press the **<NEXT PG>** button, where you will be asked to select a bridged or normal setting for your low amp (if used). The display will appear as follows:

```

Low Amp Bridging
Select
same as your amp
▶Normal
  
```

- Once you have made a bridged or mono selection, press the **<NEXT PG>** where the unit will prompt **<DATA>** wheel to load your new settings. If you do not wish to load the settings either press the **<PROGRAM>** button or use the **<PREV PG>** button to re-edit your settings. By using your selections, the MK-6.2PA-DSP will automatically generate a new program and speaker selection which are used to choose the correct crossover type, parameters, speaker compensation EQ and delay are also adjusted by the speaker selection. Amplifier parameters are used to set the limiters to stop amplifier clipping and balance out the crossover levels. You may find that you want to re-adjust the crossover levels based on your taste and type of music.

Auto EQ WIZARD

- Once you have custom-tailored your system setup, you can now proceed to EQ your system. The Auto EQ Wizard automatically adjusts the response of the system by producing pink noise and adjusting the Graphic EQ until the RTA matches a selected response. From the MK-6.2PA-DSP Wizard menu, rotate the **<DATA>** wheel until the display appears as follows:

```

DriveRack PA WIZARD
System Setup
Auto EQ WIZARD
AFS WIZARD
  
```

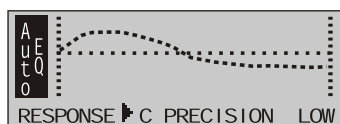
- Either press the **<NEXT PG>** button or rotate the **<DATA>** wheel and the display will read:

```

Auto EQ
Connect mic to RTA
input. Press RTA
input button.
  
```

- The display is prompting you to connect an RTA-specific microphone to the front-

panel RTA XLR input, and press the **<RTA Input>** button. It is recommended that you use the optional **MAKRTA-M** microphone. If you wish to bypass the previous steps all together, from program mode, press the **<RTA Input>** button, or press the **<NEXT PG>** button and the display will appear something like this:



- You can now select any one of the several different Frequency responses for the Auto EQ. The options are: Flat (0), and Response A-D, and Low, Medium and High Precision. Once you have selected your desired EQ Frequency response, press the **<NEXT PG>** button and the display will appear as follows:



- You will now proceed to “Pink” the room by adjusting the Pink level. The range of bar graph is -30dBu to +20dBu. Be certain to raise the pink noise level to the level to be used during the performance. Once the Pink level has been adjusted to the desired volume, press the **<NEXT PG>** button and the Auto EQ sequence will begin. The display will either show the graphic EQ or the RTA. Rotating the **<DATA>** wheel clockwise and counter clockwise will toggle between the two modes. You can also select either mode to default to in the Utility menu. Regardless, the display will appear something like this:



- At this point, the **MK-6.2PA-DSP** will automatically EQ the room. If you are using independent left and right graphic EQs, you will auto EQ each side independently. If you are using a stereo-linked EQ, both sides will be EQ'd simultaneously. Auto EQ can be aborted at any point in the process by pressing the **<NEXT PG>** button. Upon completion of the Auto EQ Wizard, you can return to program mode by releasing the **<RTA Input>** button and pressing the **<PROGRAM>** button.

For more information regarding the Auto EQ section, please refer to the Auto EQ Optimization Tips information located in the Appendix section.

AFS WIZARD

- The **MK-6.2PA-DSP** also offers its exclusive AFS (Advanced Feedback Suppression) module. This unique feature now makes unwanted feedback in a PA system a thing of the past. The AFS Wizard will lead you through the setup of of the fixed filters of the AFS module. From **MK-6.2PA-DSP** Wizard menu, rotate the **<DATA>** wheel until the display appears as follows:

```

DriveRack PA WIZARD
System Setup
Auto EQ WIZARD
AFS WIZARD

```

- Press the **<NEXT PG>** button and the display will read:

```

AFS
Please turn down the
mixer gain. Press
NEXT PG when done.

```

- Once the gain level of the mixer has been turned down, press the **<NEXT PG>** button and the display will read:

```

AFS
Select Number of
fixed filters. ▶ 6
F F F F F L L L L L L

```

- You will now use the **<DATA>** wheel to select the number of fixed filters. This will range from values 0-12. The total number of filters will stay at 12, and the number of live filters will be = Total Num Filters – Num Fixed. Live and Fixed filter types differ in that FIXED mode filters are automatically assigned to a frequency creating feedback, thus remaining at that frequency until cleared by the user. In LIVE mode, live filters automatically detect and remove feedback frequencies in the presence of audio (music or speech). When all of the live filters have been used, they begin to round robin. Essentially this means that the first filter set is replaced where a new feedback is detected and notched out. This mode is useful because feedback frequencies may change as the microphone is moved, and/or as the characteristics of the venue change.

The Fixed/Live filter usage will be indicated at the bottom of each page of the feedback elimination effect. 'F' indicates an available fixed filter, and 'L' indicates an available live filter. A blocked out F or L indicates a filter that is set, or in use. Once the desired number has been selected, press the **<NEXT PG>** and the display will read:

```

AFS
Select fixed type
▶ Speech

```

- These types pertain to the Q, sensitivity, and algorithm type. The filter is established by using the formula: $Q = \text{Freq} / \text{Bandwidth}$. This means that a higher Q will produce a filter that is more narrow. Values are: Speech (Bandwidth = 1/5 octave and $Q=7.25$) Music Low (Narrow notch filter, Bandwidth = 1/10 octave and $Q=14.5$), Music Medium (Very Narrow notch filter, Bandwidth = 1/20 octave and $Q=29$) Music High (Ultra Narrow notch filter, Bandwidth = 1/80 octave and $Q=116$). To guarantee that feedback is suppressed at lower frequencies, the AFS may place wider notch filters at these lower frequencies (below 700 Hz). Once the desired fixed

type has been selected, press the **<NEXT PG>** button and the display will read:

```
Slowly Increase the  
mixer gain to  
desired level.  
F F F F F L L L L L L
```

- You are now prompted to raise the output gain of the mixer to the level of the performance. Note that you are raising the mixer gain without an input signal running through the mixer. Once the desired level has been set and all of the fixed filters have been assigned, the unit will automatically move you to the page that indicates the fixed filter setup has been completed. If you have reached the performance level setting and all of the fixed filters have not been used, you may want to return to the page that selects the number of fixed filters and re-adjust the number of fixed in order to provide you with additional live filters. Regardless, once you have completed the setup, the display will read:

```
AES  
Fixed Filter Setup  
Done  
F F F F F L L L L L L
```

- To return to program mode, simply press the **<PROGRAM>** or **<NEXT PG>** button. For more information regarding feedback elimination, please see the AFS parameters of the Detailed parameters section.

Editing
Functions

The has been carefully designed and engineered to ensure that all aspects of operation are intuitive and logical. Simply stated, the DriveRack® PA operating system was designed with user's best interest in mind.

2.1 Basic Navigation Modes

Navigational aspects of the MK-6.2PA-DSP are clear, concise and more important: flexible. The MK-6.2PA-DSP provides you with essentially three different modes of navigation when performing program edits. **1. FX buttons** - This array of 12 FX buttons is your primary mode of directly accessing any effect module. **2. NEXTPG & PREVPG** page buttons - Successive presses of the **NEXTPG** or **PREVPG** page buttons will move the user from one page to the next in an effect block. **3. Data Wheel** - The Data Wheel is used to move through the program menu of the MK-6.2PA-DSP. The Data wheel is also used to change the values of the selected parameter by simply rotating the wheel. Pressing the Data wheel will toggle between the available parameters on any selected page of the currently selected effect module.

2.2 FX Button Array Overview



PREVIOUS PAGE - Moves to the previous page in the currently selected effect menu.



NEXT PAGE - Moves to the next page in the currently selected effect menu.



EQ - Selects the EQ effect menu. This is the EQ section located prior to the crossover section. Successive presses will rotate through the various pre-crossover 28 band EQ and Post-xover PEQ section modules.



SUBHARMONIC - Selects the Subharmonic Synthesizer section.



XOVER - Selects the Crossover section.



FEEDBACK - Selects the Advanced Feedback Suppression (AFS) effect section.



COMP/LIMITER - Selects the Compressor and the Limiter effect section. Successive presses will move from the Compressor (pre-xover) to the Limiter (post-xover).



DELAY - Selects the Alignment Delay effect module.



PROGRAM - This button is used to enter the Program screen from any sub section within the unit when pressed.



UTILITY - Selects the Utility menu of the MK-6.2PA-DSP.



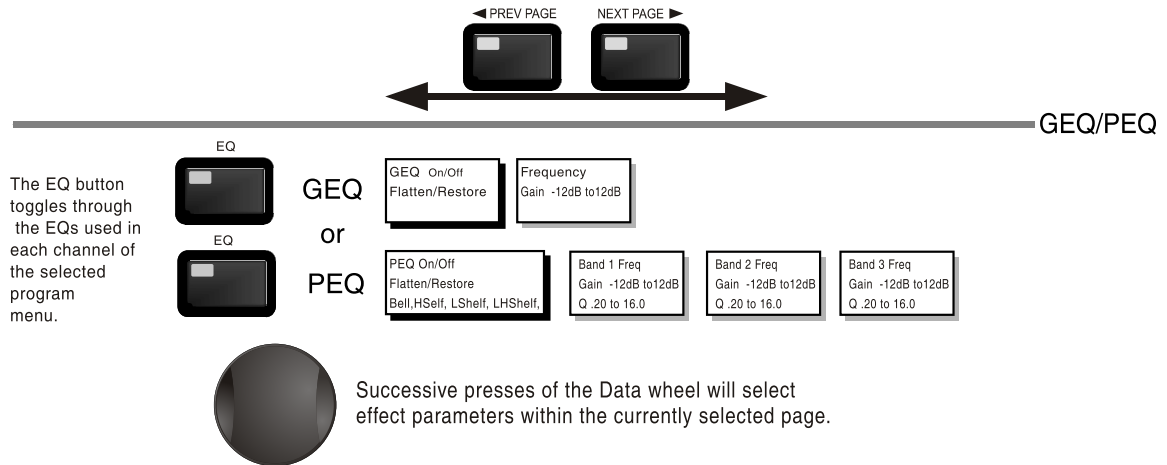
STORE - The store button is used to store program edits.



WIZARD - Enters the MK-6.2PA-DSP Wizard setup menu which includes: System Setup, Auto EQ setup and AFS Wizard.

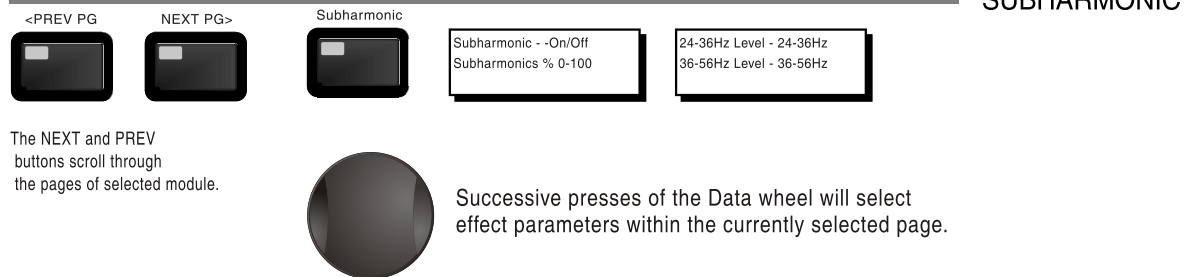
2.3 Navigating the EQ Section (28-GEQ and PEQ)

To edit the parameters of the EQs used in a selected program, simply use the following procedure. From program mode, press the EQ button to reach the EQ module to be edited. Successive presses of the EQ button will move through each channel. Navigate through the Pages of the selected EQ section by depressing "Next Page" or "Prev Page" successively until arriving at the desired Page.



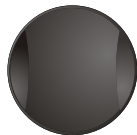
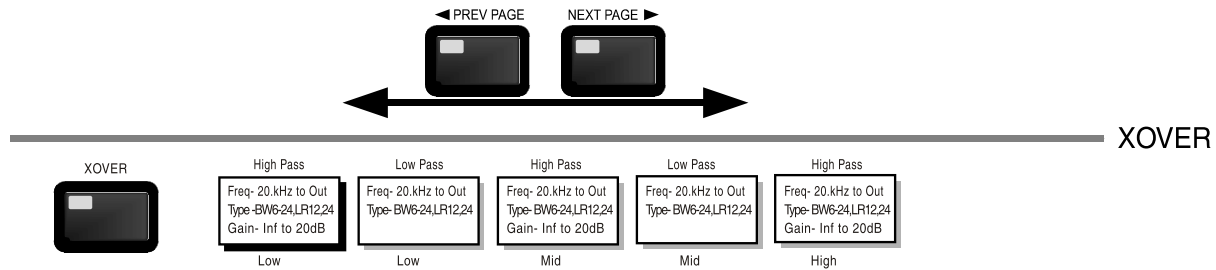
2.4 Navigating the Subharmonic Section

From program mode, press the SUBHARMONIC button. Pressing the Data Wheel will select the effect parameter to be edited.



2.5 Navigating the XOVER Section

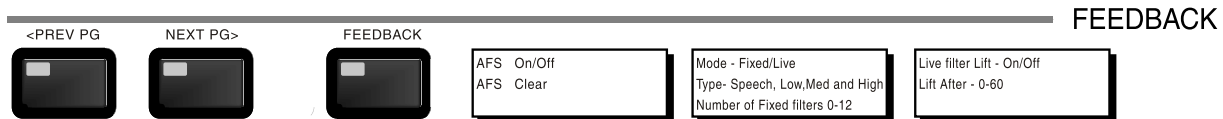
To edit the parameters of the Crossover used in a selected program, simply use the following procedure. From program mode, press the X-OVER button. Once you have reached the Crossover module, Navigate through the Pages of the selected Crossover module by pressing the "Next Page" or "Prev Page" buttons successively until arriving at the desired Page.



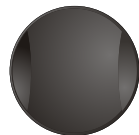
Successive presses of the Data wheel will select effect parameters within the currently selected page.

2.6 Navigating the Feedback Suppression Section

From program mode, press the FEEDBACK button. Pressing the Data Wheel will select the effect parameter to be edited.



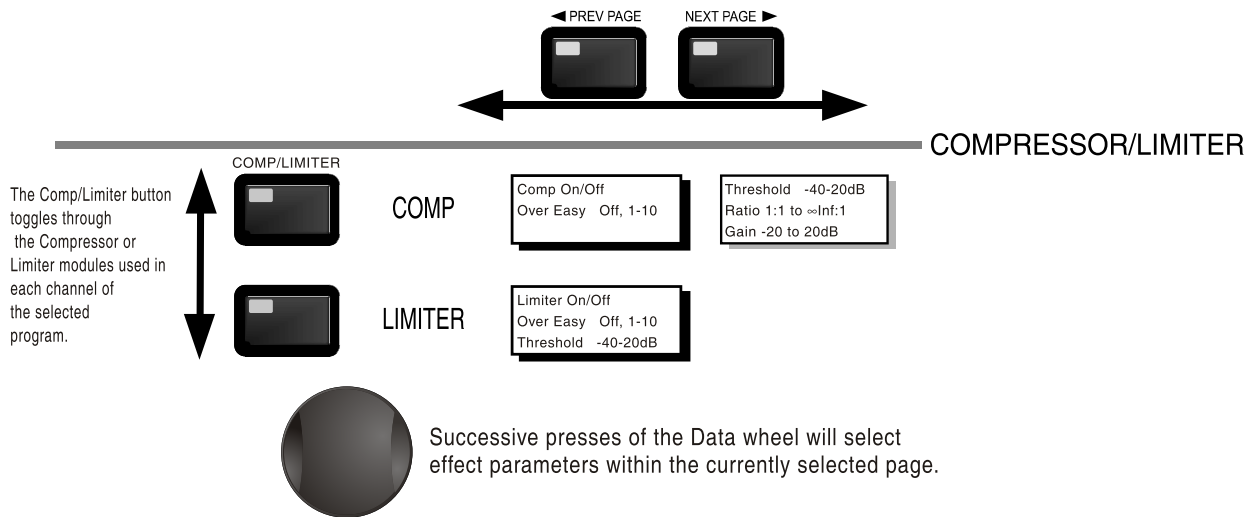
The NEXT and PREV buttons scroll through the pages of selected module.



Successive presses of the Data wheel will select effect parameters within the currently selected page.

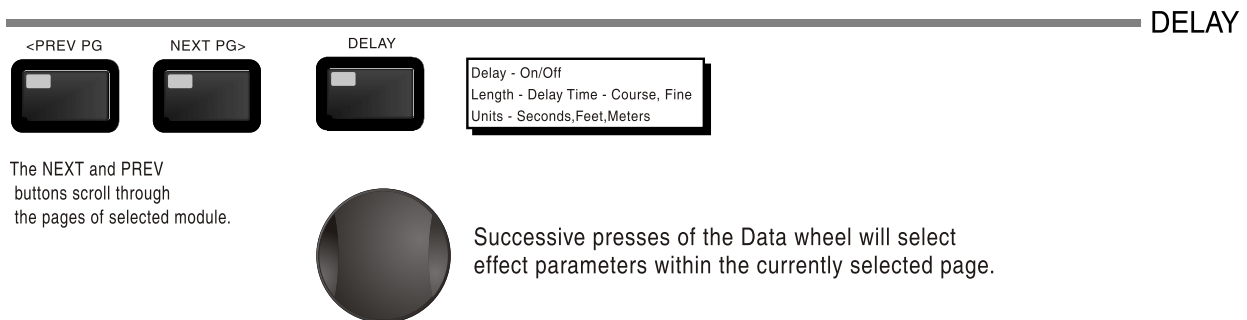
2.7 Navigating the Comp/Limiter Section

From program mode, press the comp/limiter button to move to either the Compressor or Limiter module. Once you have reached the Crossover module, successive presses of COMP/LIMITER button will move through each channel that utilizes either a Compressor (pre Crossover) or Limiter (post-crossover) module. Navigate through the Pages of the selected compressor or Limiter module by pressing the "Next Page" or "Prev Page" buttons successively until you arrive at the desired Page.



2.8 Navigating the Delay Section

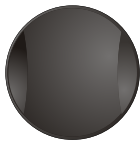
From program mode, press the Delay button. Pressing the Data Wheel will select the effect parameter to be edited.



2.9 Navigating the Utility Section

From program mode, press the UTILITY button. Pressing the Data Wheel will select the effect parameter to be edited.

UTILITY

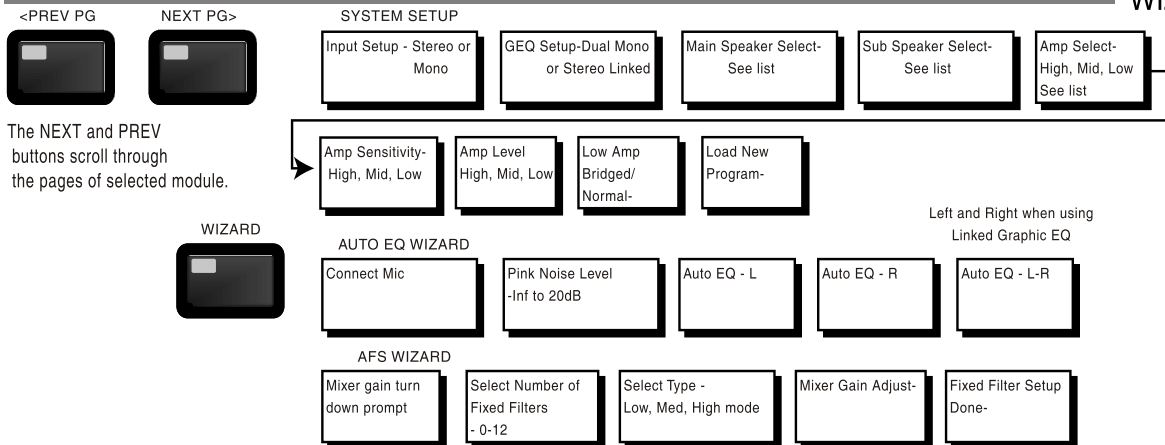


Successive presses of the Data wheel will select effect parameters within the currently selected page.

2.10 Navigating the Wizard Section

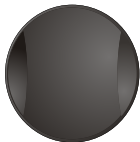
From program mode, press the WIZARD button. Pressing the Data Wheel will select the effect parameter to be edited.

WIZARD



The NEXT and PREV buttons scroll through the pages of selected module.

Left and Right when using Linked Graphic EQ



Successive presses of the Data wheel will select effect parameters within the currently selected page.

The Operation section of the MK-6.2PA-DSP will be your key to successful navigation of the operation of the MK-6.2PA-DSP. The following information provides descriptions about program functions and operating functions of the MK-6.2PA-DSP.

3.1 Program Definition

The first step in understanding the thorough programming capabilities of the MK-6.2PA-DSP is to understand the elements involved, that when combined, define a complete “program.” Within an individual program, there are several levels of editing that make up the complete program. After turning the unit on, you will be at the “program” mode level. This level supplies the user with current program information such as: current signal path, effect usage, and program name. From this point, the MK-6.2PA-DSP gives you the option of entering subsequent levels of operation that are dedicated to program editing. The Utility menu mode is accessed via the utility menu, and is not part of a single program.

3.2 Navigating Factory Programs

From the factory, the MK-6.2PA-DSP is shipped with 25 factory programs that utilize carefully constructed routing configurations that have been designed to accommodate virtually any sound reinforcement and installation application. The factory programs offer a clear and concise explanatory title to help get you up and running in a timely manner. These programs can also be used as templates or starting points for the user to create custom programs.

Selecting Programs:

The quickest way to get up and running with the MK-6.2PA-DSP is to use any one of the factory programs that are available in the box. When you reach the factory program, a FACT icon will appear above the factory program name. From program mode, use the <DATA> wheel to scroll through the various programs. As each factory program is selected, the display will clearly indicate the title that is directly related to a specific application. Once a program is selected, press the <DATA> wheel to load the program. The display will appear something like this:



FACT

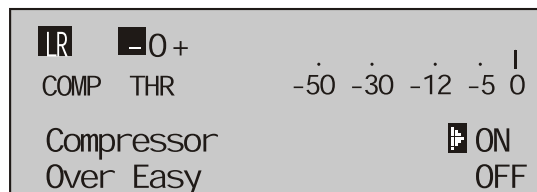
Navigation Modes

The function buttons of the MK-6.2PA-DSP allow direct access to all editing and navigating functions of the MK-6.2PA-DSP. The functions of the aforementioned buttons are as follows:

- <PREV PG> - is used to navigate back through the various pages of any module block.
- <NEXT PG> - is used to navigate forward through the various pages of any module block.
- <EQ> - is used to move to the EQ modules. Successive presses will move you through the EQ modules in the input section and through EQ modules located in the output section.
- <SUBHARMONIC> - This button is used to move to the Subharmonic Synthesizer module.
- <XOVER> - is used to move to the Crossover module.
- <FEEDBACK> - is used to move to the feedback elimination module.
- <COMP/LIMITER> - is used to move to the Compressor or Limiter modules.
- <DELAY> - is used to move to the Delay module.
- <PROGRAM> - is used to enter program mode when pressed.
- <UTILITY> - is used to access the the Utility menu.
- <STORE> - is used to store any program changes.
- <WIZARD> - is used to enter the Wizard section which includes: SYSTEM SETUP, AUTO EQ WIZARD and AFS WIZARD.

3.3 Editing Factory Programs

Once you have reached the module that you wish to edit, simply use the <PREV PG> and <NEXT PG> buttons to move through the pages within the module. The <DATA> wheel is used to edit parameter values. The following illustration shows an example of the Comp module in edit mode:



Note that the arrow indicates the currently selected parameter for editing. To select parameters to edit from the current page, simply press the <DATA> wheel until the arrow is pointing to the parameter that you wish to edit.

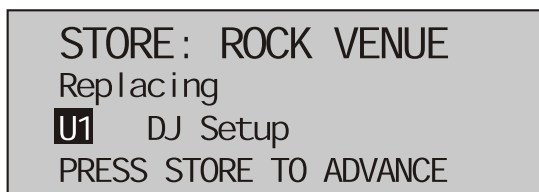
Once you are satisfied with the changes that have been made to a factory or user program, the MK-6.2PA-DSP allows you to save these changes as a custom USER program by pressing the <STORE> button, and the display will appear as follows:

```

NAME : ROCK VENUE
DATA - SELECTS CHAR
PREV/NEXTPG - LEFT/RIGHT:
PRESS STORE TO ADVANCE

```

- Rotating the **<DATA>** wheel will change the icons on the currently selected position.
- Pressing the **<DATA>** wheel will toggle between upper and lowercase letters, numbers or symbols.
- Use the **<PREV PG>** and **<NEXT PG>** button to move icon positions.
- Once the desired title has been written, press the **<STORE>** button again and the display will now appear something like this:



STORE: ROCK VENUE
Replacing
U1 DJ Setup
PRESS STORE TO ADVANCE

- Rotate the **<DATA>** wheel to select the program to be replaced and press the **<STORE>** button and the existing program will be replaced with the new program.

The MK-6.2PA-DSP will store 25 user programs in addition to the 25 factory programs. Note: Factory programs cannot be over-written. When storing changes to a Factory program, you must replace an existing User program.

This Application guide section is provided to offer suggested installation applications of the MK-6.2PA-DSP that will allow you to optimize peak performance of the units. Note that the 25 included application programs represent the extensive flexibility of the MK-6.2PA-DSP units. These applications can be used verbatim, or as sample reference guide templates for designing countless audio applications.

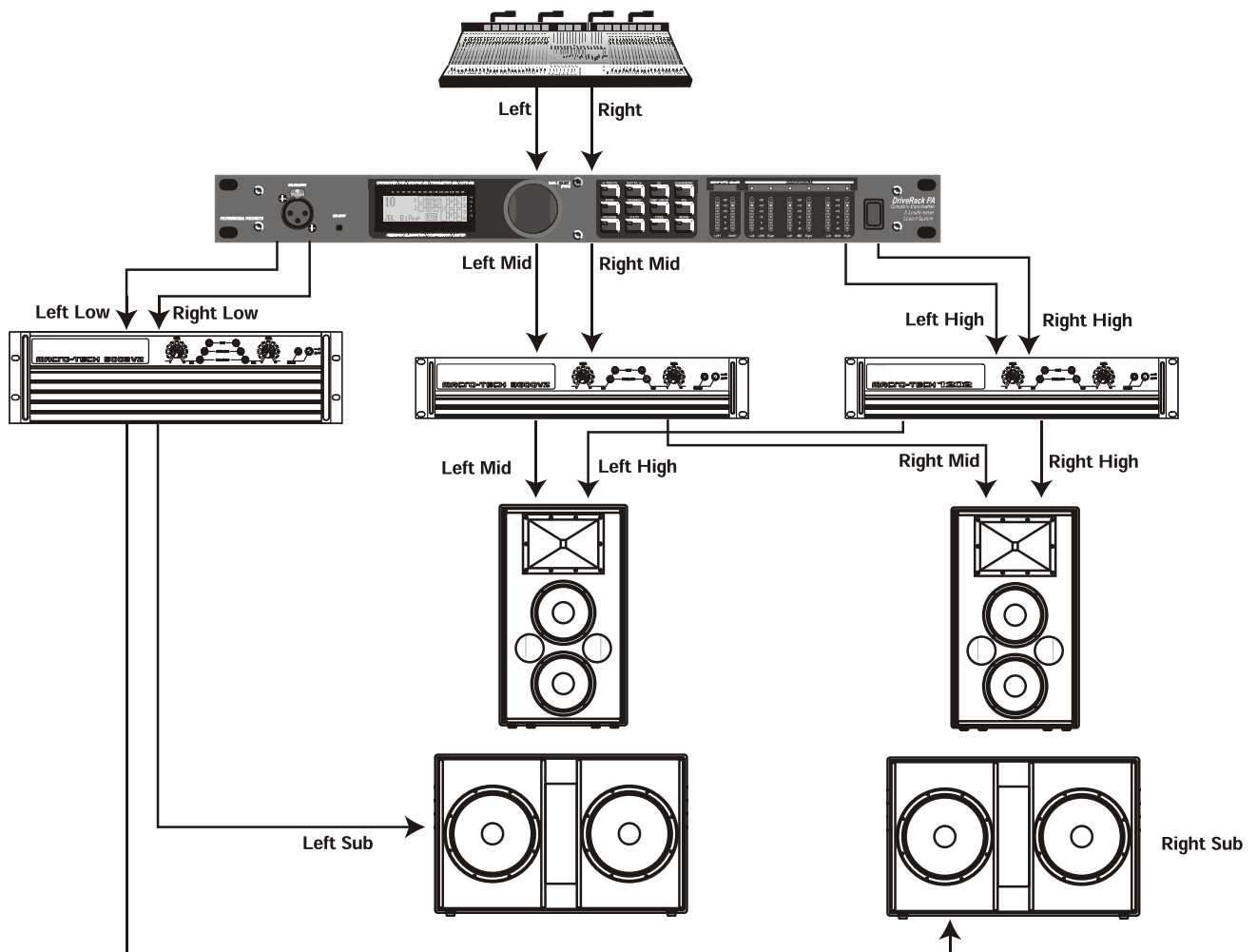
4.1 2X6 Crossover

Hardware

1. Connect the outputs from the mixer to the inputs of the MK-6.2PA-DSP.
2. Connect the outputs of the MK-6.2PA-DSP and run to the selected speaker amplifier.
3. Make sure that the mixer and power amps are turned off prior to powering up the MK-6.2PA-DSP.

Software

1. From Program mode, select factory program #F10 (SR4702 2X6) as a template, or use the Wizard to setup the specific program.
2. Once the program has been chosen, press the DATA wheel to load the program.



A.1 Factory Reset

In the event that a reset is required, the MK-6.2PA-DSP offers you the option of performing a “Soft” or “Hard” reset. The Soft Reset resets all operating parameters except user programs. The Hard Reset Procedure will reset all programmable information back to the factory defaults.

All Power-Up Functions require a button(s) to be pressed and held as the unit power is turned on.
MK-6.2PA-DSP Power-Up Button Functions

Factory (“Hard”) Reset.

Press and hold the <STORE> button at power-up until the following message appears:

“! HARD RESET?”
 “Yes <PREV PAGE>”
 “No <PROGRAM>”

- Pressing the <PREV PAGE> button will start a Factory Reset (All User Programs will become copies of the Factory Programs, all Utility settings will be defaulted, and all Security settings will be defaulted).
- Pressing the <PROGRAM> button will abort the Factory Reset sequence and the unit will reset normally.

System (“SOFT”) Reset

- Press and hold the <UTILITY> button at power-up until the following message appears:

“! SOFT RESET?”
 “Yes <PREV PAGE>”
 “No <PROGRAM>”

- Pressing the <PREV PAGE> button will start a System Reset (All Utility settings will be defaulted.)
- Pressing the <PROGRAM> button will abort the System Reset sequence and the unit will reset normally.

A.2 Power Up Quick Key Options

The MK-6.2PA-DSP offer several “Quick Key” options for initial power up and are as follow:

Change Initial Program Number

- To change the initial power program number, Press and hold the <PROGRAM> button at power-up until the following message appears:

Use Wheel to “Change Restart” Program Number”

- Turning the <DATA> wheel will select the program you wish to load at initial reset.
- Press the <PROGRAM> button again when the selection is complete. Normal resetting will continue.

System Lock Out

- Press and hold <WIZARD> at power-up until one of the following messages appears:

System Unlocked All user input will be accepted

or

System Locked No user input will be accepted

- Rotating the <DATA> wheel to select either Lock, Unlock or Filter Unlocked the system.
- Pressing <PREV PAGE> will unlock the system if it were locked or it will lock the system if it were unlocked.
- If you wish to leave the system locked with the exception of being able to clear the feedback filters, follow the same procedure on power up and then rotate the <DATA> wheel to select the feedback filter unlock feature.
- Pressing any other button will abort the System Lockout sequence and the unit will reset normally.

A.3 Specifications

Analog Inputs:

Number of Inputs:	(2) Line inputs. (1) RTA Mic input
Connectors:	(2) Female XLR line inputs, XLR RTA Mic input
Type:	Electronically balanced/RF filtered
Impedance:	> 40k Ω
Max input line level:	+20dBu
CMRR:	> 45dB
RTA Mic Phantom Voltage:	+15VDC
RTA Mic EIN:	< -117dBu, 22Hz-22kHz, 150 Ω

Analog Outputs:

Number of Outputs:	(6) Line Outputs
Connectors:	Male XLR
Type:	Electronically balanced, RF filtered
Impedance:	120 ohms
Max Output Level:	+20dBu
Alignment Delay:	10ms per channel (60ms total)

A/D Performance:

Type:	dbx Type IV conversion system
Dynamic Range:	>107 dB unweighted, >110 dB A-weighted
Type IV dynamic range:	123 dB with transient material, A-weighted, 22kHz BW 121 dB with transient material, unweighted, 22kHz BW 115 dB typical with program material, A-weighted, 22kHz BW
Sample Rate:	48kHz

D/A Performance:

Dynamic Range:	112 dB A-weighted, 110dB unweighted
----------------	-------------------------------------

System Performance:

Dynamic Range:	110 dB unweighted, >107dB weighted,
THD+N:	0.002% typical at +4dBu, 1kHz, 0dB input gain
Frequency Response:	20Hz – 20kHz, +/- 0.5dB
Interchannel Crosstalk:	>110dB, 120dB typical
Crosstalk input to output:	>100dB

Power Supply:

Operating Voltage:	DO: 100-120VAC 50/60 Hz - EU: 220-240 VAC 56/60 Hz,
Power Requirements:	25 Watts

Physical:

Weight:	5.5 lbs.(2.5 kg) Shipping weight 7 lbs. (3.18 kg)
Dimensions:	1.75" H x 5.75" D x 19" W

A.4 Auto EQ Optimization Tips

By using the setup wizard, cross over output gains and post cross over parametric EQ settings are set to match your system. The Auto-EQ can be used to adjust your system to compensate for room effects, and adjust the response of the entire system to your liking. After allowing Auto EQ to “pink the room” your system will sound tighter. The low end will have more definition, the mids will be more intelligible, and the highs can be tamed. Here are two things to look for to get the best performance from the Auto-EQ.

Look out for Modes

Some speaker and RTA microphone positions will result in certain frequencies canceling out. The resulting modes can not be corrected with equalization. The Auto-EQ does not detect modes in the frequency response, so may try to boost a band to compensate for a mode with

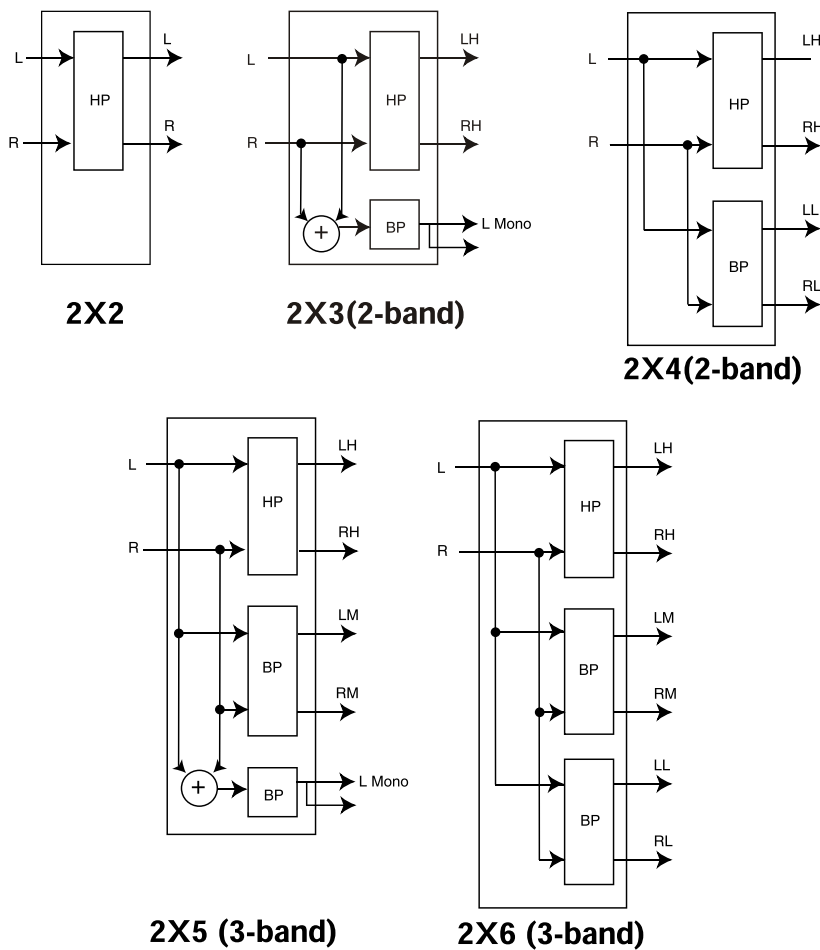
out positive affect. You may be able to see if a lifted band is a mode by manually adjusting a lifted EQ band - if no change in the EQ is perceived, you probably are seeing a mode in your frequency response. To reduce the effect of this mode, try different microphone positions and adjust the location of your speakers, then repink the room for a more effectual Graphic EQ adjustment.

Adjust Cross Over Output Gains

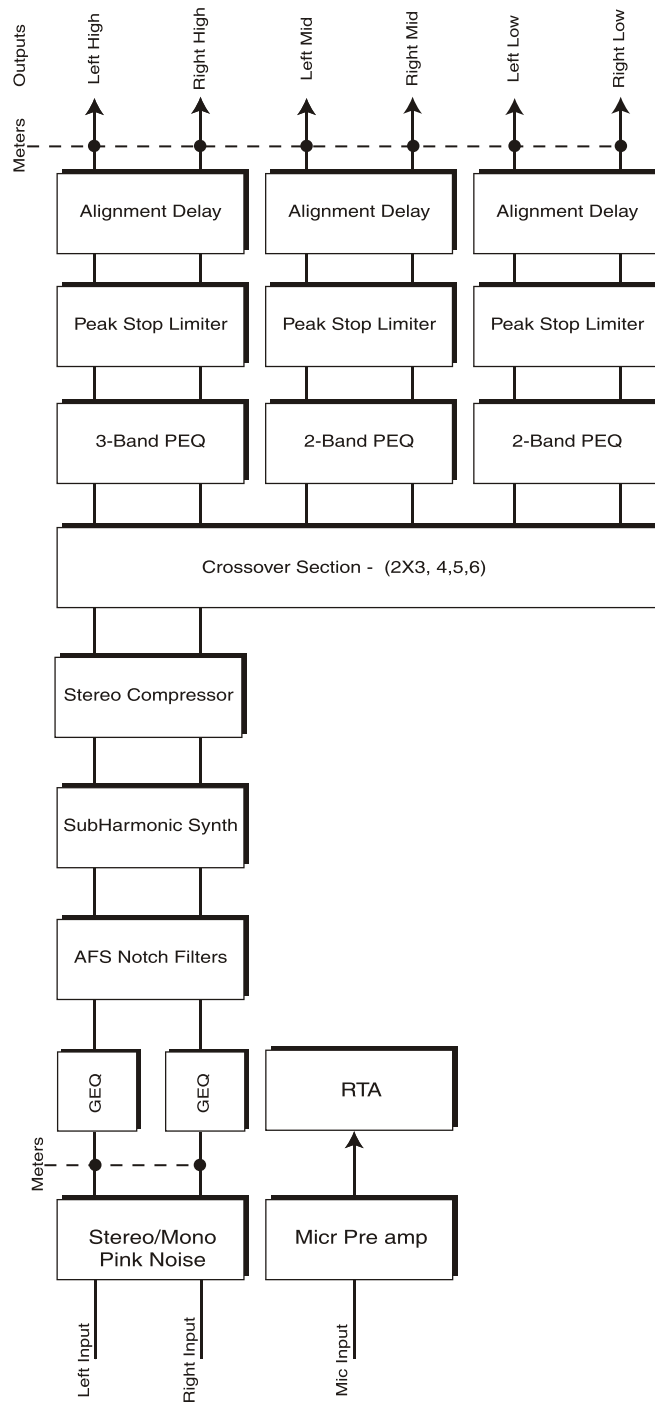
If your system setup or the response you have chosen results in the Auto-EQ lifting or cutting a number of consecutive bands of the Graphic EQ, you can adjust the level of the associated cross over output gain to match the average boost or cut in the graphic EQ and repink your room. This time, the adjustment of the Graphic EQ bands will be less “heavy handed” and the

system will sound better having fewer phase problems and a lower noise floor than a more aggressively adjusted Graphic EQ. With the rest of your system properly adjusted, the Auto EQ can compensate for room resonance and adjust to suit personal taste without large excursions in the Graphic EQ bands.

A.5 Crossover Diagrams



A.6 Block Diagram



A.7 System Setup and Gain Structure

The **MK-6.2PA-DSP** offers a wide range of tools for sound system design and setup. These tools can make your system more efficient and better sounding, but to get the best possible sound it is important to use these tools properly. In the **MK-6.2PA-DSP** we have included a Wizard setup tool to help in system setup. If you use the Wizard to set up your **MK-6.2PA-DSP** it will automatically set the limiters for some amplifier selections. If your amplifiers are not available in the Wizard, you should choose the Custom setting. The following section explains how to maximize system gain and how to use the limiters to protect your amplifiers from clipping.

In traditional system design, the output of your console would be routed to a system EQ, a compressor, and a crossover with output level control. From the crossover, there may be additional filters that are employed to improve the response of your speakers. There may also be limiters set up to keep your amplifiers from going into clipping and protect your speakers from the hazards of a clipped signal. Your amplifiers play a vital role in system setup, because they are last item in the chain before your speakers and offer the greatest amount of gain (that is their job after all). If your amplifiers are incorrectly setup you will not be using your system to its fullest potential and could be harming your speakers.

One thing that is critical to system setup is maximizing gain structure. Gain structure refers to aligning the gain of each device so that they all clip at the same point, and the noise floor of the entire system is at its absolute minimum. Quite often PA systems are setup with the amplifier input controls turned all the way up in the incorrect assumption that this is the only way to get the maximum output level. Amplifiers are fixed gain devices, turning down the amplifier input attenuators does not change the potential output of the amplifier; it only requires more input voltage to get full output power. Many amplifiers will clip with an input level greater than +6 dBu when the input attenuators are turned all the way up. Most mixing consoles can deliver over +18 dBu of output level before clipping. This means that with your amps tuned all the way up you are sacrificing 12 dB of headroom, resulting in poorer noise performance and the potential of system clipping. By adjusting the amplifier controls properly, you can maximize your system performance.

A way to set up your amplifiers for maximum gain structure is to use the clip indicators of the console and amplifiers themselves. Disconnect the output of the amplifier from the speakers. Run a continuous signal (pink noise or sine waves – many test CDs are available that have these types of signals) through your console. Turn up the output of the console until it begins clipping. If there is no clip indicator on the console then use the output meters; most reputable console manufacturers use red LEDs at the top of the meters to show the onset of clipping. Once the console is clipping, back the output gain down slightly until the clip indicator turns off. Run this signal through the **MK-6.2PA-DSP** and into the amplifiers with the crossovers and output gain section in the **MK-6.2PA-DSP** set for your particular speakers. Make sure that the output limiters are turned off. Run this signal into the amplifiers and turn up the input attenuators until the amplifier clip indicator begins to turn on. Turn the attenuators down slightly, so the clip indicator no longer is on. You have just maximized the gain through your system. This amplifier setting should give you maximum gain without clipping, another way of say this is that when the output of your console is clipping you will also be at the clip point of your amplifiers.

Once you have found the clip point of your amplifiers, you can mark this position and turn the amplifiers back up to the point where they are clipping. You can now use the output limiters in the DriveRack PA to protect the amplifier from clipping no matter what you do at the console. With the amplifiers clipping, now go to the Limiter page of the DriveRack PA and turn the limiter for each output band on. Make sure that the threshold is all the way up to +20dB. Now slowly reduce the threshold until the clip indicator of the amplifier turns off. You have successfully set the output limiter up and the amplifier will not be able to go into clipping no matter what the input is. You should now proceed to the next output band and go through the same process. If you are using a sine wave to create clipping in your amplifier you should make sure that the sine wave is within the frequency range of the output band that you are working with. Once all the limiters are set up you can now turn the amplifiers back down to the gain maximized position. The Wizard will automatically set your limiters based on your choice of amplifier. Because of component variances within the amplifier circuitry, you may need to adjust the limiter settings by a few dB after running the Wizard to ensure that they are set correctly.

Once all the limiters are set up and the gain is maximized, reduce the output of your console and reconnect your speakers. Now for the fun part, sit back and send your favorite music through the system. If your system is not loud enough, you may want to consider an amplifier or amplifiers with greater output power. Most loudspeaker manufacturers recommend an amplifier that can provide 1.5 to 2 times the rated RMS power of the speaker. If this setting is too loud when your speakers are reconnected you can turn down the amplifier input attenuators even more.

A.8 Program List

PROGRAM LIST

- 1) Stereo 3Way
- 2) Stereo 2Way
- 3) Full Range
- 4) DJ Setup
- 5) Rock Venue
- 6) JRX112M 2X4
- 7) JRX115 2X4
- 8) JRX125 2X4
- 9) MRX512M 2X4
- 10) MRX515 2X4
- 11) MRX525 2X4
- 12) EON10G2 2X4
- 13) EON15G2 2X4
- 14) SRX712M 2X4
- 15) SRX712M 2X6
- 16) SRX715 2X4
- 17) SRX715 2X6
- 18) SRX722 2X4
- 19) SRX722 2X6
- 20) SRX725 2X4
- 21) SRX725 2X6
- 22) VRX928 2x4
- 23) VRX928 2x6
- 24) VRX932 2x4
- 25) VRX932 2x6

TERMO DE GARANTIA

Este produto foi cuidadosamente avaliado em todas as fases do seu processo de fabricação. Entretanto, na improvável ocorrência de alguma falha, A The Best Sonorizações assegura ao comprador original deste produto garantia contra qualquer defeito de material ou de fabricação no período de 90 DIAS a partir da data de aquisição, apresentando nota fiscal de compra, número de serial do produto e carimbo da loja datado neste Manual. A garantia cobre eventuais defeitos no material empregado ou na fabricação.

Condições de Garantia: a garantia perde sua validade se:

- O solicitante da garantia não for o comprador original, não estando a compra comprovada por nota fiscal para todos os fins legais.
- O número de série do produto esteja raspado ou tenha sido retirado.
- Alguma parte, peça ou componente do produto estiver violado.
- Lacre da The Best Som violado
- Cobertura da Garantia: a The Best Som dá cobertura a todas as partes, peças ou componentes que apresentem falha de fabricação dentro do prazo de garantia.

A The Best Som não dá cobertura às despesas:

- Geradas no conserto do produto danificado por mau acondicionamento pelo comprador para o transporte.
- Manutenção periódica e reparação ou peças devido ao desgaste normal do produto.
- Decorrentes do transporte do produto em garantia na cidade onde exista Assistência Técnica autorizada.
- Oriunda do produto que contenha adulteração ou rasuras no número de série.
- Decorrentes da fadiga esperada na utilização normal do produto.
- Com acidentes, embalagens, seguros de qualquer natureza, inclusive no transporte, e decorrentes do uso indevido do produto ou sem a devida observação às recomendações técnicas da The Best Som.

Nenhum valor será devido ao comprador pelo período em que o seu equipamento permanecer inoperante, nem, tampouco, o comprador poderá pedir/reclamar compensação ou indenização, por despesas diretas ou indiretas, decorrentes da reparação ou substituição do produto.

Caso fique impossibilitado o uso do produto, dentro do prazo de garantia, em razão de defeito de fabricação, e, não existindo mais peças para reposição, a The Best Som poderá substituir o produto por um modelo similar, sem ônus para o cliente.

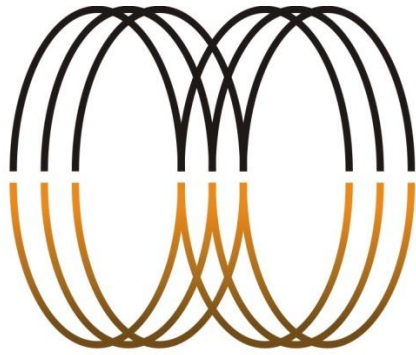
A The Best Som não se responsabiliza e não cobre qualquer custo ou indenização decorrente de eventual falha do equipamento que resulte em danos ao usuário a não ser o conserto ou a reposição do próprio equipamento por ela produzido.



Mak Pro
AUDIO SYSTEMS

(48) 3344 0237

contato@thebestsomperformance.com
www.thebestsomperformance.com



Mak Pro

AUDIO SYSTEMS