

CONTENTS

Section	Description	Page
1	Your New MX2488 Table of Contents Receiving Inspection 1-2 For the New Owner	1-1 1-3
2	Quick Start Up Quick Start Up	2-1
3	Detail Control Descriptions Front Controls and Rear Connectors 3-1	
4	Specifications Specifications	4-1
5	Technical Information Schematic Diagrams	5
6	Warranty Information Warranty and Service Information 6-1	

Receiving Inspection

INSPECT YOUR MX2488 FOR ANY DAMAGE which may have occurred during shipping. If any damage is found, notify the shipping company and call CARVIN immediately.

SAVE THE CARTON & ALL PACKING MATERIALS. In the event you have to reship your amp, always use the original carton and packing material. This will provide the best possible protection for your unit during shipment. CARVIN and the shipping company are not liable for any damage caused by improper packing.

SAVE YOUR INVOICE. It will be required for warranty servicing of your unit. Always check your invoice against the items you have received.

SHIPMENT SHORTAGE. If you find items missing, it may be that they were shipped separately. Please allow several days for the rest of your order to arrive before inquiring. If you determine (after allowing an appropriate amount of time) you have not received all the items you ordered, please call CARVIN.

For the New Owner

OVERVIEW

The CARVIN MX2488 are full function audio mixing consoles. They are designed to serve both as a control center for an eight track recording studio or for live sound reinforcement mixing. Their signal routing capabilities, low noise spec's and interconnect functions are targeted directly to professional recording applications. But, because of their rugged construction and additional "live reinforcement" features, the MX2488 double duty as very effective live sound reinforcement consoles.

This manual will deal with both of these applications, while attempting to present the various technical aspects of the consoles in an easy to read and understand format. Because the ultimate performance of your console depends a great deal upon the operator and the installation of the console, much of this manual centers around "user oriented" diagrams and explanations. Therefore, the content of this manual deals with explaining the features, various connections and technical aspects of the MX2488 to assure you the best possible performance from your studio or live performance situation.

Additional sections deal with some of the aspects of operating a sound system in general. Sections involving Bi-amping and Tri-amping as well as suggestions for maintaining and operating a sound system are included.

CONTENT

We recommend that you read the entire Operation Manual. However, if you are familiar with professional recording or live consoles, you may wish to skip to Section #1 (MX2488 Control Descriptions). This section contains the basic information about the features, various rear panel connections and technical specifications of the MX2488. It contains all the important information needed to be up and running for the more technically inclined user.

The appropriate descriptions of the MX2488's external power supply can be found under "Rear Panel Connections" listed in Section #1-6 and #1-7 "MX2488 CONTROL DESCRIPTIONS".

Section #2 (Getting Started Using Your New Carvin Console) This section deals with the use of your new console and how to get in contact with CARVIN should you encounter any problems.

Section #3 (Getting To Know the Features Of The MX2488 Consoles) goes into greater detail about the front and rear panel features common to both units. Each of the features are numbered and correspond with a numbered picture that will direct you to the feature described. Also, each number assigned to a feature will correspond to the numbering included in Section #1 (MX2488 Control Descriptions) for additional reference to a feature.

Section #4 (Recording With The MX2488) offers information on interconnecting tape recorders in a typical 8-track studio application. It deals

with setting gain levels, operating the studio, as well as monitoring and mixdown suggestions.

Section #5 (Live Sound Mixing With The MX2488) offers information on connections appropriate when using the console as the control center for live sound reinforcement. It deals with setting up main and monitor mixes and related information that might be needed to achieve the best possible performance in live sound reinforcement.

Section #6 (Bi-Amping & Tri-Amping) covers the basic differences between conventional and Bi-Amped sound systems. Differences between Bi-Amping and Tri-Amping and information covering the use of an active crossover in a Bi/Tri-Amp situation is covered.

Section #7 (Suggestions For Efficient Set-Up & Quality Sound) covers special information related to operating a studio using the MX2488 console as a control center. It also covers information on operating a live sound system and special considerations that will help organize a performance.

Section #9 (Servicing & Technical Information) includes the technical specifications, circuit schematics, harness & block diagrams as well as component layouts and listings. This section is designed to be a detailed overview of the design and construction of the console. And, should the MX2488 ever need servicing, this section should provide all the needed information for your service technician.

SECTION #1-1

MX CONTROL DESCRIPTIONS " ABOUT THE MX2488 CONSOLE"

The MX2488 was engineered and subsequently constructed using up-to-date and uncompromised materials. They represent the culmination of several years of research and surveys of the professional sound community for the features that are most important in a small production studio. Every detail of the console received extensive scrutiny. CARVIN researched the most efficient metering, monitoring and interfacing as well as state-of-the-art production techniques to achieve the reliability and remarkable performance of the MX2488. The overall design of the console was focused on providing the versatility to accommodate many different applications. And, its rugged construction, spec's and features accomplish this goal with ease. It is excellent for concert sound reinforcement as well as stage monitoring, television production, theatrical productions and multi-track recording.

The MX2488 was subjected to an exhaustive program of field and laboratory testing. The net result provided the information to fine tune the features and performance of the consoles. Every aspect of this testing was scrutinized including panel layout, color schemes, exterior dimensions and aesthetics. So, although the MX2488 is an extremely sophisticated console, it remains uncluttered and sensibly organized, and we feel this is important. It makes complicated mixdown's and signal routing a breeze to accomplish!

Recording basic tracks, overdubbing sessions and final mixdown are all

handled with ease. Signals are automatically routed to appropriate sections of the console for each recording operation. One of the key features of the MX2488, but not found on many P.A. "recording" consoles is an independent control room monitor mixer with buss/tape source selection. This section makes buss interconnects (for overdubbing) and sub-group effects routing extremely easy.

One of the most important considerations when analyzing a recording console is the quality of the input pre-amps and equalization capabilities. CARVIN refused to cut corners in these areas. Equivalent input noise is -128dB utilizing an ultra-low noise differential mic pre-amp. THD is typically less than .03% @ 40dB gain, 0dBv from 20Hz to 20kHz. This quality spec is preserved throughout the console by careful attention to grounding & gain structure. Each channel features three band continuously variable parametric equalization with bypass switching. This is a high performance, extremely quiet and musical sounding equalizer. It will handle the most critical of EQ needs making it a very effective tool in compensating microphone responses for various mixes.

Each input of the MX2488 console features an input "Gain" control for both the line & mic inputs, four auxiliary mixing busses with pre/post switching, muting, soloing, and odd/even pan controls for sub-group routing. Each channel's volume control is a 100mm smooth operating "slider" type control for precise control of signal processing imaginable.

The output sections of the MX2488 features independent control room monitoring, made possible by the (2) Track Faders and "Pan" controls provided on each output channel. A "Tape" switch is provided at each output channel to allow the tape playback signal to feed the cue and control room mixes. This means that valuable input channels do not have to be used to return tape playback signals when doing overdubs.

"

SECTION #1-2

Some of the quality components used throughout the consoles include the professional signal connectors (3 pin & 1/4") and highly reliable IIT Schadow switches. Large professional VU meters are accurately driven by a well damped circuit and are easy to read. Long throw 100mm faders have a precise 15% audio taper for smooth fade-outs. They feature integral dust shields for smooth operation and long life. The rotary pots are optimally damped for smooth reliable operation. All of the knobs have easy to read pointers and are color coded by function.

Construction of the MX2488 is modular, with individual circuit boards used for each channel and master strip. Virtually all hand wiring has been eliminated through the use of highly reliable circuit board and computer type ribbon cable. All circuits are engineered for lowest possible noise and extreme reliability. An internal heavy duty power supply spares the expense and inconvenience of a separate outboard supply and is located in such a way that system noise is not affected. Tight voltage regulation helps keep crosstalk low while current limiting protects the supply from accidental shorts. AC power is supplied to the mixer by way of a standard detachable international line cord with safety ground. The chassis is made of precision formed steel with long life pem-nut fasteners and a durable epoxy finish. One inch thick solid oak ends and a padded hand rest add to the good looks and overall aesthetics of the MX2488 console.

Every aspect of the MX project was analyzed to provide the best possible features, quality performance and versatility. The MX2488 addresses the mixing console needs of (8) track recording studios, live sound mixing, production studios, broadcast and sound mixing for film. It is an ultra-reliable state-of-the-art console backed by CARVIN's commitment to excellence and extensive background in console engineering and design. We think you will agree that the MX2488's excellent design and advanced engineering make it truly the "Professional's Choice". We're very proud of its design and operation and are confident you will share our enthusiasm for the best-"The"

SECTION #2-1

GETTING STARTED USING YOUR NEW CARVIN CONSOLE'

"A SPECIAL MESSAGE TO THE NEW OWNER"

Congratulations on your selection of CARVIN products "The Professional's Choice." Your new "MX" series console demonstrates CARVIN's commitment to producing the highest quality & most sophisticated engineering in the audio industry today. Its wide acceptance and use by industry professionals illustrates the basis for CARVIN's recognition as "The Professional's Choice".

Professionalism can only be measured by people from the results they achieve through their efforts and knowledge. It is not something that automatically happens when buying a new or more sophisticated console. Rather, it's what you do with the equipment, and how well you do it that ultimately makes the point. We are certain your new CARVIN console will deliver the performance necessary for you to achieve solid results, and ultimately achieve a high degree of professional gain & enjoyment.

To compliment your new console and help you acquire that knowledge, we've included this manual. All the information you need to be up and running is right here! You'll find using this manual easy and pleasant. We've gone to great lengths to make it so. We've attempted to present the technical aspects of your new console accurately and in "Plain English". But, if you have any questions that are not answered, please call us at our toll free numbers. Our sales staff is well versed in the technical aspects of each of our products and are eagerly willing to assist you with any problems you may have. We sincerely wish to ensure your complete satisfaction and enjoyment with your new console.

If you would like to comment on features or performance of your new console, please feel free to contact us. Criticism and comments from our owners have helped us improve and further develop our products and our business. We sincerely welcome any comments or ideas you may have.

Please send in the warranty card. Although it is not necessary to ensure warranty protection, it will allow us to better know how you are using our equipment while keeping a ready reference to our files. And, it helps us mail out literature and information that may be of interest to you as a professional musician. Let us know where you are so we can keep in touch!

In this manual there are plenty of diagrams & descriptions to aid in understanding your new console. So, with this manual in hand you hold the key to properly understanding and operating your new console, and to achieve truly professional results.

May you enjoy many years of enjoyment, success, and fun with your new CARVIN console.

TOLL FREE NATIONAL (800)-854-2235

SECTION #3-1

FEATURES OF THE MX2488 CONSOLE

RECORDING FEATURES

- * Eight track studio control center
- * Complete headphone Cue mixing facilities
- * Separate input & output channels with I/O capabilities
- * Separate (8) X (2) monitor mixer
- * Three band sweepable parametric EQ with defeat per channel
- * Four auxiliary busses per channel with pre/post switching
- * Solo & mute on all input and output channels
- * Two effects returns with Panning & Soloing
- * Built-in Talkback system with Slate (incl. monitor dimming)
- * 100mm precise faders on each input & output channel
- * Studio mix outputs as well as control room outputs
- * Stacking inputs
- * Peak warning indicators per channel with peak stretching
- * Send/Receive/Direct Outs/Line-in patch points on each channel
- * Microphone phantom power
- * Highly reliable fully regulated & protected power supply
- * Cue & Effects sends from output channels
- * Alternate metering of Cue and two track
- * Quick tape playback through monitors via "Tape" switch
- * Independent mic and line pre-amps
- * Totally modular internal construction
- * Excellent performance - Low Noise (input noise of 1128 dBv.)
- * +4dB or -10dB operating level capabilities (standard)
- * THD less than .03%

LIVE SOUND MIXING FEATURES

- * Eight Sub-Groups with solo and Mute
- * Four independent monitor mixes available
- * Headphone monitoring of Main or Monitor
- * Compact and extremely rugged for road use
- * Talkback to Monitors
- * 11 step unput gain controls for fast easy set-up
- * Channels and Outputs assignable to L&R Stereo Output
- * Channel patching on all output channels
- *XLR type, balanced, 600 ohm inputs & outputs

SECTION #3-2

GETTING TO KNOW THE FEATURES OF THE MX-2488 CONSOLE FRONT PANEL CONTROLS ***INPUT CHANNELS***

1) Mic/Line Switch

* This switch will select between the microphone input and the line input at the rear of the console. Remember, the line input will accept signals many times the strength of the mic input and this switch must be properly selected, depending upon which input best suits the signal source. Mic inputs typically accept signals from -60dB to -20dB. Line inputs can accept "pre-amp" signals (i.e. line outputs of tape decks, effects, etc.) of up to 30 volts. You may have both the line and mic inputs connected at the same time. In a live situation this is a very effective way in which to select between a tape input or a mic input. For instance, if you wish to play a tape back during a break you may wish to have your tape deck inserted into the line inputs of an input already dedicated to a mic input. This will allow you to switch to the tape source by simply depressing the Mic/Line switch. The gain control directly below this switch controls the relative gain from either the mic or line source.

* The MX-2488's line inputs on channels #1 through #8 are normally used to playback signals from the multi-track recorder.

Note: *The outputs of your (8) track or multi-track recorder should be connected to the line inputs of channels #1 through #8.*

Even when the Mic/Line switch is in the "Mic" position the line inputs inputs of channels 1 through 8 are paralleled to the tape monitor section of the console, By depressing the "Tape" switches (directly above the Output Channel Faders - Outputs #1 through #8), the signals appearing at the line inputs of channels #1 through #8 are routed to the (2) Track Monitor Faders through this interconnect section. This allows you to listen to the "2-TRK Master" faders by simply depressing the "Tape" switches at the monitor section of the console. And, you are able to adjust the volume of the multi-track playback using the "2-TRK" monitor faders as well as "Pan" them through the stereo field using the "Pan" control directly above this fader.

Note: *Usually the 2-Track monitor section will be used to mix the outputs (fed to the multi-track recorder) in the controlroom as a basic "control room mix". When the "Tape" switches are depressed you will be listening to the same exact levels and mix as previously was set up for the control room mix, during recording. (This assumes that the inputs and outputs of the multi-track recorder have been properly calibrated and adjusted.) The line inputs of channels #9 through #16 are free to accept any high level input signal and will even accept direct inputs from guitar or bass.*

* When the Mic/Line switch is selected to the "Line" position, the output of your multi-track recorder (Inputs channels #1 through #8) will be directed to the input of the channel. This allows you to go into a "Mixdown" mode, adding equalization and additional effects to each of your previously recorded tracks and subsequently route them directly to the 2-TRK Master outputs feeding your (2)-Track recorder.

SECTION #3-3

Note: *When routing signals through input channels #1 through #8 for mixdown you will probably want to depress the (L-R) "Left/Right " assignment switch to bypass the subgroup output section of the console. Bypassing the sub-group output section of the console and directly routing the signals to the (2) Track provides the most direct electrical path and the least possible noise. It also makes the conversion to a "Mixdown Mode" extremely easy.*

2) Input Gain Control

* The input gain control is very important for establishing the best signal-to-noise ratio performance of the console. This simply means that proper adjustment of this control will offer the lowest possible "hiss" or background electronic noise. The best way to use this control is to rotate it fully clockwise to the position marked as "10". This affords the maximum gain for the input. If the signal is too strong from either your microphone or line input the red "Peak" LED indicator just above the channel fader will light. This LED indicator will indicate a strong red light for a short period of time whenever the signal is too strong. Rotating the "Gain" control (One click at a time) counter-clockwise until the LED "Peak" indicator light just goes out will properly attenuate the signal, delivering just the right level to the channel. Rotating the "Gain" control excessively counter-clockwise beyond the point at which the peak LED goes out will drop the signal too much and you may not have enough gain. This usually results in having to set the volume controls much higher making the floor noise of (hiss) level more apparent.

The best rule of thumb is to rotate the "Gain" control all the way to "10" and look to see if the peak LED is lighting while the source is active. If it is not, then no further adjustment is needed, However, if it is, then you should rotate the control counter-clockwise until the peak LED just goes out. Once this adjustment

has been made, you should not need to again touch this control through the rest of the mix. You may wish to experiment with this control a little bit to become familiar with its feel and operation. It is an excellent tool for properly matching the different gains of various microphones to your console and achieving the best signal-to-noise ratio.

2) Parametric Channel Equalizer

* The channel (parametric) equalizer on the MX2488 console is a very precise tone control. The top control is the high frequency (treble) control, the midrange control is in the center and the low frequency or (bass) is at the bottom of this array. How tone controls work is basically similar to a volume control. The difference being that a tone control literally controls the volume of a specified frequency range. So, when you are "Boosting" or "Cutting" with a tone control you are literally changing the volume of those frequencies at whatever their range is defined to be. The general high, mid, and low frequency ranges of the MX2488 are:

SECTION #3-4

High Freq - 1kHz to 16kHz
Mid Freq - 200Hz to 4kHz
Low Freq - 40Hz to 800Hz

With a "Parametric" equalizer such as included in the MX2488 a small band of frequencies within the range of the specific filter (high, mid or low) are able to be adjusted, This means that you have the ability to "zero in" on a particular frequency within a particular band and boost or cut its volume. For example, if you wished to boost the volume of a frequency centered at 2kHz, you would use the midrange control. Using the midrange "Frequency control adjustment" (lower knob) you would rotate it to the "2k" setting. Then you would use the upper knob, rotating it clockwise until the desired boost at that frequency is attained. (Counter-clockwise from the center detent position would produce a "cut" or lowered volume at that frequency).

Using a parametric equalizer is quite easy and gives excellent control over the tone of the various instruments. It is good to note that radical adjustments of your tone controls should never have to be made. Usually these controls are used as a means of compensating the response of the various microphones in order to achieve the most natural response of the instruments you are mixing.

In the upper right of the EQ section you will find an EQ/Bypass switch. This switch allows you to remove the (3) band parametric equalizer from the signal path in a channel. It is an excellent tool to use when determining how little, or how much equalization has been added to a particular instrument (when compared to its non-equalized sound). And, if you find that a particular instrument requires no equalization you may simply remove the equalizer from the circuit by leaving the switch in the "Up" position.

Note: *If you determine that no equalization is necessary it is preferred to bypass the equalizer, thus ensuring the most direct signal path and best overall signal-to-noise performance.*

Experimentation with the parametric equalizer will help to familiarize you with the various frequency centers and find which settings are most effective for various instruments. The ability of the parametric equalizer to "zero" in on the exact frequency ranges of different instruments makes this control a very effective tool in achieving the most natural sound possible from various instruments. Familiarizing yourself with the parameters of this control and your ability to make an instrument sound as natural as possible is part of the overall art of professional sound mixing and recording.

4) Cue & Effects Sends

* The Cue and Effects controls provide for separate echo, effects, or monitor mixes. Either the (2) Cue sends or (2) Effects sends may be selected pre or post channel fader. Both the "Cue" and "Effects" sends are always post EQ. (This means that regardless of the pre/post switch setting, the equalizer will always affect these sends.) Although the MX2488 uses the nomenclature "Cue" and "Effects," many other names also describe these features. They are sometimes called "Busses, Foldback, Echo or Monitor" sends. Although any of these names are perfectly appropriate, the MX2488 uses "Cue" and "Effects" for simplicity and ease of set-up. Usually the "Cue" sends will be used for headphone (Cues), and the "Effects" sends will be used to send channel signals to various signal processing devices (Effects).

SECTION #3-5

*Usually the "Cue" sends will be selected to the pre fader setting. This allows the Cue sends to work independently of the channel fader. This send is then fed to the headphone or monitor amplifiers for subsequent amplification. An adjustment of a Cue control on each channel will alter the relative amount of volume that channel will send to its corresponding main monitor output. (See Effects Master Strip "Send Masters"). If you are operating a stereo headphone mix you will have to use both Cue sends. Cue #1 would be dedicated to the Left and Cue #2 would be the right sends. Varying the volumes of these controls with respect to each other will deliver a stereo output. If you are using the Cue sends for live stage monitor feeds it is recommended that you use caution when turning up or down monitors during a live performance. Stage monitors are typically right next to the microphones and as such are usually most susceptible to feedback. It will take a certain amount of "feel" for addressing the proper monitor mix, however, experimentation and practice are again the key to obtain the most consistent results for professional performances.

* The "Effects Sends" (although selectable to either pre or post fader) are usually selected to the "post" fader setting. This means that when the channel fader is off, so are the effects controls. This is done because the control is usually normalized to a signal processing effect such as reverb, delay, harmonizer, etc., and the effect should vary in intensity with alterations of the channel volume. The best way to set this control would be to start at a mid setting (appx. 5 on the control) and adjust the corresponding effects send control to drive a healthy signal to the input of effect. (The output of the effect will subsequently be returned to the console using the effects return controls on the Effects Master strip). So, any boosting or cutting of the effects control will now vary the intensity of the signal to the effect. *Be sure not to drive the effects input too hard with these controls as channel volume changes will affect the output levels preset by these controls.*

5) Channel Pan & Assign Group

* This section of the input channel is used to route the signals appearing at the channels to the respective outputs of the console. The "Pan" control is used as an odd/even control to route signals in pairs to the outputs. For example, if the (1-2) assignment switch is depressed and the "Pan" control is panned fully to the left, the channel signal will appear only at output #1. If the "Pan" control is panned totally right the channel signal will appear only at output #2 of the console. Plus, any variation of level between output channels #1 and #2 may be achieved by panning between these outputs. The channel assignment switches and the pan control will allow you to route any channel to any output of the console as well as directly to the 2-Track Master outputs (for stereo mixdown). The Pan control is termed an "odd/even" control since panning fully to the left will allow assignment of all the odd numbered output channels, and panning fully to the right will yield all the even numbered output channels.

SECTION #3-6

6) Channel Mute Switch

* The channel mute switch allows the operator to totally remove the channel from the system including eliminating signals to the Cue and Effects, and Direct Output sends. But, more often it is used to audition individual channels or groups of channels including their respective effects levels (exactly as they appear in the mix). It allows the operator to mix groups of channels and preview them exactly as they appear in the mix by eliminating all channels the operator does not want to hear. This allows the operator to listen to the relative stereo positioning of different channels not muted, amounts of reverb, delay or additional effects, and add additional channels (by releasing their "mute" switches) to the mix one at a time. It is a very useful tool for fine tuning and auditioning prior to a performance or a mix. A green LED will light just above the Mute switch when it is selected, indicating that the channel is muted.

7) Channel Solo Switch

* The channel solo switch allows you to audition each channel in the headphones or control room without affecting the main mix. What this means is that by depressing this switch you will be able to hear only that particular channel in the control room monitors or headphones even though you may be using several inputs on your console. This is an extremely useful feature allowing you to fine tune your mix during a performance. By being able to listen to a particular channel in perview to the rest of the channels you are able to focus your attention specifically to the details of that channel. You may depress one or more solo switches in order to hear relative levels of different channels as well. This allows you to listen to how well different channels are blending and make adjustments to their relative levels during a mix. Regardless of what is selected at the control room section of the console, when any solo switch is depressed only the "soloed" signal will be heard in the control room monitors. Also, the solo switch has a separate "Solo Level" control located on the System Master Strip of the console. This will allow you to adjust the level of the "soloed" signal in the

control room monitors. Whenever a channel is "soloed" a green LED just above the switch will light to indicate the solo switch has been depressed. Also, a green LED will light at the System Master Strip "Control Room Group" to indicate that a soloed channel is appearing at the control room group.

8) Peak Warning Light

* The channel "Peak LED" illuminates whenever signal peaks come within 6dB of clipping any stage in the input channel. This light is used to warn the operator whenever signals are becoming too strong and will distort within the console. Whenever you see the Peak LED flashing you should rotate the input gain control (See #2) counter-clockwise until the LED just stops flashing. The Peak indicator will light when any level is too strong on the channel. Whether the signal is too strong at the input, the output of the equalizer, or the output of the channel fader, It will indicate any overloads. This indicator along with the Gain control work hand-in-hand as a first step in setting up the input gain of the console for a mix . Proper use of the gain control and peak LED will deliver the best overall quietness and performance from the console.

SECTION #3-7

9) Channel Fader

* The Channel Fader controls the volume of each channel. It provides a smooth travel and dB calibrated attenuation of channel signals. A proper setting of the channel fader would be between "-5" and "+8" on the calibrated fader markings. This means that usually you will be operating your channel faders quite high when compared to your Master Output Faders. Doing this will assure you the most quiet performance and best overall sound from your console. Although each channel fader incorporates integral dust & dirt seals, it is best to try and keep them as clean as possible for highest reliability.

SECTION #3-8

GETTING TO KNOW THE FEATURES OF THE MX2488 CONSOLE FRONT PANEL CONTROLS *EFFECTS MASTER STRIP*****

1) Send Master Section

* After each of the MX2488's channel (Cue) and (Effects) controls have been set, each of these signals are electronically summed. (i.e. All channel CUE #1 channel controls are summed together at the CUE #1 Master Output). The Send Master controls then adjust the overall output level for these four signals. Each of the channels "Cue" and "Effects" sends are adjusted relative to each other. This

allows individual channels to send more or less signal depending upon their "Cue" or "Effects" settings (in relation to other channels). These "Relative" signals are then electronically summed (maintaining their relative volume differences) at the "Send Master" controls. The Send Master controls then adjust the overall signal level to drive either a signal processing device or amplifier.

Note: *Usually the send master controls will be set at around (5) when setting up the Cue and Effects levels. This allows for adequate signal levels to monitor your changes. More finite changes for matching input signal levels to drive signal processing devices or amplifiers may be made later.*

2) Effects Return Groups

* "EFF RTN A" and "EFF RTN B" are identical. Each return group provides for adjusting the volume level of an effect as it is returned to the main output, monitor, or (2) Track mix. The assignment switches allow the effect to be routed to any output or combination of outputs as deemed necessary. Each Effects Return group also provides a way to "Pan" a particular effect or combination of effects within the stereo field of the (2) Track outputs, or any of the Main Outputs. And, each return group may be "Soloed" in order to monitor the signal quality and intensity of the effect signal as it relates to the mix.

The Effects Return groups are a versatile tool for returning effects signals. For instance, if you are overdubbing vocals and wish to record the vocal tracks dry (without reverb), but the vocalist requires reverb in the headphone mix as a reference, you would simply depress the "Cue" switch at the top of the stack of switches, and adjust the volume level and Pan the returned "reverb" effect as desired in the headphone mix. This will leave the print (record) mix unaffected, allowing you to adjust the amount and quality of reverb later during mixdown.

Note: *If you have an effect that requires equalization, or if you have more effects than the (2) Effects Returns can accommodate, you may utilize an unused channel as an effects return. Simply insert the output of your effect into the "Line In" on the channel you will be returning your effect to, adjust the proper input level using the "Gain" control, and assign the effect to any of the outputs using the channel assignment switches & Pan control. You may also interconnect effects to the "Cue" busses by opening this control. However, be careful not to return output signals of an effect to busses already dedicated to sending signal to the effect. This could cause a "loop" resulting in feedback or electronic oscillation!*

3) 2 Track Master Faders

* These faders are close spaced to allow for easy operation of both faders with one finger. They set the level of the 2-Track output signals. Usually the best operating parameters for your "Master Controls" are from -20 to -3 on the calibrated fader markings, (normally set lower than channel fader settings). This will provide for the most quiet mix, minimizing background electronic hiss. The 2-Track Master outputs are an important and well used feature in any studio or live performance situation. You will mainly be monitoring the 2-Track outputs in

the control room during a mix, (requiring the faders to be up). All the 2-Track interconnects as well as all the channels are assignable to the 2-Track Master Outputs, and the 2-Track Master outputs are usually normalized to your 2-track tape deck for mixdown. In a live situation the 2-Track outputs may be used to drive the main system. So, it is a good idea to experiment with the 2-Track Master Faders to determine their best operating parameters for your application, getting a feel for levels to your 2-track tape deck and control room.

SECTION #3-10

GETTING TO KNOW THE FEATURES OF THE MX2488 CONSOLE FRONT PANEL CONTROLS ***SYSTEM MASTER STRIP***

1) Phantom Power Switch

* The Phantom Power switch (when depressed) will provide +48V D.C. voltage to pins #2 and #3 on the mic inputs of your console. This voltage is required to operate condenser type microphones. Without Phantom Power you simply would not be able to use these types of microphones with your console, unless you purchased a special outside "Phantom" power supply.

Note: *If most of your microphones are dynamic (not requiring phantom power) and you are operating several condenser type mics, you will need to depress the phantom power switch. This will not affect the dynamic microphones operation or reliability.*

Note: *Before using the Phantom Power switch with wireless microphones, check to be sure your (receiver unit) is tolerant of phantom power. It is best to consult with the microphone's manufacturer to be absolutely certain.*

* Directly next the Phantom Power switch is a small BNC connector labeled (6 volt). This is a receptacle for a BNC style "Little Lite". This small 6 volt light is used to provide some illumination to your console when it may be used in the dark or dimly lit areas. It operated on 6 volts and provides an excellent source of light. It may be positioned to see back panel connections or front panel controls in dimly lit areas. The mini-light is offered by Carvin & may be purchased for \$25.00 dollars. (Model #G-12)

2) Meter Function Switches

* The eight VU meters on the MX2488 normally monitor the output levels from the eight output channels of the console. By depressing the "Cue" meter function switch, the VU meters (Assigned to output channels #5 & #6) will meter the Cue #1 and #2 output signals. This will give you an instant ready reference to the output levels of your Cue sends. If you depress the (L-R) switch,

VU meters (#7 & #8) will indicate the output levels of the 2-Track Master Sends.

3) Studio Select Group

* In addition to the Control Room, 2-Track, Main Output, Cue, and Effects mixes, you also have a "Studio Mix." This is a Master output that may select various signals (identical to the control room) to feed the studio. It is extremely useful for playing back a mix to the studio monitors. The Studio Sends are "Pre-amp" sends normally connected to an amplifier dedicated to driving the studio monitor speakers. For instance, you may wish to play back a "Demo" tape to the musicians in the studio (prior to recording) for a reminder or reference to tempo and style of music to be recorded. The Studio feed may also be different than the Control Room feed. So, you could be playing back a tape to the studio while performing a mixdown in the control room. This saves time and greatly increases the efficiency of the studio. The Studio Select Group will allow you to select 2-Track Effects signals. In a production studio the "Studio Feed" is essential and a real time saver.

4) Talkback Section

* The talkback section of the MX2488 console will allow you to feed talkback audio to the Cue Outputs, Studio Outputs, Effects Outputs, and Slate (all Main Outputs). A built in condenser microphone & volume control will allow you to speak directly to any one, or combination of each of the busses, and vary the amount of signal sent to them. Whenever a talkback switch is depressed the volume in the control room monitors will drop. This eliminates feedback from the talkback mic in the control room.

* The Cue talkback switch is very useful for speaking to performers through their headphones. Usually Cue #1 and #2 sends will be dedicated to the headphones. In a live situation, the Cue talkback switch will allow you to speak through the stage monitors for cueing on stage performances.

* The studio talkback switch will allow you to cue musicians in the studio through the studio speakers or monitors.

* The talkback select to the Effects sends may be used to verify signals connected to various effects, or for slating recorded effects tracks.

* The "Slate" switch feeds a talkback signal to all of the Main Outputs of the MX2488. This feature is usually used to Cue tapes or for audio labeling of each recording.

5) Control Room Group

* At the top of this group you will find the Master Solo "Green" LED and "Solo Level" control. (See Front Panel Controls - Input Channels - #7). Whenever any solo switch on the mixing console is depressed the Master Solo LED will illuminate to indicate that you are listening to a solo or group of solo signals. The Solo Level control will allow you to adjust the level of soloed signals in the control room monitors.

* The control room "select" switches directly below the Solo Level control will allow you to access the signals appearing at the (2) Track Outputs, (2) Track Playback (Inputs), Cue Outputs, and Effects Outputs connections at the rear panel of the console. By depressing any of these switches, or groups of switches, their signals will be fed to the control room outputs (after adjustment by the Control Room Faders) for subsequent amplification to the control room monitors.

* The (Stereo/Mono) switch when depressed will change the control room monitors from stereo to monaural operation. This allows for phase checks of various multiple microphone mixes, or for monaural monitoring. This switch is very useful in checking the phase coherency of a mix, or relative differences in stereo placement as it relates to mono.

SECTION #3-12

6) Control Room Faders

* The control room faders (like the 2-Track Master Faders) are a close spaced pair for ease of simultaneous operation. After a particular output is selected for auditioning in the control room monitors, the Control Room Faders will adjust the overall volume level. So, if you were monitoring the 2-Track Master Outputs, you would first adjust for nominal levels using the 2-Track Master faders. Then you would depress the (2-TRK) switch in the control room group and raise the Control Room Faders until the desired volume in the control room monitors is achieved.

SECTION #3-13

GETTING TO KNOW THE FEATURES OF THE MX2488 CONSOLE FRONT PANEL CONTROLS ***OUTPUT CHANNEL (X8)***

1) Cue and Effects Sends

* The Cue and Effects sends on each of the output channels allow signals to be sent to the four auxiliary mixes (Cue #1, Cue #2 Eff #1 & Eff #2) from each of the output channels. Each pair of Cue and Effects sends also feature a Pre/Post fader switch. This switch will select whether the output signal will be picked up before or after the output channel fader.

Note: *The "Pre-Fader" position selects the signal prior to the output channel fader. When the switch is selected to "Post-Fader" the signal is selected after the output channel fader, but before the 2-Track Level Monitor fader. This means that in order to monitor playback signals from the multi-track tape deck to the Cue & Effects busses you will have to select the "Post-Fader" position on these switches.*

The most common use of monitoring the busses with the multi-track tape deck is playback with overdubbing. (See "Overdubbing", Section #4).

There are several applications for using this "monitor" feature on the MX2488. The following should help outline some of these uses;

* When the Cue or Effects busses are selected "Pre" fader they may be used to send sub-grouped signals to on stage monitors or to headphone feeds. For example, if you had a drum mix sub-grouped (mixed) to two output channels, you could use the Cue outputs (Pre-Fader) to send the signal to the stage monitors, or to a headphone mix during a recording. This greatly simplifys the monitor or headphone "Cue" mix.

* When the Cue or Effects busses are selected "Post" fader they may be used as effects sends for the output channels. If you had several channels sub-grouped to one or two output channels you could use the output effects buss to send that signal to an effect directly from the sub-group. Without this feature you would have to adjust several "Effects" controls on several channels. This greatly simplifys adding effects to sub-grouped mixes.

* Having this "monitor" capability from the output of the multi-track playback allows you to interconnect the playback signals with the Cues for overdubbing. It also allows for easy connection to add effects to multi-track playback signals for rough mixes. (See section #4 "Overdubbing")

SECTION #3-14

2) Tape Switch

* Depressing this switch will route the multi-track tape playback's to the 2-Track monitor section for rough mixes, quick playback of multi-track tapes, and monitoring for overdubs. (See "Overdubbing" Section #4). Normally the outputs of the multi-track tape deck will be connected to the "Line Inputs" of channels #1 through #8. Depressing the "Tape" switches will access the multi-track outputs for playback through the 2-Track Master Outputs. The (8) output VU meters will accurately meter the outputs of your multi-track deck for level setting during a rough mix. Depressing the "Tape" switch also causes the 2-Track fader, Pan and VU meter to be fed from the tape playback source. Whenever the "Tape" switch is depressed you will be making the tape playback signal available for all functions at the 2-Track monitor section of the console. So, monitoring busses, rough mixes to the 2-Track, and level settings to the 2-Track can be made with ease.

Note: *The tape switches will not affect the output channel levels. So, your print mix levels (including channel levels) should never have to be disturbed. This allows you to fine tune a mix, accurately match overdub levels, and do rough mixdowns without affecting the overall print mix. They should save you a considerable amount of time and will probably become a very often used feature in your production studio.*

3) 2-Track Monitor Pan and Fader

* The 2-Track "Pan" and "Fader" controls make up an important part of

the control room monitor section of the MX2488 console. They provide a means of routing the output channel signals to the 2-Track Master faders as well as "Panning" the output channel signal within the stereo field of the 2-Track mix. During a recording you will usually set up your print (record) levels to your tape deck with the Output Channel Faders. After you have achieved proper levels to your multi-track deck you should not need to adjust these controls any further. In order to then monitor the signals in the control room, you will raise the 2-Track Monitor faders to achieve the proper volume level (relative to the other signal levels) in the control room monitors. And, using the 2-Track Monitor "Pan" control you will place the output signals within the proper stereo field of the 2-Track mix. This allows you to perform a rough 2-Track mix for monitoring in the control room.

* After recording the basic tracks, you will want to listen to them. So, by depressing the "Tape" switches, the multi-track outputs are routed to the 2-Track Monitor faders for subsequent listening and adjustments. The outputs of the tape deck will match the recording levels. So, when the "Tape" switches are depressed you will be listening to the exact rough 2-Track mix levels you previously set-up during the recording of the basic tracks. You may make alterations in the levels, change the stereo fields, or even make a rough mixdown using the 2-Track Monitor faders, without affecting your original print mix. These controls will have no effect on signals going to tape except when doing 2-Track "Rough" mixdowns.

Note: *When doing final mixdowns you will probably route the outputs of your multi-track tape deck through input channels #1 through #8. This provides for additional equalization of the playback signals as well as the ability to add additional effects. These signals will then be routed directly to the 2-Track Master Faders using the (L-R) assignment switches, bypassing the 2-Track Monitor faders.*

SECTION #3-15

4) Sub Mute Switch

* When the Sub Mute switch is depressed the output channel is removed entirely from the system. This includes any signals routed to the Cue and Effects monitor. However, the "Tape" switch function is not affected by the mute switch. This switch allows you to completely mute an output channel and prevent it from sending a signal to the multi-track tape deck. But, you may monitor the outputs of the multi-track. So, if you have printed a particular track, you may wish to mute the console's output to that track in order to assure you do not print over previously recorded material. The mute switch may also be used to listen to selected sub-grouped mixes (prior to recording basic tracks) for properly adjusting volume and effects levels.

5) Sub Solo Switch

* Depressing the output channel "Solo" switch output channel to be soloed in the control room monitors. The solo switch allows you to solo the output signals from the multi-track tape deck, or the output channel signals. It is an excellent feature in identifying sub-group tracks and monitoring combinations of sub-groups for fine tuning a mix. (See "Solo" function in section #3-Input Channel).

6) Output Channel Fader

* The output channel fader is always fed from the channels regardless of the position of the "Tape" switch. This fader is dedicated to adjusting the print (record) levels to the multi-track recorder. The output of this fader also feeds the 2-Track monitor section of the console for rough control room 2-Track mixing. This fader is usually operated lower than the channel faders. The normal settings are around -20 to -3 on the calibrated fader markings. Adjustments of this fader are metered by the (8) main VU meters. It is also advisable to check the VU levels on your tape deck to be sure they are properly calibrated, assuring that you are not overdriving your multi-track tape deck.

SECTION #3-16

GETTING TO KNOW THE FEATURES OF THE MX2488 CONSOLE ***REAR PANEL CONNECTIONS***

1) Line Input Jack

* This jack is a "Line Input" or pre-amp input connection. It is designed to accept signals normally too strong for the mic input. (See Section #3-Mic/Line Switch). Line level (pre-amp) signals are typically from 200 millivolts to 2 volts. These inputs will accept signals from any line level source including tape deck outputs, signal processing devices, keyboard or instrument amplifier outputs. The input utilizes a single ended 1/4" phone plug connection. Most cassette tape decks and other line sources may use a DIN type RCA phono plug connector. This may require the use of an adaptor or special wired cord to plug the outputs of your tape deck into this input. However, this is perfectly acceptable.

Note: *"Line Inputs" of channels #1 through #8 are internally connected to the 2-Track Interconnect section at the output channels of the console. These "Line Inputs" are normally connected to the outputs of the multi-track tape deck for quick playback, rough 2-Track mixing and overdubbing. These inputs may be accessed for playback by depressing the "Tape" switches at the output section of the console. The playback signals may be manipulated and rough mixed using the 2-Track Level faders directly above the Output Channel Faders. Depressing the Mic/Line switches on the channels will direct the multi-track outputs through channel #1 through #8 input channels for final mixdowns.*

SECTION #3-17

2) Mic Input Connector

* This is an input with far greater sensitivity than the "Line Input". Line Inputs typically accommodate input voltages of 200 millivolts to 2 volts, whereas Mic Inputs will accommodate input signals of 10 to 100 millivolts. This input is sometimes called a "High gain" input, because it is designed to amplify low level signals. There are two main differences between a Mic and Line input. This is why this input connector (XLR type) looks much different than the Line Input connection (1/4" phone plug type).

A) The "XLR" type input connection is designed for low impedance, balanced signals. Low impedance simply means lower resistance to A.C. current sent from the microphone. Low impedance mic's by definition offer very little resistance to A.C. current allowing very long mic cables without significant signal loss. The fact that low impedance cable runs produce very little line losses makes this type of input especially well suited to long mic cable runs, snakes, or mic cord extensions.

B) The input is "Balanced". This term works closely in hand with the term "Common Mode Rejection" for the mic input of your console. As a low level signal is transmitted down a wire to the Mic input of your console there is a good chance that extraneous voltages such as 60Hz power line sources could be injected into the cable, and later amplified by the console. What balancing does is eliminate much of this "Stray field" by cancelling it at the input of the console. This is called "Common Mode Rejection", and allows for long mic cable runs without the risk of picking up significant hum or other extraneous signals. Balanced cables feature (3) wires: a ground wire, in-phase wire, and out-of-phase wire. When the in-phase and out-of-phase signals are summed at the input of the console the extraneous noise is rejected, or cancelled. The amount of this rejection is expressed as "Common Mode Rejection". So, balanced cables offer the lowest possible hum and noise when running long cables.

* Microphone cables are always "Shielded". This means that the signal wire within the mic cord is surrounded by tightly braided or solid "Ground" or shield wire. This is done so that any potential injected signals (stray field) must first pass through the ground wire prior to affecting the signal wire at the center of the cable. Mic level and pre-amp level cables should always be shielded for the lowest possible noise.

SECTION #3-18

* By this time you should be deducing that a "Balanced, Low Impedance" mic is the best to use with this input. With a properly shielded cord, it will provide the best overall performance and lowest possible noise.

3) Channel Direct Output

* This is a post fader direct output featured on each channel. It may be used as a direct input to a multi-track tape recorder, Auxiliary Effects send, a Cue send, etc. If you have assigned a channel to one of the output channels you may still utilize the direct output. This allows the output to be used as an auxiliary send controlled by the Channel Fader, because the channel will feed the Output Channels and the Direct Output simultaneously. Another way to assign a channel to the multi-track tape recorder would be to use the channel direct outputs. The

channel direct outputs may be used to directly route signals to appropriate channels on the multi-track tape recorder. Simply leave the channel assignment switches in the "up" or unassigned position. This will interrupt the signal flow to the eight main outputs while still offering the signal at the channel direct outputs. You may then route the channel direct output signal to the input of a particular channel on your multi-track deck. This will allow the most direct connectio of a channel signal to the multi-track deck. The direct output is both post fader and post equalizer.

Note: *Channel direct outputs are an alternate means of routing signals to your multi-track tape recorder. They allow you to effectively bypass any output "summing" circuitry and thereby offer a more direct signal path to the tape deck. This affords better overall noise performance and frees up the output channels for any additional sub-grouping that you may require.*

4) Channel Send & Return Jacks

* The channel patch allows you to access a channel for inserting various effects or signal processing equipment. Usually these jacks are used with such signal processing equipment as compressors, limiters, de-essers, exciters, delays, EQ's, etc. These jacks allow you to address particular channels for problem situations requiring special attention. For instance, if you have a vocal input requiring compression, uand more precise equalization you may wish to patch in a more elaborate equalizer and a compressor. This allows you to affect that particular channel without affecting adjacent channels. And, you achieve your objective of fine tuning the vocal.

* The send jack is used to send the signal from the channel to your signal processing equipmnet. This jack accesses the signal pre-fader. The normal signal routing through the channel is not disturbed when plugging into this jack. So, the "Send" jack may also be used as a pre-fader, post-Equalizer send, simultaneous to normal signal routing through the channel.

* When you plug the output of your processing equipment back into the "Return" jack (1/4" phone plug input), the signal flow through the channel is interrupted. Only signals appearing at the Effects Return jack are then routed through the channel. This interruption of the normal signal path forces the signals from the mic or line input through the send jack Post-Equalizer, into your signal processing equipment and subsequently back into the channel via the "Return" jack. Returned signals through this jack are then normally routed through the channel. So, you could use the Effects Return jack as a Post-EQ line input to the channel. Remember, any signal source plugged into the mic input will be interrupted whenever plugging into the Effects Return jack (unless looped from the Effects Send back through the Effects Return).

SECTION #3-19

5) Sub Output Send & Return Jacks

* The Sub-Output patch jacks allow you to add signal processing to each of the sub-group outputs. The "Send" and "Recieve" are both Pre-Output

Fader. Like the Channel Send, the Sub-Output send is an access jack that will not interrupt the normal signal flow through the output channels. The "Sub-Send" is pre-fader, so any output fader changes will not affect the output of the "Sub-Send". Its output signal will only be affected by the amount of signal sent from the channel assigned to the particular Sub-Output.

* The "Sub-Return" jack interrupts the signal (similar to the Channel Return). When a signal is plugged into the Sub-Return (utilizing a 1/4" phone plug) the signal normally appearing at the Output Channel is interrupted, and only the signal injected at the Sub-Return will appear at the output. The Sub-Return is pre-fader, so any Output Fader changes will affect the volume levels of your signal processing to be returned via the Sub-Return in order for the signal to appear at the selected Sub-Outputs.

6) Sub Outputs

* The Sub Output signals are available as both balanced and un-balanced signals. The XLR connectors carry the balanced signal, and the 1/4" outputs carry the un-balanced signal. Both of these outputs will deliver high quality, low noise audio. The 1/4" outputs are calibrated for a -10dBv at (0)VU signal for direct connection to multi-track tape recorders with -10dBv operating levels. The XLR connectors may be internally recalibrated to +4dBv. (See Section #4 - VU Meter Calibration). The Sub-Output connections are usually used to make connection to your multi-track tape deck, and both connections may be used at the same time if so desired.

SECTION #3-20

7) Control Room outputs

* These connections are pre-amp connections intended to drive a power amplifier - subsequently powering your control room monitor speakers. As with all inputs and outputs of the MX2488 you are advised to use good quality shielded cable. This will provide the best possible quality and lowest noise.

Note: *In some studios the Control Room outputs are used to drive both the headphone amps as well as the control room amps, providing simultaneous headphone feeds and control room monitoring. In this way the engineer monitors a rough headphone mix while recording the basic tracks. This may or may not be preferred depending upon your particular application. There are several ways to achieve headphone feeds from the MX2488.*

8) Cue Send Jacks

* These "Output" jacks are used to drive your Cue amplifiers. The Cue sends are normally used to drive headphone systems in the studio. In a live situation, the Cue sends may be used to drive the on stage monitor amplification system.

Note: *The Cue sends may be selected to either pre-fader*

(headphone or monitor send) or post-fader in which case it would be used primarily for an effects send. Rotating the Cue Send Master "Rotary" volume controls will vary the intensity of signal appearing at the Cue outputs. And, rotating the Effects Send Master "rotary" volume controls will vary the intensity of the signal appearing at the Effects Outputs.

9) Effects Send Jacks

* These output jacks are identical to the Cue output jacks. They may be selected for pre-fader operation to drive headphone systems or monitor systems, and they may also be selected post-fader as an effects send. This "Effects Send" output will connect to the input of your effect, and is of sufficiently low source impedance to connect to any professional signal processing gear assuring the best overall signal quality. *Remember" The Cue and Effects outputs may be used interchangeably depending upon their pre/post fader selection at the front panel of the console.*

10) Effects Return Input Jacks

Quick Start Up

GETTING STARTED QUICKLY

If you're like most new owners, you're probably in a hurry to plug in your FET401 and use it. Here are some brief instructions to get you going quickly. With the amp unplugged, turn the unit off and complete the following procedures:

1) CONNECTING AC POWER

- Check and change if necessary the rear AC Voltage Switch to the proper voltage. If a switch is not found, than pull out the Fuse Holder (built into the AC cord receptacle) and turn it over to the proper voltage as seen on the holder—this automatically switches the voltage and the fuse to the proper voltage and fuse value. On units with an AC Voltages Switch, change the fuse as necessary (fuse values are listed on the rear panel).
- Use only a grounded (3 prong) power outlet to prevent a shock hazard. This gives the quietest grounding for your amp.

2) CONNECTING SPEAKERS

- Use the two 1/4" speaker jacks on the rear panel or the Red and Black speaker binding post. Be sure all your speakers are properly wired in "Phase" with each other (positive and negative speaker terminals connected correctly to each other). The Red binding post is the positive connection while the Black binding post is negative. Use only Heavy-Duty speaker cables (16 ga for 50', 14 ga for 100').

NOTE: Do not run your speakers through microphone wire or multi-conductor microphone junction boxes or "snakes" as sometimes referred to. This wire is normally a very light 20 gauge wire causing a substantial loss of power through the cable for less power to your speakers. All speaker wires must be non-shielded to prevent the power amplifier from oscillating at high frequencies.

3) CONNECTING INPUTS

- For high line level balanced output devices plug into the balanced "MIC" XLR input at the rear of the FET401. Use a 3 conductor shielded cable.
- For high level non-balanced inputs, plug into the "LINE" 1/4" input jacks on the rear panel. Use a 2 conductor shielded cable.
NOTE: This will also accept a balanced 1/4" signal if you wire the balanced signal to a stereo phone plug.

4) TURNING ON THE FET401

- Adjust the level control to the off position.

- Adjust the 9 Band Graphic EQ's to their center position.
- Turn the amp on and slowly raise the level control to the desired setting.

5) THE LED "CLIP" INDICATOR

The "CLIP" LED indicates when the amp is starting to distort. Occasional flashing of this LED is all right. However, heavy flashing is not recommended especially because of damage that "square wave" power can do to speakers and horn drivers.

6) The "PROTECT" LED

- The "PROTECT" LED has three protect functions. It's important that these functions be understood should the LED come on and the amp go in a "Protect Mode".
- a) The first protection mode is against shorted speaker outputs. If the speaker outputs should ever short while a signal is present at the output, the "Protect" relay will politely disengage the speakers from the output section of the power amp protecting the amp from any damage.
- b) The second protection mode detects any excess load (current) that may be drawn from the speaker outputs. The FET401 is designed to give its full rated power into 2Ω

without the Protect Relay engaging. Even 1Ω loads can be used safely at less than full power. However, the Protect Relay will engage when the amp is driven to its full power and loaded less than its 2Ω rating.

- c) The third protection mode is temperature related. The "Protect" LED will come on if the amp approaches its maximum operating temperature. This protect mode may be caused by blocked fan vents, excessively warm air going into the fan vents (if rack mount be sure the rack is properly vented with cool air), or the amp is driven hard below its rated speaker impedance.

7) RESETTING THE PROTECT LED

- a) If the FET401 does go into the protect mode because of an excessive load (current), simply turn the amp off—wait for 3 seconds—and then turn the amp on. The Protect LED will go off and the amp is ready to function.
- b) If the amp goes into the protect mode because of higher than normal operation temperature, turn the amp off—wait for to 3 seconds and if the Protect LED does not go off than you know that it's protecting from higher than normal operating temperatures. If this is the cause, leave the amp on and wait for the fan to cool the amp down. This generally takes about 3 to 5 minutes. At that time turn the amp off—wait for 3 seconds and turn it back on and the amp is ready to function. It's important to know that if your amp should ever go into a "Protect Mode" it does not harm your amp in any way. In fact, your amp was checked in the "Protect Mode" several times before its was shipped as part of Carvin's quality assurance program.

Front Panel Features

1. POWER SWITCH

Push to turn the amplifier ON.

2. POWER LED

The Power LED Indicates when the FET401 is on.

3. PROTECT— LED

See "Quick Start Up"

4. LEVEL CONTROL

The Level Control should be turned up at least 1/3 for the FET401 to reach its full rated output. If not, your input source may start to distort (clip) by trying to drive the FET401 to its full output. If your signal is strong, it is not necessary to turn the FET401 full on.

5 CLIP LED

The CLIP LED will indicate when the power amp starts to distort. Occasional flashing is OK. If the LED is on continuously, turn the LEVEL control down. Amp distortion produces "square wave" power that is harmful to your speakers.

6. EQ IN/OUT SWITCH

If you require the Graphic Equalizer, push the EQ IN/OUT switch IN. Volume levels will be similar in either position providing the graphic sliders are in their center—neutral position.

7. GRAPHIC EQUALIZER

The 9 band Graphic Equalizer in the FET401 provides a wide degree of tonal flexibility. To properly use the Graphic EQ (equalizer), set all sliders to their center position. With the sliders at this position, there is no effect on the audio signal. When you raise the slider above the center position, you boost levels in a narrow frequency band. If you lower the slider below the center, you are subtracting levels. When using these sliders, think of them as volume controls that can add or subtract tones in narrow bands.

Frequency: The 63 Hz slider is for deep sub bass level adjustments, the 125 Hz is for higher bass adjustments, the 250, 500 and 1K Hz is for mid and higher mid tone adjustments, the 2K and 4K Hz is for mid treble adjustments, and the 8K and 16K Hz sliders add to the very high end treble.

Adjusting: It is recommended that all sliders be set in their center position before equalizing your tone. Typically low frequency feedback is in the 125 and 250 Hz range while high feedback is in the 2k and 4k Hz range. Occasionally you may have to turn one frequency (slider) off to -12dB to help stop feedback. But you should never turn the adjacent sliders off too. Instead, set the adjacent sliders to -6dB to form a gentle negative curve. Likewise, if you need more deep bass, boost the 63 Hz by 10 dB and the 125Hz by 5 dB. Or, if you need more treble, boost the 8k by 6 dB and the 16k Hz by 4 dB. Note—there is not much signal at 16k so you may not hear any difference except for added noise. If you raise or lower all sliders at the same time, the EQ will act like a volume control because you are effecting all frequencies. Take care not to over-adjust as this will drastically alter your over-all sound. Use the EQ in addition to proper microphone and speaker placement for the control of feedback.

Rear Panel Connections

1. AC LINE CORD

The FET401 employs a heavy duty removable grounded AC cord and should only be plugged into a grounded "3 prong" power outlet. If a grounded outlet is not available, the amp should not be used. For safety, no attempt should ever be made to defeat the ground pin of the AC line cord.

2. AC LINE FUSE

The FET401 fuse is built into the AC receptacle socket—marked by an arrow on the rear panel pointing to the receptacle. The fuse can be changed by removing the AC cord and wedging a slot-head screwdriver under the top to pull out the fuse holder. Once out, the fuse can be replaced (there is room for a spare fuse in the tunnel). 120 volt fuses are available from Radio Shack: Part No 270-1175 for a 5 Amp slow-blow fuse for 120 volt use and 2.5 Amp for 220 volt use. Use slow-blow 5 x 20mm fuses only.

3. SPEAKER CONNECTIONS

The FET401 incorporates two speaker jacks and two speaker binding post. You may use any of these connectors for your speaker hook ups. Note the positive and negative polarity on all speaker connections for proper speaker phasing. All jacks and binding posts are wired in parallel. As you connect speakers to the FET401, the impedance will reduce in half as you add more speakers. Do not use Mic or Guitar cords or any cord that is shielded. Your power will be reduced because of the lighter gage wire. Use 16 gauge wire or heavier.

4. INPUT CONNECTORS

The FET401 features a D3F balanced connector designed to take any balanced impedance source from 150Ω to 100KΩ. Use this connector for cable lengths over 50' or if you are having a grounding problem from your signal

source from unbalanced cables. Any time you use a balance input, your input gain will be 6 dB higher. You also have your choice of a 1/4" input jack for unbalance or balance inputs. This is a tip/ring stereo jack which will work for both. Use only shielded cables.

5. COOLING FAN

The fan is designed to run continually to cool the FET401. Be careful not to block the air around the grill—fan area. If you are having Temp/Protect problems or if the incoming air is too hot, the "Protect" LED will come on. See "Quick Set Up".