

SONY®

PROFESSIONAL MIXING CONSOLE
MXP-3000 Series

OPERATION AND MAINTENANCE MANUAL

Volume 1, 3rd Edition

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SECTION 1

INTRODUCTION

1.1 MXP-3000 PROFESSIONAL MIXING CONSOLE

The **MXP-3000** series console is a versatile, in-line, professional mixing console which is intended for use in recording or broadcast applications. The console design provides maximum flexibility, and allows the user to select the exact configuration that best meets his needs.

The console can be used as a stand-alone, manually-operated unit, or can be fitted with the optional Console Automated Fader system, **CAF-3000** and Automation Data Storage system, **ADS-3000**.

Each Input/Output (I/O) module on the console features modular Microphone Pre-amplifiers and Equalizer units. An Audio Grouping Master (AGM) switch allows for audio grouping on the Active Combining Network (ACN) bus as well as conventional in-line operation.

The console features state of the art construction and utilizes large-crystal, oxygen-free copper wire, this greatly improving conductivity and giving superior sound quality. In addition, the use of Hybrid circuits for the Pre-amplifiers, differential line inputs/outputs and ACN's considerably reduces console noise.



Figure 1-1. MXP-3000 Professional Mixing Console

The console Patch Bay is panel-mounted, and provision is made in the Patch Bay rack for mounting two standard 19-inch panels (one 3-inch and one 7-inch) to accommodate such outboard equipment as the user may desire.

1.1.1 Console Features

The major features of the **MXP-3000** include:

- Two frame sizes available — 20 and 36 input channel versions
- Inputs and Outputs balanced — available in transformer-balanced or electronically-balanced versions
- Power supply voltage check indicators built into Meter Housing
- 24 individual track assignment buses
- High and Low Pass Filters in each I/O channel (independent of Equalizer), with variable frequency control on the High Pass Filters
- Plug-in Equalizers and Pre-Amplifier modules available in several types
- Complete monitoring capability
- Stereo and Mono mix meters
- Panel-mounted modular Patch Bay
- Stereo Solo functions on all Channel outputs, Monitor sections and returns
- Phase meter range of ± 180 degrees
- Optional VU or Peak metering arrangements
- Optional Vacuum Fluorescent Displays with selectable VU/PPM scales
- Optional Automated or Non-automated Fader packages
- Very low noise floor and improved sound quality
- Convection cooled power supply, eliminating need for noisy fans
- Gold contacts used throughout the console to improve reliability
- DIN multiway connectors used for all inputs and outputs
- Complete communications functions with built-in talkback microphone
- Optional two-way communications function

- Large-crystal, oxygen-free wire used throughout to improve sound quality

1.1.2 Standard Models

The standard **MXP-3000** series console is available in two frame sizes. The smaller frame houses 20 Input/Output (I/O) modules, and is designated **MXP-3020**, while the larger frame, which houses 36 I/O modules is designated **MXP-3036**.

1.1.3 Console Modules

Four major types of module are used in the **MXP-3000**. In addition to the Input/Output modules, the console mainframe contains one Master module, one Monitor module, and one Communications module. The Master, Monitor and Communications modules are mandatory to system operation.

1.1.4 I/O Modules

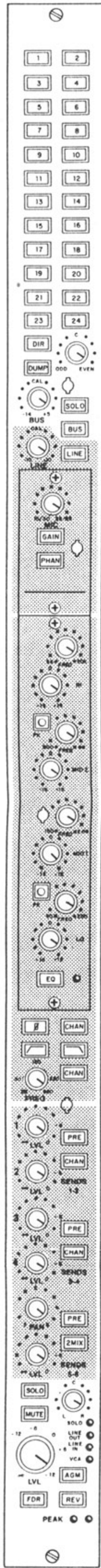
Each I/O module (Figure 1-2A) has its own microphone/line inputs and signal processing facilities, together with a switching system which directs the channel signals to any one of 24 tracks on a multitrack recorder. The I/O modules also include monitoring arrangements, Pre-Fader listening (PFL) capabilities, and Send systems which can be used for cueing as well as feeding external effects units.

To achieve maximum flexibility, each of the I/O modules has available five optional Pre-amplifiers and five optional Equalizers. The I/O module illustrated in Figure 1-2A is fitted with Microphone Pre-amplifier **MXBK-MI31** and Equalizer **MXBK-EQ31**, this being the standard I/O configuration.

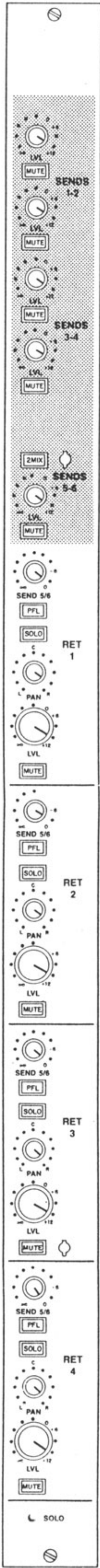
1.1.4.1 Pre-Amplifier Options

Any one of four different Microphone Pre-amplifiers can be installed in each of the I/O modules. The Microphone Pre-amplifier options are listed below:

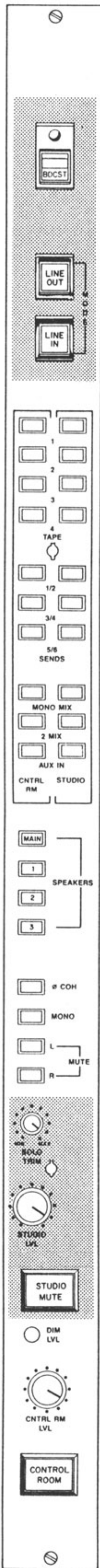
- **MXBK-MI31** Single channel electronically-balanced Microphone Pre-amplifier with controls for Phantom power and Gain (see Figure 1-3).
- **MXBK-MI32** Dual channel electronically-balanced Microphone Pre-amplifier with individual controls for Phantom power and Gain.
- **MXBK-MI33** Single channel Microphone Pre-amplifier with balancing transformers and controls for Phantom power, Pad (attenuation), and Gain.



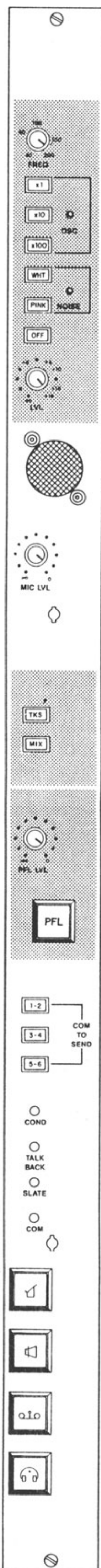
A
INPUT/OUTPUT



B
MASTER



C
MONITOR



D
COMMUNICATION

Figure 1-2. Console Modules



- **MXBK-MI34** Dual channel Microphone Pre-amplifier with balancing transformers and individual controls for Phantom power, Pad and Gain.

In addition to the four Microphone Pre-amplifiers, a dual-channel Line Input Pre-amplifier, **MXBK-LI32**, is available for those I/O modules being used for inputs at line level (+4 dB).

For further information on the Pre-amplifier options, refer to Section 9 of this manual.

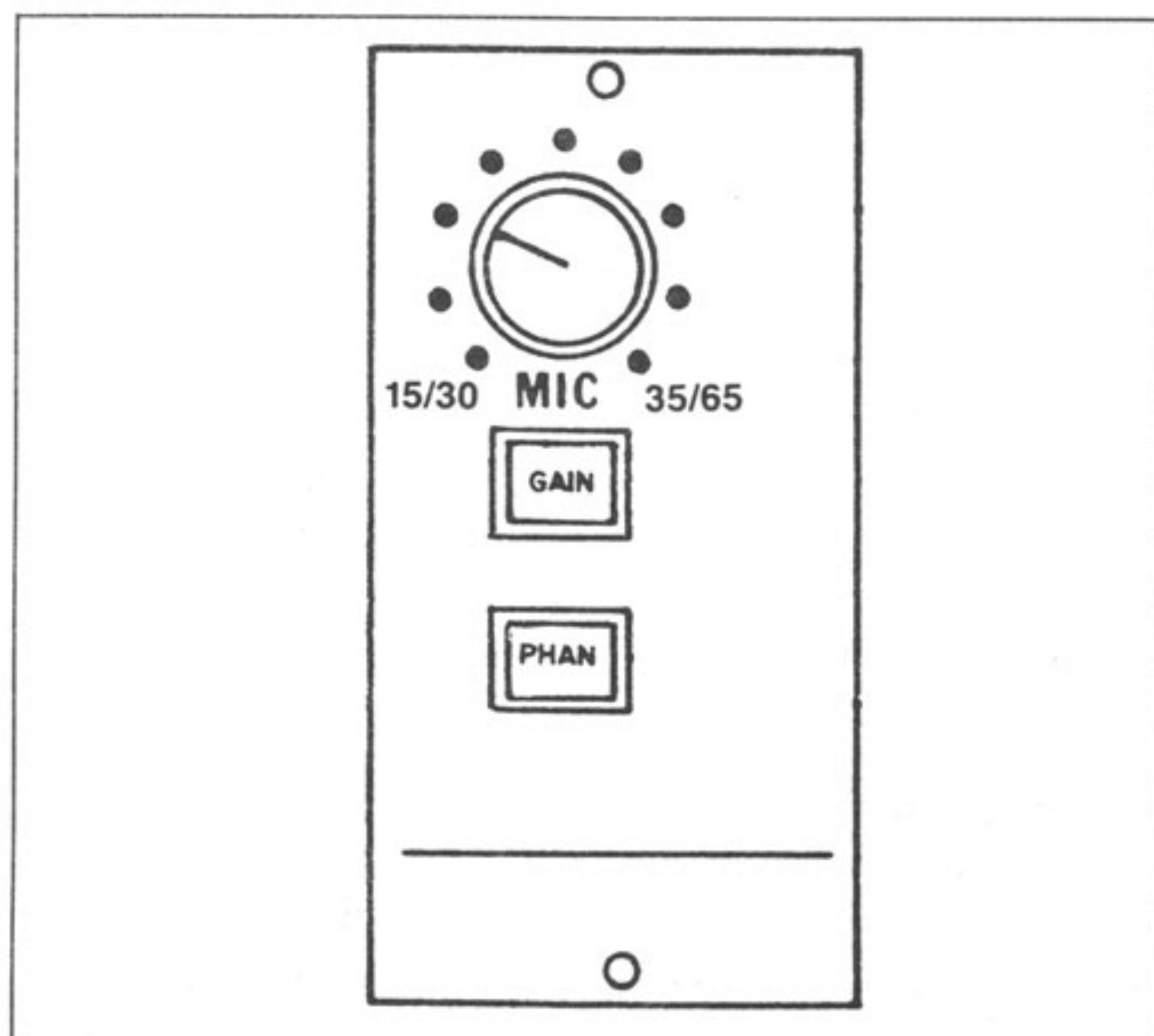


Figure 1-3. Microphone Pre-amplifier MXBK-MI31

1.1.4.2 Equalizer Options

Any one of five different Equalizers can be installed in the Equalizer section of each I/O Module. These options are listed below.

- **MXBK-EQ31** Four Band, fixed-Q, Wien Equalizer (see Figure 1-4).
- **MXBK-EQ32** Four Band, selectable-Q, Wien Equalizer.
- **MXBK-EQ33** Four Band, State Variable Equalizer.
- **MXBK-EQ34** Four Band, fixed-Q, Passive (LC) Equalizer.
- **MXBK-EQ35** Ten Band Graphic Equalizer with the following frequencies: 31 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz and 16 kHz.

For further information on the Equalizer options refer to Section 9 of this manual.

1.1.5 Master Module

The Master module (Figure 1-2B) controls the 2-Mix and Mono outputs, Sends 1 through 6, and the four returns. In addition, the “wild” inputs to 2-Mix and

Sends are injected via this module. Level and mute controls for the six Sends are provided on the module itself, while the 2-Mix level is controlled by the external Master Audio Fader. Provision also is made for switching the 2-Mix directly to Sends 5 and 6.

Level, mute and pan controls for the four returns are incorporated in the Master module, provision also being made for SOLO or PFL operation for the returns.

1.1.6 Monitor Module

The Monitor module, shown in Figure 1-2C, controls all of the signals sent from the console to the studio and control room amplifiers. It includes level and dim functions for the control room, and mute and level controls for the studio. An additional feature is the phase coherence switch. This switch reverses the phase of the left channel signal and sums it with the right channel signal. The resultant out-of-phase component is fed to a single speaker (right channel) in the control room, and can be useful in tracking down any improper, anti-phase component in a mix.

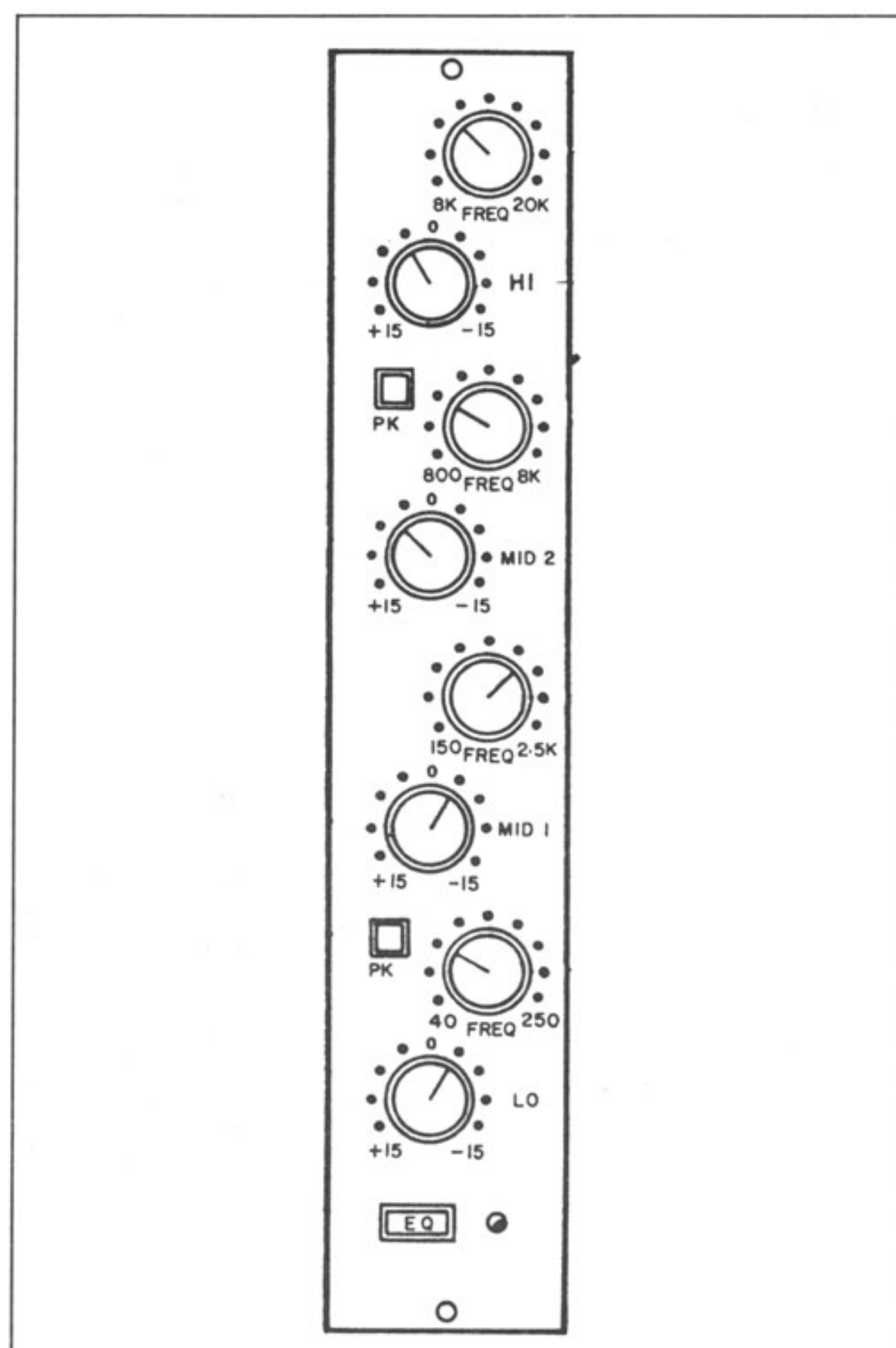


Figure 1-4. Equalizer MXBK-EQ31

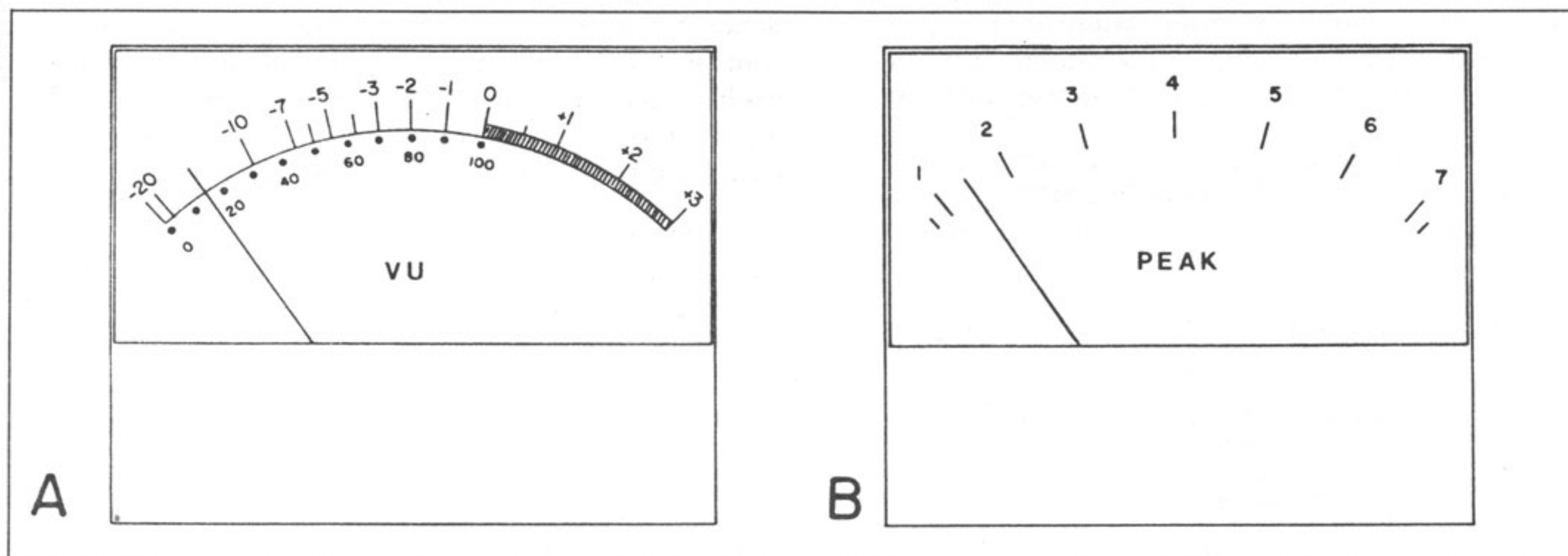


Figure 1-5. VU and PPM Meters

1.1.7 Communication Module

The Communication module provides communication facilities between the console operator and the studio, including a private line to the conductor. It also contains a slate oscillator for generating "take" markers, as well as a low-distortion oscillator and noise generators for use during test and calibration. The Communication module is shown in Figure 1-2D.

1.1.8 Meter Housing

The Meter Housing contains all of the channel meters

for the console, together with one Mono mix meter, two 2-Mix meters, one Phase meter and six Send meters. Status indicators and the PFL loudspeaker also are included in the Meter Housing.

1.1.8.1 Meters

Several metering arrangements are available for the console, and these can be selected to meet the specific needs of the user. The channel meters can be either Volume Unit (VU) or Peak Program (PPM) indicators.

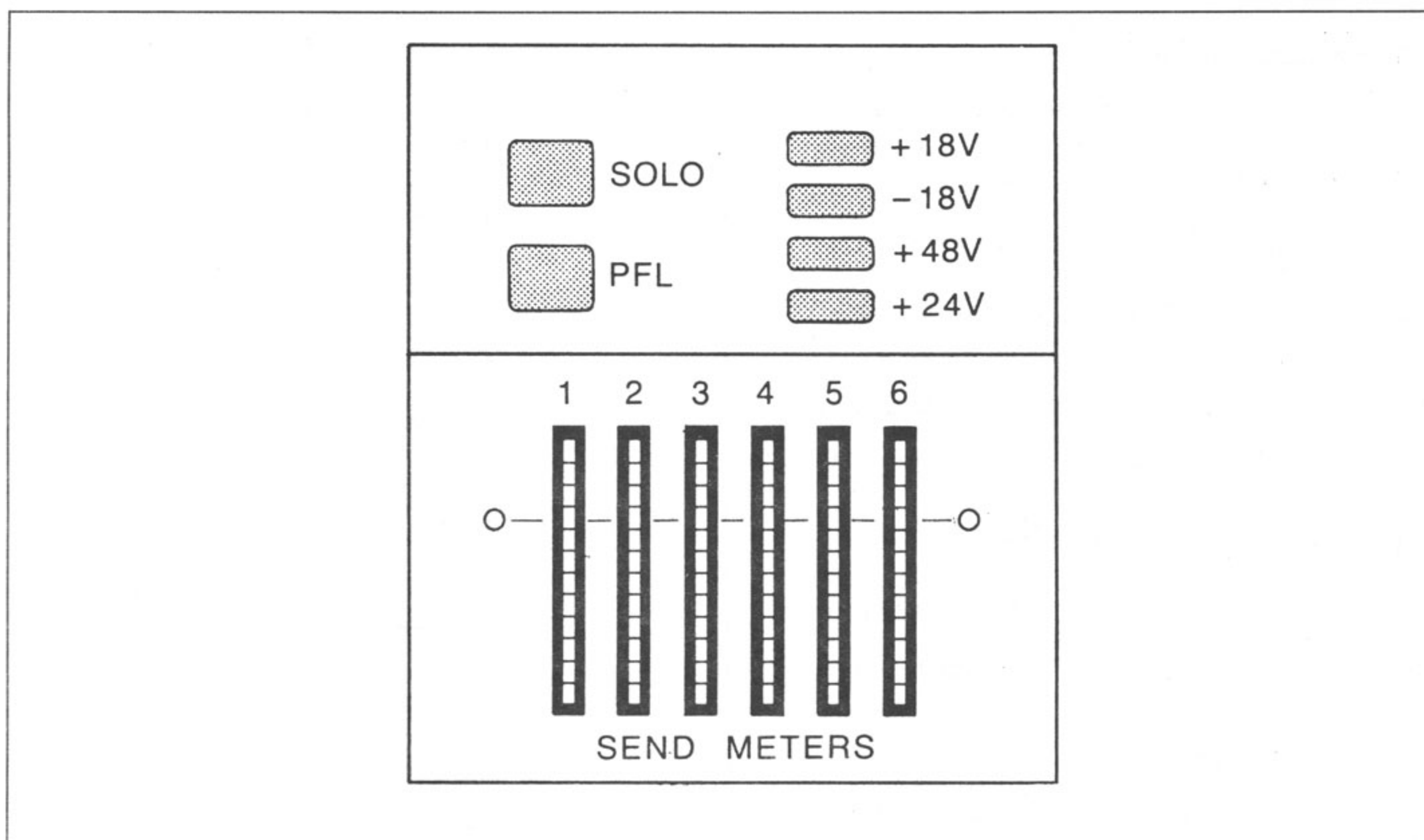


Figure 1-6. Status Panel

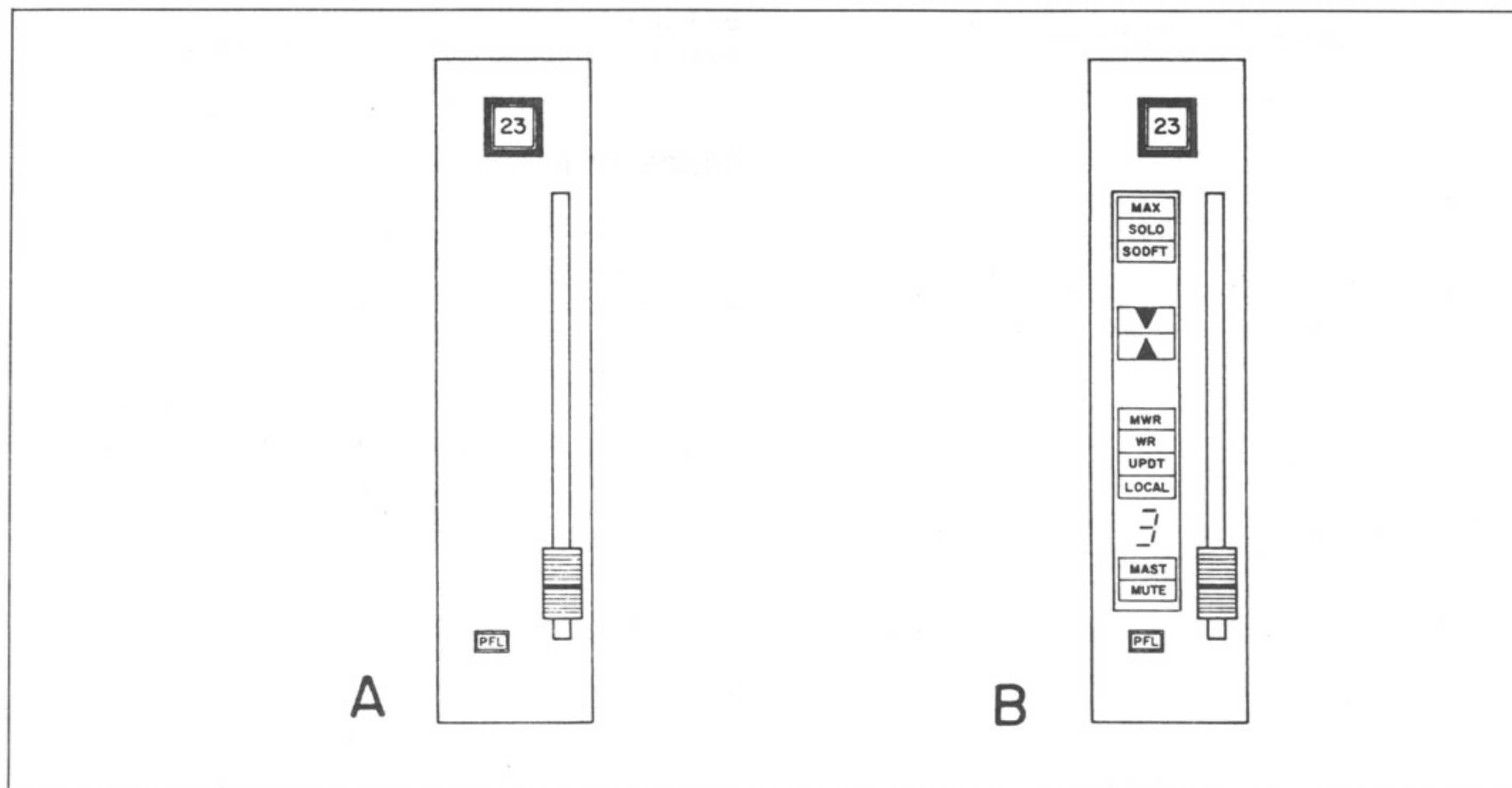


Figure 1-7. Non-automated and Automated Faders

The VU meter, shown in Figure 1-5A, displays volume relative to a given standard, and its zero dB reference can be calibrated in accordance with the requirements of the studio.

The PPM meter is designed to follow closely the peaks in the program material. The attack and decay ballistics of this meter conform to British Broadcasting Standard BB 4297:1968. The PPM meter is shown in Figure 1-5B

The standard Meter Housing for the **MXP-3036** is fitted with 24 channel meters, one for each I/O module with active ACN. Meters for the remaining 12 channels are optionally available. The Meter Housing in the **MXP-3020** console is fitted with 20 channel meters.

Vacuum Fluorescent Displays are available as an option to mechanical meters, and these can be switched to select VU, Peak (BBC), DIN, NORDIC or DC scales. For further details, see Section 9 of this manual.

1.1.8.2 Status Panel

The Status Panel (Figure 1-6) has both SOLO and PFL indicators, the appropriate indicator becoming illuminated when either one of these functions is selected. Also included on the Status Panel are six SEND meters which indicate the levels of the signals on the Send Buses.

1.1.9 Faders

The console employs a single Master Audio Fader (MAF) to set the final Stereo or Mono recording levels to the

tape machine. In addition to the MAF, each of the I/O modules in the console has an associated linear Fader which normally controls the I/O monitor level, but can be switched to control the I/O channel level. The I/O Faders are available in either automated or non-automated versions. The Non-automated Fader is shown in Figure 1-7A, and the Automated Fader is shown in Figure 1-7B.

1.1.9.1 Non-Automated Faders

The non-automated fader contains a linear, slider-type Fader, a backlighted Mute switch, and a (PFL) Pre-Fader Listening switch.

By means of the Fader Reverse (FDR) switch on the I/O panel, the linear Fader function can be interchanged with that of the rotary Channel level (LVL) control on the I/O so that the linear Fader controls the Channel level and the LVL potentiometer controls the Monitor.

The Mute switch, which is labelled with the I/O channel number, is normally backlighted to indicate a non-muted condition. When muting is selected, the backlight is dimmed.

When the PFL mode is selected, an indicator on the Status Display Panel becomes illuminated to show that this mode is in effect.

1.1.9.2 Automated Faders

When the Fader Automation system is ordered with the console, each I/O has an Automated Fader (Figure 1-7B) in place of the Non-automated type. The Automated Fader has the same controls as the

Non-automated version, and, when Automation is switched off, is used in exactly the same manner. Automated Faders are further discussed in paragraph 1.2.4.1.

1.1.10 Additional Options

In addition to the optional Pre-amplifiers and Equalizers already described, other options are available for the **MXP-3000** console, and these are listed below. For more detailed information regarding all options, refer to Section 9 of this manual.

1.1.10.1 I/O Module

I/O module **MXBK-3001** is available less Pre-amplifier and Equalizer, this version being designated **MXBK-3001E**. In addition, both **MXBK-3001** and **MXBK-3001E** are available with isolating transformers in their LINE IN and LINE OUT circuits, the modules then being designated **MXBK-3002** and **MXBK-3002E**.

1.1.10.2 Voltage Controlled Amplifier

Voltage Controlled Amplifier, **MXBK-VCA31** is available for installation in the I/O module.

1.1.10.3 Headphone Amplifier

Headphone Amplifier **MXP-OP3001** provides an amplified headphone output from the console. The output level is adjustable by means of a rotary control. Inputs to the Headphone Amplifier can be selected from the PFL line or from auxiliary inputs.

1.1.10.4 Two-Way Communications Module

The Two-Way Communications module, **MXBK-OP3002**, can be installed in place of the standard Communications module to provide three additional, two-way communication channels which can be directed to and from any desired points. These two-way channels can be switched at the console and/or at remote locations.

1.1.10.5 Dual Microphone Patches

Two dual microphone patch types are available for the consoles. For the **MXP-3020**, patch type **MXP-OP3102** is used, while patch type **MXP-OP3202** is used for the **MXP-3036**.

The Microphone Patch option provides a simple method of transferring microphones from one input to another without need for time-consuming rewiring efforts. It also greatly enhances the available possibilities for customizing the console installation.

1.1.10.6 Master Module Transformers

Master module transformer option, **MXP-OP3003** is applicable to both **MXP-3020** and **MXP-3036** consoles,

and provides transformer isolation for the Master module outputs and the four CHAMBER returns.

1.1.10.7 Wild Faders

The Wild Fader options for **MXP-3000** Series automated consoles are used to provide four or eight additional Automated Faders, these being available for use as Group Masters, Returns, etc. Wild Fader option **MXP-OP3012** provides Channels 1 through 4, and a second, separate option package, **MXP-OP3013**, provides Channels 5 through 8. The Wild Fader options are available for field retrofit.

1.2 FADER AUTOMATION

The **CAF-3000** Automated Faders system provides the mixing engineer with a more effective of accomplishing his tasks. This system collects data (including dynamic changes) relating to the VCA level and mute status for each channel, and stores them on disk in the **ADS-3000** Automation Data Storage system. Alternatively, where the optional **ADS-3000** system is not available, the data can be recorded on a spare track on the multi-track recorder. The data for VCA levels and mutes then are available for playback in real time to repeat the mix, or for modification in real time to update the mix.

Where incorporated in conjunction with the Automated Faders, the optional **ADS-3000** Automation Data Storage system provides Time Code frame accuracy and operates at high speed, thus avoiding the delays which are normally inherent in automation systems using magnetic tape storage.

1.2.1 CAF-3000 Features

The features of the Automation system include:

- All channel faders can be put into a local mode where their level is not controlled by the automation master fader
- Electronic high speed latched mute switching ensures mute capture with video frame accuracy
- Specific commands can be entered via the Remote Control Keypad or the optional **ADS-3000** keyboard
- Individual Fader Status indicators are provided
- Both power-up and operator-controlled system diagnostics are included

1.2.2 CAF-3000 Standard Models

The Fader Automation System can support either the **MXP-3020** (20 channels) or the **MXP-3036** (36 channels).

Any number of channels can be ordered, up to the maximum that can be accommodated in the frame.

1.2.3 Advantages of Automated Faders

Faders can be placed into READ, WRITE, or UPDATE mode as needed to allow for refinement of a mix. MUTE WRITE or MUTE READ can be specified where it is desired to record or retrieve only the mute status.

Channels can be grouped together as desired and a group master assigned, the Fader level and mute status of the master then affecting all members of the group. The Automation Master Fader controls all channels except those assigned to LOCAL 0 mode.

A SOLO function is available to easily mute all channels except the one that is "Soloed". A SOLO DEFEAT function also can be used in conjunction with the SOLO function. When SOLO DEFEAT is activated for a channel, then that channel will remain unmuted when any other channel is soloed.

A Soft lock provision allows the operator to "lock" out further commands from the keypad by entering a numeric code. The Faders then are protected from unwanted functional changes until the same code is re-entered to unlock the keyboard.

The phase reversal command provides the operator with a simple way to electrically reverse the phase of the signal from the audio tape recorder to the automation system.

Automation can be turned off by a keypad command to allow the console to be operated as a non-automated system with fully functioning fader and mute controls.

1.2.4 CAF-3000 System Components

The five additional components supplied for a console with the Fader Automation System are:

- Automated Faders
- Automation Master Fader
- Remote Control Keypad
- Automation Status Display
- Processor Boards

1.2.4.1 Automated Faders

The **CAF-3000** Automated Faders have the same controls as the Non-automated Fader plus a series of LED indicators which show the current operating status of

the Automation System. The Fader indicators are illustrated in Figure 1-8.

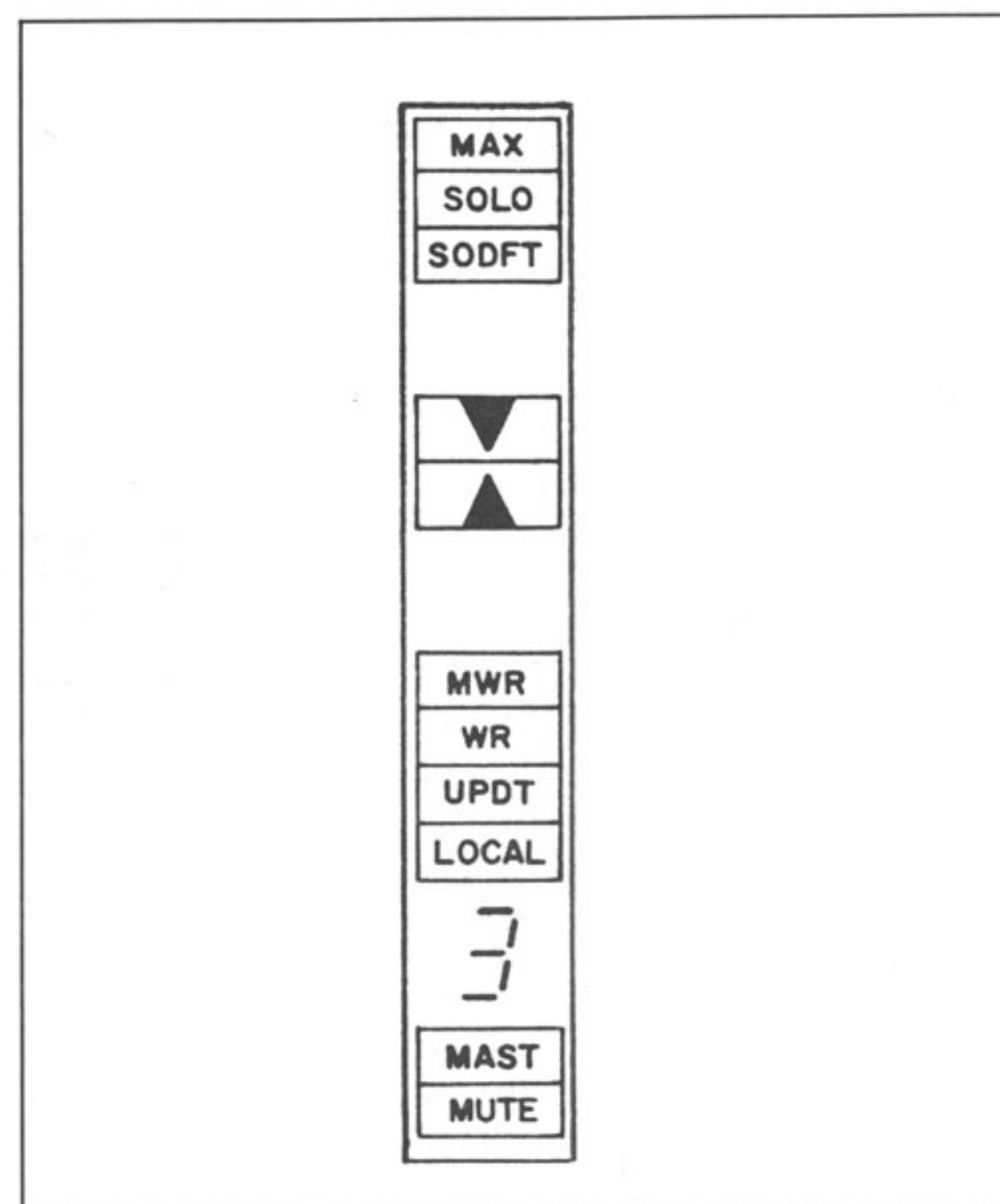


Figure 1-8. Automated Fader Indicators

The Maximum Gain (MAX) LED becomes illuminated to indicate that the VCA is operating at +12dB, this being the maximum gain.

Two arrow-shaped LEDs are used to indicate the direction in which the fader must be moved to set the null point. To set the null, the fader is moved in the direction shown by the illuminated arrow. At the null point, both arrows become illuminated. It should be noted that the null is provided as a reference, it not being necessary to null the faders during operation.

The 7-segment display indicates the number of the group to which the fader is assigned, and the remaining LEDs give direct indications of each of the following modes of operation in the automated system:

SOLO	UPDATE (UPDT)
SOLO DEFEAT (SODFT)	LOCAL
MUTE WRITE (MWR)	MASTER (MAST)
WRITE (WR)	MUTE

1.2.4.2 Automation Master Fader

The Automation Master Fader sets the level of all channels except those assigned to the LOCAL zero mode. In the up position, the Fader offers zero attenuation. In the down position, the Fader offers maximum attenuation.

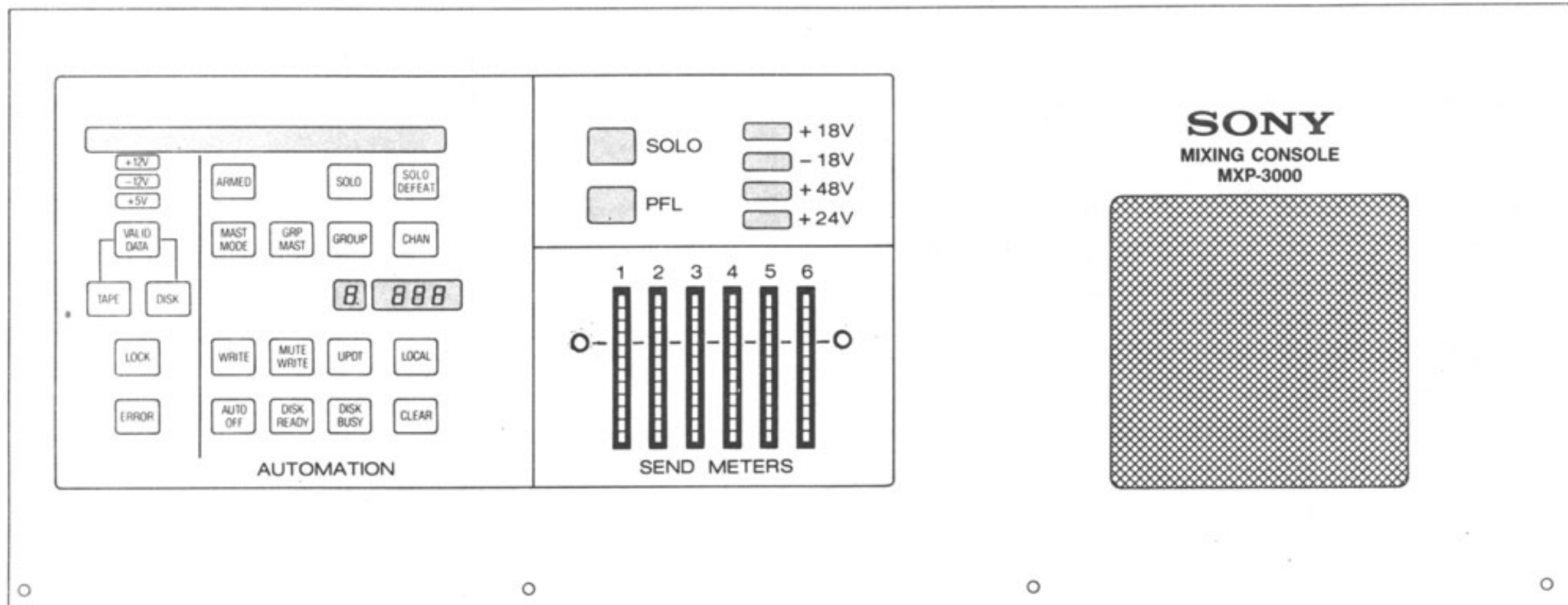


Figure 1-9. Status Display Panel

1.2.4.3 Remote Control Keypad

The Remote Control Keypad is the control center for the Fader Automation system. It is mounted on a movable assembly which allows for its operation from any part of the console. The keypad communicates with the console via an infrared transmitter mounted on its rear panel, the transmitted information being accepted by an infrared receiver in the **MXP-3000** Meter Housing.

Group and local assignments, group master, solo functions, mode changes and special automation configurations can be executed through specific command sequences entered from the keypad. All commands are reflected on the Status display in the console Meter Housing.

After a specific command has been keyed in, all channels are "armed" to execute that command. The channel to be controlled then can be selected by either entering the channel number on the numeric keypad or by pressing the Mute switch on the desired Fader.

1.2.4.4 Status Display

The Status display (Figure 1-9) is located on the console Meter Housing. It provides the operator with visual confirmations of the commands keyed into the keypad, and indicates the various status conditions of the system.

When the operator enters a command, the associated LED on the display panel becomes illuminated. If the command arms the channel for selections through the mute switches, then the ARMED indicator also illuminates. When a numeric entry is made, the number is shown on the 7-segment display. After the command sequence is completed and executed, the indicators extinguish.

The ERROR indicator shows that an illegal command entry has been made. The LOCK indicator illuminates if the "soft" keypad lock is on. Additional indicators are used to show that power is applied to the system, whether the system is selected for the audio tape recorder or the **ADS-3000** Automation Data Storage system, and to confirm that valid data is being received from the storage medium.

1.3 SPECIFICATIONS

1.3.1 MXP-3000 Specifications

Channel Mix Bus System

Summing Bus Headroom:	+24 dB
Output Trim:	-14 dB to +5 dB
Noise Floor (Unity gain):	
No channels assigned	Better than -84 dBu
One channel assigned	Better than -84 dBu
Bus Crosstalk (at 15 kHz)	Better than -60 dB
Output Amplifier Type:	Transformerless Active Differential Output
Nominal Output Level	+4 dBu
Nominal Output Impedance	120 Ohms
Max Output Level	+28 dBu
Total Harmonic Distortion	
At max level	Less than 0.01%
At nominal level	Less than 0.01%
Intermodulation Distortion(SMPTE Standard)	
At max level	Less than 0.02%
At nominal level	Less than 0.01%

Microphone Pre-Amplifier MXBK-MI31

Nominal output level at patch:	-2 dBu
Max output level at patch:	+22 dBu
Total Harmonic Distortion:	Less than 0.01% (at +20 dBu out)
Intermodulation Distortion:	Less than 0.01% (at +20 dBu out)
Input Impedance:	1.2k at 1000 Hz
Output Impedance:	Less than 10 ohms
Gain Range:	
Low	15 dB to 35 dB ± 3 dB
High	30 dB to 65 dB ± 3 dB
Equivalent Input Noise:	-128 dBu (20 Hz to 20 kHz, input terminated with 150 ohms)
Note:	0dBu = 0.775 Vrms
Frequency Response	
(at +60 dB gain):	+0.0 dB/-0.3 dB
Phantom Power:	+48 VDC ± 0.5 VDC

Equalizer MXBK-EQ31

Filter Q:	1.5 $\pm 10\%$
Nominal Level:	-2 dBu
Max Level:	+22 dBu
Noise Floor	
20 Hz to 20 kHz:	Better than -85 dBu
(EQ set for flat response, nominal level measured at EQ OUT patch)	
Low Frequency Section:	
Frequency Range	40 Hz to 250 Hz $\pm 10\%$
Boost/Cut Range	15 dB ± 1 dB
Filter Response	Selectable Shelf/Peak

Mid 1 Section:

Frequency Range	150 Hz to 2.5 kHz $\pm 10\%$
Boost/Cut Range	15 dB ± 1 dB
Filter Response	Peak response only

Mid 2 Section:

Frequency Range	800 Hz to 8 kHz $\pm 10\%$
Boost/Cut Range	15 dB ± 1 dB
Filter Response	Peak response only

High Frequency Section:

Frequency Range	8 kHz to 20 kHz $\pm 10\%$
Boost/Cut Range	15 dB ± 1 dB
Filter Response	Selectable Shelf/Peak

Monitor System

Line Input:

Input Impedance	10k
Gain Range	± 10 dB
Nominal Input Level	+4 dBu
Max Input Level	+28 dBu

Monitor Mix Busses:

Summing Bus Headroom +24 dBu, unity gain

Pre-Master Fader Patch:

Nominal Level	-2 dBu
Max Level	+24 dBu

Master Fader:

Turn Off (20 Hz to 20 kHz)	Greater than -90 dBu
Tracking	± 2.0 dB between channels
Crosstalk (at 15 kHz)	Less than -60 dB relative to +4 dBu

Noise Floor (within 20 Hz
to 20 kHz bandwidth) -80 dB at unity gain

Output Amplifier:

Type	Hybrid
Nominal Output Level	+4 dBu
Nominal Output Impedance	120 ohms
Max output level	+28 dBu
Total Harmonic Distortion	Less than 0.01%
Intermodulation Distortion	Less than 0.01% (SMPTE Standard)

Communication System

Functions Provided:

Talkback to Studio
Communicate to Cue Mix
Slate to tracks and Mix
Conductor to separate Conductor Headphones

Slate Oscillator:

Frequency	18 Hz
Level	-20 dBu
Noise Sources:	White and Pink

Wien Bridge Oscillator:

Frequency Range	20 Hz to 20 kHz (auto-levelled output)
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Output Level	Variable to +19 dBu
Total Harmonic Distortion	Less than 0.05%

Control Room and Studio Monitor

Inputs:

Impedance	5 kohms, differential
Nominal level	+4 dB, balanced

Outputs:

Available Gain:	Balanced +6 dB
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Mute/Dim:

Control Monitor	-6 dB to -40 dB
Studio Monitor	Better than -80 dB

Left/Right Separation (at 15 kHz):

Better than -55 dBu

Power Supplies

Inputs:	100 to 260 VAC, 50/60 Hz
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Outputs:

VDC	+18, -18, +24, +48
VAC	5 V

Connecting Cables:

Standard	35 feet
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1.3.2 CAF-3000 Specifications

CAF-3000 Mechanical Specifications

- **Fader Bay Area** The Communications Host Processor, Fader Processor, and Expansion Power Boards are housed in the Fader Bay by the Patch Bay.
- **Power** The Automation Power Supply mounts in a standard 19-inch relay rack. It occupies 4.0 inches of panel space.
- **Automated Fader Mounting** The Automated Faders mount on motherboards located in the Fader Bay.
- **Bus Termination Board** One Bus Termination board is required. This board mounts on stand offs at the left end of the Console Fader Bay.
- **Connectors** Low impedance gold plated throughout.

CAF-3000 Electrical Specifications

Information System

- Hard Disk System
- Any two or more tracks of an Audio Recording System which meet the following criteria:
 1. Is able to sync with the Master tape.
 2. Is able to record and playback a 14 kHz signal.
 3. Has at least 15 dB isolation between sync tracks at 10 kHz.

Faders, Fader Status LEDs

- Built into all faders.

Keyboard Status LEDs

- Built into console meter housing.

System Control

- Built into console meter housing in remote keyboard transmitter and individual fader packages.

System Resolution

- 100 dB fader range is divided into 256 steps of 0.4 dB/step.

System Accuracy

- A to D and D to A is adjustable to better than System Resolution. System Resolution (0.4 dB) becomes System Accuracy when this adjustment is properly made.

Cumulative System Error (unlimited passes)

- Limited only by System Resolution

Data Rate

- 38.4 k Baud in Disk Mode
- 9600 Baud in Tape Mode.

Compatibility

- Tapes made on a standard JH-600 JH-50 type Automation may be played or generated using this automation system.

Power Requirements

115V	@	3 amps
+5V	@	16 amps
+19V	@	2 amps
-19V	@	2 amps
+24V	@	2.6 amps from console

SECTION 2

INSTALLATION

2.1 INTRODUCTION

This section of the manual describes the procedures to be used for unpacking and installing **MXP-3000** Series consoles (both automated and non-automated). Paragraph 2.2 provides the general information applicable to the console, and the unpacking and installation instructions are given in paragraphs 2.3 and 2.4. The connection information for the Fader Automation Power Supply is presented in paragraph 2.5.

2.1.1 Consoles with Vacuum Fluorescent Displays

When installing consoles that are fitted with optional Vacuum Fluorescent Displays, great care must be taken to avoid confusion between the power supply cables for the Vacuum Fluorescent Displays and the Automation system.

The Automation Power Supply is identified by the label "**MIXING CONSOLE MXP-3000 AUTOMATION POWER SUPPLY UNIT**", this being clearly marked on its front panel. The cable which must be connected to this supply originates from a series of terminal strips at the left-hand end (as seen from the rear of the console) of the Tuchel Bay, and its connector end is marked "**AUTOMATION PWR CABLE**".

The VF Displays Power Supply is identified by the front panel marking "**MIXING CONSOLE MXP-3000VF POWER SUPPLY UNIT**". The connecting cable for this supply originates from the Power Distribution Board, this being located at the left-hand end (as seen from the rear of the console) of the Meter Housing. The connector end of this cable is marked "**VF PWR CABLE**".

2.2 INSTALLATION PLANNING

Before installation is carried out, it is necessary to consider the space, power and environmental requirements of the equipment. The following paragraphs are presented as guidelines for planning the installation.

2.2.1 Space Requirements

The physical dimensions for both console versions are given in Table 2-1. When considering console place-

ment, this data can be used in drawing up an overall floor plan which should take into account the space requirements of all of the associated equipment as well as those for the console itself. Further consideration also must be given to both operational convenience and equipment accessibility for maintenance or service.

	MXP-3020	MXP-3036
Height:	109.4 cm. (43.07 in.)	109.4 cm. (43.07 in.)
Depth:	113.54 cm. (44.7 in.)	113.54 cm. (44.7 in.)
Length:	172.97 cm. (68.1 in.)	237.24 cm. (93.4 in.)

Table 2-1. Console Dimensions

2.2.2 Environmental Requirements

The console should be operated in an area such that it is not subjected to temperatures greater than 35 degrees C. (95 degrees F.) or humidity in excess of 80% (non-condensing). Further, to prevent heat build-up in the equipment, an unrestricted flow of air is essential.

The heat dissipated by the console is approximately 2700 BTUs/hour. For all practical purposes, this will require about one half-ton of cooling capacity, and the room air conditioning must be adjusted accordingly.

2.2.3 Power Requirements

Total power consumption for the **MXP-3000** series console is approximately 900 watts. Power input to the console can be from 100 VAC to 260 VAC at 50/60 Hz. Detailed instructions for making power connections are given in Paragraph 2.4.3.

The power requirement for the Automation Power Supply is 345 watts at 120 VAC or 240 VAC. Instructions for connecting the Automation Power Supply connections are given in paragraph 2.5.2.

2.3 IXP-3000 CONSOLE UNPACKING

WARNING

THE CONSOLE MUST BE UNPACKED ONLY BY PROFESSIONAL LIFTING PERSONNEL

For shipping purposes, the legs are removed from the console and stored within the skid on which the console is shipped. The console then is secured to the skid by means of four bolts inserted into holes which are normally used to secure the legs.

Lifting eyes are provided on the console, as illustrated in Figure 2-1. These eyes are located at the extreme ends of the console, and are accessible through the blank panels at those points.

CAUTION

DO NOT ATTEMPT TO LIFT THE CONSOLE BY THE WOOD SIDES OR BY MEANS OF A FORK LIFT UNDER THE BELLY PAN

ALSO, TAKE GREAT CARE NOT TO ALLOW THE WEIGHT OF THE CONSOLE TO FALL ON THE METER HOUSING

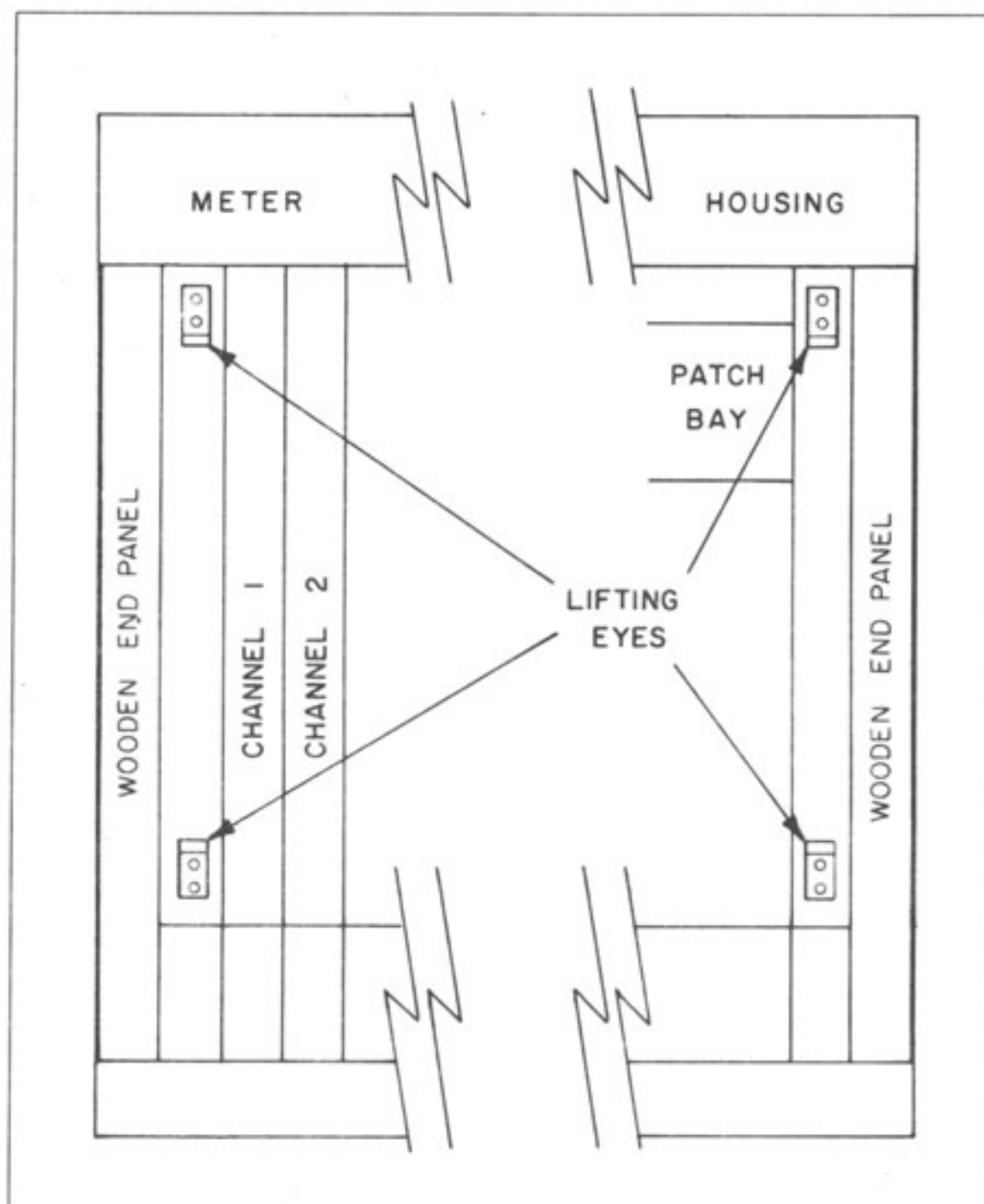


Figure 2-1. Lifting Eye Locations

2.4 MXP-3000 CONSOLE INSTALLATION

2.4.1 General

Paragraphs 2.4.2 through 2.4.4.3 provide information relating to the installation of the **MXP-3000** non-automated console. The same information also is applicable to automated console installation. For Fader Automation Power Supply information, refer to paragraph 2.5.

2.4.2 Equipment Location

Since the physical location of the console will depend largely on the type of facility available, it is not possible to give specific, detailed procedures for selecting its location. However, the following guidelines should be adhered to as closely as possible.

When the site for the console is being selected, consideration must be given not only to the console and power supply, but also to the peripheral equipment to be used with the console. Further, since different operating applications will require different peripherals, space must be allowed for equipment to be moved around the console. As final considerations, ease of operation and accessibility for service also must be considered.

Once the console is placed in position, the location of the power supply must be determined. The power supply design is such as to allow installation in a standard 19-inch rack or cabinet. The panel height is 8.75 inches, and the total package depth is 18 inches. An additional space of four inches is required at the rear of the supply to allow for connectors and cables. Further, since it is convection cooled, a space of at least three inches must be provided above and below the power supply.

Power supply location requires careful planning, since it must be placed in such a position as to avoid electromagnetic interference with other equipment while remaining within the confines of its cable length, this being 10.7 meters (35 feet).

It is also strongly recommended that any additional power supplies, lines, and outlets be kept at least 20 feet from the console to further avoid any interference.

2.4.3 Electrical Connections

The following paragraphs describe the electrical connections for the console and power supply.

CAUTION

DO NOT CONNECT POWER TO THE EQUIPMENT UNTIL THESE PARAGRAPHS HAVE BEEN READ AND UNDERSTOOD

2.4.3.1 Grounding

When making electrical power connections to the console, it is most important that system grounding is carried out properly. It is strongly recommended that the procedures and practices detailed in Appendix C be followed as closely as possible.

2.4.3.2 Power Supply to Console Connections

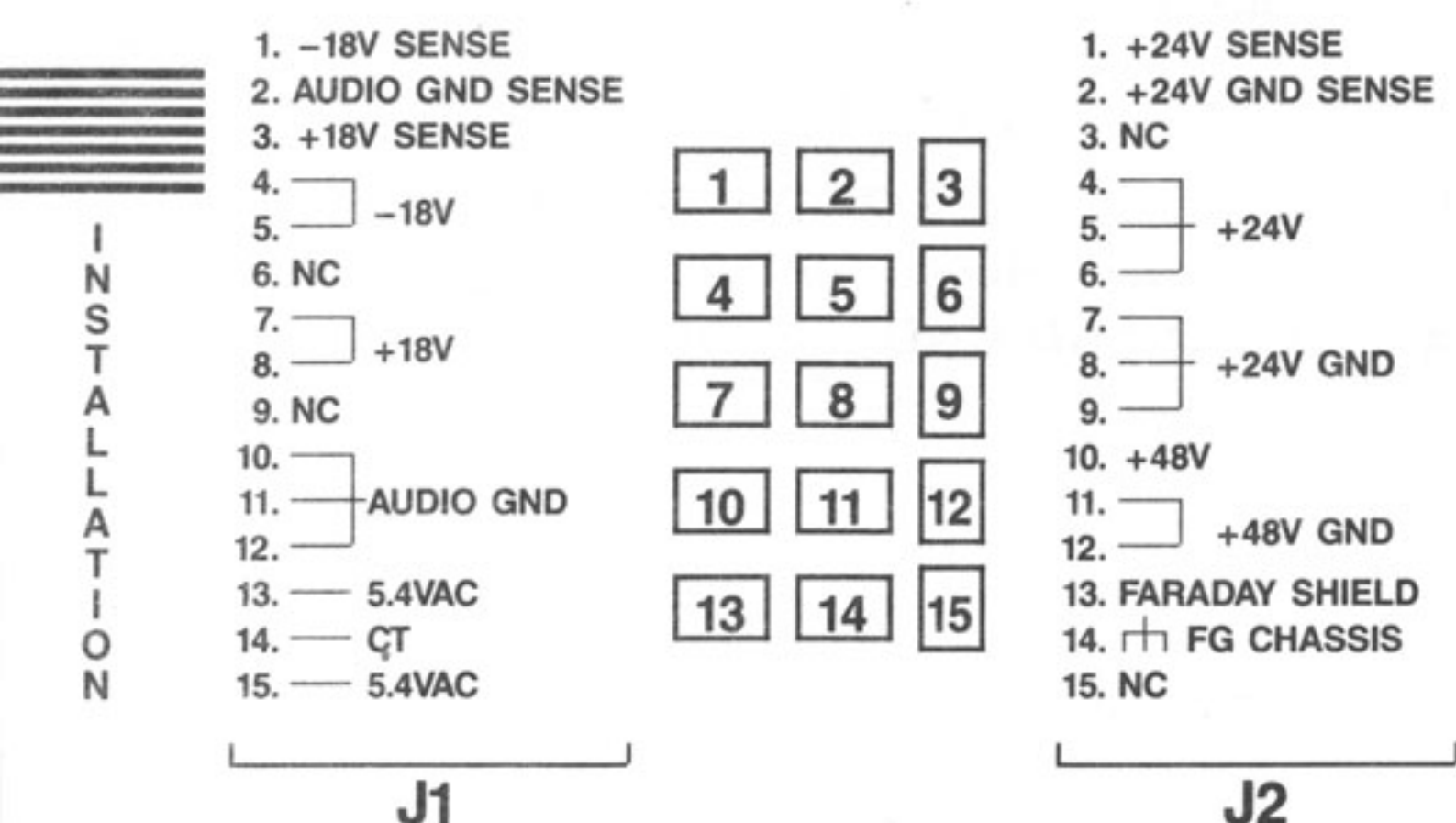
The power supply connects to the console via two cables which are stored in the console Tuchel bay. To connect the power supply to the console, proceed as follows:

CAUTION

THE CABLE CONNECTORS CAN FIT INTO EITHER SOCKET ON THE POWER SUPPLY. CAREFULLY OBSERVE THE PLUG AND SOCKET MARKINGS WHEN MAKING CONNECTIONS.

- STEP 1** Remove the rear covers from the Tuchel Bay and locate the power cables. (Both cables are gray in color, and are terminated with 15-pin connectors.)
- STEP 2** Pass the cables through the appropriate cable chimney opening and route them to the power supply.
- STEP 3** Insert the plug labelled J1 into the power supply socket labelled J1.
- STEP 4** Insert the plug labelled J2 into the power supply socket labelled J2.
- STEP 5** Install and fasten the connector retainer brackets.

The pin connections for J1 and J2 are illustrated below:



2.4.3.3 Power Supply Input Connections

The console power supply is designed for operation on nominal input voltages from 100 VAC to 260 VAC at 50/60 Hz. The supply is set for the available input voltage by means of jumpers on the power transformer terminal strip. The power transformer primary circuit diagram is illustrated in Figure 2-2, all of the terminals shown in this diagram being clearly marked on the terminal strip.

Input Voltage	Line Connection	First Jumper	Second Jumper
90 to 115	Pin 7	Pins 1-6	Pins 2-7
99 to 121	Pin 8	Pins 1-6	Pins 3-8
108 to 132	Pin 4	Pins 1-6	Pins 4-9
117 to 143	Pin 10	Pins 1-6	Pins 5-10
180 to 220	Pin 2	Pins 1-7	None
198 to 242	Pin 3	Pins 1-8	None
216 to 264	Pin 4	Pins 1-9	None
234 to 286	Pin 5	Pins 1-10	None

Table 2-2. Transformer Connections

Table 2-2 lists the connections to be used for all of the permissible input voltages for the power supply. Before connecting any power, carry out the following procedure:

STEP 1 Remove the top and side covers from the power supply and locate the power transformer terminal strip.

STEP 2 Determine the locally available voltage, and connect jumpers to the terminal strip in accordance with that voltage and the data supplied in Table 2.2.

STEP 3 Connect the input neutral lead to terminal strip pin 6, and the line lead to the proper pin as listed in Table 2.2.

STEP 4 Verify all connections, then replace the covers.

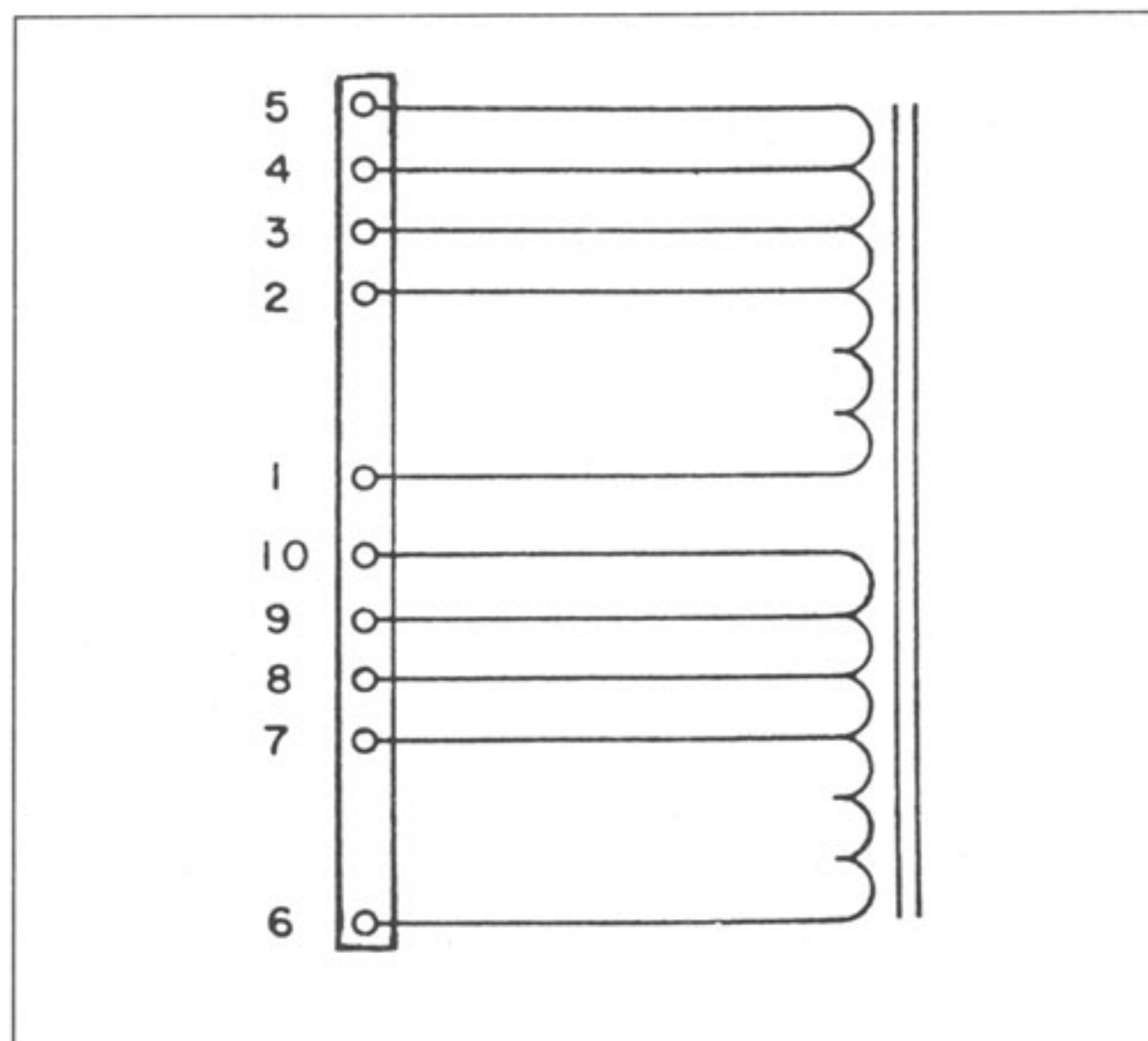


Figure 2-2. Console Power Supply Transformer Primary Circuit

2.4.3.4 Power Supply Fuses

Five fuseholders are mounted on the front panel of the power supply (Figure 2-3), a row of four across the bottom of the panel, and one just to the right of the main power switch. The four lower fuses are for the DC outputs, +48 V, +18 V, -18 V, and +24 V, while the remaining fuse is for the main input. A list of the correct fuse values is given in Table 2-3. Note that the main input fuse has different values for high and low input voltages.

Voltage	Fuse Rating
+48 V	2 A
+18 V	20 A
-18 V	20 A
+24 V	20 A
Input (100 to 130 VAC)	20 A
Input (200 to 260 VAC)	10 A

Table 2-3. Power Supply Fuses

2.4.4 External Equipment Connections

2.4.4.1 General

All external equipment is connected via the Tuchel Connectors Panel located in the rear section of the console. Details of the Tuchel connector assignments are given in Paragraphs 2.4.4.2 through 2.4.4.4 below.

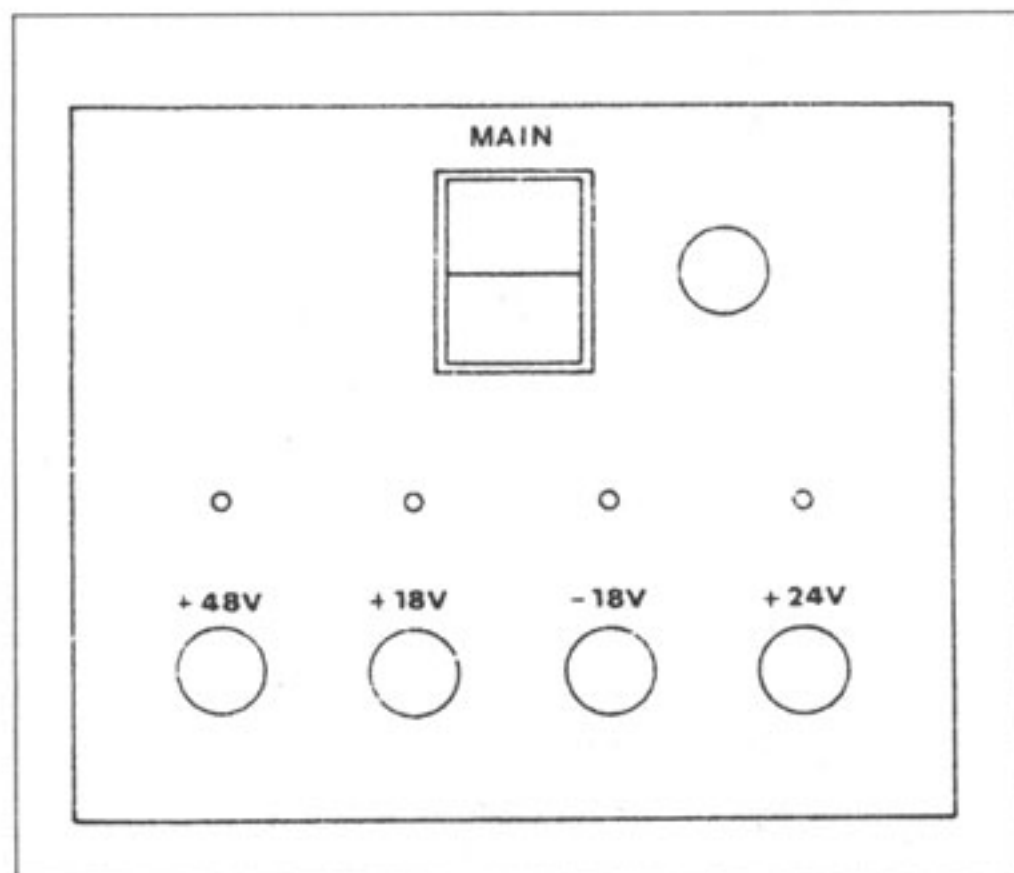


Figure 2-3. Console Power Supply Panel

2.4.4.2 Tuchel Connectors

Figure 2-4 gives a front view of the Tuchel connector. As can be seen, the connector pins are arranged in clearly marked rows and columns. Each of the rows usually is assigned for a specific 3-wire input or output, while the columns are assigned as follows:

- a. Input or Output high side
- b. Input or Output low side
- c. Cable shield

2.4.4.3 Tuchel Panel Assignments

Tuchel Panel assignments for both the **MXP-3020** and the **MXP-3036** consoles are shown in Table 2-4.

2.4.4.4 Tuchel Connections

Figure 2-5A and 2-5B illustrate the Tuchel Panel connections for both consoles in complete detail, showing the destination for each row on every connector. These illustrations provide all of the information required for external equipment connections.

As an aid to planning cable lengths, Figure 2-6 illustrates the Tuchel layouts for both **MXP-3020** and **MXP-3036**.

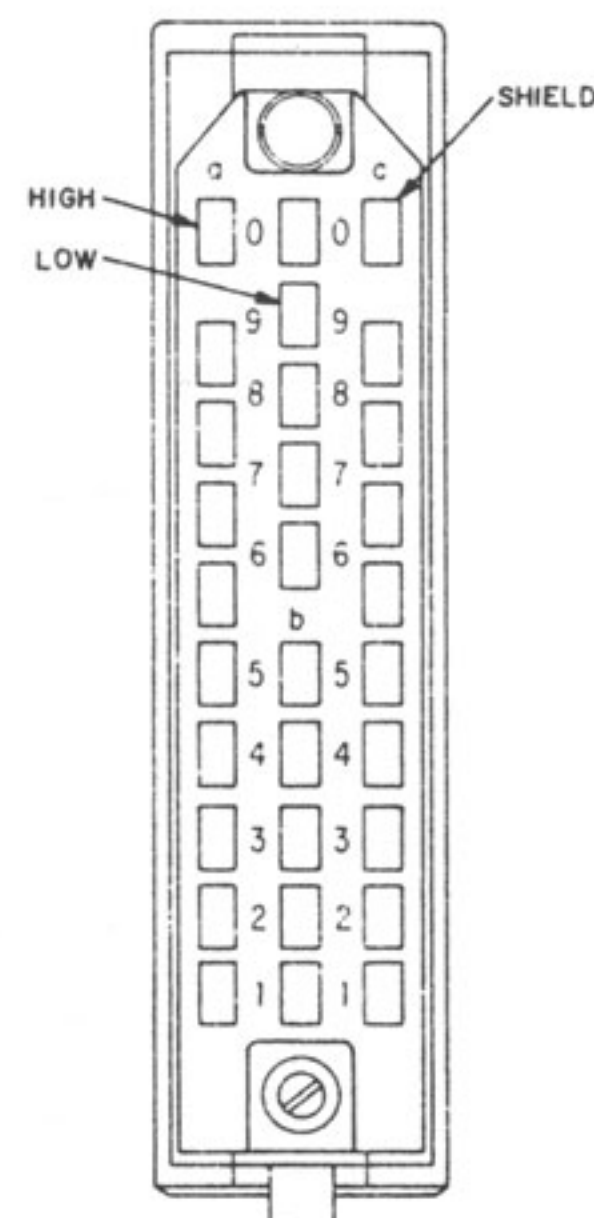


Figure 2-4. Tuchel Connector

Connectors		Assignments
MXP-3020	MXP-3036	
1 — 6	1 — 4	Spares
	5 — 8	Tape Remote Option
	9	Spare
7 — 24	10 — 34	Tielines
25	—	Spare
26 — 28	35 — 37	Automation Inputs/Outputs
—	38 — 41	Line Inputs/Outputs
29 — 34	42 — 47	Multitrack Inputs/Outputs
35 — 37	48 — 50	Tape Inputs/Outputs
38 — 39	51 — 52	Control room and studio monitors
40 — 41	53 — 54	Chambers
42 — 46	55 — 63	Microphones
47 — 48	64 — 65	Communications options
49 — 52	—	Tape Remote Option
53 — 63	66 — 87	Stereo Input Module Option

Table 2-4. Tuchel Panel Assignments

TUCHEL #10		TUCHEL #11		TUCHEL #12	
ROW 8	Tieline 200	ROW 8	Tieline 192	ROW 8	Tieline 184
ROW 7	Tieline 199	ROW 7	Tieline 191	ROW 7	Tieline 183
ROW 6	Tieline 198	ROW 6	Tieline 190	ROW 6	Tieline 182
ROW 5	Tieline 197	ROW 5	Tieline 189	ROW 5	Tieline 181
ROW 4	Tieline 196	ROW 4	Tieline 188	ROW 4	Tieline 180
ROW 3	Tieline 195	ROW 3	Tieline 187	ROW 3	Tieline 179
ROW 2	Tieline 194	ROW 2	Tieline 186	ROW 2	Tieline 178
ROW 1	Tieline 193	ROW 1	Tieline 185	ROW 1	Tieline 177
TUCHEL #13		TUCHEL #14		TUCHEL #15	
ROW 8	Tieline 176	ROW 8	Tieline 168	ROW 8	Tieline 160
ROW 7	Tieline 175	ROW 7	Tieline 167	ROW 7	Tieline 159
ROW 6	Tieline 174	ROW 6	Tieline 166	ROW 6	Tieline 158
ROW 5	Tieline 173	ROW 5	Tieline 165	ROW 5	Tieline 157
ROW 4	Tieline 172	ROW 4	Tieline 164	ROW 4	Tieline 156
ROW 3	Tieline 171	ROW 3	Tieline 163	ROW 3	Tieline 155
ROW 2	Tieline 170	ROW 2	Tieline 162	ROW 2	Tieline 154
ROW 1	Tieline 169	ROW 1	Tieline 161	ROW 1	Tieline 153
TUCHEL #16		TUCHEL #17		TUCHEL #18	
ROW 8	Tieline 152	ROW 8	Tieline 144	ROW 8	Tieline 136
ROW 7	Tieline 151	ROW 7	Tieline 143	ROW 7	Tieline 135
ROW 6	Tieline 150	ROW 6	Tieline 142	ROW 6	Tieline 134
ROW 5	Tieline 149	ROW 5	Tieline 141	ROW 5	Tieline 133
ROW 4	Tieline 148	ROW 4	Tieline 140	ROW 4	Tieline 132
ROW 3	Tieline 147	ROW 3	Tieline 139	ROW 3	Tieline 131
ROW 2	Tieline 146	ROW 2	Tieline 138	ROW 2	Tieline 130
ROW 1	Tieline 145	ROW 1	Tieline 137	ROW 1	Tieline 129
TUCHEL #19		TUCHEL #20		TUCHEL #21	
ROW 8	Tieline 128	ROW 8	Tieline 120	ROW 8	Tieline 112
ROW 7	Tieline 127	ROW 7	Tieline 119	ROW 7	Tieline 111
ROW 6	Tieline 126	ROW 6	Tieline 118	ROW 6	Tieline 110
ROW 5	Tieline 125	ROW 5	Tieline 117	ROW 5	Tieline 109
ROW 4	Tieline 124	ROW 4	Tieline 116	ROW 4	Tieline 108
ROW 3	Tieline 123	ROW 3	Tieline 115	ROW 3	Tieline 107
ROW 2	Tieline 122	ROW 2	Tieline 114	ROW 2	Tieline 106
ROW 1	Tieline 121	ROW 1	Tieline 113	ROW 1	Tieline 105
TUCHEL #22		NOTES: 1. Tichel rows 9 and 0 are not connected except where otherwise stated. 2. Tichel high, low and shield connections are detailed in Figure 2-4.			
ROW 8	Tieline 104				
ROW 7	Tieline 103				
ROW 6	Tieline 102				
ROW 5	Tieline 101				
ROW 4	Tieline 100				
ROW 3	Tieline 99				
ROW 2	Tieline 98				
ROW 1	Tieline 97				

Figure 2-5A. MXP-3036 Tichel Panel Connections (1 of 2)

TUCHEL # 23

ROW 8 TIE LINE 96
ROW 7 TIE LINE 95
ROW 6 TIE LINE 94
ROW 5 TIE LINE 93
ROW 4 TIE LINE 92
ROW 3 TIE LINE 91
ROW 2 TIE LINE 90
ROW 1 TIE LINE 89

TUCHEL # 24

ROW 8 TIE LINE 88
ROW 7 TIE LINE 87
ROW 6 TIE LINE 86
ROW 5 TIE LINE 85
ROW 4 TIE LINE 84
ROW 3 TIE LINE 83
ROW 2 TIE LINE 82
ROW 1 TIE LINE 81

TUCHEL # 25

ROW 8 TIE LINE 80
ROW 7 TIE LINE 79
ROW 6 TIE LINE 78
ROW 5 TIE LINE 77
ROW 4 TIE LINE 76
ROW 3 TIE LINE 75
ROW 2 TIE LINE 74
ROW 1 TIE LINE 73

TUCHEL # 26

ROW 8 TIE LINE 72
ROW 7 TIE LINE 71
ROW 6 TIE LINE 70
ROW 5 TIE LINE 69
ROW 4 TIE LINE 68
ROW 3 TIE LINE 67
ROW 2 TIE LINE 66
ROW 1 TIE LINE 65

TUCHEL # 27

ROW 8 TIE LINE 64
ROW 7 TIE LINE 63
ROW 6 TIE LINE 62
ROW 5 TIE LINE 61
ROW 4 TIE LINE 60
ROW 3 TIE LINE 59
ROW 2 TIE LINE 58
ROW 1 TIE LINE 57

TUCHEL # 28

ROW 8 TIE LINE 56
ROW 7 TIE LINE 55
ROW 6 TIE LINE 54
ROW 5 TIE LINE 53
ROW 4 TIE LINE 52
ROW 3 TIE LINE 51
ROW 2 TIE LINE 50
ROW 1 TIE LINE 49

TUCHEL # 29

ROW 8 TIE LINE 48
ROW 7 TIE LINE 47
ROW 6 TIE LINE 46
ROW 5 TIE LINE 45
ROW 4 TIE LINE 44
ROW 3 TIE LINE 43
ROW 2 TIE LINE 42
ROW 1 TIE LINE 41

TUCHEL # 30

ROW 8 TIE LINE 40
ROW 7 TIE LINE 39
ROW 6 TIE LINE 38
ROW 5 TIE LINE 37
ROW 4 TIE LINE 36
ROW 3 TIE LINE 35
ROW 2 TIE LINE 34
ROW 1 TIE LINE 33

TUCHEL # 31

ROW 8 TIE LINE 32
ROW 7 TIE LINE 31
ROW 6 TIE LINE 30
ROW 5 TIE LINE 29
ROW 4 TIE LINE 28
ROW 3 TIE LINE 27
ROW 2 TIE LINE 26
ROW 1 TIE LINE 25

TUCHEL # 32

ROW 8 TIE LINE 24
ROW 7 TIE LINE 23
ROW 6 TIE LINE 22
ROW 5 TIE LINE 21
ROW 4 TIE LINE 20
ROW 3 TIE LINE 19
ROW 2 TIE LINE 18
ROW 1 TIE LINE 17

TUCHEL # 33

ROW 8 TIE LINE 16
ROW 7 TIE LINE 15
ROW 6 TIE LINE 14
ROW 5 TIE LINE 13
ROW 4 TIE LINE 12
ROW 3 TIE LINE 11
ROW 2 TIE LINE 10
ROW 1 TIE LINE 9

TUCHEL # 34

ROW 8 TIE LINE 8
ROW 7 TIE LINE 7
ROW 6 TIE LINE 6
ROW 5 TIE LINE 5
ROW 4 TIE LINE 4
ROW 3 TIE LINE 3
ROW 2 TIE LINE 2
ROW 1 TIE LINE 1

TUCHEL # 35

ROW 8
ROW 7
ROW 6
ROW 5
ROW 4
ROW 3
ROW 2
ROW 1

TUCHEL # 36

ROW 8
ROW 7 DB 25 CONN
ROW 6 RS232
ROW 5 STATUS/CMD
ROW 4 FOR AUTOMATION
ROW 3
ROW 2
ROW 1

TUCHEL # 37

ROW 8
ROW 7 DB 9 CONN
ROW 6 HIGH SPEED
ROW 5 AUTOMATION DATA
ROW 4
ROW 3
ROW 2
ROW 1

TUCHEL # 38	
ROW 8	
ROW 7	
ROW 6	
ROW 5	
ROW 4	
ROW 3	
ROW 2	
ROW 1	

TUCHEL # 39	
ROW 8	LINE 36 OUT
ROW 7	LINE 35 OUT
ROW 6	LINE 36 RET
ROW 5	LINE 35 RET
ROW 4	LINE 34 OUT
ROW 3	LINE 33 OUT
ROW 2	LINE 34 RET
ROW 1	LINE 33 RET

TUCHEL # 40	
ROW 8	LINE 32 OUT
ROW 7	LINE 31 OUT
ROW 6	LINE 32 RET
ROW 5	LINE 31 RET
ROW 4	LINE 30 OUT
ROW 3	LINE 29 OUT
ROW 2	LINE 30 RET
ROW 1	LINE 29 RET

TUCHEL # 41	
ROW 8	LINE 28 OUT
ROW 7	LINE 27 OUT
ROW 6	LINE 28 RET
ROW 5	LINE 27 RET
ROW 4	LINE 26 OUT
ROW 3	LINE 25 OUT
ROW 2	LINE 26 RET
ROW 1	LINE 25 RET

TUCHEL # 42	
ROW 8	MULT 24 IN
ROW 7	MULT 23 IN
ROW 6	MULT 24 RET
ROW 5	MULT 23 RET
ROW 4	MULT 22 IN
ROW 3	MULT 21 IN
ROW 2	MULT 22 RET
ROW 1	MULT 21 RET

TUCHEL # 43	
ROW 8	MULT 20 IN
ROW 7	MULT 19 IN
ROW 6	MULT 20 RET
ROW 5	MULT 19 RET
ROW 4	MULT 18 IN
ROW 3	MULT 17 IN
ROW 2	MULT 18 RET
ROW 1	MULT 17 RET

TUCHEL # 44	
ROW 8	MULT 16 IN
ROW 7	MULT 15 IN
ROW 6	MULT 16 RET
ROW 5	MULT 15 RET
ROW 4	MULT 14 IN
ROW 3	MULT 13 IN
ROW 2	MULT 14 RET
ROW 1	MULT 13 RET

TUCHEL # 45	
ROW 8	MULT 12 IN
ROW 7	MULT 11 IN
ROW 6	MULT 12 RET
ROW 5	MULT 11 RET
ROW 4	MULT 10 IN
ROW 3	MULT 9 IN
ROW 2	MULT 10 RET
ROW 1	MULT 9 RET

TUCHEL # 46	
ROW 8	MULT 8 IN
ROW 7	MULT 7 IN
ROW 6	MULT 8 RET
ROW 5	MULT 7 RET
ROW 4	MULT 6 IN
ROW 3	MULT 5 IN
ROW 2	MULT 6 RET
ROW 1	MULT 5 RET

TUCHEL # 47	
ROW 8	MULT 4 IN
ROW 7	MULT 3 IN
ROW 6	MULT 4 RET
ROW 5	MULT 3 RET
ROW 4	MULT 2 IN
ROW 3	MULT 1 IN
ROW 2	MULT 2 RET
ROW 1	MULT 1 RET

TUCHEL # 48	
ROW 8	OSC. OUTPUT
ROW 7	TAPE 2R OUT
ROW 6	TAPE 2L OUT
ROW 5	TAPE 2R RET
ROW 4	TAPE 2L RET
ROW 3	
ROW 2	TAPE 1 OUT
ROW 1	TAPE 1 RET

TUCHEL # 49	
ROW 8	TAPE 4R OUT
ROW 7	TAPE 4L OUT
ROW 6	TAPE 4R RET
ROW 5	TAPE 4L RET
ROW 4	TAPE 3R OUT
ROW 3	TAPE 3L OUT
ROW 2	TAPE 3R RET
ROW 1	TAPE 3L RET

TUCHEL # 50	
ROW 8	
ROW 7	
ROW 6	
ROW 5	
ROW 4	TO AUX R
ROW 3	TO AUX L
ROW 2	FROM AUX R
ROW 1	FROM AUX L

TUCHEL # 51	
ROW 8	
ROW 7	
ROW 6	STUDIO MON R
ROW 5	STUDIO MON L
ROW 4	SND6 OUT/CUE 2R IN
ROW 3	SND5 OUT/CUE 2L IN
ROW 2	SND4 OUT/CUE 1R IN
ROW 1	SND3 OUT/CUE 1L IN

TUCHEL # 52	
ROW 0	PRE FDR CR MON R
ROW 9	PRE FDR CR MON L
ROW 8	ALT SPKR 3 R
ROW 7	ALT SPKR 3 L
ROW 6	ALT SPKR 2 R
ROW 5	ALT SPKR 2 L
ROW 4	ALT SPKR 1 R
ROW 3	ALT SPKR 1 L
ROW 2	MAIN SPKR R
ROW 1	MAIN SPKR L

TUCHEL # 53	
ROW 8	SEND 2 OUT/CHAM 2 IN
ROW 7	SEND 4 OUT/CHAM 4 IN
ROW 6	CHAM 2 RET/RET 2 IN
ROW 5	CHAM 4 RET/RET 4 IN
ROW 4	SEND 1 OUT/CHAM 1 IN
ROW 3	SEND 3 OUT/CHAM 3 IN
ROW 2	CHAM 1 RET/RET 1 IN
ROW 1	CHAM 3 RET/RET 3 IN

TUCHEL # 54	
ROW 8	
ROW 7	
ROW 6	
ROW 5	
ROW 4	
ROW 3	
ROW 2	
ROW 1	

TUCHEL # 55	
ROW 8	MIC B 36
ROW 7	MIC A 36
ROW 6	MIC B 35
ROW 5	MIC A 35
ROW 4	MIC B 34
ROW 3	MIC A 34
ROW 2	MIC B 33
ROW 1	MIC A 33

TUCHEL # 56	
ROW 8	MIC B 32
ROW 7	MIC A 32
ROW 6	MIC B 31
ROW 5	MIC A 31
ROW 4	MIC B 30
ROW 3	MIC A 30
ROW 2	MIC B 29
ROW 1	MIC A 29

TUCHEL # 57	
ROW 8	MIC B 28
ROW 7	MIC A 28
ROW 6	MIC B 27
ROW 5	MIC A 27
ROW 4	MIC B 26
ROW 3	MIC A 26
ROW 2	MIC B 25
ROW 1	MIC A 25

TUCHEL # 58	
ROW 8	MIC B 24
ROW 7	MIC A 24
ROW 6	MIC B 23
ROW 5	MIC A 23
ROW 4	MIC B 22
ROW 3	MIC A 22
ROW 2	MIC B 21
ROW 1	MIC A 21

TUCHEL # 59	
ROW 8	MIC B 20
ROW 7	MIC A 20
ROW 6	MIC B 19
ROW 5	MIC A 19
ROW 4	MIC B 18
ROW 3	MIC A 18
ROW 2	MIC B 17
ROW 1	MIC A 17

TUCHEL # 60	
ROW 8	MIC B 16
ROW 7	MIC A 16
ROW 6	MIC B 15
ROW 5	MIC A 15
ROW 4	MIC B 14
ROW 3	MIC A 14
ROW 2	MIC B 13
ROW 1	MIC A 13

TUCHEL # 61	
ROW 8	MIC B 12
ROW 7	MIC A 12
ROW 6	MIC B 11
ROW 5	MIC A 11
ROW 4	MIC B 10
ROW 3	MIC A 10
ROW 2	MIC B 9
ROW 1	MIC A 9

TUCHEL # 62	
ROW 8	MIC B 8
ROW 7	MIC A 8
ROW 6	MIC B 7
ROW 5	MIC A 7
ROW 4	MIC B 6
ROW 3	MIC A 6
ROW 2	MIC B 5
ROW 1	MIC A 5

TUCHEL # 63	
ROW 8	MIC B 4
ROW 7	MIC A 4
ROW 6	MIC B 3
ROW 5	MIC A 3
ROW 4	MIC B 2
ROW 3	MIC A 2
ROW 2	MIC B 1
ROW 1	MIC A 1

TUCHEL # 64			
	C	B	A
ROW 0	PER GND	RM TBK	RM COND
ROW 9	PER GND	RM COM	RM SLATE
ROW 8	PER GND	RM CM2	RM COM1
ROW 7	PER GND	RM ALL	RM COM3
ROW 6	HEADPHONE AUX 1L (IN)		
ROW 5	HEADPHONE AUX 1R (IN)		
ROW 4	HEADPHONE AUX 2L (IN)		
ROW 3	HEADPHONE AUX 2R (IN)		
ROW 2	HEADPHONE AUX 3L (IN)		
ROW 1	HEADPHONE AUX 3R (IN)		

TUCHEL # 65	
ROW 8	COND OUT
ROW 7	TBK PRE OUT
ROW 6	COM 3 IN
ROW 5	COM 2 IN
ROW 4	COM 1 IN
ROW 3	COM 3 OUT
ROW 2	COM 2 OUT
ROW 1	COM 1 OUT

NOTES:

1. Tuchel rows 9 and 0 are not connected except where otherwise stated.
2. Tuchel high, low and shield connections are detailed in Figure 2-4.

Figure 2-5A. MXP-3036 Tuchel Panel Connections (2 of 2)

TUCHEL # 7

ROW 8	Tieline 136
ROW 7	Tieline 135
ROW 6	Tieline 134
ROW 5	Tieline 133
ROW 4	Tieline 132
ROW 3	Tieline 131
ROW 2	Tieline 130
ROW 1	Tieline 129

TUCHEL # 8

ROW 8	Tieline 128
ROW 7	Tieline 127
ROW 6	Tieline 126
ROW 5	Tieline 125
ROW 4	Tieline 124
ROW 3	Tieline 123
ROW 2	Tieline 122
ROW 1	Tieline 121

TUCHEL # 9

ROW 8	Tieline 120
ROW 7	Tieline 119
ROW 6	Tieline 118
ROW 5	Tieline 117
ROW 4	Tieline 116
ROW 3	Tieline 115
ROW 2	Tieline 114
ROW 1	Tieline 113

TUCHEL # 10

ROW 8	Tieline 112
ROW 7	Tieline 111
ROW 6	Tieline 110
ROW 5	Tieline 109
ROW 4	Tieline 108
ROW 3	Tieline 107
ROW 2	Tieline 106
ROW 1	Tieline 105

TUCHEL # 11

ROW 8	Tieline 104
ROW 7	Tieline 103
ROW 6	Tieline 102
ROW 5	Tieline 101
ROW 4	Tieline 100
ROW 3	Tieline 99
ROW 2	Tieline 98
ROW 1	Tieline 97

TUCHEL # 12

ROW 8	Tieline 96
ROW 7	Tieline 95
ROW 6	Tieline 94
ROW 5	Tieline 93
ROW 4	Tieline 92
ROW 3	Tieline 91
ROW 2	Tieline 90
ROW 1	Tieline 89

TUCHEL # 13

ROW 8	Tieline 88
ROW 7	Tieline 87
ROW 6	Tieline 86
ROW 5	Tieline 85
ROW 4	Tieline 84
ROW 3	Tieline 83
ROW 2	Tieline 82
ROW 1	Tieline 81

TUCHEL # 14

ROW 8	Tieline 80
ROW 7	Tieline 79
ROW 6	Tieline 78
ROW 5	Tieline 77
ROW 4	Tieline 76
ROW 3	Tieline 75
ROW 2	Tieline 74
ROW 1	Tieline 73

NOTES:

1. Tichel rows 9 and 0 are not connected except where otherwise stated.
2. Tichel high, low and shield connections are detailed in Figure 2-4.

**Figure 2-5B. MXP-3020 Tichel Panel
Connections (1 of 2)**

TUCHEL # 15

ROW 8
ROW 7
ROW 6
ROW 5
ROW 4
ROW 3
ROW 2
ROW 1

TUCHEL # 16

ROW 8 TIE LINE 72
ROW 7 TIE LINE 71
ROW 6 TIE LINE 70
ROW 5 TIE LINE 69
ROW 4 TIE LINE 68
ROW 3 TIE LINE 67
ROW 2 TIE LINE 66
ROW 1 TIE LINE 65

TUCHEL # 17

ROW 8 TIE LINE 64
ROW 7 TIE LINE 63
ROW 6 TIE LINE 62
ROW 5 TIE LINE 61
ROW 4 TIE LINE 60
ROW 3 TIE LINE 59
ROW 2 TIE LINE 58
ROW 1 TIE LINE 57

TUCHEL # 18

ROW 8 TIE LINE 56
ROW 7 TIE LINE 55
ROW 6 TIE LINE 54
ROW 5 TIE LINE 53
ROW 4 TIE LINE 52
ROW 3 TIE LINE 51
ROW 2 TIE LINE 50
ROW 1 TIE LINE 49

TUCHEL # 19

ROW 8 TIE LINE 48
ROW 7 TIE LINE 47
ROW 6 TIE LINE 46
ROW 5 TIE LINE 45
ROW 4 TIE LINE 44
ROW 3 TIE LINE 43
ROW 2 TIE LINE 42
ROW 1 TIE LINE 41

TUCHEL # 20

ROW 8 TIE LINE 40
ROW 7 TIE LINE 39
ROW 6 TIE LINE 38
ROW 5 TIE LINE 37
ROW 4 TIE LINE 36
ROW 3 TIE LINE 35
ROW 2 TIE LINE 34
ROW 1 TIE LINE 33

TUCHEL # 21

ROW 8 TIE LINE 32
ROW 7 TIE LINE 31
ROW 6 TIE LINE 30
ROW 5 TIE LINE 29
ROW 4 TIE LINE 28
ROW 3 TIE LINE 27
ROW 2 TIE LINE 26
ROW 1 TIE LINE 25

TUCHEL # 22

ROW 8 TIE LINE 24
ROW 7 TIE LINE 23
ROW 6 TIE LINE 22
ROW 5 TIE LINE 21
ROW 4 TIE LINE 20
ROW 3 TIE LINE 19
ROW 2 TIE LINE 18
ROW 1 TIE LINE 17

TUCHEL # 23

ROW 8 TIE LINE 16
ROW 7 TIE LINE 15
ROW 6 TIE LINE 14
ROW 5 TIE LINE 13
ROW 4 TIE LINE 12
ROW 3 TIE LINE 11
ROW 2 TIE LINE 10
ROW 1 TIE LINE 9

TUCHEL # 24

ROW 8 TIE LINE 8
ROW 7 TIE LINE 7
ROW 6 TIE LINE 6
ROW 5 TIE LINE 5
ROW 4 TIE LINE 4
ROW 3 TIE LINE 3
ROW 2 TIE LINE 2
ROW 1 TIE LINE 1

TUCHEL # 26

ROW 8
ROW 7
ROW 6
ROW 5 JH-50 AUTO DATA IN
ROW 4 JH-50 AUTO DATA OUT
ROW 3 JH-50 AUTO DATA OUT
ROW 2 JH-50 AUTO DATA OUT
ROW 1 JH-50 AUTO DATA OUT

TUCHEL # 27

ROW 8
ROW 7 DB 25 CONN
ROW 6 RS232
ROW 5 STATUS/CMD
ROW 4 FOR AUTOMATION
ROW 3
ROW 2
ROW 1

TUCHEL # 28

ROW 8
ROW 7 DB 9 CONN
ROW 6 HIGH SPEED
ROW 5 AUTOMATION DATA
ROW 4
ROW 3
ROW 2
ROW 1

TUCHEL # 29

ROW 8	MULT 24 IN
ROW 7	MULT 23 IN
ROW 6	MULT 24 RET
ROW 5	MULT 23 RET
ROW 4	MULT 22 IN
ROW 3	MULT 21 IN
ROW 2	MULT 22 RET
ROW 1	MULT 21 RET

TUCHEL # 30

ROW 8	MULT 20 IN
ROW 7	MULT 19 IN
ROW 6	MULT 20 RET
ROW 5	MULT 19 RET
ROW 4	MULT 18 IN
ROW 3	MULT 17 IN
ROW 2	MULT 18 RET
ROW 1	MULT 17 RET

TUCHEL # 31

ROW 8	MULT 16 IN
ROW 7	MULT 15 IN
ROW 6	MULT 16 RET
ROW 5	MULT 15 RET
ROW 4	MULT 14 IN
ROW 3	MULT 13 IN
ROW 2	MULT 14 RET
ROW 1	MULT 13 RET

TUCHEL # 32

ROW 8	MULT 12 IN
ROW 7	MULT 11 IN
ROW 6	MULT 12 RET
ROW 5	MULT 11 RET
ROW 4	MULT 10 IN
ROW 3	MULT 9 IN
ROW 2	MULT 10 RET
ROW 1	MULT 9 RET

TUCHEL # 33

ROW 8	MULT 8 IN
ROW 7	MULT 7 IN
ROW 6	MULT 8 RET
ROW 5	MULT 7 RET
ROW 4	MULT 6 IN
ROW 3	MULT 5 IN
ROW 2	MULT 6 RET
ROW 1	MULT 5 RET

TUCHEL # 34

ROW 8	MULT 4 IN
ROW 7	MULT 3 IN
ROW 6	MULT 4 RET
ROW 5	MULT 3 RET
ROW 4	MULT 2 IN
ROW 3	MULT 1 IN
ROW 2	MULT 2 RET
ROW 1	MULT 1 RET

TUCHEL # 35

ROW 8	OSC. OUTPUT
ROW 7	TAPE 2R OUT
ROW 6	TAPE 2L OUT
ROW 5	TAPE 2R RET
ROW 4	TAPE 2L RET
ROW 3	
ROW 2	TAPE 1 OUT
ROW 1	TAPE 1 RET

TUCHEL # 36

ROW 8	TAPE 4R OUT
ROW 7	TAPE 4L OUT
ROW 6	TAPE 4R RET
ROW 5	TAPE 4L RET
ROW 4	TAPE 3R OUT
ROW 3	TAPE 3L OUT
ROW 2	TAPE 3R RET
ROW 1	TAPE 3L RET

TUCHEL # 37

ROW 8	
ROW 7	
ROW 6	
ROW 5	
ROW 4	TO AUX R
ROW 3	TO AUX L
ROW 2	FROM AUX R
ROW 1	FROM AUX L

TUCHEL # 38

ROW 8	
ROW 7	
ROW 6	STUDIO MON R
ROW 5	STUDIO MON L
ROW 4	SND6 OUT/CUE 2R IN
ROW 3	SND5 OUT/CUE 2L IN
ROW 2	SND4 OUT/CUE 1R IN
ROW 1	SND3 OUT/CUE 1L IN

TUCHEL # 39

ROW 0	PRE FDR CR MON R
ROW 9	PRE FDR CR MON L
ROW 8	ALT SPKR 3 R
ROW 7	ALT SPKR 3 L
ROW 6	ALT SPKR 2 R
ROW 5	ALT SPKR 2 L
ROW 4	ALT SPKR 1 R
ROW 3	ALT SPKR 1 L
ROW 2	MAIN SPKR R
ROW 1	MAIN SPKR L

TUCHEL # 40

ROW 8	SEND 2 OUT/CHAM 2 IN
ROW 7	SEND 4 OUT/CHAM 4 IN
ROW 6	CHAM 2 RET/RET 2 IN
ROW 5	CHAM 4 RET/RET 4 IN
ROW 4	SEND 1 OUT/CHAM 1 IN
ROW 3	SEND 3 OUT/CHAM 3 IN
ROW 2	CHAM 1 RET/RET 1 IN
ROW 1	CHAM 3 RET/RET 3 IN

TUCHEL # 41

ROW 8	
ROW 7	
ROW 6	
ROW 5	
ROW 4	
ROW 3	
ROW 2	
ROW 1	

TUCHEL # 42

ROW 8	MIC B 20
ROW 7	MIC A 20
ROW 6	MIC B 19
ROW 5	MIC A 19
ROW 4	MIC B 18
ROW 3	MIC A 18
ROW 2	MIC B 17
ROW 1	MIC A 17

TUCHEL # 43

ROW 8	MIC B 16
ROW 7	MIC A 16
ROW 6	MIC B 15
ROW 5	MIC A 15
ROW 4	MIC B 14
ROW 3	MIC A 14
ROW 2	MIC B 13
ROW 1	MIC A 13

TUCHEL # 44		TUCHEL # 45		TUCHEL # 46	
ROW 8	MIC B 12	ROW 8	MIC B 8	ROW 8	MIC B 4
ROW 7	MIC A 12	ROW 7	MIC A 8	ROW 7	MIC A 4
ROW 6	MIC B 11	ROW 6	MIC B 7	ROW 6	MIC B 3
ROW 5	MIC A 11	ROW 5	MIC A 7	ROW 5	MIC A 3
ROW 4	MIC B 10	ROW 4	MIC B 6	ROW 4	MIC B 2
ROW 3	MIC A 10	ROW 3	MIC A 6	ROW 3	MIC A 2
ROW 2	MIC B 9	ROW 2	MIC B 5	ROW 2	MIC B 1
ROW 1	MIC A 9	ROW 1	MIC A 5	ROW 1	MIC A 1

TUCHEL # 47				TUCHEL # 48	
	C	B	A		
ROW 0	PER GND	RM TBK	RM COND	ROW 8	COND OUT
ROW 9	PER GND	RM COM	RM SLATE	ROW 7	TBK PRE OUT
ROW 8	PER GND	RM CM2	RM COM1	ROW 6	COM 3 IN
ROW 7	PER GND	RM ALL	RM COM3	ROW 5	COM 2 IN
ROW 6	HEADPHONE AUX 1L (IN)			ROW 4	COM 1 IN
ROW 5	HEADPHONE AUX 1R (IN)			ROW 3	COM 3 OUT
ROW 4	HEADPHONE AUX 2L (IN)			ROW 2	COM 2 OUT
ROW 3	HEADPHONE AUX 2R (IN)			ROW 1	COM 1 OUT
ROW 2	HEADPHONE AUX 3L (IN)				
ROW 1	HEADPHONE AUX 3R (IN)				

NOTES:

- Tuchel rows 9 and 0 are not connected except where otherwise stated.
- Tuchel high, low and shield connections are detailed in Figure 2-4.

Figure 2-5B. MXP-3020 Tuchel Panel Connections (2 of 2)

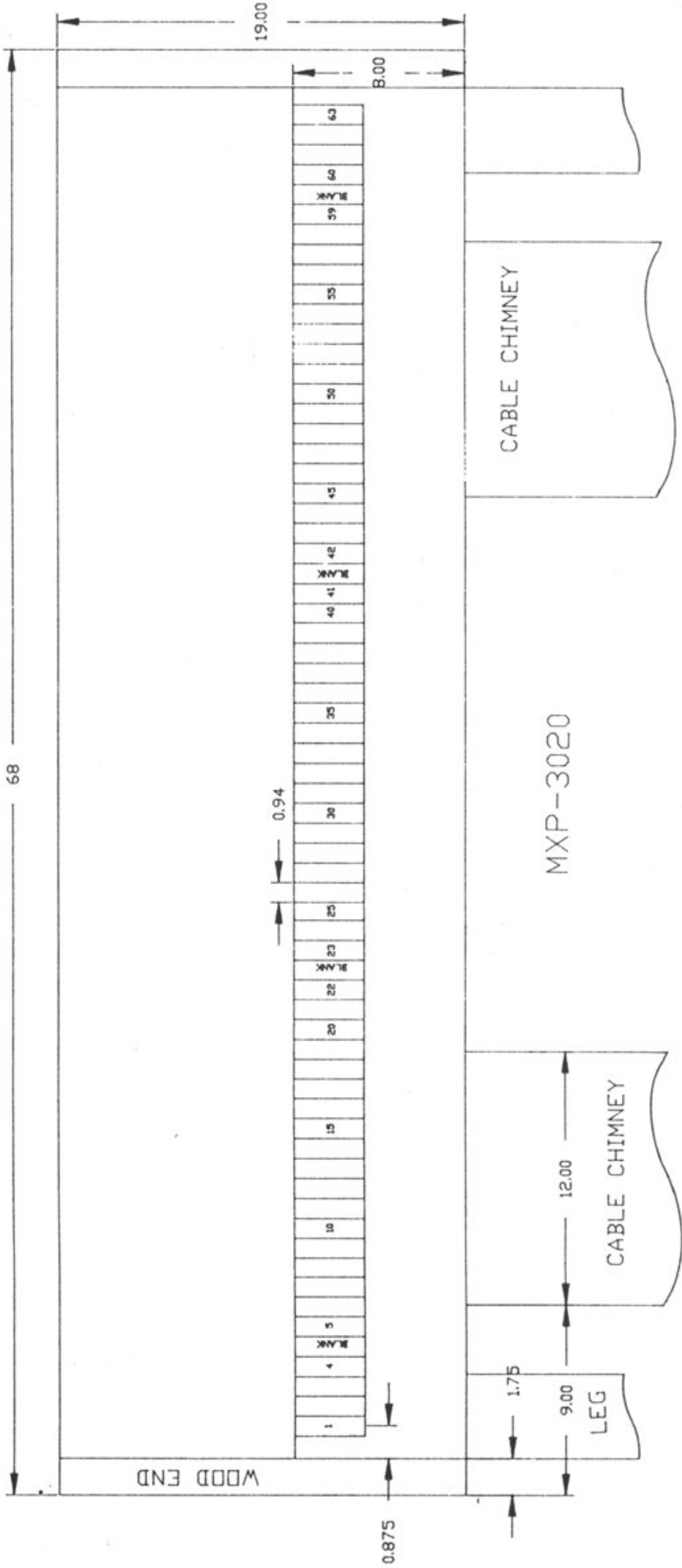
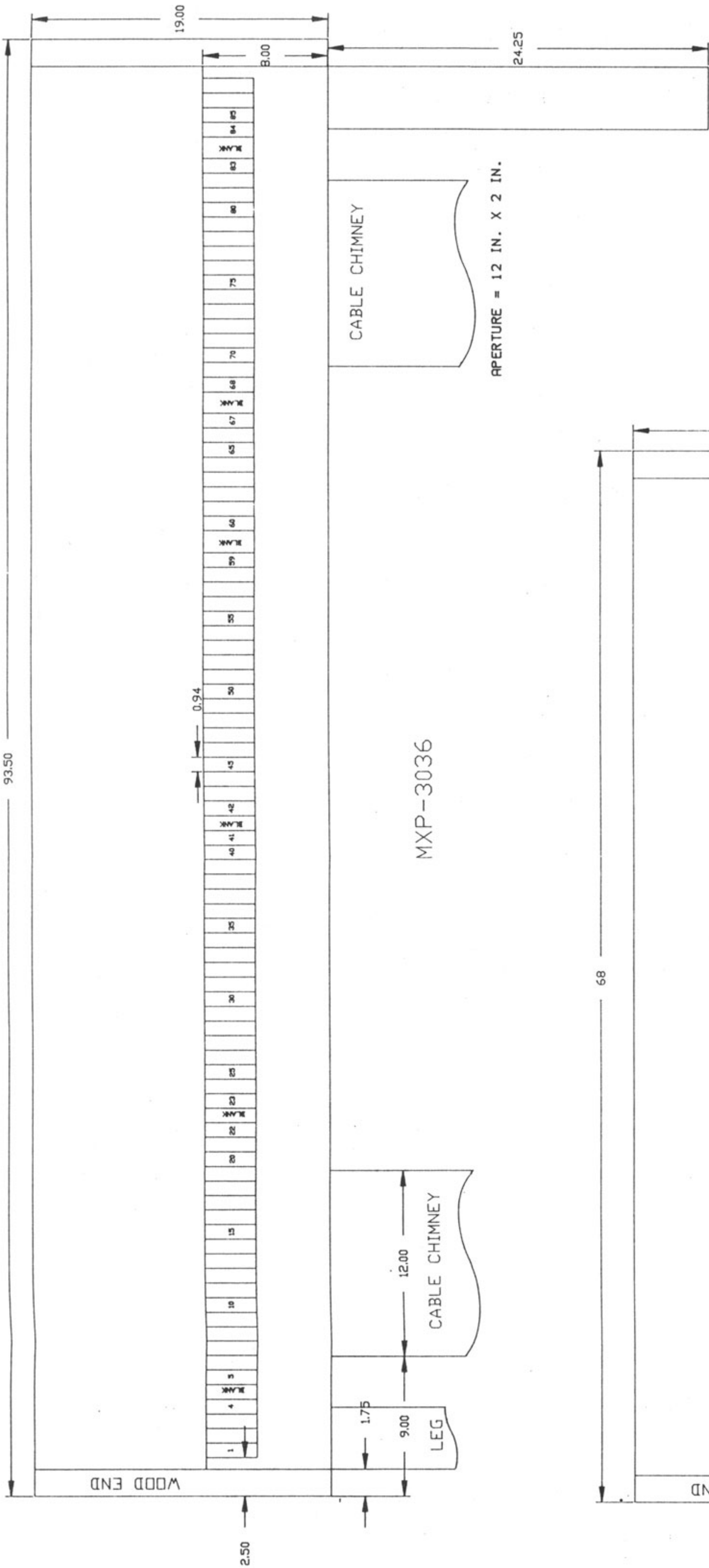
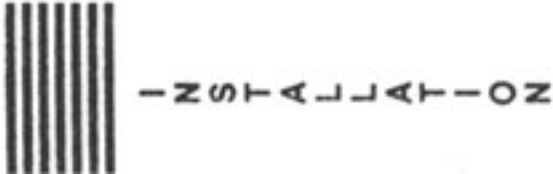


Figure 2-6. Tuchel Layouts



FADER NUMBER	SWITCH SECTION								FADER NUMBER	SWITCH SECTION							
	8	7	6	5	4	3	2	1		8	7	6	5	4	3	2	1
1	0	0	1	0	0	0	0	0	33	0	0	1	1	0	0	0	0
2	0	0	1	0	0	0	1	0	34	0	0	1	1	0	0	1	0
3	0	0	1	0	0	0	0	1	35	0	0	1	1	0	0	0	1
4	0	0	1	0	0	0	1	1	36	0	0	1	1	0	0	1	1
5	0	1	1	0	0	0	0	0	37	0	1	1	1	0	0	0	0
6	0	1	1	0	0	0	1	0	38	0	1	1	1	0	0	1	0
7	0	1	1	0	0	0	0	1	39	0	1	1	1	0	0	0	1
8	0	1	1	0	0	0	1	1	40	0	1	1	1	0	0	1	1
9	0	0	1	0	0	1	0	0	41	0	0	1	1	0	1	0	0
10	0	0	1	0	0	1	1	0	42	0	0	1	1	0	1	1	0
11	0	0	1	0	0	1	0	1	43	0	0	1	1	0	1	0	1
12	0	0	1	0	0	1	1	1	44	0	0	1	1	0	1	1	1
13	0	1	1	0	0	1	0	0	45	0	1	1	1	0	1	0	0
14	0	1	1	0	0	1	1	0	46	0	1	1	1	0	1	1	0
15	0	1	1	0	0	1	0	1	47	0	1	1	1	0	1	0	1
16	0	1	1	0	0	1	1	1	48	0	1	1	1	0	1	1	1
17	0	0	1	0	1	0	0	0	49	0	0	1	1	1	0	0	0
18	0	0	1	0	1	0	1	0	50	0	0	1	1	1	0	1	0
19	0	0	1	0	1	0	0	1	51	0	0	1	1	1	0	0	1
20	0	0	1	0	1	0	1	1	52	0	0	1	1	1	0	1	1
21	0	1	1	0	1	0	0	0	53	0	1	1	1	1	0	0	0
22	0	1	1	0	1	0	1	0	54	0	1	1	1	1	0	1	0
23	0	1	1	0	1	0	0	1	55	0	1	1	1	1	0	0	1
24	0	1	1	0	1	0	1	1	56	0	1	1	1	1	0	1	1
25	0	0	1	0	1	1	0	0	57	0	0	1	1	1	1	0	0
26	0	0	1	0	1	1	1	0	58	0	0	1	1	1	1	1	0
27	0	0	1	0	1	1	0	1	59	0	0	1	1	1	1	0	1
28	0	0	1	0	1	1	1	1	60	0	0	1	1	1	1	1	1
29	0	1	1	0	1	1	0	0	61	0	1	1	1	1	1	0	0
30	0	1	1	0	1	1	1	0	62	0	1	1	1	1	1	1	0
31	0	1	1	0	1	1	0	1	63	0	1	1	1	1	1	0	1
32	0	1	1	0	1	1	1	1	MASTER	0	1	1	1	1	1	1	1

Table 2-5. AFB Fader DIP Switch Settings

FADER NUMBER	SWITCH SECTION								FADER NUMBER	SWITCH SECTION							
	8	7	6	5	4	3	2	1		8	7	6	5	4	3	2	1
1	1	1	1	1	1	1	1	1	33	0	1	1	1	1	1	1	1
2	1	1	1	1	0	1	1	1	34	0	1	1	1	0	1	1	1
3	1	1	0	1	1	1	1	1	35	0	1	0	1	1	1	1	1
4	1	1	0	1	0	1	1	1	36	0	1	0	1	0	1	1	1
5	1	1	1	1	1	0	1	1	37	0	1	1	1	1	0	1	1
6	1	1	1	1	0	0	1	1	38	0	1	1	1	0	0	1	1
7	1	1	0	1	1	0	1	1	39	0	1	0	1	1	0	1	1
8	1	1	0	1	0	0	1	1	40	0	1	0	1	0	0	1	1
9	1	0	1	1	1	1	1	1	41	0	0	1	1	1	1	1	1
10	1	0	1	1	0	1	1	1	42	0	0	1	1	0	1	1	1
11	1	0	0	1	1	1	1	1	43	0	0	0	1	1	1	1	1
12	1	0	0	1	0	1	1	1	44	0	0	0	1	0	1	1	1
13	1	0	1	1	1	0	1	1	45	0	0	1	1	1	0	1	1
14	1	0	1	1	0	0	1	1	46	0	0	1	1	0	0	1	1
15	1	0	0	1	1	0	1	1	47	0	0	0	1	1	0	1	1
16	1	0	0	1	0	0	1	1	48	0	0	0	1	0	0	1	1
17	1	1	1	1	1	1	1	0	49	0	1	1	1	1	1	1	0
18	1	1	1	1	0	1	1	0	50	0	1	1	1	0	1	1	0
19	1	1	0	1	1	1	1	0	51	0	1	0	1	1	1	1	0
20	1	1	0	1	0	1	1	0	52	0	1	0	1	0	1	1	0
21	1	1	1	1	1	0	1	0	53	0	1	1	1	1	0	1	0
22	1	1	1	1	0	0	1	0	54	0	1	1	1	0	0	1	0
23	1	1	0	1	1	0	1	0	55	0	1	0	1	1	0	1	0
24	1	1	0	1	0	0	1	0	56	0	1	0	1	0	0	1	0
25	1	0	1	1	1	1	1	0	57	0	0	1	1	1	1	1	0
26	1	0	1	1	0	1	1	0	58	0	0	1	1	0	1	1	0
27	1	0	0	1	1	1	1	0	59	0	0	0	1	1	1	1	0
28	1	0	0	1	0	1	1	0	60	0	0	0	1	0	1	1	0
29	1	0	1	1	1	0	1	0	61	0	0	1	1	1	0	1	0
30	1	0	1	1	0	0	1	0	62	0	0	1	1	0	0	1	0
31	1	0	0	1	1	0	1	0	63	0	0	0	1	1	0	1	0
32	1	0	0	1	0	0	1	0	MASTER	0	0	0	1	0	0	1	0

Table 2-6. AFB II Fader DIP Switch Settings

2.5 FADER AUTOMATION

Those consoles that are fitted with Automated Faders have a separate Fader Automation Power Supply which must be connected in accordance with the information given in paragraph 2.5.2.

Paragraph 2.5.1 provides program information for the Automated Faders. All Faders are programmed at the factory before shipment, and the program data is provided here only in case the user needs to confirm that the DIP switch settings have not been inadvertently changed during removal or repair.

2.5.1 Fader Programming

The console may employ either one of two different Automated Fader types, AFB or AFB II. These Faders are identifiable by means of their PC board part numbers, that for AFB being T-9412-564-REV and that for AFB II being T-9413-673-REV. The part numbers are marked on the component sides of the boards, AFB being marked just above the edge connector and AFB II being marked just below the display card.

Fader programming is set by means of the 4-section DIP switch, S1 and the 8-section DIP switch, S4. S1 is used to identify the Fader type (AFB or AFB-II), and must be set as shown below:

Switch Section	1	2	3	4
AFB	OFF	OFF	OFF	OFF
AFB II	ON	OFF	OFF	OFF

S2 is used to identify the channel in which the Fader is to be used. The 8-section DIP switch settings for AFB are shown in Table 2-5, and those for AFB II are shown in Table 2-6. In both of these tables, "1" indicates that the switch is set to ON and "2" indicates that the switch is set to OFF.

2.5.2 Automation Power Supply Connections

Connect the Automation Power Supply to the console as follows:

CAUTION

DO NOT CONNECT POWER TO THE EQUIPMENT UNTIL THESE PARAGRAPHS HAVE BEEN READ AND UNDERSTOOD.

STEP 1 The power supply cable is tie-wrapped to the Tuchel bay in the console. Cut the tie-

wraps, and route the cable through the cable chimney opening to the Fader Automation Power Supply.

STEP 2 Plug the 18-pin cable connector into the appropriate socket on the rear panel of the Fader Automation Power Supply.

STEP 3 Install and fasten the connector retaining brackets.

The pin connections for the Automation Power Supply output are illustrated below:

1	2	3	1,3	SPARES
4	5	6	2	+8VDC GND SENSE
7	8	9	4,5,6	+8VDC AUTOM
10	11	12	7,8,9	+8VDC GND
13	14	15	10	+18VDC AUTOM
16	17	18	11	±18VDC GND
			12	-18VDC
			13,14	CHAS/EARTH GND
			15,16,17,18	SPARES

2.5.3 Automation Power Supply Input Voltage

CAUTION

TO PREVENT PROBLEMS WHICH CAN BE CAUSED BY POWER FAILURE OR NOISY POWER LINES, IT IS STRONGLY RECOMMENDED THAT THE FADER AUTOMATION SUPPLY BE CONNECTED TO A FILTERED, NON-INTERRUPTABLE SOURCE.

The Fader Automation Power Supply is designed for input voltages of 100 to 120 VAC or 220 to 240 Vac at 50/60 Hz. The power supply is set to accept the locally-available voltage by means of a plug-in card located on the rear panel. To select the correct input voltage, proceed as follows:

CAUTION

FOR CORRECT FADER AUTOMATION SYSTEM OPERATION, IT IS ABSOLUTELY ESSENTIAL THAT THE THIRD PIN ON THE FADER AUTOMATION POWER SUPPLY BE PROPERLY GROUNDED. REFER TO APPENDIX C.

STEP 1. Determine the voltage available on the local power line.

STEP 2. Remove the power cable from the rear panel.

- STEP 3.** Locate the small plastic window next to the power input connector, and slide it to the left.
- STEP 4.** Look in the lower part of the opening revealed in STEP 3, and find the small plug-in card. Note the voltage (120 or 240) that is visible on the card.
- STEP 5.** If the voltage marked on the card does not agree with the local line voltage, pull out the card and reinsert it as required. The number visible on the card after reinsertion should be that closest to the available line voltage. The input limits are 95V to

for the low range and 190V to 252V for the high range.

2.5.4 Automation Power Supply Fuses

Three fuseholders are mounted on the front panel of the Automation Power Supply, and these contain the fuses for the +8 VDC, +18 VDC and -18 VDC outputs. Table 2-7 lists the correct fuse ratings for these outputs.

The AC input fuse is mounted on the rear panel, and it should be noted that the input fuse rating varies in accordance with the input voltage. For input voltages in the range 95 VAC to 126 VAC, the required fuse is 4A., while for input voltages in the range 190 VAC to 252 VAC, the required fuse is 2A.

OUTPUT VOLTAGE (VDC)	FUSE RATING (AMPS)
+8	20
+18	0.5
-18	0.5

Table 2-7. Automation Power Supply Fuses

SECTION 3

CONSOLE CONTROLS AND INDICATORS

3.1 CONSOLE FUNCTIONS

3.1.1 Input/Output Modules

The inline design of the **MXP-3000** series consoles is such that each Input/Output (I/O) module acts as a miniature "console within a console", providing its own microphone and line inputs, signal processing facilities, and a switching system to direct the processed signals to any one of 24 tracks on a Multitrack recorder. The I/O modules also include monitoring arrangements, Pre-Fader Listening (PFL), and Send systems which can be used for cueing as well as feeding external processing units.

3.1.2 Master Module

The Master module incorporates six Send masters and two 2-Mix Active Combining Networks (ACNs), the ACNs having provision for "wild" inputs. This module also supplies metering signals for monitoring Sends and control room levels.

3.1.3 Monitor Module

The Monitor module provides level and mute controls for all signals to the studio and the control room. This module also provides a "dim" (level reduction) function for the control room signals.

3.1.4 Communication Module

The Communication module provides communication facilities between the console operator and the studio. In addition, it incorporates a test oscillator and noise generators (pink and white), together with a Slate oscillator.

3.2 CONSOLE ORGANIZATION

The **MXP-3000** console layout is designed to allow maximum convenience of operation. The I/O modules are arranged side by side, with Channel 1 at the extreme left of the console. The Fader for each channel is located at the front of the console and in line with the appropriate I/O module. The Master, Communication and Monitor modules are located to the right of

the Channel 36 I/O module, and the Patch Bay is at the extreme right of the console.

All meters and Status Panels are located in the Meter Housing mounted at the back of the console. At the left-hand end of the Meter Housing are the VU or PPM meters used for monitoring the Line In or Line Out levels for each I/O. Toward the right-hand end of the Meter Housing, approximately in line with the Master, Communication and Monitor modules, are the 2-Mix LEFT meter, 2-Mix RIGHT meter, MONO meter, and PHASE meter. At the extreme right of the Housing are the Status Panel (including Automation Status where applicable), the six SEND meters, and the PFL loudspeaker.

With the exception of the BDCST rocker switch on the Monitor module, all of the switches on the console modules are pushbutton types. In the following descriptions, a switch which is pressed will be referred to as being "in". Otherwise, it will be referred to as being "out".

3.3 INPUT/OUTPUT MODULE

The I/O module includes two major sections, the Channel path and the Monitor path. The Channel path is that which carries all of the signals to the tape or line output. As its name implies, the Monitor path allows signal monitoring. The monitored signals may be any or all of the console inputs or outputs, singly or in combination, and these may be set to desired levels without affecting the level of the Channel path signals. The I/O module controls and indicators are illustrated in Figure 3-1. Each control and indicator is labelled with a callout number. These callouts are used for identification in the descriptions given in paragraph 3.3.1 below.

3.3.1 I/O Controls and Indicators

- (1) **Assignment Switches 1 to 24:** These switches are used to select the track(s) to which the I/O Channel signal is to be directed. These signals may be subject to left/right panning (see Bus PAN Control).
- (2) **PAN control (bus pan):** Shifts the apparent physical position of the input source. This con-

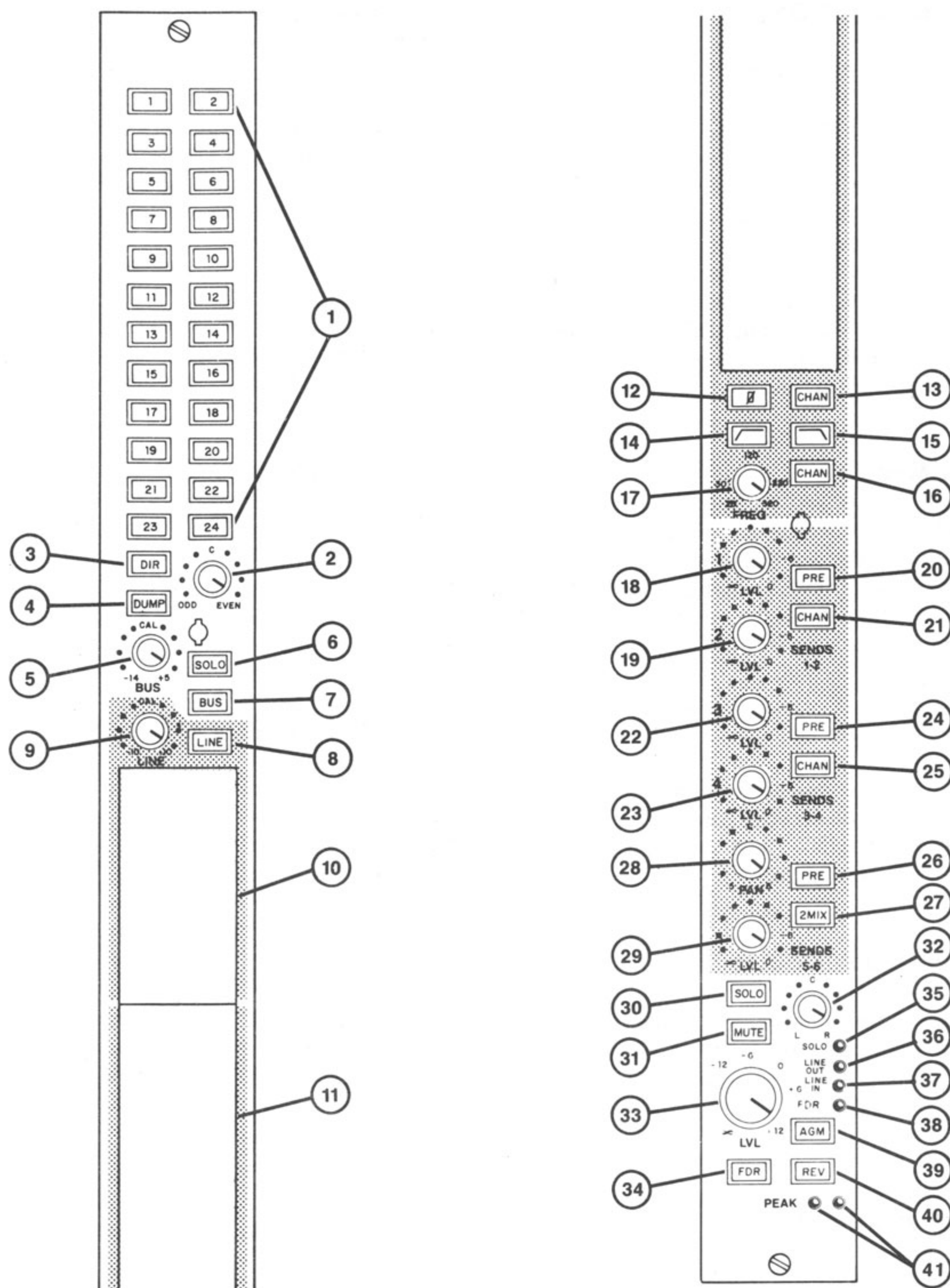


Figure 3-1. Input/Output Module

trol is used only when both odd and even tracks are selected by the assignment switches. Where a single bus, multiple odd busses or multiple even busses are selected, the control is ineffective.

- (3) **DIR switch (direct):** Directly connects the Channel path signal to the Channel line output, bypassing the Channel ACN and thus reducing noise. DIR is selected when the switch is in, and is used when the I/O signal is to be directed to its own channel on the multitrack recorder.
- (4) **DUMP switch:** Assigns the post-PAN, post-Fader Monitor path signal to the selected channel ACN busses. DUMP is selected when the switch is in. This function can be used to "dump" Multitrack signals over to other tracks on the recorder.
- (5) **BUS control (bus trim):** Sets the channel output level between the limits -14 dB to +5 dB. Has a detent position (CAL) which sets unity (0 dB) gain.
- (6) **SOLO switch (channel solo):** Places the Channel signal on the Solo Bus and mutes signals from all other I/Os so that the only I/O heard is that with SOLO selected. SOLO is selected when the switch is in.
- (7) **BUS switch (monitor to bus):** Directs the Monitor post-Fader signal to the Channel Fader, enabling the use of the Channel busses as additional Sends in the mix-down mode.
- (8) **LINE switch (microphone/line):** Selects either microphone or line as the Channel input. Line is selected when the switch is in.
- (9) **LINE control (line level):** Sets the line input gain between the limits -10 dB and +10 dB. Has a detent position (CAL) which sets unity gain (0dB).
- (10) **Microphone Pre-amplifier:** see paragraph 3.4.
- (11) **Equalizer:** see paragraph 3.5.
- (12) **Ø switch (phase):** Reverses the phase of the signal to the Equalizer. This may be either Channel or Monitor signal (see Equalizer Monitor/Channel switch).
- (13) **CHAN switch (equalizer monitor/channel):** Places the Equalizer in either the Monitor path or the Channel path. When the switch is in,

the Equalizer is in the Channel path. When the switch is out, the Equalizer is in the monitor path.

- (14) **switch (high pass filter):** Switches the High Pass Filter in or out (see Filter Monitor/Channel switch). The Filter is effective when the switch is in.
- (15) **switch (low pass filter):** Switches the Low Pass Filter in or out (see Filter Monitor/Channel switch). The Filter is effective when the switch is in.
- (16) **CHAN switch (filter monitor/channel):** Places the High Pass and Low Pass Filters in either the Monitor path or the Channel path. The filters are in the Channel path when the switch is in, and in the Monitor path when the switch is out.
- (17) **FREQ control (frequency):** Sets the cutoff frequency for the High Pass Filter.
- (18) **LVL control 1:** Sets the level of the Send 1 signal.
- (19) **LVL control 2:** Sets the level of the Send 2 signal.
- (20) **PRE switch (pre-fader):** Selects between pre-Fader or post-Fader signals for Sends 1 and 2. When the switch is in, pre-Fader signals are fed to the Sends.
- (21) **CHAN switch (channel/monitor):** Selects between Channel and Monitor signals for Sends 1 and 2. The Channel signal is sent when the switch is in, and the Monitor signal is sent when the switch is out.
- (22) **LVL control 3:** Sets the level of the Send 3 signal.
- (23) **LVL control 4:** Sets the level of the Send 4 signal.
- (24) **PRE switch:** Same as (20), but for Sends 3 and 4.
- (25) **CHAN switch:** Same as (21), but for Sends 3 and 4.
- (26) **PRE switch (pre-fader):** Selects between pre-Fader and post-Fader signals for Sends 5 and 6. When the switch is in, pre-Fader signals are sent.
- (27) **2 MIX switch:** Routes the 2-Mix signal (post-PAN and post-Fader) to Sends 5 and 6. Is effective when the switch is in.
- (28) **PAN control:** Sets the left/right balance for Sends 5 and 6. Has a detent position (C) which provides evenly balanced left and right Sends.



(29) **LVL control:** Sets the levels for Sends 5 and 6.

(30) **SOLO switch (monitor solo):** Same as Channel SOLO (6), but for Monitor path signals.

(31) **MUTE switch:** Mutes the 2-Mix output.

(32) **Pan control (monitor pan):** Pans between 2-Mix left and right outputs.

(33) **LVL (rotary fader):** Is usually used to control the Channel level, but can be switched to control the Monitor level (see FDR switch).

(34) **FDR switch (fader interchange switch):** Reverses the functions of the rotary (Channel) Fader and the linear (Monitor) Fader so that the rotary Fader controls the Monitor path and the linear Fader controls the Channel path.

(35) **SOLO LED (yellow):** Becomes illuminated to indicate that the I/O is in either Channel Solo or Monitor Solo mode.

(36) **LINE OUT LED (red):** Is illuminated to indicate that the Monitor path is being fed from line output.

(37) **LINE IN LED (green):** Is illuminated to indicate that the Monitor path is being fed from line input.

(38) **FDR LED (red):** Illuminates when the FDR switch (34) is in, showing that the Fader functions are interchanged.

(39) **AGM switch (Audio Grouping Master):** Selects Audio Grouping Master mode (see SECTION 4, paragraph 4.7.3).

(40) **REV switch (reverse):** Switches the Monitor path feed between line input and line output. Pressing the switch causes the current condition to become reversed (on its own I/O only).

(41) **PEAK LEDs (overload):** Indicate proper levels of Microphone Pre-amplifier output. The green LED indicates that a -20 dB signal is present. If the red LED becomes illuminated, it indicates that the signal is overloading -2 dB from the point of becoming clipped.

3.4 MICROPHONE PRE-AMPLIFIER MXBK-MI31

The **MXBK-MI31** Microphone Pre-amplifier is used to boost the microphone input to line level. This plug-in unit has only two switches and one level control, as illustrated in Figure 3-2.

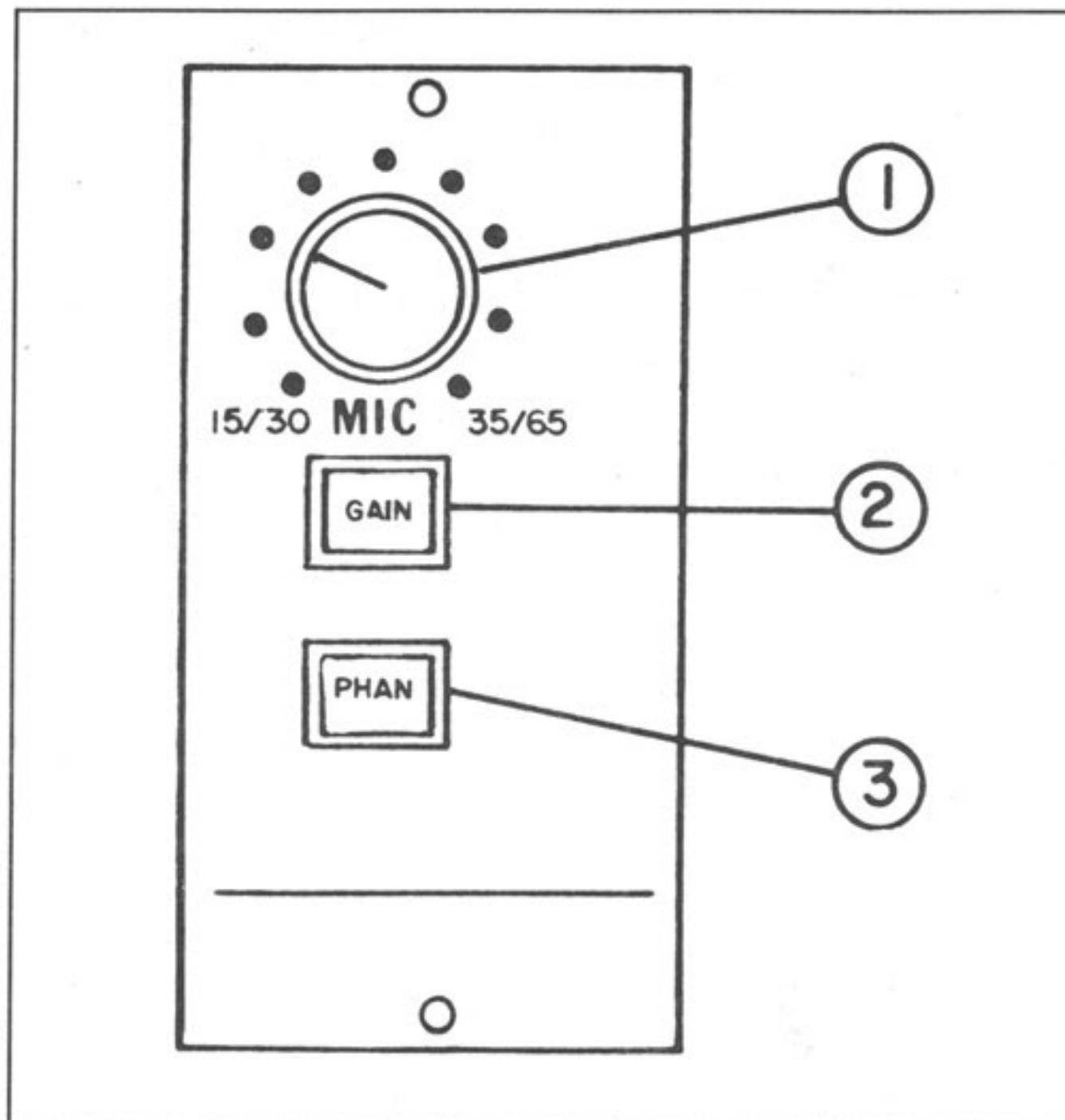


Figure 3-2. Microphone Pre-amplifier MXBK-MI31

3.4.1 Microphone Pre-amplifier Controls

(1) **MIC control (pre-amplifier gain):** Is used to compensate for different microphone output levels. The control has two ranges, 15 dB to 35 dB and 30 dB to 65 dB (see GAIN switch).

(2) **GAIN switch:** Sets the range for the MIC control. With the switch out, the range is 15 to 35 dB. With the switch in, the range is 30 to 65 dB.

(3) **PHAN switch:** Supplies +48 Volt phantom power for microphones requiring external power.

3.5 EQUALIZER MXBK-EQ31

The **MXBK-EQ31** Equalizer is a fixed-Q, four-band device, with band frequencies of 8 kHz to 20 kHz (HI) 800 Hz to 8 kHz (MID 2), 150 Hz to 2.5 kHz (MID 1) and 40 Hz to 250 Hz (LO). Figure 3-3 illustrates the Equalizer controls. There are four sets of similar controls, with additional peaking switches for the high and low bands.

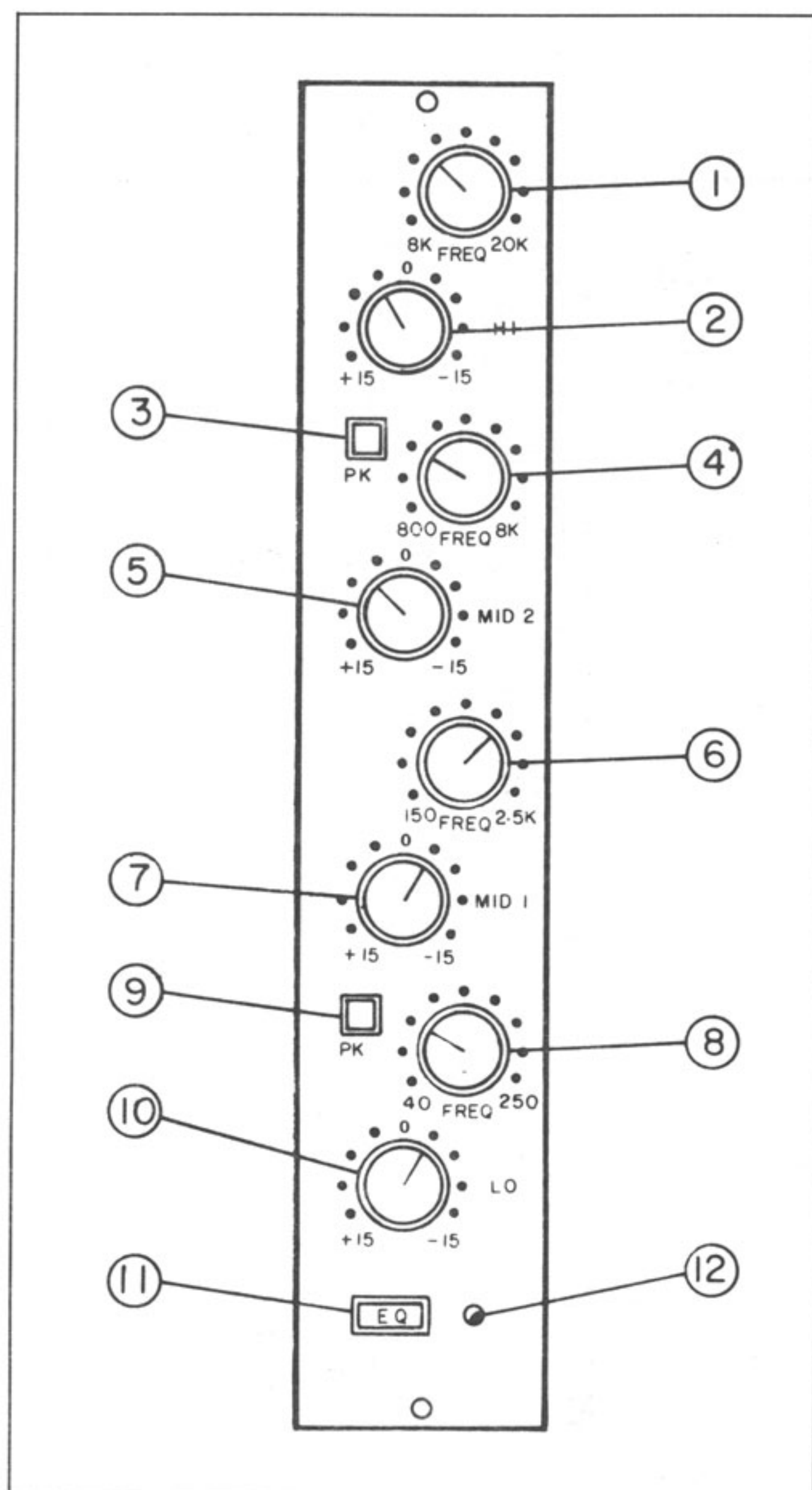


Figure 3-3. Equalizer MXPBK-EQ31

3.5.1 Equalizer Controls

- (1) **FREQ control:** Selects the high frequency to be boosted or cut.
- (2) **Level control:** Sets the degree of boost or cut between the limits -15 dB to $+15$ dB.
- (3) **PK switch (peak):** Selects the response for the high frequency section. With the switch in, the response curve is peaking. With the switch out, the response curve is shelving.
- (4) **FREQ control:** Same as (1), but for MID 2 section.
- (5) **Level control:** Same as (2), but for MID 2 section.
- (6) **FREQ control:** Same as (1), but for MID 1 section.
- (7) **Level control:** Same as (2), but for MID 1 section.
- (8) **FREQ control:** Same as (1), but for LO section.
- (9) **PEAK switch:** Same as (3), but for LO section.
- (10) **Level control:** Same as (2), but for LO section.
- (11) **EQ switch:** Switches the Equalizer on. The Equalizer becomes effective when the switch is in.
- (12) **Equalizer LED:** Becomes illuminated to show when the Equalizer is effective.

3.6 MASTER MODULE

The Master module controls Sends 1 through 6 and the four returns, and contains the 2-Mix ACN amplifier. Level and mute controls are provided for all six Sends, and level controls are provided for the four returns, together with Pre-Fader Listening (PFL) and Solo capabilities. The Master module controls are shown in Figure 3-4.

3.6.1 Master Module Controls

- (1) **LVL control:** Sets Send 1 output level.
- (2) **MUTE switch:** Mutes Send 1 output when switch is in.
- (3) **LVL control:** Sets Send 2 output level.
- (4) **MUTE switch:** Mutes Send 2 output when switch is in.
- (5) **LVL control:** Sets Send 3 output level.
- (6) **MUTE switch:** Mutes Send 3 output when switch is in.
- (7) **LVL control:** Sets Send 4 output level.
- (8) **MUTE switch:** Mutes Send 4 output when switch is in.
- (9) **2MIX switch:** Directs 2-Mix signal to Sends 5 and 6. Is effective when switch is in.

CONSOLE CONTROLS AND INDICATORS

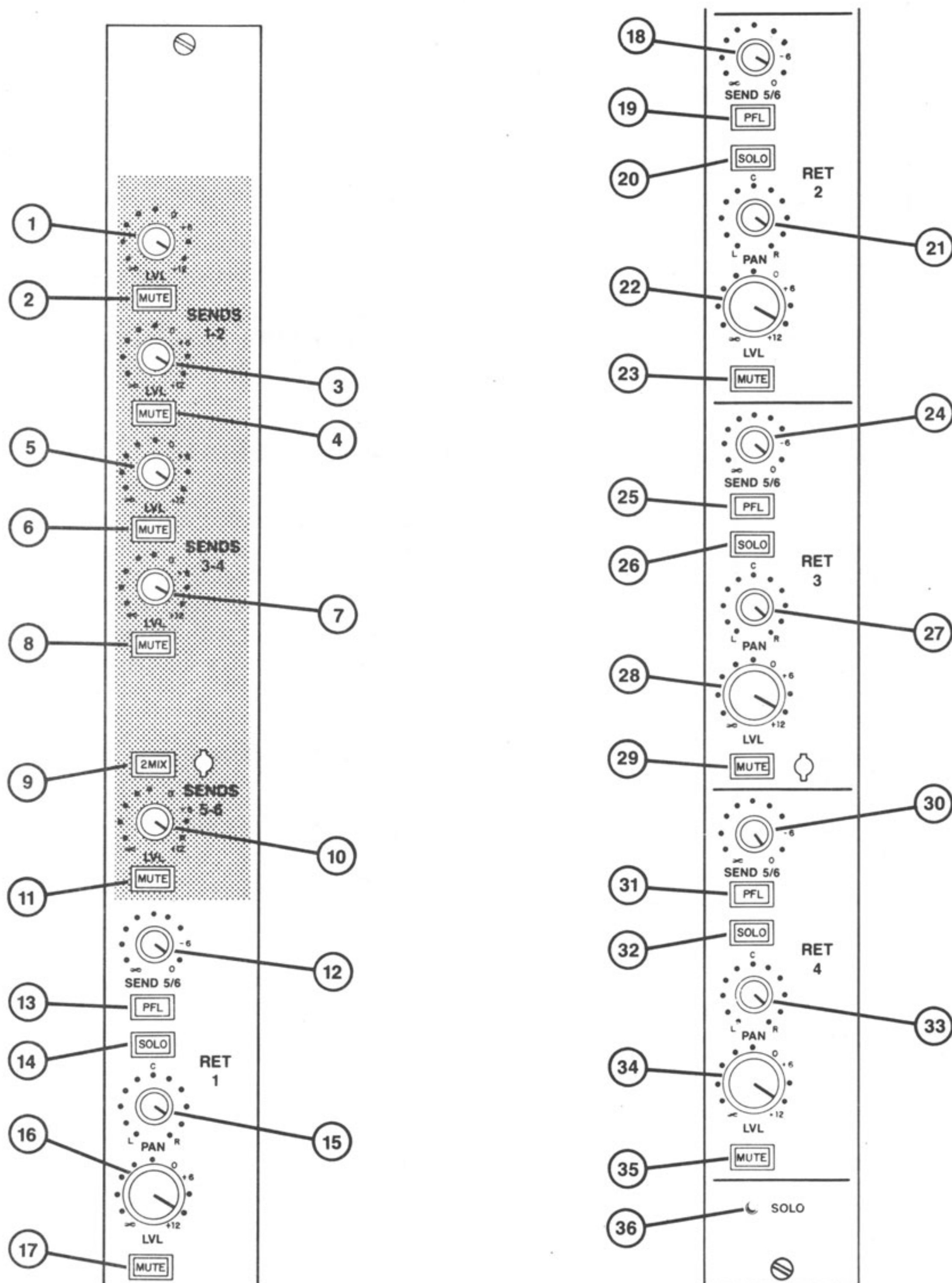


Figure 3-4. Master Module

- (10) **LVL control:** Sets Sends 5 and 6 output levels.
- (11) **MUTE switch:** Mutes Sends 5 and 6 when switch is in.
- (12) **SEND 5/6 control:** Sets level of Return 1 output to Sends 5/6.
- (13) **PFL switch:** Selects Return 1 for PFL when the switch is in.
- (14) **SOLO switch:** Selects Return 1 for Solo listening when the switch is in.
- (15) **PAN control:** Sets balance between left and right signals from Return 1. Has detent (C) at point where left and right signals are balanced.
- (16) **LVL control:** Sets Return 1 signal input level.
- (17) **MUTE switch:** Mutes Return 1 signal when the switch is in.
- (18) **SEND 5/6 control:** Same as (12), but for Return 2.
- (19) **PFL switch:** Same as (13), but for Return 2.
- (20) **SOLO switch:** Same as (14), but for Return 2.
- (21) **PAN control:** Same as (15), but for Return 2.
- (22) **LVL control:** Same as (16), but for Return 2.
- (23) **MUTE switch:** Same as (17), but for Return 2.
- (24) **SEND 5/6 control:** Same as (12), but for Return 3.
- (25) **PFL switch:** Same as (13), but for Return 3.
- (26) **SOLO switch:** Same as (14), but for Return 3.
- (27) **PAN control:** Same as (15), but for Return 3.
- (28) **LVL control:** Same as (16), but for Return 3.
- (29) **MUTE switch:** Same as (17), but for Return 3.
- (30) **SEND 5/6 control:** Same as (12), but for Return 4.
- (31) **PFL switch:** Same as (13), but for Return 4.
- (32) **SOLO switch:** Same as (14), but for Return 4.
- (33) **PAN control:** Same as (15), but for Return 4.

- (34) **LVL control:** Same as (16), but for Return 4.
- (35) **MUTE switch:** Same as (17), but for Return 4.
- (36) **SOLO LED:** Is illuminated when Solo is selected for any return.

3.7 MONITOR MODULE

The Monitor module is used to control all studio and control room speaker outputs from the console. It incorporates control room level and dim (level reduction) controls, studio level and mute controls, and a phase switch which compares the phases of the left and right signals. Figure 3-5 illustrates the various Monitor module controls.

3.7.1 Monitor Module Controls

- (1) **BDCST switch:** Sets all the I/Os into broadcast mode, allowing the input signals to be fed to the Channel and Monitor paths simultaneously.
- (2) **LINE OUT switch:** Sets all I/Os for line output monitoring.
- (3) **LINE IN switch:** Sets all I/Os for line input monitoring.

NOTE: Switches (2) and (3) set all I/Os simultaneously to the same mode. The Line In or Line out mode can be set independently for any individual I/O by means of its REV switch.

- (4) **TAPE 1 switch (left):** Selects Tape 1 for input to the control room monitor when the switch is in.
- (5) **TAPE 2 switch (left):** Same as (4), but for tape 2.
- (6) **TAPE 3 switch (left):** Same as (4), but for tape 3.
- (7) **TAPE 4 switch (left):** Same as (4) but for tape 4.
- (8) **TAPE 1 switch (right):** Selects Tape 1 for input to the studio monitor when the switch is in.
- (9) **TAPE 2 switch (right):** Same as (8), but for tape 2.
- (10) **TAPE 3 switch (right):** Same as (8), but for tape 3.
- (11) **TAPE 4 switch (right):** Same as (8), but for tape 4.
- (12) **SENDS 1/2 switch (left):** Selects Sends 1 and 2 for input to the control room monitor when the switch is in.

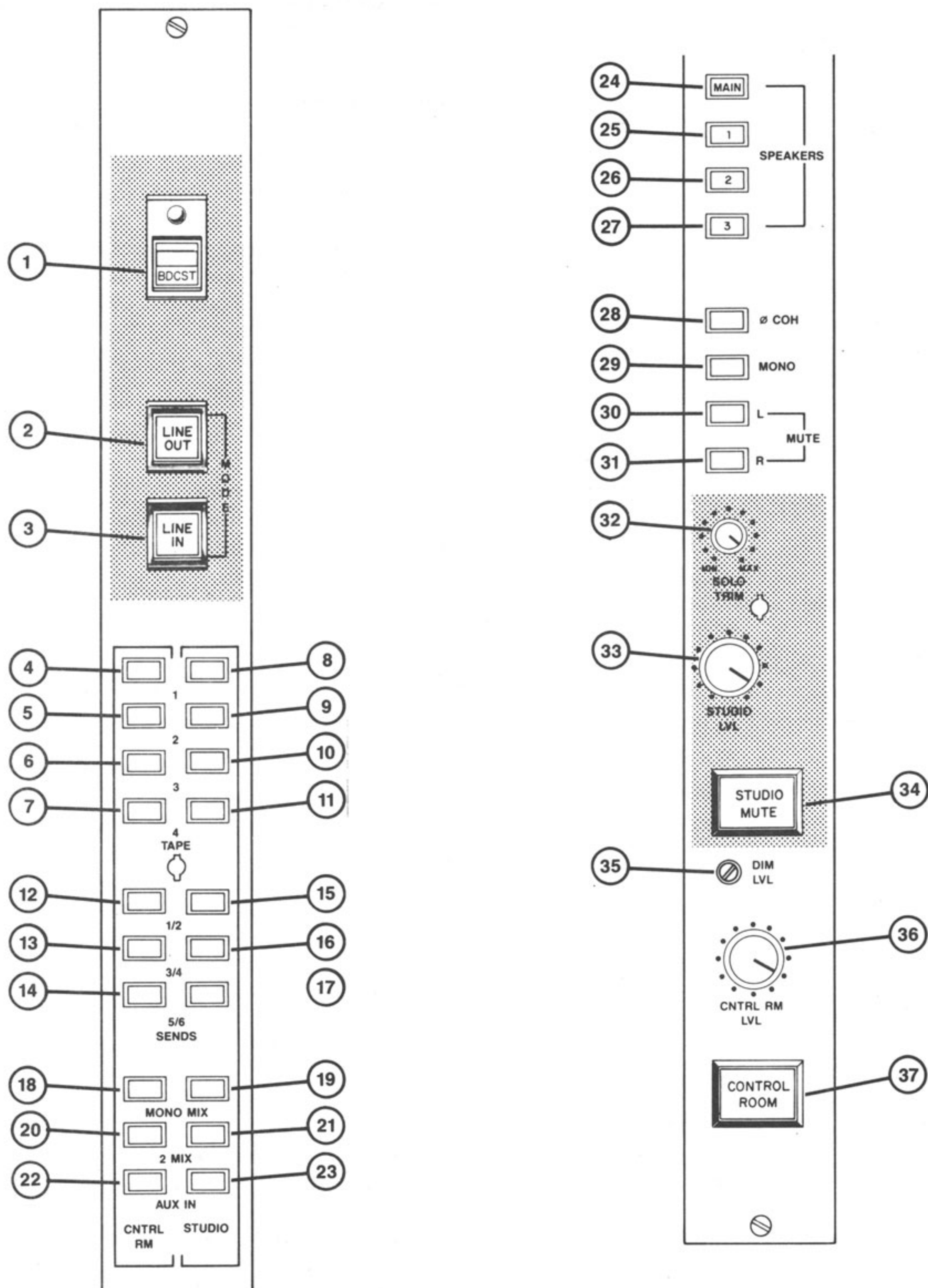


Figure 3-5. Monitor Module

- (13) **SENDS 3/4 switch (left):** Same as (12), but for Sends 3 and 4.
- (14) **SENDS 5/6 switch (left):** Same as (12), but for sends 5 and 6.
- (15) **SENDS 1/2 switch (right):** Selects Sends 1 and 2 for input to the studio monitor when the switch is in.
- (16) **SENDS 3/4 switch (right):** Same as (15) but for Sends 3 and 4.
- (17) **SENDS 5/6 switch (right):** Same as (15), but for Sends 5 and 6.
- (18) **MONO MIX switch (left):** Selects Mono mix input for the control room monitor when the switch is in.
- (19) **MONO MIX switch (right):** Selects Mono mix input for the studio monitor when the switch is in.
- (20) **2-MIX switch (left):** Selects 2-Mix signal for input to the control room monitor when the switch is in.
- (21) **2-MIX switch (right):** Selects 2-Mix signal for input to the studio monitor when the switch is in.
- (22) **AUX IN switch (left):** Selects the Auxiliary input for the control room monitor when the switch is in.
- (23) **AUX IN switch (right):** Selects the Auxiliary input for the studio monitor when the switch is in.
- (24) **MAIN SPEAKER switch:** Selects main left and right speakers in the control room when the switch is in.

Alternate speaker switches (25), (26) and (27) perform the same function as the main speaker switch, but select alternate speakers 1, 2 or 3.

- (28) **Ø COH switch (phase coherence):** Inverts the left channel signal, then adds the left and right signals to provide a single out-of-phase component to the control room right channel speaker.
- (29) **MONO switch:** Directs a summed Mono signal to the control room monitor. Is effective when the switch is in.

- (30) **L MUTE switch:** Mutes the left channel signal to the control room monitor when the switch is in.
- (31) **R MUTE switch:** Mutes the right channel signal to the control room monitor when the switch is in.
- (32) **SOLO TRIM control:** Sets the level of the Solo signals fed to the control room monitor.
- (33) **STUDIO LVL control:** Sets the level of the signals supplied to the studio monitors.
- (34) **STUDIO MUTE switch/indicator:** Mutes the signals to the studio monitor. The switch lamp is dimmed to show when muting is in effect.
- (35) **DIM LVL control (screwdriver adjust):** presets the audio dim level for the control room speakers. Dimming will occur in response to the CONTROL ROOM switch (37), or when any communication function is selected.
- (36) **CNTRL RM LVL control:** Sets the level of the signals fed to the control room.
- (37) **CONTROL ROOM switch/indicator:** Reduces the control room audio to the dimmed level. The switch illumination is dimmed when audio dimming is selected.

3.8 COMMUNICATION MODULE

The Communication module (Figure 3-6) provides communication paths between the console operator and the studio. It also incorporates a Slate oscillator, together with a test oscillator and noise generators (both white and pink noise) for test and calibration purposes.

3.8.1 Communication Module Controls

- (1) **FREQ control:** Sets the test oscillator base frequency, the frequency range being 20 to 200 Hz.

The OSC $\times 1$, $\times 10$ and $\times 100$ switches (2), (3) and (4) are frequency multipliers for the test oscillator. These switches are so arranged that only one switch at a time may be selected. The generated test frequency is equal to the oscillator base frequency times the selected multiplier. Oscillator signals are not effective until one of the multipliers is selected.

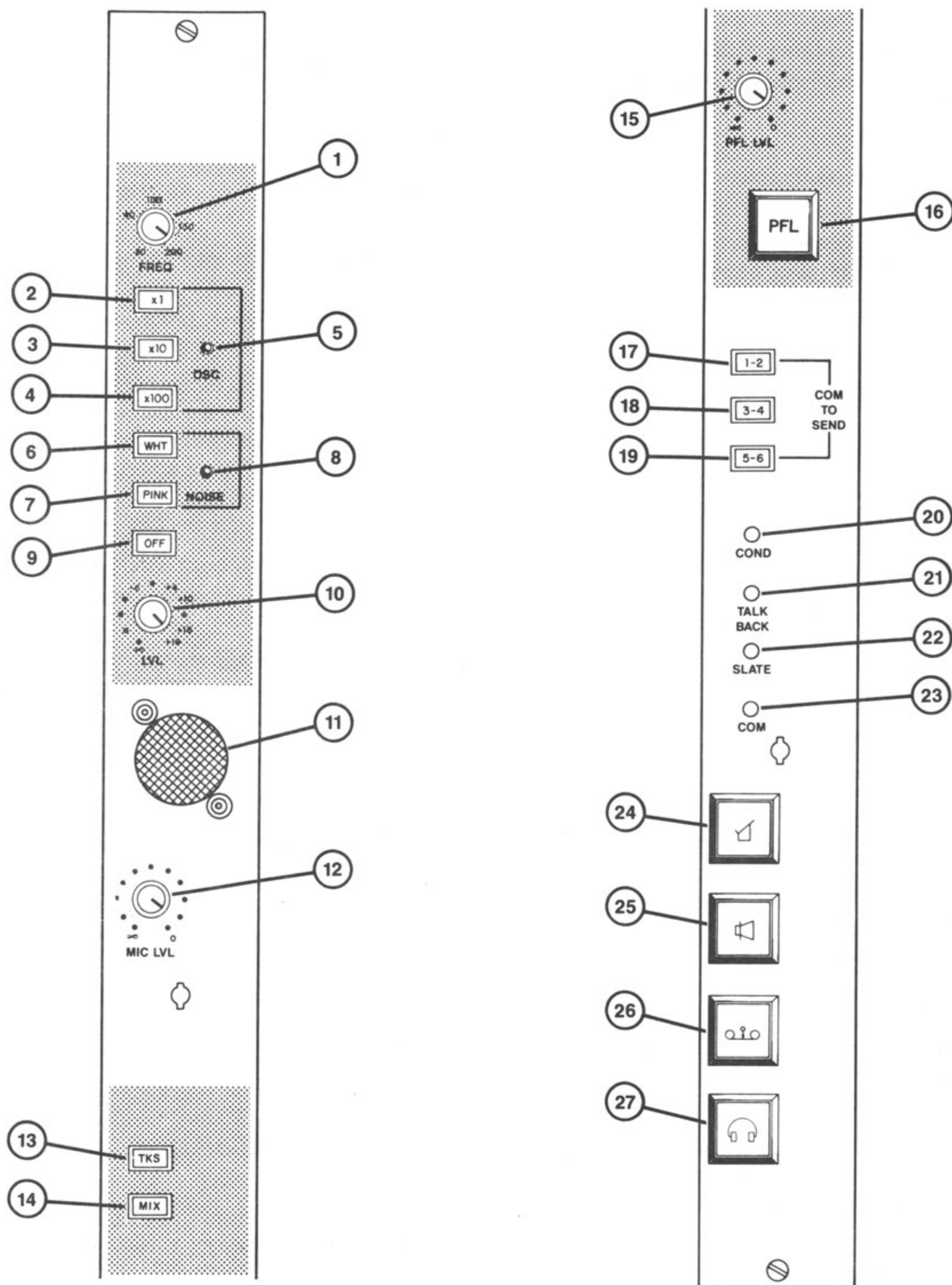


Figure 3-6. Communication Module

- (5) **OSC LED (red):** Illuminates to show that the test oscillator is selected.
- (6) **WHT switch:** Turns on the white noise generator when the switch is in. When selected, this switch automatically disables the test oscillator and/or the pink noise generator.
- (7) **PINK switch:** Turns on the pink noise generator when the switch is in. When this switch is selected, it automatically disables the test oscillator and/or the white noise generator.
- (8) **NOISE LED (red):** Illuminates to show when either noise generator has been selected.
- (9) **OFF switch:** Switches off the test oscillator and/or noise generators.
- (10) **LVL control:** Sets test oscillator and noise generator output levels.
- (11) **Talkback Microphone:** Used in conversations between the console operator and the studio.
- (12) **MIC LVL control:** Sets Talkback microphone pre-amplifier gain.
- (13) **TKS switch (tracks):** Assigns Slate tone, oscillator or noise signals to the recorder tracks when switch is in.
- (14) **MIX switch:** Assigns Slate tone, oscillator or noise signals to the 2-Mix Bus when the switch is in.
- (15) **PFL LVL:** Sets the level of the signal to the PFL speaker.
- (16) **PFL switch/indicator:** Mutes the PFL signal and redirects it to the Solo Bus. The switch is illuminated when selected.
- (17) **COMM to SEND 1-2 switch:** Switches the communication microphone signal to the Send 1 and Send 2 busses. Is effective when the switch is in.
- (18) **COMM TO SEND 3-4 switch:** Same as (17), but for Sends 3 and 4.
- (19) **COMM TO SEND 5-6 switch:** Same as (17), but for Sends 5 and 6.
- (20) **COND preset (screwdriver adjust):** Presets the Talkback level to the conductor.

- (21) **TALK BACK preset (screwdriver adjust):** Presets the Talkback output level.
- (22) **SLATE preset (screwdriver adjust):** Presets the Slate tone output level.
- (23) **COM preset (screwdriver adjust):** Presets the COM output level.
- (24)  **switch/indicator:** Directs the Talkback audio to the conductor output. The switch is illuminated when selected.
- (25)  **switch/indicator:** Directs the Talkback audio to the studio monitor. The switch is illuminated when selected.
- (26)  **switch/indicator:** Directs the Talkback audio to the Slate system. The switch is illuminated when selected.
- (27)  **switch/indicator:** Directs the Talkback audio to the cue system. The switch is illuminated when selected.

3.9 FADERS

The Faders for all of the I/O modules are located at the forward edge of the console, each in line with its applicable I/O. Faders may be of either the Automated or Non-automated type, both of which are illustrated in Figure 3-7.

The Master Audio Fader (Figure 3-8) is at the forward edge of the console, in line with the Master module, and the Master Automation Fader (automated systems only) is directly to the right of the Master Audio Fader.

3.9.1 Non-automated I/O Fader Controls

- (1) **Mute switch/indicator:** Mutes the signal from the I/O. This switch is labelled with the channel number, and is illuminated in normal operation. When muting is selected, the indicator becomes dimmed.
- (2) **Linear Fader:** Controls the level of the I/O Monitor path signal. This function can be interchanged with that of the rotary Fader (LVL) on the I/O (see paragraph 3.3.1).
- (3) **PFL switch:** Selects Pre-Fader Listening for the I/O.

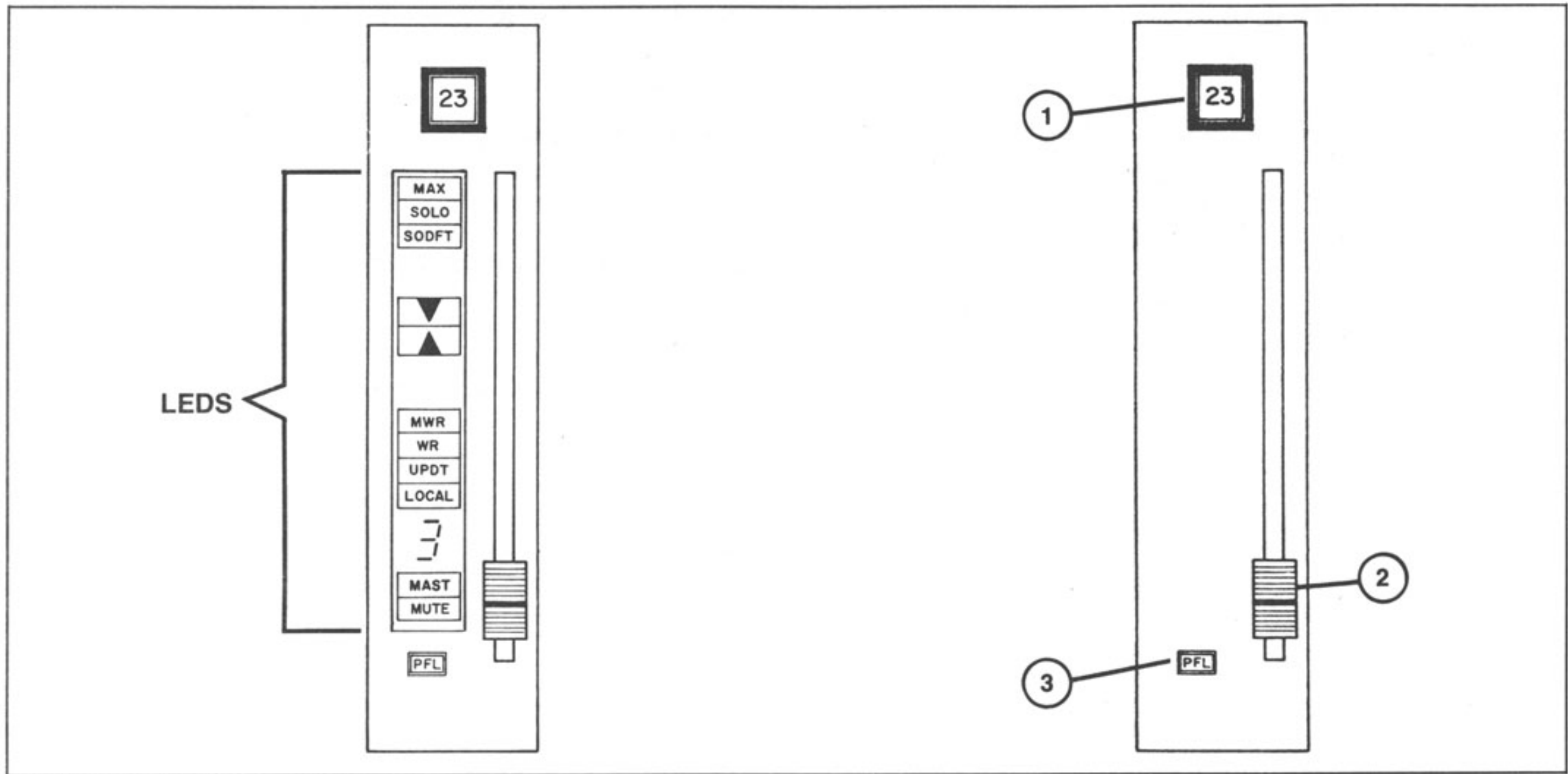


Figure 3-7. Automated and Non-automated Faders

3.9.2 Automated I/O Fader Controls

The Automated I/O Fader has the same controls as the Non-automated version, plus some added LED indicators. These indicators are used to display the status of the following automation functions:

MAX GAIN (MAX)	UPDATE (UPDT)
SOLO	LOCAL
SOLO DEFEAT (SODFT)	MASTER (MAST)
MUTE WRITE (MWR)	MUTE
WRITE (WR)	

When automation is switched off, this Fader operates in exactly the same manner as the Non-automated version.

For further information on the automation functions, refer to the Automated Fader Operation section of this manual.

3.9.3 Master Audio Fader

The Master Audio Fader controls the level of the 2-Mix output. There are no controls on this module other than the potentiometer itself (see Figure 3-8).

3.10 METER HOUSING

The Meter Housing is mounted at the rear edge of the console and contains all of the system meters and

status indicators. In automated systems, the Meter Housing also contains the Automation Status Panel.

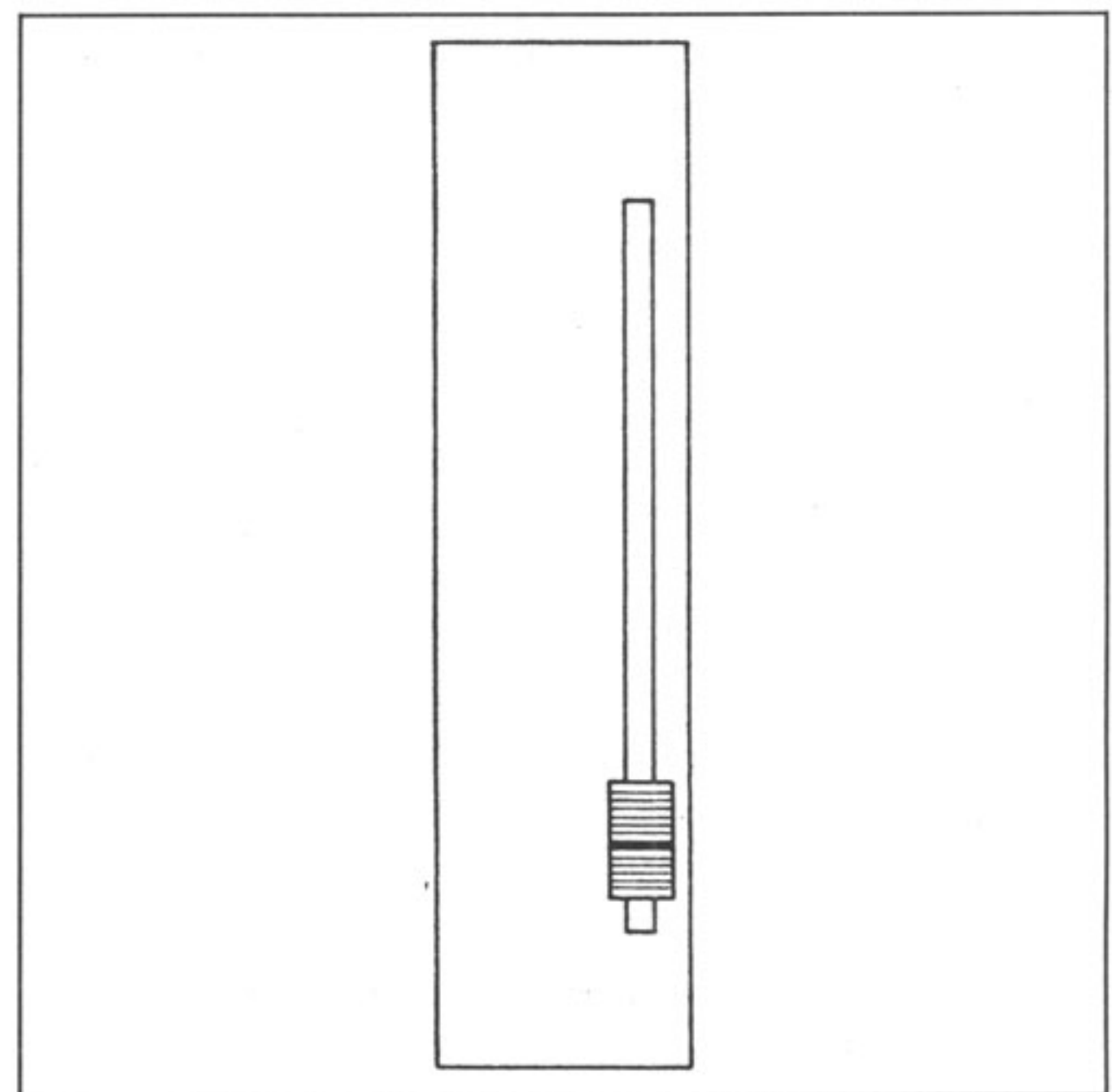


Figure 3-8. Master Audio Fader

3.10.1 Channel Meters

The Channel Line In/Line Out meters may be either VU or PPM types, depending upon the option selected. In the **MXP-3036** console, one meter is provided for each of the first 24 I/Os, and meters for the

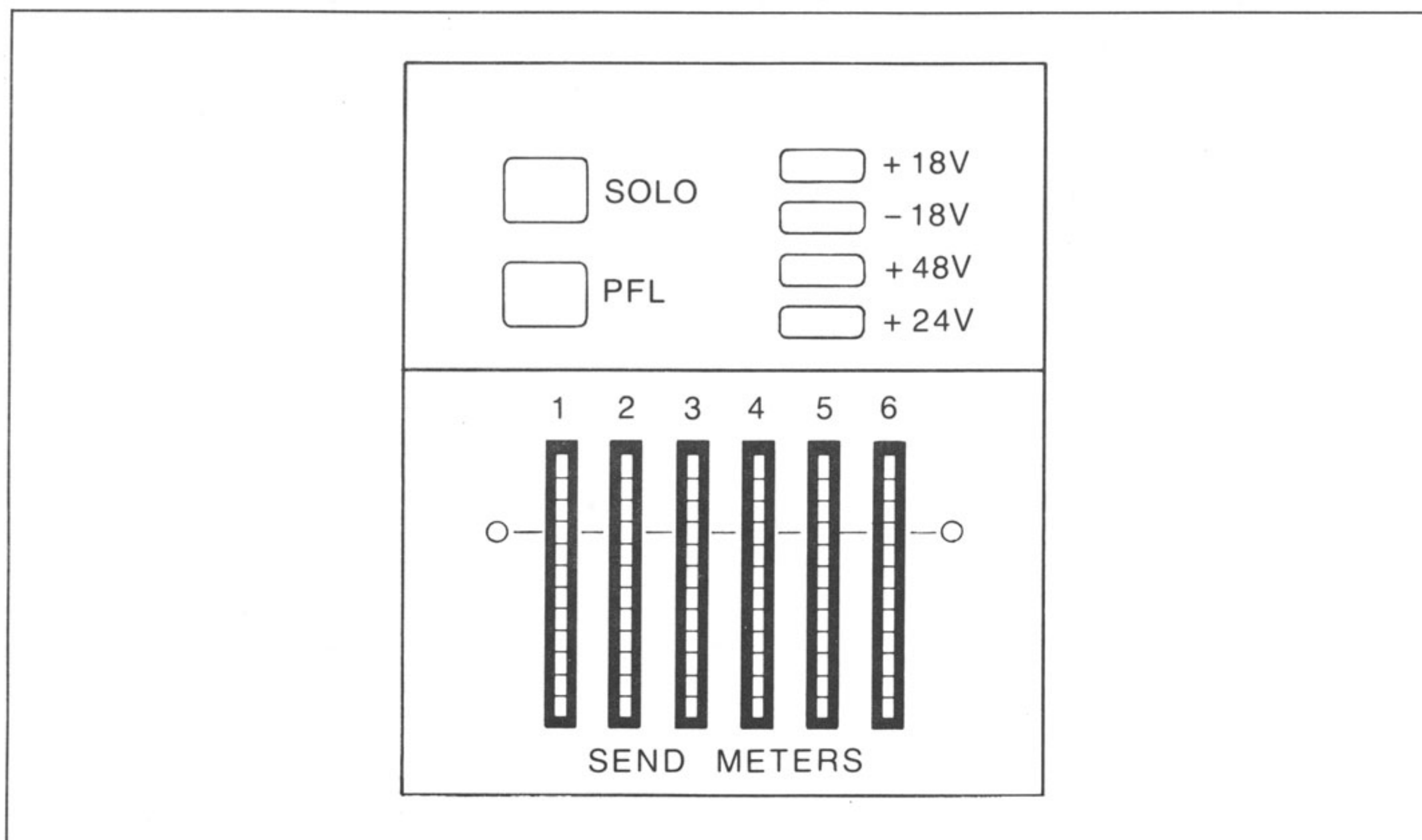


Figure 3-9. Status Panel

remaining 12 I/Os are optionally available. In the **MXP-3020** console, one meter is provided for each channel. These meters are used to measure the line input or line output to or from the console. The meter functions are switched automatically as the I/Os are set for Line In or Line Out mode.

3.10.2 Control Section Meters

The control section meters monitor the signals selected at the control room section of the Monitor module. The purpose of each of the meters in the group is listed below.

- **LEFT meter:** Measures the level of the signal on the left stereo channel as selected at the Monitor module.
- **RIGHT meter:** Measures the level of the signal on the right stereo channel as selected at the Monitor module.
- **MONO meter:** Measures the level of the combined 2-Mix signal.

- **PHASE meter:** Measures the phase difference between the left and right stereo channel signals.

3.10.3 Status Panel Indicators

The status panel (Figure 3-9) at the right-hand end of the Meter Housing incorporates six LED indicators and six Send meters. The purpose of each of these is listed below.

- (1) **SOLO LED:** Illuminates to show that a Solo function has been selected on the console.
- (2) **PFL LED:** Illuminates to show that Pre-Fader Listening has been selected.
- (3) **Voltage LEDs:** Illuminate to indicate that all of the required DC voltages (+18, -18, +48 and +24) are present in the console.
- (4) **SEND METERS 1 through 6:** Indicate the levels of all of the Send outputs.

SECTION 4
CONSOLE OPERATIONS

4.1 GENERAL

Because of the many different MXP-3000 functions and capabilities, it is not possible to give specific step-by-step operational procedures for the console, and this section is necessarily presented in general terms. However, it describes the Patch Bay, and Patch Bay connections in detail, and includes a comprehensive description of console signal flow, together with discussions of basic operating modes and other fundamental operational details.

4.2 PATCH BAY

The Patch Bay provides a means of quickly and easily directing signals to any part of the system. External equipment such as effects units and limiters are coupled to the Patch Bay by means of tielines.

The Patch Bay jacks are arranged in 16 rows. Rows 1 through 8 in the upper section are assigned to the I/O

modules. In the lower section (Rows 9 through 16), Columns 1 through 10 are assigned to various different functions, Columns 11 through 22 are assigned to tielines, and Column 36 is assigned to Automation data. (For differences in MXP-3020 Patch Bay, refer to paragraph 4.2.5.)

4.2.1 Normalized Patches

As applied to the Patch Bay, the term “normalized” refers to the patch wiring sequence, and indicates that the output jack does not open the signal path, whereas the return jack does so. Thus, assuming that a connection is to be made between a MIC PRE OUT and MIC PRE RET patch pair, the signal path is not opened when a plug is inserted into the MIC PRE OUT jack. However, when the return plug is inserted into the MIC PRE RET jack, the direct signal path is opened, allowing the returned signal to be injected into the Channel path.

CONSOLE OPERATIONS

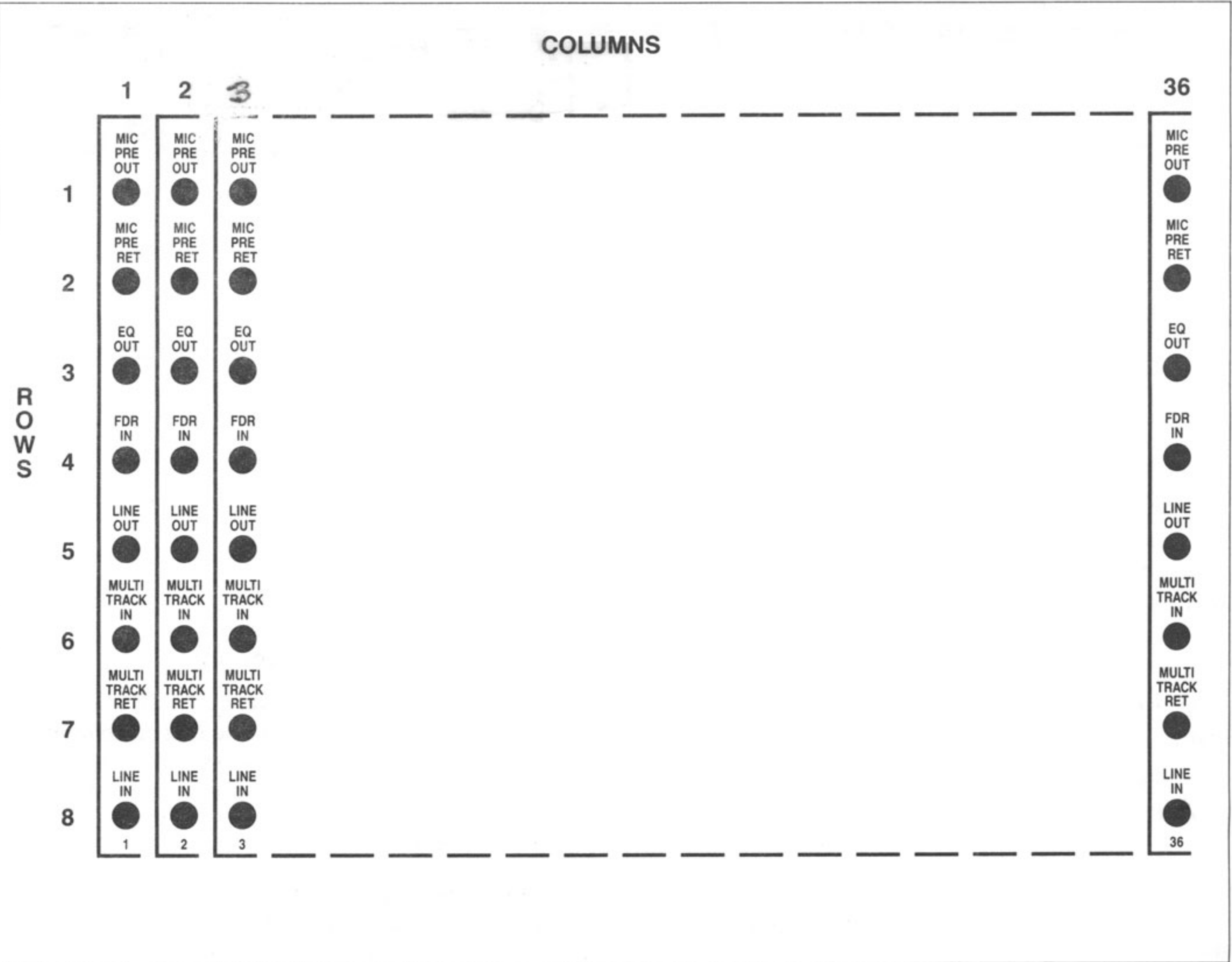


Figure 4-1. Upper Patch Bay Section

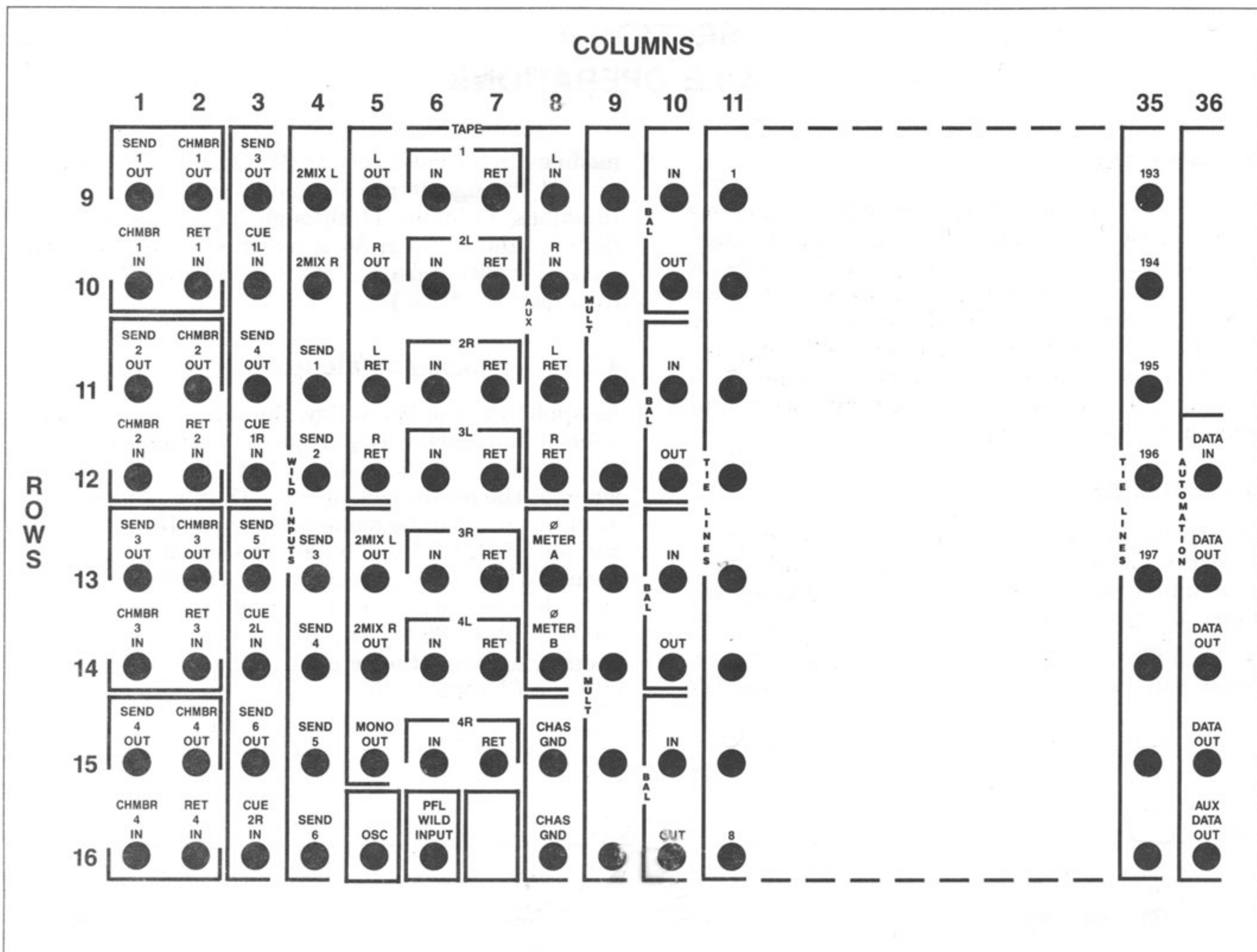


Figure 4-2. Lower Patch Bay Section

4.2.2 Upper Patch Bay Section

The upper Patch Bay section (MXP-3036) is illustrated in Figure 4-1. The jack assignments for each row are listed below.

Row 1 MIC PRE OUT:

Microphone Pre-amplifier output patch. Normalized to MIC PRE RET.

Row 2 MIC PRE RET:

Microphone Pre-amplifier return. This is the input point for the Channel path on the I/O module. Normalized from MIC PRE OUT.

Row 3 EQ OUT:

Post-Equalizer output patch. Normalized to FDR IN.

Row 4 FDR IN:

Fader input patch. Normalized from EQ OUT (the Equalizer is pre-Fader).

Row 5 LINE OUT:

Provides access to the Channel line output. Normalized to MULTITRACK IN.

Row 6 MULTITRACK IN:

Allows connection to be made to the Multitrack input. Normalized from LINE OUT.

Row 7 MULTITRACK RET:

Patch point from the Multitrack output. It is normalized to LINE IN.

Row 8 LINE IN:

Provides access to the line input. Is normalized from MULTITRACK RET.

4.2.3 Lower Patch Bay Section

As shown in Figure 4-2, the lower Patch Bay section jacks have various assignments in the first 10 columns, while those in columns 11 to 35 are assigned to tielines and column 36 is reserved for Automation data.

Columns 1 and 2

Columns 1 and 2 are arranged in four sets of four jacks each, these being used to provide outputs from Sends 1, 2, 3 and 4 to echo chambers or other effects units.

Each set of four jacks is assigned as follows:

SEND OUT:

Provides access to signals from the Send Bus. Is normalized to CHMBR IN.

CHMBR IN:

Is for connection to the effects unit input. Is normalized from SEND OUT.

CHMBR OUT:

Is for connection from the effects unit output.

RET IN:

Is the input jack for the echo return.

Column 3

The patch jacks in Column 3 are used to make interconnections from Send Buses 3, 4, 5 and 6 to cue inputs 1 and 2. The SEND OUT jacks provide access to the bus signals, and the CUE IN jacks are the cue signal input points. The patches are normalized as detailed below:

Row 1 SEND 3 OUT is normalized to **Row 2 CUE 1L**

Row 3 SEND 4 OUT is normalized to **Row 4 CUE 1R**

Row 5 SEND 5 OUT is normalized to **Row 6 CUE 2L**

Row 7 SEND 6 OUT is normalized to **Row 8 CUE 2R**

Column 4

The eight jacks in Column 4 are used to accommodate external "wild" inputs to 2-Mix or Sends. Each individual jack is labeled with its specific destination.

Column 5

Rows 1 through 7 of Column 5 are assigned to 2-Mix and stereo functions, and Row 8 is assigned to the Test Oscillator. The patch function for each row is listed below.

The assignments for Rows 1 through 4 (2MIX PATCH) are:

Row 1 L OUT:

Provides a pre-Fader, left stereo channel patch point. Normalized to L RET.

Row 2 R OUT:

Same as L OUT, but for right stereo channel. Normalized to R RET.

Row 3 L RET:

Reinsertion point for left stereo signal. Normalized from L OUT.

Row 4 R RET:

Same as L RET, but for right stereo signal. Normalized from R OUT.

Rows 5, 6 and 7 are assigned as follows:

Row 5 2MIX L OUT:

Post-Fader patch point for left stereo channel. Picks up the 2-Mix left channel signal at a point im-

mediately preceding the tape recorder input. Normalized to TAPE 2L IN, TAPE 3L IN and TAPE 4L IN.

Row 6 2MIX R OUT:

Same as 2MIX L OUT, but for right stereo channel. Normalized to TAPE 2R IN, TAPE 3R IN and TAPE 4R IN.

Row 7 MONO OUT:

Post-Fader patch point for Mono signal. Picks up the signal at point immediately preceding the tape recorder input. Normalized to TAPE 1 IN.

Row 8 (OSC) is assigned to the Test Oscillator, and provides an output from the Oscillator for external use.

Column 6

Rows 1 through 7 of Column 6 are assigned to tape recorder input patches, and Row 8 is assigned to PFL wild input.

The TAPE IN jacks provide patches for tape recorder inputs, and are normalized in the following manner:

1 IN is normalized from **MONO OUT**.

2L IN, 3L IN and 4L IN are normalized from **2MIX L OUT**.

2R IN, 3R IN and 4R IN are normalized from **2MIX R OUT**.

ROW 8 (PFL WILD INPUT) provides a direct input to the PFL amplifier.

Column 7

Rows 1 through 7 of Column 7 provide return patches for the tape recorder output. The TAPE RET jack functions are listed below:

1 RET — Return from Mono tape recorder.

2L RET, 3L RET and 4L RET — Returns from left stereo channels.

2R RET, 3R RET and 4R RET — Returns from right stereo channels.

Row 8 (S.V.INPUT) is reserved for a future option.

Column 8

The first four rows of Column 8 (AUX jacks) provide a means of inserting auxiliary inputs into the Monitor system. The AUX RET jacks are wired to the AUX selection switches on the Monitor module.

Rows 5 and 6 (PHASE METER A and PHASE METER B) allow external signals to be patched to the console phase meter.

Rows 7 and 8 (CHAS GND) provide chassis ground points which can be used for grounding any desired point on the Patch Bay.

Column 9

Two sets of MULT (multiple) jacks are provided in Column 9. These afford a means of supplying up to three outputs from a single input. When a signal is patched into any one of the jacks in Rows 1, 2, 3 or 4, it becomes available at the other three jacks in the group. The second group (Rows 5, 6, 7 and 8) are used for the same purpose.

Column 10

Four pairs of BAL IN/BAL OUT JACKS are available in Column 10. These provide access to four balancing transformers which are normally used to isolate console circuits from external devices.

Columns 11 through 35

The tieline jacks in Columns 11 through 35 are used to connect to external devices through the Tuchel panel at the back of the console. For details of the Tuchel panel to Patch Bay connections, refer to Figures 2-5A and 2-5B.

Column 36

This column is used for patching tape-based Automation data functions. For further information on these functions, refer to Section 5 of this manual.

4.2.4 Patching External Units

The following paragraphs provide several typical examples of Patch Bay operations.

4.2.4.1 Insertion After Microphone Pre-amplifier

To insert an external unit between the Microphone Pre-amplifier and the Channel path, first connect Row 1 (MIC PRE OUT) to the appropriate tieline jack for input to the external unit, then connect the external unit's output tieline jack to Row 2 (MIC PRE RET).

The nominal output from MIC PRE OUT is -2 dBu. If a higher level is required, adjust the pre-amplifier gain accordingly. Summing bus headroom at the nominal level is 24 dBu. When adjusting pre-amplifier gain, be sure to allow sufficient headroom for the peak signals. For best results, the return signal should have a nominal value of approximately -2 dBu.

4.2.4.2 Insertion Between Equalizer and Fader

To insert the external unit between the Equalizer and the Fader, first connect Row 3 (EQ OUT) to the input jack appropriate to the external unit's tieline, then connect the output tieline jack to Row 4 (FDR IN).

4.2.4.3 Insertion Between Channel Output and Tape Machine

To make this insertion, connect Row 5 (LINE OUT) to the external unit's input tieline jack and Row 6 (MULTITRACK IN) to its output tieline jack.

The nominal level at the LINE OUT jack is $+4$ dBu, and the return from the external unit should be at the same level.

4.2.4.4 Insertion On-Line

To insert the external unit into the line ahead of the Fader, use Row 7 (MULTITRACK RET) as input to the external unit and Row 8 (LINE IN) for the return.

The nominal MULTITRACK RET output level should be $+4$ dBu, and the return from the external unit should be at the same level.

4.2.5 MXP-3020 Patch Bay

In MXP-3020 consoles, the Patch Bay differs from that in MXP-3036 consoles in several respects. These differences are listed in paragraphs 4.2.5.1 and 4.2.5.2.

4.2.5.1 Upper Patch Bay Section

- Only 20 INPUT/OUTPUT columns (one for each channel) are provided in the MXP-3020.
- Those columns normally located in columns 6, 7, and 8 of the lower Patch Bay section in the MXP-3036 are moved to the upper Patch Bay section in the MXP-3020, and are located in columns 22, 23, and 21, respectively.
- The AUTOMATION patches are located in column 24 of the upper Patch Bay section in the MXP-3020.

4.2.5.2 Lower Patch Bay Section

- In the lower Patch Bay section, columns 1 through 5 in the MXP-3020 remain unchanged from those in the MXP-3036.

- Columns 6 and 7 in the **MXP-3020** have the MULT and BAL patches normally located in columns 9 and 10 in the **MXP-3036**.
- Only 136 tielines are provided in the **MXP-3020**, these being located in columns 8 through 24 in the lower Patch Bay section.

4.3 INPUT/OUTPUT MODULE SIGNAL FLOW

The signal flow diagram for the I/O module, including the plug-in Microphone Pre-amplifier and Equalizer modules, is given in Figure 4-3. In this illustration, those control and switch labels shown in boxes correspond exactly to the labels on the I/O module, Pre-amplifier and Equalizer control panels.

CAUTION

IF, WHEN MONITORING "LINE OUT", THE BUS OR THE DUMP SWITCH IS PRESSED TOO SHARPLY, HEAVY AUDIO TRANSIENTS WILL BE GENERATED. USE NORMAL, EVEN PRESSURE WHEN OPERATING THESE SWITCHES.

4.3.1 Channel Path

The Channel path is that part of the I/O module circuit which carries all of the signals to the Multitrack or line output. The input to the Channel path may be either a microphone signal or a Line In signal from the Multitrack, selection being made at the LINE (microphone/line) switch.

CAUTION

WHEN THE MICROPHONE INPUT IS UNTERMINATED (NO MICROPHONE CONNECTED), THE MICROPHONE PRE-AMPLIFIER GAIN CONTROL (MIC) MUST BE SET FULLY COUNTER-CLOCKWISE.

Microphone input to the I/O module is brought in through the appropriate Tuchel connector to the Microphone Pre-amplifier. In this sub-module, the PHAN (phantom power) switch is used to supply +48 Volts for microphones requiring external power, and the MIC (microphone level) control is used to set the pre-amplifier gain.

The MIC PRE OUT and MIC PRE RET patches provide a means of inserting external effects units into the Microphone Pre-amplifier output path if required. From the MIC PRE RET patch point, the signal (with

or without effects) is coupled to the upper contact on the LINE switch.

The Line In connection from the Multitrack is provided with MULTITRACK RET and LINE IN patches for external effects, and is coupled through the optional transformer (if installed) and the Line Amplifier to the lower contact on the LINE switch. The LVL (line level) control on the Line Amplifier is used to set the amplifier gain.

The selected signal, either Microphone or Line, from the LINE switch common contact is fed directly into the Channel path. The CHAN (filter to Monitor or Channel) switch (Fig 3-2, callout 16) is used to switch the High Pass and Low Pass Filters into the Channel path if required. Similarly, the CHAN (Equalizer to Monitor or Channel) switch (Fig 3-2, callout 13) can be used to switch the Equalizer into the Channel path.

After the Filters and Equalizer (if selected), the signal passes through normally closed contacts on the BUS switch to a Fader. This usually is the LVL (Rotary Fader) control on the I/O module, but the Linear Fader can be switched into the place of the Rotary Fader by means of the FDR (fader reverse) switch. The function of the BUS switch is discussed in paragraph 4.3.2.2.

The signal from the selected Fader is fed to the Bus Assignment Switches and to the PAN (bus pan) control. The outputs from the PAN control also are coupled to the Bus Assignment Switches through normally closed contacts on the DUMP (Monitor to bus) switch and the Odd and Even Bus Pan Buffers. Thus, both direct and panned signals are available at the Bus Assignment Switches for placement on selected buses.

The Bus Assignment Switch arrangement is such that:

- If a single bus is selected, the panned signals are ineffective.
- If multiple odd buses or multiple even buses are selected, the panned signals are ineffective.
- Panned signals are placed on the buses ONLY when an odd and even bus pair is selected.

4.3.2 Monitor Path

The Monitor path is used to supply a final mix to the 2-Mix Bus, and its signals may be adjusted to any desired levels without affecting the Channel path. The Monitor path may carry either the Line In signal from the Multitrack or the Line Out signal from the Channel ACN. In Broadcast applications, the Monitor path carries the same signal as the Channel path.



4.3.2.1 Monitor Input Switching

Selection between Line In or Line Out signals for Monitor path input is made by the Monitor Input Switch under control from either the Monitor Switching Logic or local (REV switch) selection.

The Line In (Multitrack return) signal to the Monitor Input Switch is taken directly from the Line Input Amplifier, and the Line Out signal to the switch is taken from the Channel ACN through normally closed contacts on the DIR (direct) switch. The control input is derived from the Monitor Switching Logic, and is coupled through normally closed contacts on the AGM, BUS and DUMP switches.

When either LINE IN or LINE OUT is selected at the Monitor module, the appropriate command sets or clears the Monitor Switching Logic so that its output level is high for Line Out or low for Line In. This level is coupled through normally closed contacts on the AGM, BUS and DUMP switches to the Monitor Input Switch control line. A high level control signal causes the switch to block Line In and pass Line Out, while a low level control signal causes the switch to block Line Out and pass Line In.

Selection of LINE IN or LINE OUT at the Monitor module sets all of the I/O modules to the same mode. The REV (reverse) switch allows each I/O module to be set independently for Line In or Line Out mode. Operating the momentary contact REV switch causes the existing state of the Monitor Switching Logic to be changed, overriding the most recent command from the Monitor module. A new command from the Monitor module resets all of the I/O modules to the same mode.

When AGM (Audio Grouping Master) is selected, the control path from the Monitor Switching Logic is opened, allowing the Monitor Input Switch control connection to assume a high level, thereby setting the Line Out mode.

When either BUS or DUMP is selected, the control signal to the Monitor Input Switch is grounded (low), forcing the Line In mode. Note that selecting either BUS or DUMP causes the AGM switch to be overridden.

4.3.2.2 Signal Flow

The selected signal from the Monitor Input Switch is amplified in the Monitor Input Amplifier and coupled through normally closed contacts on the Broadcast Relay into the Monitor path. (In Broadcast mode, the relay contacts are switched so that the Channel signal is fed to the Monitor path.)

Signal flow for the Monitor path is similar to that for the Channel path in that the Filters and Equalizer may be switched into the line if so required, and the Faders may be reversed. However, the EQ OUT and FDR IN patch points allow for insertion of effects or other units into the Monitor path, the returned signals being coupled through the Fader Patch Buffer and the selected Fader to the Monitor PAN control.

The Monitor path output is coupled to five places, these being the BUS, DUMP, PRE (pre/post), and AGM switches, and the PAN (Monitor pan) control. Each of these outputs is discussed separately below.

The output to the BUS switch provides a means of creating additional Sends during mixdown. Since, in this mode, the ACN Buses are not used for sending signals to the Multitrack, they can be used as Send Buses. This is accomplished by feeding the post-Fader Monitor signal through the BUS switch (BUS selected) and the Rotary Fader to the Assignment Switches.

The lower section of the DUMP switch allows the post-Fader Monitor signal to be directed to the Line Out path. (The terms "upper" and "lower" used in these descriptions refer to the switch or contact locations as shown in Figure 4-3.) Further explanation of the DUMP function is given in paragraph 4.3.5.

The output to the PRE switches makes the post-Fader signal available for switching to Sends. Pre-Fader and post-Fader Send switching is discussed in paragraph 4.3.3.

The post-Fader Monitor signal to the AGM switch forms part of the signal flow in AGM operation. This is further discussed in paragraph 4.7.3.

The Monitor path output to the PAN control is the major path for the Monitor signal. The panned signal is coupled, through the Left and Right Monitor Pan Buffers and normally closed contacts on the MUTE switch, to the 2-Mix Bus. As will be shown in paragraph 4.4.2.1, the signals on the 2-Mix Bus are directed to the stereo tape recorder. The panned signals also are coupled to the MON SOLO (Monitor Solo) switch, the DUMP switch and the 2 MIX switch, which is used to supply a cue mix to Sends 5 and 6. The SOLO switch places the Monitor signal on the Solo Bus. The DUMP switch function is explained in paragraph 4.3.5.

4.3.3 Pre-Fader and Post-Fader Sends

Signals to the Send Buses can be either pre-Fader or post-Fader. Considering Sends 1 and 2: the pre-Fader

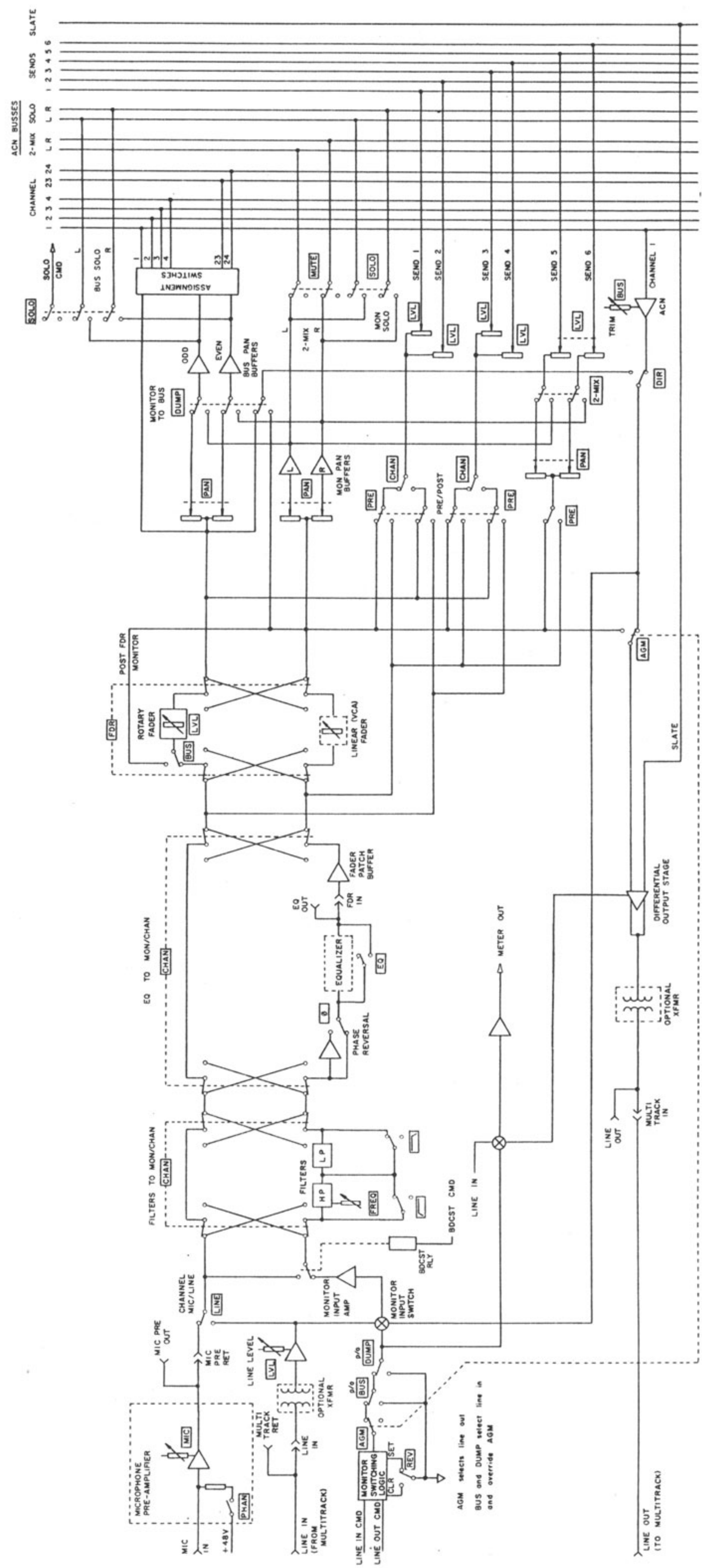


Figure 4-3. Input/Output Module
Signal Flow Diagram

Monitor signal is coupled to the lower contact on the upper section of the PRE (pre/post) switch, while the post-Fader Monitor signal is coupled to the upper contact on the same switch section. Thus, the upper section of the PRE switch selects between pre-Fader and post-Fader Monitor signals.

Similarly, the lower section of the PRE switch is fed with the pre-Fader Channel signal on its lower contact and the post-Fader Channel signal on its upper contact, thereby providing selection between pre-Fader and post-Fader Channel signals.

Selection between Channel and Monitor signals is made at the CHAN (Monitor or Channel) switch, and the selected signal is passed on to the Send 1 and Send 2 LVL (level) controls. From the LVL controls, the signals are fed to the Send 1 and Send 2 Buses.

Pre-Fader and post-Fader switching for Send 3 and Send 4 is accomplished in exactly the same manner as for Send 1 and Send 2, but Sends 5 and 6 are treated differently. Since Sends 5 and 6 are used only for Monitor signals, the Channel output is disregarded, and only one PRE switch section is used. Further, Channel/Monitor selection is not required, and the Monitor signal (pre-Fader or post-Fader) is fed directly to the S5&6 PAN control. From the PAN control, the signals are coupled through the 2 MIX switch to the S5&6 LVL control and on to the buses for Sends 5 and 6.

4.3.4 Line Out Signal Flow

In Figure 4-3, the input to the ACN (Active Combining Network) is shown to be coming from ACN Bus 1, indicating that the illustrated module is I/O #1. It is important to note that the signal on Channel Bus 1 is rarely the same as that in the I/O #1 Channel, but usually has been directed to that bus from some other I/O module. Indeed, for "own channel" operation, the DIR (direct) switch is used, and the bus is bypassed. This will be further discussed below.

The signal from the bus is coupled, through the ACN and normally closed contacts on the DIR and AGM switches, to the Differential Output Stage. When a SLATE (take marker) signal is used, it also is injected into this stage from the Slate Bus.

The output from the Differential Output Stage is passed through the optional transformer (if installed) and out via the Patch Bay to the Multitrack. The LINE OUT and MULTITRACK IN patch points allow for insertion of effects units.

Line Out from the ACN also is taken off at a point be-

tween the DIR and AGM switches. This is used as the Line Out signal to the Monitor Input switch.

The DIR switch is used when the Channel signal is to be placed on its own track, that is when the Channel signal in I/O #1 is to be directed to Track 1 on the Multitrack. The signal on the upper contact of the DIR switch is taken from the Channel path through normally closed contacts on the DUMP switch, and, when DIR is selected, it is directed to the Line Out path. This has the effect of bypassing both the bus and the ACN, and results in a reduction in noise.

4.3.5 Dump Operation

Figure 4-4 illustrates the dump operation, which is used to transfer recorded signals from track to track. The illustration assumes that the Line In signal from the Multitrack is from some previously recorded track which is to be re-recorded on Tracks 5 and 6.

The Line In signal to the I/O module is applied to the Monitor Input Switch. Section A on the DUMP switch grounds the control input to the Monitor Input Switch, thereby selecting Line In and passing the signal to the Monitor path. After passage through the Monitor path, the signal is fed to the Monitor PAN control. The panned Left and Right outputs are coupled, through the Monitor Pan Buffers, sections B and C on the DUMP switch (DUMP selected) and the Bus Pan Buffers, to the Assignment Switches. Buses 5 and 6 are selected at the Assignment Switches, and the signal is directed through Buses 5 and 6 to be re-recorded on Tracks 5 and 6.

4.4 MASTER MODULE SIGNAL FLOW

The Master module provides all of the master controls for use in monitoring, and also accommodates four return inputs.

The signal flow diagram for the module is given in Figure 4-5. All of those switch and control labels which are shown in boxes correspond exactly to the labels used on the control panel.

4.4.1 Input Section

The input section of the module is shown in that part of the diagram to the left of the Send and Cue ACN

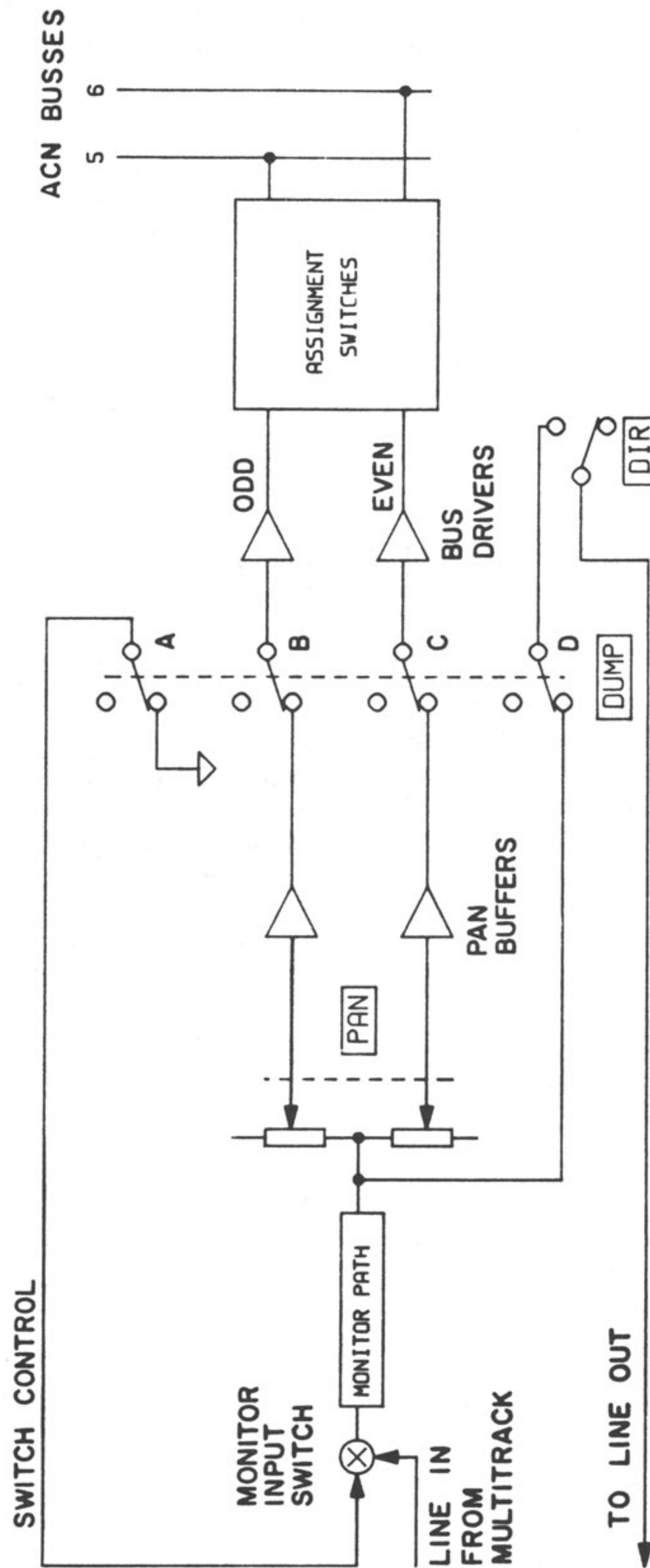


Figure 4-4. Dump Signal Flow

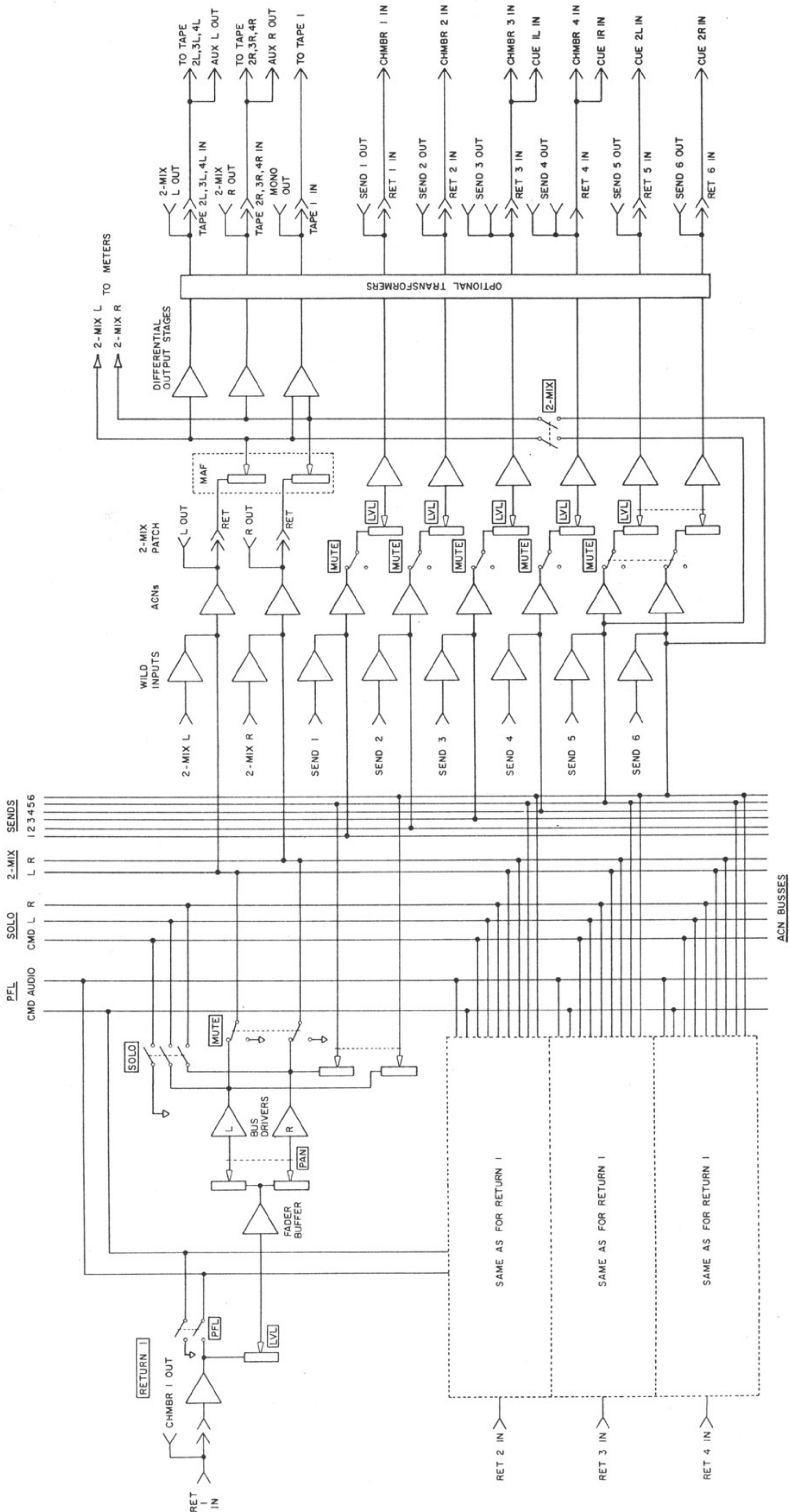


Figure 4-5. Master Module Signal Flow

Buses. Since the input section comprises four identical return circuits, only that for RET 1 (Return 1) will be described.

The Return input is taken from the RET 1 jack on the Patch Bay, and is applied to the Differential Input Stage, whose output is coupled across the LVL control into the Fader Buffer. The PFL switch is used to place a direct output from the Differential Output stage onto the PFL Bus for Pre-Fader Listening.

The output from the Fader Buffer goes to the PAN control, and the 2-Mix signals from the PAN control are passed to the Left and Right Bus Drivers. From the Bus Drivers, the signals split to three destinations, these being the SOLO and MUTE switches, and the SENDS 5-6 control.

The SENDS 5-6 control sets the level of the Return signals to the Send 5 and Send 6 Buses. The SOLO switch selects Solo mode for the Return, placing the Return signals on the Solo Buses, and sending a Solo Command to the Monitor module over the Solo Command Bus. The Return signal is passed to the 2-Mix Bus through normally closed contacts on the MUTE switch.

4.4.2 Output Section

The output section of the module is shown to the right of the Send and Cue ACN Buses in Figure 4-5. This section is further divided into two sub-sections, Tape outputs and Send outputs. Provision also is made in the output section for inserting wild inputs into the 2-Mix and Sends paths.

4.4.2.1 Tape Outputs

The Tape outputs are those used for directing signals, either 2-Mix or Mono, to the tape recorder. The signals to be recorded are applied from the 2-Mix Bus to the ACN's, whose outputs are taken to the MAF (Master Audio Fader) which sets the audio level for the mix. The 2MIX PATCH OUT and RET patches provide for effects units to be inserted between the ACN and the MAF. From the MAF, the signals are applied to the Differential Output Stages. The balanced outputs are coupled (either directly or through optional transformers) to the Patch Bay, where the 2MIX OUT and TAPE IN patches are used, if required, for inserting effects units between the output stages and the recorders. From the Patch Bay, the signals are coupled out, on Tuchel connectors, to up to three recorders.

The Mono Differential Output Stage has both Left and Right 2-Mix signals applied to its inputs, the resultant

summed Mono output being passed to Tape 1 in a manner similar to that described for the 2-Mix signals.

4.4.2.2 Send Outputs

The signal on the Send 1 Bus is coupled, through the ACN and normally closed contacts on the MUTE switch, to the Send 1 LVL control and Differential Output Stage. From this stage, the signal is coupled (either directly or through the optional transformer) to the Send 1 jack on the Patch Bay. When required, muting is accomplished by grounding the input to the Differential Output Stage.

The Send 2 circuit is exactly the same as that described for Send 1, and Sends 3 and 4 differ from Sends 1 and 2 only in that they each have an extra jack at the Patch Bay, these being used, if so required, to create an additional cue mix.

Sends 5 and 6 are a stereo pair and are dedicated to the headphone cue mix. They are essentially similar to Sends 1 through 4, but their LVL controls and MUTE switches are operated in tandem. Further, provision is made for switching the 2-Mix signals onto the Send buses by means of the 2 MIX switch.

4.4.2.3 Wild Inputs

Wild inputs may be inserted into the 2-Mix or Send paths as required. These inputs are patched into the appropriate jacks on the Patch Bay, and are coupled through Differential Input Stages into the appropriate ACNs.

4.5 MONITOR MODULE SIGNAL FLOW

The Monitor module controls the routing of Tape, Send, Auxiliary, 2-Mix and Mono signals to both studio and control room. All of these signals are applied to switching matrices, where they are selected as required. The controls and switching for Solo operations also are incorporated into the Monitor module, which is illustrated in Figure 4-6.

4.5.1 Studio Signals

The signals selected at the Studio Monitor Switching Matrix are applied to the TKB (Talkback) switches. In the Talkback mode, the TKB CMD (Talkback Command) closes the switches to these signals and passes TKB audio. However, in normal operation, the signals from the matrix are passed through the TKB switches to the Left and Right Studio ACNs. From the ACNs, the signals are fed through closed contacts on the

Studio Mute Relay to the STUDIO LEVEL control, and then on to the Studio Speaker Drivers. The outputs from these drivers are coupled through the optional transformers (if installed) and the studio power amplifiers to the studio speakers.

Studio muting and override are accomplished by means of the Studio Mute Relay. In normal operation, this relay is in the energized state, and the audio signals are coupled through its contacts to the STUDIO LEVEL control. When STUDIO MUTE is selected, the relay becomes de-energized, causing its contacts to ground the inputs to the Studio Speaker Drivers.

If Talkback is selected while the studio speakers are muted, the TKB CMD from the Communication module causes the relay to become re-energized, thus overriding the muting control.

4.5.2 Control Room Signals

Selected signals from the Control Room Switching Matrix are fed across the MONO switch and through the Left and Right Control Room ACN's to the Solo Switches. The MONO switch is used, when required, to sum the left and right signals into a single Mono signal which is carried in both Left and Right channels.

In normal operation (Solo not selected), the signals from the matrix are passed through the Solo Switches to the MON L MTR, the MON R MTR, and the Left and Right Control Room Buffers. Solo operation will be further discussed in paragraph 4.5.3.

The output from the Left Control Room Buffer is fed through normally closed contacts on the $\emptyset$ COH (phase coherence) switch to the left channel LVL control, and the Right Control Buffer output is fed directly to the right channel LVL control. The $\emptyset$ COH switch provides a check on phase coherence. When this switch is selected, the left channel signal is inverted and then summed into the right channel signal, the resultant out-of-phase component being fed only to the right channel speaker amplifier.

From the LVL controls, the signals are coupled through normally closed contacts on the MUTE switch to the DIM LEVEL control and the Dim FET Switches. In the normal mode, no Dim Control signal is received at the Dim FETs, and the direct, unattenuated audio signals from the MUTE switch are passed to the Monitor Output Amplifiers. When audio dimming is selected, either at the CONTROL ROOM switch or through a DIM CMD from the Communication module, the control signal to the Dim FETs allows only the adjusted signals from the DIM LEVEL control wipers to be

passed. Thus, when CONTROL ROOM is selected, or when any communication function is selected at the Communication module, the gain of the Monitor Output Amplifiers is reduced to some level which is preset by the DIM LVL control.

The selected outputs from the Dim FETs are applied to the Monitor Output Amplifiers, and from there to the SPEAKERS switches, either directly or through optional transformers.

4.5.3 Solo Switching

When Solo operation is selected for any of the Returns or I/O signals, a SOLO CMD (Solo Command) signal is fed over the Solo Command Bus to the control inputs on the Solo Switches. At the same time, the selected Solo signals are placed on the Left and Right Solo Buses and applied to the Left and Right Solo ACNs.

The output signals from the ACNs are adjusted to the desired level by the SOLO TRIM control, and fed through the Left and Right Solo Buffers to the signal inputs on the Solo Switches. Since these switches have a Solo Command on their control inputs at this time, the Solo signals are passed through the switches to the Left and Right Control Room Buffers, and then on to the speaker switches.

Metering signals to the MON L MTR and R MON MTR are controlled in exactly the same manner, but the signals are taken directly from the Solo ACN's without level adjustment.

4.6 COMMUNICATION MODULE

The Communication module provides communication facilities between the console operator and the studio, including a private line to the conductor. It also incorporates a Slate Oscillator for generating take markers, as well as Noise Generators and a low-distortion Oscillator for use during test and calibration. The signal flow diagram for the Communication module is given in Figure 4-7.

4.6.1 Talkback

The audio signal from the built-in Talkback Microphone is applied to the Talkback Microphone Pre-amplifier where the MIC LVL control is used to set the audio gain. From the pre-amplifier, the signal is fed to the TALKBACK, COND (conductor), COM (communication), and SLATE level controls. All of

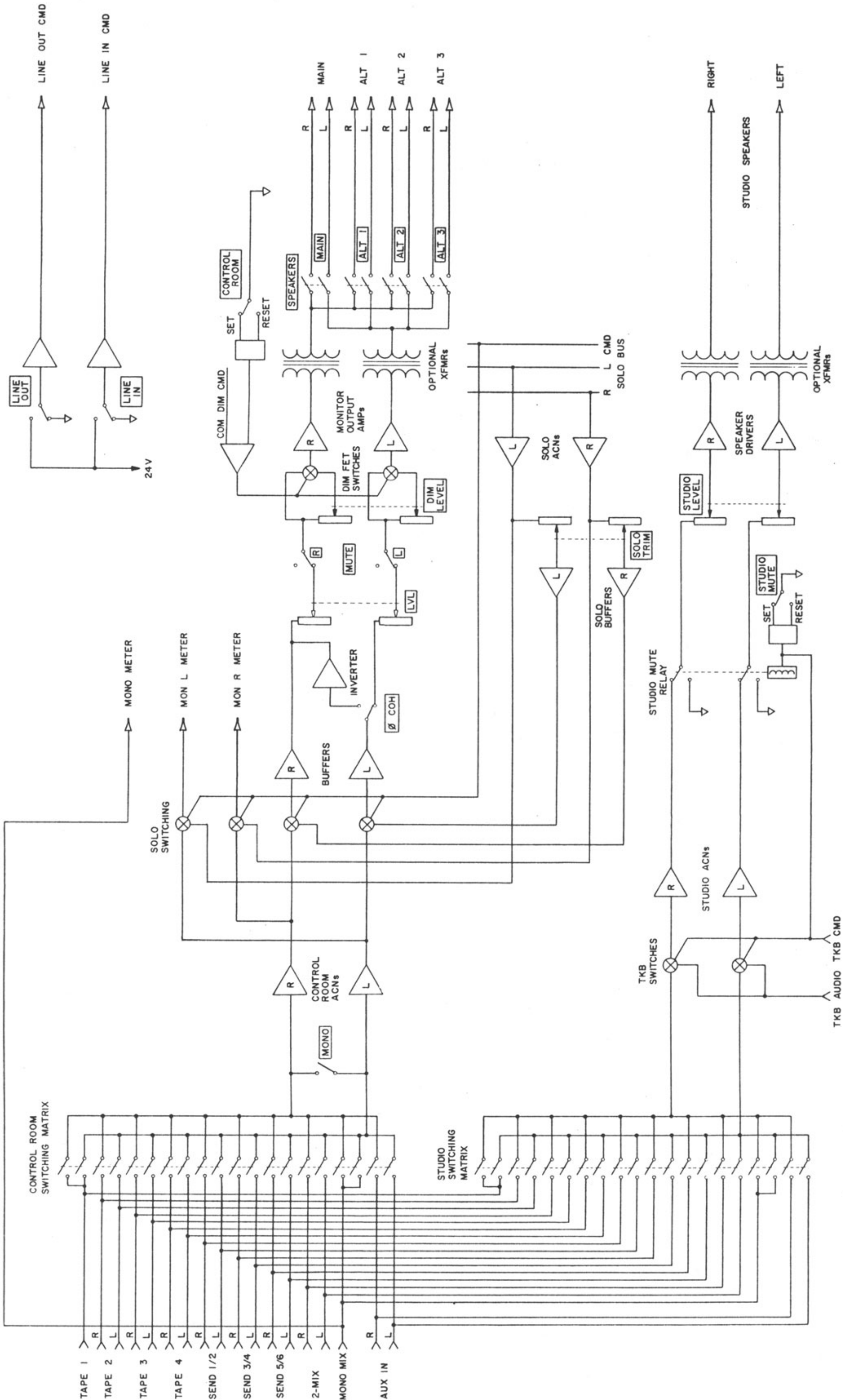


Figure 4-6. Monitor Module Signal Flow

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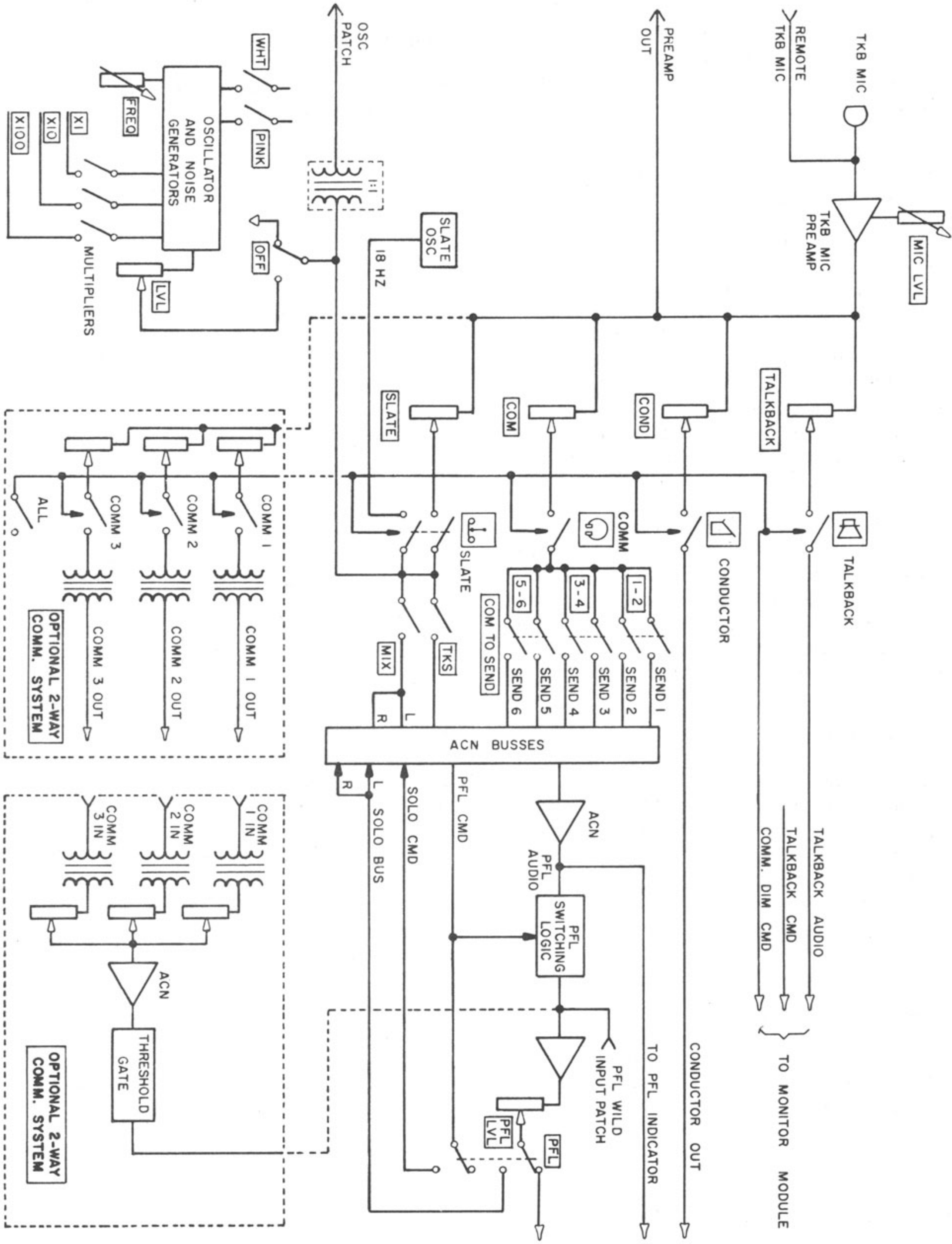


Figure 4-7. Communications Module

these screwdriver-adjustable controls are used to preset the signals to desired listening levels.

Output to the studio is taken from the TALKBACK level control. When Talkback is selected, Talkback audio is fed, together with the TBK CMD, to the Monitor module where the signal is directed to the studio speakers.

The private output to the conductor is taken off the COND level control and coupled through the Conductor switch contacts to the Conductor output.

The COM (communication) switch provides a general means of communicating with locations other than the studio or conductor, this being accomplished by placing the Talkback audio on the Send Buses.

The output from the SLATE level control is used for recording Talkback audio on tape, thereby providing a means of identifying takes. When SLATE is selected, it also becomes necessary to select either MIX (2-Mix) or TKS (tracks) so as to direct the audio to the required destination.

When TKS is selected, the TKB audio is directed to the Slate Bus, and from there to the Line Out paths on all of the I/O modules. This results in the Talkback audio being impressed upon all tracks on the Multitrack recorder. When MIX is selected, the signal is placed on the 2-Mix Bus, and directed through the Monitor module to the stereo recorder.

4.6.2 Slate Oscillator

In addition to Talkback audio, a Slate signal is fed automatically to the output when SLATE is selected. The frequency of the Slate Oscillator is so low as to be inaudible in normal recorder playback mode. However, in the rewind or fast forward mode, the much greater tape speed causes the Slate signal to become audible, making it easily recognizable as a marker.

4.6.3 Remote Switching

Remote switching facilities are available for the TALKBACK, COND, COM and SLATE modes, but these are used only with the optional Two-Way Communication System. For details of this option, refer to Section 9 of this manual.

4.6.4 Oscillator and Noise Generators

The Oscillator and Noise Generators section is provided for test and calibration purposes. The Oscillator has extremely low distortion characteristics, and its fundamental frequency is variable between the limits

20 Hz to 200 Hz. Frequency multiplications of $\times 1$, $\times 10$ and $\times 100$ are provided, so that the full range of available test frequencies is 20 Hz to 20 kHz. The Oscillator is activated by selecting any one of the multiplier switches, $\times 1$, $\times 10$, or $\times 100$.

Two Noise Generators are provided, one for white noise and one for pink noise, the desired generator being selected by means of the WHT or PINK switches.

The Oscillator and Noise Generator switches are mechanically arranged so that pressing any one of the WHT, PINK, $\times 1$, $\times 10$ or $\times 100$ switches automatically deselects any of the other switches in the group. Further, if OFF is selected, all of these switches become deselected. Thus, it is not possible to select Oscillator and Noise Generator signals simultaneously, nor is it possible to select more than one frequency multiplier switch.

4.6.5 Pre-Fader Listening

When PFL (Pre-Fader Listening) is selected for any I/O or at the Master module, the selected pre-Fader signal is placed on the PFL Bus, and a PFL command is placed on the PFL CMD Bus. Both of these signals are carried over the buses to the PFL section of the Communication module.

PFL audio is applied to the PFL ACN whose output is fed to the PFL Switching Logic. Since this stage is enabled by the PFL CMD, the audio signal is passed on to the PFL Buffer. From the buffer, the signal is coupled across the PFL LVL control and through normally closed contacts on the PFL switch to the PFL Speaker Amplifier.

The PFL switch can be used to direct the PFL audio to the Solo Buses and the PFL CMD to the Solo Command Bus. This results in the PFL audio being directed, as a Solo signal, through the Monitor module to the control room speaker amplifiers.

4.7 MODES OF OPERATION

The following paragraphs describe the basic operating modes of the console, together with other miscellaneous functions.

4.7.1 Laying Tracks

"Laying Tracks" is the term used to describe the initial Multitrack recording process. Tracks are almost always laid "dry", i.e. without effects, because, while effects can always be added during mix down, they cannot be removed once recorded.

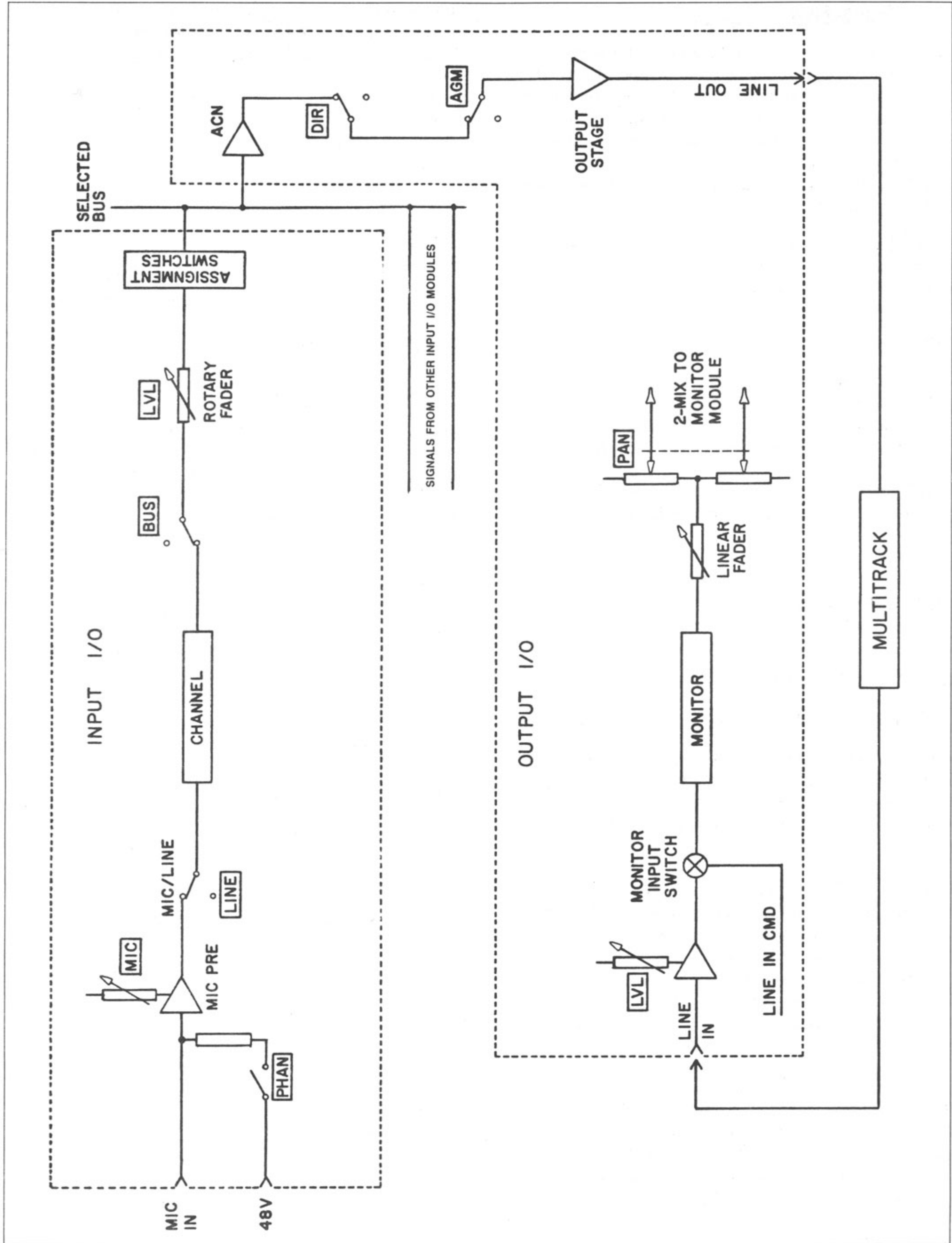


Figure 4-8. Laying Tracks

4.7.1.1 Signal Flow

Figure 4-8 gives a simplified diagram of the signal flow used when laying tracks. For most operations, the microphone signal fed into an I/O module will be assigned to a bus which directs the signal to the ACN on any other I/O module. In Figure 4-8, the module to which the microphone is connected is called the Input I/O, while the module whose ACN is used is called the Output I/O.

To establish the illustrated signal flow, switches and controls on the I/O modules and on the Monitor module must be set as detailed below:

INPUT I/O

- LINE (mic/line) switch is set to out
- BUS switch is set to out
- LVL (Rotary Fader) is set to the 0 position
- Assignment Switches are set to select the Output I/O
- MIC (Microphone level) control and GAIN switch are set to boost the microphone signal to line level

OUTPUT I/O

- DIR switch is set to out
- AGM switch is set to out

MONITOR MODULE

- CONTROL ROOM 2 MIX switch is set to in

Besides the switch settings listed above, it is necessary to verify that, for proper monitoring, all of the Input I/O Faders are up, and that the CONTROL ROOM switch on the Monitor module is illuminated (dimming is not selected).

In this mode, the microphone signal is applied to the Microphone Pre-amplifier where the PHAN switch is set to in if the microphone requires external power. The LINE (mic/line) switch is set to select microphone, and the signal is passed into the Channel path, then through closed contacts on the BUS switch and the LVL (Rotary Fader) control to the Bus Assignment Switches.

At the Assignment Switches, the destination bus is selected, and the signal is coupled over the bus to the ACN on the Output I/O. Here, the signal is passed through the ACN, closed contacts on the DIR and AGM switches, and the Differential Output stage to the Line Out path and on to the Multitrack recorder.

While the Channel path signals are being recorded on the Multitrack, the recorder feeds back the same

signals to the Line In inputs on all of the Output I/Os, thus providing the engineer with an independent mix for monitoring. The signals are fed through the Line Level Amplifiers to the Monitor paths, and the Monitor path outputs are coupled through the Monitor PAN controls to the 2-Mix bus. From the 2-Mix Bus, the combined mix is coupled through the Monitor module to the control room speakers.

Effects, filtering and equalization can be introduced into the Monitor mix during dry recording, which presents an opportunity to preview the results of these enhancements. Single channel monitoring can be established by selecting SOLO at the Input I/O.

4.7.1.2 Multiple Microphones

In many cases, to obtain the best results on tape, it is necessary to use more than one microphone for a particular instrument. This is easily accomplished by simply using the Assignment Switches to direct all of those microphone inputs to a single Output I/O. In this mode, the Fader for the assigned Output I/O adjusts the Monitor level for all of the microphone inputs.

4.7.2 Overdubbing

The purpose of Overdubbing is to add voices or instruments to existing tracks for multiple harmonies, or to re-record a small section of track to correct errors in the original recording.

This mode requires that the I/O modules for the tracks to be changed be set in the same way as for laying tracks, while those for the unchanged tracks are in Mixdown mode. In this manner, the unchanged tracks are used for cueing while the new or added material is being recorded.

4.7.3 Audio Grouping Master Mode

If a requirement arises to use a single control for adjusting the signals from several tracks during mix-down, the Audio Grouping Master (AGM) mode can be implemented. In this mode, any number of I/O modules (group I/Os) can be assigned for control by a master I/O. (In the **MXP-3036** console, the I/O module selected as the AGM master must have an active ACN, i.e. Channels 1 through 24.)

To establish the AGM mode, all of the group I/Os have their Assignment Switches set to select the bus for the master I/O. At the master I/O, the AGM switch is set to in (AGM selected), which forces the Monitor Input Switch to Line Out mode and directs the ACN output

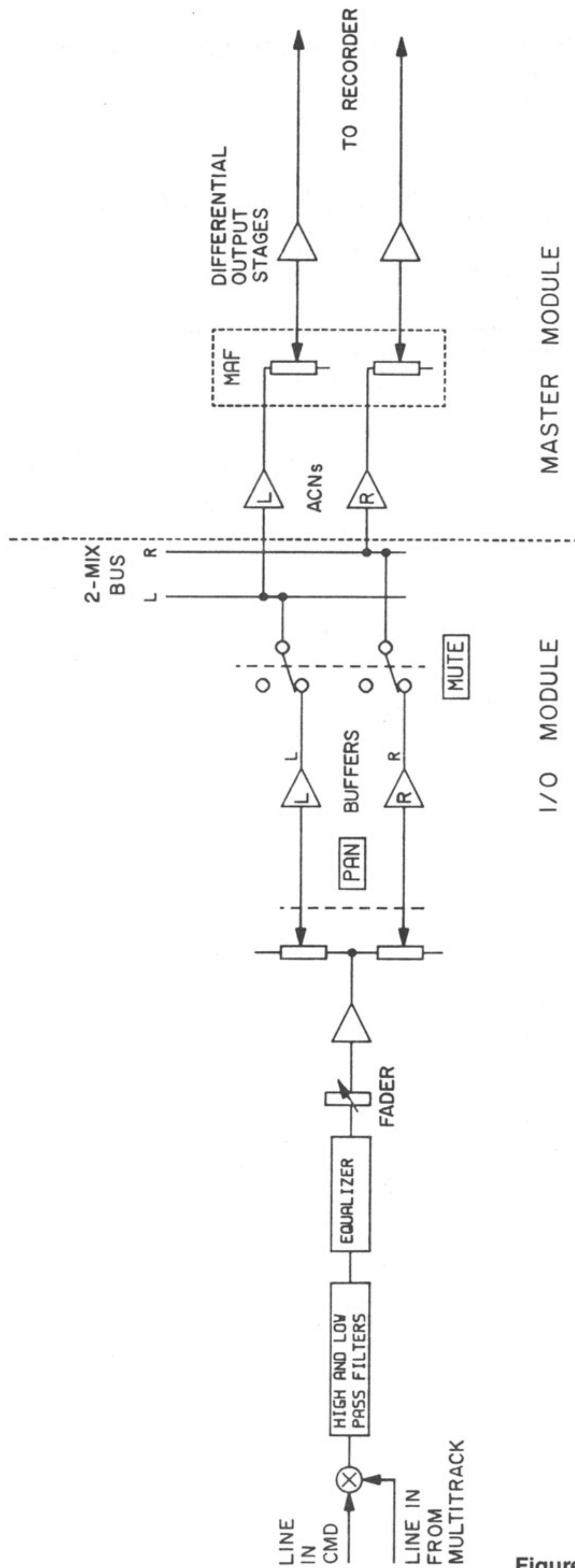


Figure 4-9. Mixdown Signal Flow

to the Monitor path. At the same time, the Monitor path output is connected to the Line Out path. (Refer to Figure 4-3.)

Under these conditions, the group I/O signals on the master bus are passed through the Monitor path in the master I/O, and are all controlled by the master I/O's Linear Fader. For Multitrack recording, the master's Monitor path output is coupled through the closed contacts on the (selected) AGM switch and out to the Multitrack. For 2-Mix recording, the Monitor path output is coupled to the 2-Mix Bus in the usual manner. It should be noted that both Multitrack and 2-Mix outputs are available simultaneously.

4.7.4 Mixing Down

Mixing down is the process used to combine all of the previously recorded tracks into a final mix. Signal flow for this operation is illustrated in Figure 4-9.

When mixing down, Line In is selected at the Monitor module, and the AGM, DUMP and MUTE switches on the I/O modules are all set to out (not selected). If additional Sends are required, the BUS switches on the appropriate I/O modules should be set to in. Left and Right panning is accomplished by means of the Monitor PAN controls on the I/O modules.

At the I/O modules, the Line In signals from the Multitrack are fed through the Monitor Input Switches to the Monitor paths. Equalizers and Filters are normally switched into these paths, and the Linear Faders set the desired levels for the individual signals. Outputs from the Monitor paths are fed across the PAN controls and through drivers to the 2-Mix Bus.

From the 2-Mix Bus, the combined stereo signal is applied to the 2-Mix ACNs in the Monitor module and passed to the MAF (Master Audio Fader) which sets the desired overall recording level. From the MAF, the mix is fed through Differential Output Stages to the stereo recorder(s).

4.8 MISCELLANEOUS OPERATIONS

The following paragraphs describe the miscellaneous operations associated with the Communication module.

4.8.1 Talkback to Studio

To talk back to the studio, the  switch on the Communication module must be pressed and held. To talk back on the private line to the conductor, the  switch must be pressed and held. The audio levels for both of these lines are preset by the TALKBACK and CONDUCTOR controls.

4.8.2 Slate, Oscillator and Noise Signals

To feed Slate, Oscillator, or Noise signals to either tracks or the 2-Mix Bus, it is first necessary to select TKS or MIX as required. Once this is done, the desired signal can be inserted as detailed below.

4.8.2.1 Slate

To implement the Slate signal, the  switch must be pressed and held for as long as the signal is to be generated. The Slate signal level is preset by the SLATE control.

4.8.2.2 Oscillator

When turning on the Oscillator signal, the frequency must first be set by means of the FREQ control. The Oscillator becomes active as soon as the appropriate multiplier switch is set to in. The Oscillator level can be varied by means of the LVL control.

To turn off the Oscillator signal, the OFF (Osc On/Off) switch must be set to in.

4.8.2.3 Noise

Noise signals are generated when the appropriate (WHT or PINK) switch is set to in. The noise level is adjustable at the LVL control.

To turn off the Noise Generator, the OFF switch must be set to in.

SECTION 7

CONSOLE APPLICATIONS

7.1 INTRODUCTION

MXP-3000 Series consoles are available in manual or automated versions, and their design provides maximum operational flexibility, allowing the user to select the exact configuration which best meets his needs. This section of the Manual describes some practical applications for the console.

Certain terms are repeatedly used throughout this section, and, in the interests of clarity, these terms are defined in paragraphs 7.1.1 through 7.1.5. More detailed definitions, together with signal flow data, are given in Section 4 of this volume.

7.1.1 Input Section

The input section of the console includes the pre-amplifiers which are used to connect signal sources into the console via the I/O modules. Where an input is derived from a microphone, a Microphone Pre-amplifier must be used. Conversely, where the input is derived from a line level source (nominally +4 dB), a Line Input pre-amplifier is used. Typical line level sources include such devices as keyboards, drum machines, guitar pre-amplifiers and effects units. Signals to the input section are usually coupled via the Tuchel connectors at the rear of the console.

The pre-amplifier outputs are available for monitoring, or for external connection, at the MIC PRE OUT jacks (Fig. 4-1, Row 1) for the appropriate channels. Where it is desired to input some external signal into the I/O module, it can be inserted by way of the appropriate MIC PRE RET jack (Fig. 4-1, Row 2).

7.1.2 ACN Assignment Switches

The I/O module Assignment Switches (Fig. 3-1, Ref. 1) and the DIR (Direct) switch (Fig. 3-1, Ref. 3) are used to route the input signals to the desired Multitrack recorder channels. For example, a signal connected into Channel 1 pre-amplifier can be recorded on Channel 15 of the Multitrack by simply selecting Assignment Switch 15 on I/O Module #1.

A special case exists when it is desired to record an input on the track for its own channel. Given the situation in which it is desired to record the Chan-

nel 1 signal onto Track 1, this could be carried out, as described above, by selecting Assignment Switch 1 on I/O module #1. However, the DIR (Direct) switch offers a better method. Selecting DIR on I/O module #1 causes the Channel 1 input to be recorded on Track 1, and, since the DIR switch bypasses the ACN circuitry, this method reduces the noise factor by about 6 dB.

The ACN (Direct) outputs are available for monitoring, or for external connection, at the LINE OUT jacks (Fig. 4-1, Row 5) for the appropriate channels.

7.1.3 Monitor Path and 2-Mix

The major function of the I/O module's Monitor path is to supply the final stereo signal to the 2-Mix Bus. The Monitor path can be fed with Line In signals from the Multitrack or with Line Out signals from its own Channel ACN. Selection between Line In and Line Out is made with the LINE IN and LINE OUT switches on the Monitor module (Fig. 3-5, Refs. 2 and 3), these switches setting the mode for the entire console. Where it is desired to set an individual Fader to a LINE IN or LINE OUT mode other than that selected at the Monitor module, this is accomplished by pressing REV (Reverse) on the desired I/O module (Fig. 3-1, Ref. 40).

Except where the CHAN (Equalizer Monitor/Channel) switch is selected, the Equalizer lies in the Monitor path. If so desired, the Equalizer can be switched from the Monitor path to the Channel path by selecting the Equalizer CHAN switch (Fig. 3-1, Ref. 13) on the I/O module. Similarly, the High-Pass and Low-Pass Filters, which normally are in the Monitor path, can be transferred to the Channel path by selecting the Filter CHAN switch (Fig. 3-1, Ref. 16).

The Monitor path signal level usually is controlled by the Linear Fader, but can be placed under Rotary Fader control (Fig. 3-1, Ref. 33) by selecting the FDR (Fader interchange) switch (Fig. 3-1, Ref. 34). The post-Fader signal is panned by the Monitor PAN control (Fig. 3-1, Ref. 32) before being directed to the 2-Mix Bus.

In a mixdown session, the 2-Mix signal is created by combining the Monitor path outputs from various I/O modules, this signal eventually being used to make the stereo master tape. The overall 2-Mix level is controlled by the MAF (Master Audio Fader).

The pre-MAF 2-Mix Left Out and Right Out signals (summing bus outputs) are available for monitoring, or for external connection, at the 2 MIX PATCH in the lower section of the Patch Bay (Fig. 4-2, Col. 5, Rows 9 and 10). Post-MAF 2-Mix Left and Right signals are available at the 2 MIX OUT jacks (Fig. 4-2, Col. 5, Rows 13 and 14). Where it is desired to input external 2-Mix signals into the console, these can be inserted via the 2 MIX PATCH L RET (Left Return) and R RET (Right Return) jacks (Fig. 4-2, Col. 5, Rows 11 and 12).

Note: The Monitor path functions described above should not be confused with the Control Room and Studio monitoring functions.

7.1.4 Channel Path

The Channel signal path in the I/O module is used to direct signals to the Multitrack recorder. Input to the Channel path can be derived from either the I/O module pre-amplifier (Microphone or Line Input) or the Line In signal from the Multitrack, selection between these signals being made by the LINE switch (Fig. 3-1, Ref. 8).

The Channel path signal level usually is controlled by the Rotary Fader (Fig. 3-1, Ref. 33), but can be placed under Linear Fader control by selecting the Fader interchange switch (Fig. 3-1, Ref. 34). When laying tracks, the Channel signal levels must be optimized, i.e. should be of a level which provides in a good signal to noise ratio without being so high as to produce transients and/or distortion.

In most operations, as tracks are being laid, the recording signals are fed back from the Multitrack to the Monitor path (see Fig. 4-8), and the Monitor path Faders then are used to set the relative levels for the mix, which can be monitored on the Control Room speakers or at the 2 MIX PATCH (Fig. 4-2, Col. 5, Rows 9 and 10).

7.1.5 Line In and Line Out Signals

The Line In signal usually is that which comes from the Multitrack recorder output. However, if a patch cord be inserted into any channel's LINE IN jack on the Patch Bay (Fig. 4-1, Row 8), then the Multitrack output becomes disconnected, and a signal can be applied via the patch cord to the LINE IN connection for that channel.

Line Out is the signal that is routed from the console to the Multitrack recorder input. A patch cord

inserted into the MULTI TRACK IN jack (Fig. 4-1, Row 6) for any channel causes the Line Out signal for that channel to become disconnected from the Multitrack input, allowing signals to be fed via the patch cord to the console. It is important to note that, where this is done, the internal Line Out signal remains available at the LINE OUT jack (Fig. 4-1, Row 5).

7.2 SENDS AND RETURNS

7.2.1 General

Many different types of outboard equipment are used in the recording and remixing process, these including such items as reverberation units, echo chambers, compressor/limiters, equalizers, etc. In the following discussion, the general term "chamber" is used to describe any of these outboard devices.

Audio signals to and from chambers usually are routed through SENDs and RETURNs, SENDs being the lines which carry signals from the console to the chamber input, and RETURNs being the lines which bring the chamber output back to the console. For most operations, chambers are permanently connected to the console in such a manner that both their inputs and outputs can be accessed via the Patch Bay. This arrangement makes it possible to patch any desired signal out to the chamber, and to direct the chamber return to any desired destination within the console.

As well as providing connections to external chambers, SENDs can be used to provide Cue mixes, these being directed out of the console to the studio headphones. Six SENDs are provided in the console. Two of these are dedicated to chamber SENDs, two are dedicated to a cue mix, and two are available for use as chamber SENDs and/or cue SENDs.

In addition to the SENDs described above, unused ACN Buses can be used to direct signals out of the console under certain conditions. This capability is more fully discussed in paragraph 7.2.9.

Four RETURNs are provided, and chamber outputs usually are brought back via these paths. In addition, chamber outputs can be returned via tielines and channel LINE IN connections, this method being available when more than four signals are being returned. Where a signal is returned through LINE IN, it is routed through the Monitor path in the selected I/O module and can be equalized, if so desired. Further, the return level can be controlled by either the channel's Linear Fader or by the Automation system (Automated Faders only).

7.2.2 SEND 1 and SEND 2

SEND 1 and SEND 2 are dedicated to chamber SENDs, and are specifically associated with RETURN 1/RETURN 2 and CHMBR (Chamber) 1/CHMBR 2. The Patch Bay access points used in dealing with these SENDs and RETURNS are shown in Figure 4-2, Cols. 1 and 2, Rows 9 through 12.

The four patch points for SEND 1/RETURN 1 are arranged in a group, the jacks being labelled SEND 1 OUT, CHMBR 1 OUT, CHMBR 1 IN and RET 1 IN. Of these connectors, SEND 1 OUT is normalized to CHMBR 1 IN, and CHMBR 1 OUT is normalized to RET 1 IN. Thus, where no patch cords are inserted into any of these jacks, the SEND 1 signal is connected through internal wiring to CHMBR 1 IN, and from there to the permanently connected external chamber. Similarly, the signal from the chamber is returned to CHMBR 1 OUT and from there, via RET 1 IN to the RETURN 1 circuit in the console.

Where it is required to direct the pre-chamber SEND 1 signal to some other point in the console, a patch cord can be connected between SEND 1 OUT and the appropriate Patch Bay jack for the desired destination. It is most important to note that a patch cord inserted into SEND 1 OUT does NOT break the normal path, and the SEND signal still will be sent to and returned from the chamber, as described above, as well as to the patch cord destination.

To direct the post-chamber SEND 1 signal to some other destination in the console, a patch cord can be connected between CHMBR 1 OUT and the desired Patch Bay jack. As with SEND 1 OUT, this patch does NOT break the normal path, and RET 1 still receives the SEND 1 signal returned from the chamber.

Patches inserted into the CHMBR 1 IN or RET 1 IN jacks break the normal signal path, and these jacks are used where it is desired either to supply some signal other than SEND 1 to the chamber or to feed the RETURN 1 circuit with some signal other than the chamber output.

Where it is required to patch some other signal to the external chamber, a patch cord can be inserted into CHMBR 1 IN, the other end of the cord being connected to the desired signal source. If this connection be made without inserting any other patch cord, the chamber output will be carried over the usual path to the RETURN 1 circuit.

When patching a signal other than SEND 1 into the chamber, it may be desired to direct the post-chamber signal to some point other than the RETURN 1 cir-

cuit. If so, this can be readily accomplished by patching CHMBR 1 OUT to the desired destination.

If it be required to feed the RETURN 1 circuit with some signal other than the post-chamber SEND 1 signal, a patch cord can be connected between the desired signal source and RET 1 IN. This patch breaks the normal path between the chamber and the RETURN 1 circuit, but leaves the chamber output available at CHMBR 1 OUT for connection to any desired destination.

The patch points for SEND 2 are set up in exactly the same manner as those for SEND 1, and all of the patching arrangements that have been described for SEND 1 are equally applicable to SEND 2.

7.2.3 SEND 5 AND SEND 6

SEND 5 and SEND 6 are dedicated to assembling a stereo mix to be fed to the Studio headphones, the cue from these SENDs being labelled CUE 2. The patches applicable to these SENDs are shown in Figure 4-2, Col. 3, Rows 13 through 16, these being labelled SEND 5 OUT, CUE 2L IN, SEND 6 OUT and CUE 2R IN.

SEND 5 OUT is normalized to the left stereo channel jack, CUE 2L IN. Similarly, SEND 6 OUT is normalized to CUE 2R IN (right stereo channel), and, when no patches are inserted into any of these jacks, SEND Buses 5 and 6 are both connected through the appropriate jacks and internal wiring to the Studio headphone amplifiers.

Where it is desired to connect the Cue signal to some other point in the console without breaking the normal Cue feed, this can be accomplished by connecting a patch cord between SEND OUT and the appropriate jack for the desired destination.

Patches inserted into the CUE IN jacks break the normal Cue signal path, and these can be used when it is desired to feed the Studio headphones with signals other than those on SENDS 5 and 6.

It should be noted that SENDs 5 and 6 can be fed with the 2-Mix signal by selecting 2 MIX (Fig. 3-4, Ref. 9) on the Master module. In this situation, the entire 2-Mix signal is summed with the SEND 5/6 signals.

7.2.4 SEND 3 AND SEND 4

As can be seen in Figure 4-2, Cols. 1 and 2, Rows 13 through 16, the patching arrangements for SENDs 3 and 4 are set up in exactly the same sequence as for



SENDS 1 and 2. In addition, the SEND 3 OUT, CUE 1L IN, SEND 4 OUT and CUE 1R IN patches (Col. 3, Rows 9 through 12), are set up in the same way as those for SENDs 5 and 6. These patching facilities allow SENDs 3 and 4 to be used as chamber SENDs in the same manner as SENDs 1 and 2, and/or as Cue SENDs in the same manner as SENDs 5 and 6.

7.2.5 Wild Inputs to SENDs

Provision is made for feeding external signals to SENDs via the WILD INPUT jacks (Fig. 4-2, Col. 4, Rows 11 through 16). It should be noted that the Wild Inputs are summed directly with the SEND Bus signals, ahead of the SEND output controls.

7.2.6 SEND Output Controls

All of the SEND output controls are located at the top of the Master module panel (Fig. 3-4, Refs. 1 through 11). SENDs 1, 2, 3 and 4 are provided with individual MUTE switches and LVL (level) controls, while stereo SENDs 5 and 6 have single controls which affect both channels. In addition, SENDs 5 and 6 are provided with a 2 MIX switch which, as has been stated elsewhere, can be used to direct the 2-Mix to the SEND 5/6 outputs on the CUE 2 Bus.

7.2.7 Return Input Controls

All of the RETURN controls are located on the lower end of the Master module panel (Fig. 3-4, Refs. 12 through 36). The panel is divided into four clearly marked sections, each section being devoted to one RETURN.

The PFL switches can be used to direct the pre-LVL, pre-PAN returns to the Meter Housing speaker (PFL MUTE on the Communications module not selected), and the SOLO switches can be used to solo the post-LVL, post-PAN signals to the Control Room monitors. When MUTE is not selected, post-LVL, post-PAN signals are fed directly to the 2-Mix Bus. Post-LVL, post-PAN signals also are connected directly to CUE 2, their levels being adjusted by means of the SEND 5/6 controls.

7.2.8 Inputs to SEND Buses

7.2.8.1 SEND 1 through SEND 4

The signals fed to SEND Buses 1, 2, 3 and 4 can be derived from either the Channel or Monitor paths in the I/O modules, and can be either pre-Fader or post-

Fader signals. Selection of the desired signal is made by the PRE and CHAN switches (Fig. 3-1, Refs. 20, 21, 24 and 25), one PRE and one CHAN switch being assigned to SENDs 1 and 2, and a similar switch pair being assigned to SENDs 3 and 4. Each SEND also has its own LVL control (Fig. 3-1, Refs. 18, 19, 22 and 23), this being used to set the individual SEND level.

Where neither PRE nor CHAN is selected, the post-Fader Monitor signal is fed to the SEND Bus pair. If it be desired to direct the pre-Fader Monitor signal to the buses, PRE should be selected. When CHAN is selected, the Channel signal is fed to the buses, selection between pre- and post-Fader signals again being made by means of the PRE switch. All of the SEND 1 through SEND 4 switching options are synopsized in Table 7-1.

It is most important to note that, regardless of PRE and CHAN switch selection, some signal always will be fed from the I/O module to the SEND Bus pair. Where it is desired to suppress this signal, the SEND LVL control must be set fully counter-clockwise.

SIGNAL TO BUSES	PRE	CHAN
Post-Fader Monitor	—	—
Pre-Fader Monitor	X	—
Post-Fader Channel	—	X
Pre-Fader Channel	X	X

X = Switch selected

Table 7-1. SEND Input Selection

7.2.8.2 SEND 5 and SEND 6 Inputs

The I/O module Channel signal is not available for feed to SENDs 5 and 6, the PRE switch (Fig. 3-1, Ref. 26) being used only to select between pre-Fader and post-Fader Monitor signals. The PAN control (Ref. 28) is used to pan the selected signal.

The 2 MIX switch (Ref. 27) is used to select between the Monitor and 2-Mix signals. Where 2 MIX is selected, the PAN control (Ref. 28) is no longer effective, panning being adjusted by the 2-Mix PAN control (Ref. 32). LVL (Ref. 29) sets the amplitude of the signal delivered to the SEND 5/SEND 6 Bus pair.

7.2.8.3 Communications to SENDs

Provision is made for directing Communications audio to any or all of the SEND Buses. This can be accomplished by selecting the appropriate switches on the COMM TO SEND section of the Communication module (Figure 3-6, Refs. 17 through 19).

7.2.9 ACN Buses as SENDs

When a Mixdown operation is performed, many of the ACN Buses are not used, and these can be employed as additional SENDs should the need arise. To convert an ACN Bus into a SEND, all that is necessary is to select BUS (Fig. 3-1, Ref. 7) and one Assignment Switch on the applicable I/O module.

For example, let it be supposed that ACN Bus #12 is not being used, and an additional SEND is needed to direct the Channel 18 and Channel 20 Monitor path (LINE IN) signals to an external chamber. This could be performed by carrying out the following procedure.

- STEP 1** Using the Tutchels at the rear of the console, connect the external chamber input and output to any two unused Tielines.
- STEP 2** Select BUS on I/O modules #18 and #20. This causes the Monitor path signals to be fed, via the Rotary Faders, to the Assignment Switches.
- STEP 3** Also on I/O modules #18 and #20, select Assignment Switch 12, directing the Channel 18 and Channel 20 Monitor path signals to ACN #12.
- STEP 4** Make sure that DIR is not selected on I/O module #12.
- STEP 5** At the Patch Bay, connect a patch cord between the Channel 12 LINE OUT and the appropriate Tieline for the chamber input.
- STEP 6** Patch the chamber output Tieline to the desired destination for the SEND.
- STEP 7** Use the Rotary Faders on I/O modules #18 and #20 to adjust the individual Channel 18 and Channel 20 signal levels.
- STEP 8** On I/O module #12, use the BUS trim control (Fig. 3-1, Ref. 5) to adjust the overall level of the combined SEND signal to the ACN Bus.

7.3 EQUALIZERS AND FILTERS

Five different Equalizer types are available for installation in MXP-3000 I/O modules. In addition to the optional plug-in Equalizers, each I/O module is fitted with High-Pass and Low-Pass Filters. All of these devices can be switched in or out independently of each other, and provide different methods of controlling the I/O module's frequency response, thereby modifying the audio sound.

7.3.1 High-Pass and Low-Pass Filters

As its name implies, the High-Pass Filter (sometimes called the Low-cut Filter) is used to pass frequencies above some given limit, suppressing frequencies below that limit. In the MXP-3000, this cutoff frequency is adjustable between the limits 20 Hz to 320 Hz, and the roll-off characteristic below the selected frequency is -12 db/octave.

The frequency limit for Low-Pass Filter (High-cut Filter) is fixed at 16 kHz. This Filter passes frequencies below 16 kHz, suppressing frequencies above that limit, the roll-off characteristic above 16 kHz also being -12 dB/octave.

The High-Pass Filter can be switched into the audio path by selecting the  switch (Fig. 3-1, Ref. 14). Similarly, the Low-Pass Filter is selected by pressing the  switch (Fig. 3-1, Ref. 15). Both filters usually lie in the Monitor path. However, if so desired, they can be switched into the Channel path by selecting CHAN (Fig. 3-1, Ref. 16).

7.3.2 Equalizers

Of the five Equalizers available for the MXP-3000, two are Four-band Wien types, one of these having a fixed-Q characteristic (MXBK-EQ31) and the other having its Q selectable between 0.5 and 1.5 (MXBK-EQ32). Two other Four-band types are available, State Variable Equalizer MXBK-EQ33 and LC Equalizer MXBK-EQ34. The final Equalizer in the series is the Ten-band Graphic Equalizer MXBK-EQ35. All of these types are more fully described in Section 1, paragraph 1.4.1 (MXBK-EQ31) and Section 9, paragraph 9.4.

Equalizer MXBK-EQ31 can be activated by selecting EQ (Fig. 3-3, Ref. 11), and all of the other Equalizer types have their activating (EQ) switches in exactly the same location.

As with the High-Pass and Low-Pass Filters, the Equalizer usually lies in the I/O module's Monitor path. Where it is desired to switch the Equalizer into the Channel path, this is done by selecting CHAN (Fig. 3-1, Ref. 13).

7.4 MULTITRACK RECORDING

The primary uses for the MXP-3000 console are Multitrack recording and mixing down. This section describes many of the key factors which must be considered when using the console for Multitrack recording.



7.4.1 Track Assignments

Before any material is recorded onto the Multitrack tape, it is desirable that certain tracks on the tape be assigned to specific instruments. Furthermore, track assignments should be similar for all of the Multitrack tapes within any given project, thus precluding the need for changing the console setup whenever tapes are changed.

No specific rules are laid down for track assignments, but common sense dictates that they should be planned in such a manner as to simplify the mixdown session. This can be greatly facilitated by recording tracks in 'groups' in which compatible instrument types are recorded together on the same track.

When considering track assignments, it must be remembered that one track must usually be striped with Time Code so as to provide proper synchronization facilities during later operations. In addition, in those consoles using tape-based Automation, two tracks must be reserved for Automation data.

7.4.2 Laying Tracks

Initial tracks should be recorded, without regard to the relative levels desired in the final mix. Tracks should be laid at levels which provide the optimum compromise between signal-to-noise ratio and distortion, this usually being the maximum level below which distortion begins to appear.

It also is frequent practice to record tracks "dry", i.e. without effects, this being done because, while effects always can be added later, they cannot be removed once recorded on an original track.

Figure 4-8 portrays the general signal flow that occurs when laying tracks, this illustration showing a single input module and a single output module. In practice, several input modules usually would be directed (via their Assignment Switches) to each output module, with each output module being connected to one track on the recorder.

In the MXP-3036, any or all of the I/O modules in the console can be used as input modules. However, since ACN Buses are available only for I/O modules #1 through #24, these generally are employed as the output modules, usually being connected to the Multitrack with I/O module #1 to Track 1, I/O module #2 to Track 2, and so on.

Should it be desired to use I/O modules #25 through #36 as output modules, this can be accomplished by

selecting the DIR (Direct) switches on those modules. However, since no ACN Buses are available for these modules, input signals cannot be directed to them from other modules by means of Assignment Switches.

A general procedure for laying tracks is given below, this procedure presupposing that all of the necessary prerequisites, such as input and output connections, proper microphone placement, track assignments, etc., have been met. It must be noted that the following is intended only to show the use of the various switches and controls on the console, it not being possible to take into account all of the variables which can exist in a "real world" recording session.

- STEP 1** Set switches and controls on all active I/O modules as follows:
 - a. All pushbutton switches out (NOT selected).
 - b. All level controls (except Rotary Fader) set fully CCW.
 - c. Rotary Fader set to 0 dB.
- STEP 2** At the Master module, select LINE IN (Fig. 3-5, Ref. 3).
- STEP 3** On the Input I/O modules, set the Assignment Switches so as to direct their signals to the desired Output I/O modules. (Where the input signal is being directed to "own channel", the DIR switch should be used).
- STEP 4** Using the appropriate inputs, set the pre-amplifier gain controls on the Input I/O modules so that all Channel Meter indications become 0 VU.
- STEP 5** Using the appropriate inputs, adjust the Rotary Faders on the Input I/O modules to set the desired recording levels.
- STEP 6** Start the Multitrack (in RECORD mode) and proceed with the recording.

7.4.3 Laying Stereo Tracks

For some operations, it may be convenient to group several inputs together and record them to two tracks on the Multitrack recorder as a stereo sub-mix. In this mode, the connections to the Input I/O modules are essentially similar to those used in laying initial tracks, differing only in that the Assignment Switches on the Input I/O modules MUST select one even-numbered Output I/O and one odd-numbered Output I/O.

As an example, let it be supposed that the inputs to I/O modules #2, #6, #7, #28, #30 and #33 are to be recorded in stereo, with #2, #7 and #30 in the left

stereo channel and #6, #28 and #33 in the right channel. Also let it be supposed that the sub-mix is to be recorded on tracks 11 and 12 on the Multitrack. To accomplish this, the following procedure should be used.

- STEP 1** Set switches and controls on I/O modules #2, #6, #7, #28, #30, #33, #11, and #12 (Input I/O modules) as follows:
- All pushbutton switches out (NOT selected).
 - All level controls (except Rotary Fader) set fully CCW.
 - Rotary Fader set to 0 dB.
- STEP 2** On each of the Input I/O modules, select Assignment Switches 11 and 12.
- STEP 3** On I/O modules #2, #7 and #30, set Bus PAN (Fig. 3-1, Ref. 2) fully CCW.
- STEP 4** On I/O modules #6, #28 and #23 set Bus PAN fully CW.
- STEP 5** Connect the desired left stereo channel inputs to Input I/O modules #2, #7 and #30, and use the MIC (Fig. 3-2, Ref. 1) and/or Rotary Fader controls to set the relative levels desired in the sub-mix.
- STEP 6** Connect the desired right stereo channel inputs to Input I/O modules #6, #28 and #33, and use the MIC and/or Rotary Fader controls to set the relative levels desired in the sub-mix.
- STEP 7** Using the Rotary Faders on I/O modules #11 and #12, set the desired recording levels.
- STEP 8** Set the Multitrack for Input monitoring and proceed with the recording. The overall mix can be monitored by setting the entire console to LINE IN mode and selecting CONTROL ROOM 2 MIX (Fig. 3-5, Ref. 20) on the Monitor module. If it is desired to monitor only the sub-mix, Monitor SOLO (Fig. 3-1, Ref. 30) can be selected on I/O #11 (odd/left stereo channel), on I/O #12 (even/right stereo channel), or on both #11 and #12 I/O modules (both stereo channels).

7.4.4 Preliminary Mix

As is shown in Figure 4-8, while the initial tracks are being recorded, the Line In signals from the Multitrack recorder are fed to the 2-Mix Bus via Monitor paths in the Output I/O modules. Thus, while tracks are be-

ing laid, a preliminary stereo mix can be set up by making appropriate adjustments to the Linear Faders for all channels. The mix can be monitored by selecting CONTROL ROOM 2 MIX (Fig. 3-5, Ref. 20) on the Monitor module.

In Automated consoles, data for this preliminary mix can be written either to the Multitrack recorder (tape-based Automation) or to the Automation Data Storage system, thus providing a starting point for the mixing down process. Operating details for Console Automated Faders system CAF-3000 are given in Sections 5 and 6 of this Manual, while those for Automation Data Storage system ADS-3000 are given in the ADS-3000 Operation and Maintenance Manual.

7.5 TRACK MANAGEMENT/MODIFICATION

After the initial tracks have been laid, the need frequently arises to modify the recording. This may necessitate recording additional tracks, re-recording tracks, or combining several tracks together so as to make room for added material. The methods of performing these operations are discussed in paragraphs 7.5.1 and 7.5.2.

7.5.1 Overdubbing

Overdubbing is the term used to describe recording new (additional) tracks, or revising previously recorded tracks. For either of these operations, the Multitrack must be set to AUTO mode for all of the tracks. In addition, for those tracks that are to be re-recorded, the Multitrack must be set to RECORD READY.

7.5.1.1 Adding New Tracks

To record a new track, the new input(s) should be directed via Input I/O module(s) to the Output I/O module corresponding to the track that is to be recorded. The general sequence of operations follows.

- STEP 1** Set the switches and controls on the I/O modules for the new track as follows:
- All pushbutton switches set to out (NOT selected).
 - All level controls (except Rotary Fader) set fully CCW.
 - Rotary Fader set to 0 dB.
- STEP 2** At the Master module, select LINE IN.
- STEP 3** On the Input I/O modules for the new track, set the Assignment Switches to direct the signals to the Output I/O for the new track.

- STEP 4** Using the appropriate input for the new track, set the Input I/O module pre-amplifier controls and Rotary Faders so as to set the desired recording level.
- STEP 5** At the Multitrack, set all of the channels into AUTO mode. In addition, set the channel for the new track into RECORD READY.
- STEP 6** Set up a cue (headphone) mix by directing the previously recorded tracks to SEND 5 and SEND 6. For Control Room monitoring, select CONTROL ROOM 2 MIX on the Monitor module.
- STEP 7** Start the Multitrack in PLAY mode, then, at the appropriate time, enter RECORD mode to lay the new track.

7.5.1.2 Re-recording Tracks

To modify a previously recorded track in its entirety, the basic sequence remains essentially the same as that given above for recording a new track, differing only in that all references to "new track" should be changed to "track being re-recorded".

Where only a segment of a previously recorded track is to be re-recorded, the sequence remains similar to that for reworking the entire track, but with STEP 4 and STEP 7 changed as follows:

- STEP 4** Using the appropriate input for the new track, set the Input I/O module pre-amplifier controls and Rotary Faders so that the recording level becomes equal to the level on the original track.
- STEP 7** Start the Multitrack in PLAY mode, then, at the point where re-recording is to begin, press RECORD. At the point where re-recording ends, press PLAY to set all Multitrack channels into playback mode.

7.5.2 Bouncing Tracks

Where it is desired to combine some of the existing tracks so as to make space for the new inputs. The DUMP mode provides a method of combining tracks, this operation commonly being known as "bouncing tracks".

7.5.2.1 DUMP Operation

The DUMP operation can be used to take the material from any number of previously recorded tracks, and re-record this material as a stereo sub-mix on an odd/even pair of blank tracks. The sub-mix is created

in the I/O modules for those tracks which are going to be bounced, and is directed to the odd/even bus pair by means of Assignment Switches.

In the general DUMP procedure given below, the active I/O modules are referred to as the sub-mix I/O modules (those in which the sub-mix is being created) and the recording I/O modules (those appropriate to the tracks for the odd/even pair).

- STEP 1** Set switches and controls on all active I/O modules as follows:
- All pushbutton switches out (NOT selected).
 - All level controls (except Rotary Fader) set fully CCW.
 - Rotary Fader set to 0 dB.
- STEP 2** At the Master module, select LINE IN (Fig. 3-5, Ref. 3).
- STEP 3** Also on the sub-mix modules, set the Assignment Switches to select the appropriate odd/even bus pair for the desired recording I/O modules.
- STEP 4** Set the Multitrack so that all tracks are in SYNC mode, and cue the machine to the start of the tracks.
- STEP 5** Select CONTROL ROOM 2 MIX on the Monitor module.
- STEP 6** Roll the tape. While the tape is running, monitor the Control Room speakers and adjust the Monitor PAN (Fig. 3-1, Ref. 32) and Linear Fader on each of the sub-mix I/O modules to achieve the desired mix. If so desired, individual channels can be monitored by selecting 2-Mix SOLO on the appropriate sub-mix I/O module (Fig. 3-1, Ref. 30).
- STEP 7** When the desired mix is achieved, stop the Multitrack and re-cue to the start of the tracks.
- STEP 8** Select DUMP (Fig. 3-1, Ref. 4) on all of the sub-mix I/O modules.
- STEP 9** On the odd recording I/O module, set the Monitor PAN control fully counter-clockwise.
- STEP 10** On the even recording I/O module, set the Monitor PAN control fully clockwise.
- STEP 11** On both recording I/O modules, select REV (Fig. 3-1, Ref. 40) to monitor LINE OUT.

- STEP 12** Roll the tape (all tracks in SYNC mode), and adjust the Rotary Faders on both the odd and even recording I/O modules to set the desired recording levels for both tracks.
- STEP 13** On all of the sub-mix I/O modules, select 2-Mix MUTE (Fig. 3-1, Ref. 31).
- STEP 14** Stop the Multitrack and re-cue to the start of the tracks.
- STEP 15** Set the Multitrack so that the selected odd/even tracks are in RECORD mode and all other tracks are in SYNC mode.
- STEP 16** Roll the tape, allowing it to play through the entire length of the tracks.

When the DUMP is completed, the sub-mix will have been recorded to the tracks for selected odd/even pair, with the left stereo channel on the odd track and the right stereo channel on the even track.

7.6 MIXING DOWN

Once all of the basic tracks have been laid down, mixing down can be carried out, this being the process of creating the final stereo mix from the Multitrack recording. In general, the mixdown is carried out by playing the Multitrack recording back through the console and setting the Equalizers, Filters and Linear Faders to obtain the results desired in the final mix.

Before carrying out the mixdown, several factors must be considered, these including monitoring methods and the possible need for adding effects or adding inputs. These factors are briefly discussed in the following paragraphs.

7.6.1 Monitoring Considerations

The eventual purpose of the mixdown is to create a stereo recording which will provide acceptable results when played back on either stereo or monophonic equipment. Because of this, the mixing engineer must always listen to the mono mix as well as the stereo mix.

When mixing down, the stereo mix is directed to the Control Room speakers by selecting CONTROL ROOM 2 MIX (Fig. 3-5, Ref. 20). For normal stereo monitoring, Ø COH, MONO, MUTE L and MUTE R (Fig. 3-5, Refs. 28, 29, 30 and 31 respectively) are not selected.

Where it is desired to listen to only one stereo channel, the other channel can be muted by selecting the appropriate MUTE L or MUTE R switch.

For stereo monitoring, the Ø COH switch provides a method of listening to the out-of-phase components in the mix. When this switch is selected, the left stereo signal is inverted and summed with the right stereo signal, the resultant out-of-phase components being fed only to the right channel speaker. When this operation is carried out, only those out-of-phase components that have been introduced deliberately (by chambers, reverberation units etc.) should be audible, and if some particular instrument (or group of instruments) is heard at a substantial level, it is indicative of incorrect phasing. This usually can be rectified by selecting the Ø switch (Fig. 3-1, Ref. 12) on the appropriate I/O module or by correcting the appropriate microphone connections and re-recording.

For mono sum monitoring, the MONO switch (Fig. 3-5, Ref. 29) must be selected, this causing the mono signal to be heard in both the left and right Control Room speakers. It should be noted that selecting Ø COH while monitoring the mono sum causes complete cancellation of the signal.

7.6.2 Additional Inputs to the Mix

In situations where the number of signals to be mixed exceeds the number of available inputs on the console, i.e. where two or more Multitrack machines are locked together, it is possible to use the Channel paths (which generally direct signals to the Multitrack for recording) as additional inputs to the 2-Mix. The following procedure can be used.

- STEP 1** Designate an odd/even pair of I/O modules whose LINE OUT signals are not being used. These will be called the Output I/O modules.
- STEP 2** Designate as many I/O modules as are required for the additional inputs. These will be called the Input I/O modules.
- STEP 3** At the Patch Bay, connect the additional inputs into the MIC PRE RET jacks (Fig. 4-1, Row 2) for the Input I/O modules.
- STEP 4** On the Input I/O modules, set the Assignment Switches to select the odd/even Output I/O modules.
- STEP 5** On those Input I/O modules whose signals are to be directed to the Left 2-Mix Bus, set the Bus PAN control (Fig. 3-1, Ref. 2) fully CCW.
- STEP 6** On those Input I/O modules whose signals are to be directed to the Right 2-Mix Bus, set the Bus PAN control fully CW.

I/O MODULE	CONTROL SETTINGS			
	SEND 1 LVL	SEND 1/2 PRE	SEND 4 LVL	SEND 3/4 PRE
#5	−3	Selected	Fully CCW	X
#7	0	Not Selected	Fully CCW	X
#10	−6	Selected	Fully CCW	X
#6	Fully CCW	X	−3	Not Selected
#11	Fully CCW	X	−6	Selected

X = Doesn't Matter

Table 7-2. SEND Control Settings

STEP 7 Patch LINE OUT (Fig. 4-1, Row 5) for the odd Output I/O module to the 2 MIX L WILD INPUT (Fig 4-2, Col. 4, Row 9), and patch LINE OUT for the even Output I/O to the 2 MIX R WILD INPUT (Fig 4-2, Col. 4, Row 9).

Using the setup given above, signal levels into the mix can be controlled by the Rotary Faders on the Input I/O modules. Where it is desired to modify the 2-Mix balance, individual inputs can be panned by means of the Bus PAN controls on the appropriate Input I/O modules.

7.6.3 Adding Effects

External chamber effects usually are added during the mixdown process. For most operations, several audio signals are directed to and from a single chamber, but provision also is made for routing individual signals to external effects units.

7.6.3.1 Effects on Multiple Signals

As has been stated previously, SENDs and RETURNs are used when it is desired to pass signals through external chambers, and these signal paths are fully described in paragraphs 7.2 et seq. The following example is provided as an application of the material given in those paragraphs.

Let it be supposed that signals from Channels 5, 7 and 10 were to be sent to Chamber 1 and signals from Channels 6 and 11 were to be sent to Chamber 4 in accordance with the following details:

Channel 5 pre-Fader signal to Chamber 1 at −3 dB
Channel 7 post-Fader signal to Chamber 1 at 0 dB
Channel 10 pre-Fader signal to Chamber 1 at −6 dB

Channel 6 post-Fader signal to Chamber 4 at −3 dB
Channel 11 pre-Fader signal to Chamber 4 at −6 dB

To accomplish the above, the SEND controls on the appropriate I/O modules would have to be set as shown in Table 7-2. These settings would cause the signals to be directed, at the desired levels, to the appropriate chambers. Signals back from the chambers then would be automatically routed via the RETURN circuits to the 2-Mix Bus.

7.6.3.2 Effects on Individual Signals

Two patch points are provided for use in passing individual channel signals through external units, and these allow effects to be added to either the pre-Equalizer or the post-Equalizer signal.

To add an effect to the pre-Equalizer signal for any channel, the MULTI TRACK RET jack (Fig. 4-1, Row 7) for that channel must be patched to the chamber input, and the return must be patched back to the LINE IN jack (Fig. 4-1, Row 8) for the same channel.

Where it is desired to add the effect to the post-Equalizer signal, the signal must be patched from the EQ OUT jack (Fig. 4-1, Row 3) to the chamber input, and returned to the FDR IN jack (Fig. 4-1, Row 4).

Patching arrangements also are provided for the entire 2-Mix signal. These are not usually used for adding effects, but are available should it be necessary to pass the 2-Mix signal through devices such as compressors, limiters, etc. Where they are used, the signals to the device input must be patched from the 2 MIX PATCH OUT jacks (Fig. 4-2, Col. 5, Rows 9 and 10), and the device output must be patched back to the 2 MIX PATCH RET jacks (Fig. 4-2, Col. 5, Rows 11 and 12).

7.6.4 Mixdown Procedure

Because of the many different possible signal routing combinations that are available in the **MXP-3000**, it is not feasible to provide a cut and dried mixdown procedure. The following is offered only as a general guide, and should be followed only insofar as it proves to be useful in any given mixdown situation.

- STEP 1** On all of the I/O modules, set all pushbutton switches to NOT selected except for:
- Assignment Switches where ACN Buses are used as SENDs (paragraph 7.2.9) or for adding inputs to the mix (paragraph 7.6.2).
 - BUS switches used for creating SENDs from ACN Buses (paragraph 7.2.9).
 - Ø switches used to invert the audio phase (paragraph 7.6.1).
 - PRE switches used to direct pre-Fader Monitor signals to SENDs.
- STEP 2** Set all LVL controls on the I/O modules fully counter-clockwise except for:
- SEND LVLs where SENDs are used.
 - BUS Trim controls where ACN Buses are used as SENDs (paragraph 7.2.9).

- Rotary Faders where ACN Buses are used as SENDs (paragraph 7.2.9) or for adding inputs to the mix (paragraph 7.6.2).

STEP 3 On the Monitor module, select the CONTROL ROOM 2 MIX and LINE IN switches.

STEP 4 Set the Multitrack to REPRO mode and start the machine. While the tape is rolling, adjust the Linear Faders, High-Pass Filters, Equalizers and SEND levels on all of the I/O modules so as to obtain the desired results. Where SENDs are used, adjust their RETURNS at the Master module.

The final step in this general procedure rarely can be performed on all of the I/O modules simultaneously. More usually, I/O modules first are soloed and adjusted individually, then, after several modules have been set up, they are readjusted as a group. In this manner, all of the I/O module outputs are gradually brought together until the entire console has been adjusted to build up a satisfactory mix from the Multitrack inputs.

