Neve

Neve
Electronics
International
Limited

A Siemens Company

V Series

Operator Handbook

Neve Electronics International Ltd.
Melbourn, Royston,
Hertfordshire SG8 6AU England
Telephone: Royston (0763) 60776
Cables: Neve Cambridge

Rupert Neve Inc.
Berkshire Industrial Park,
Bethel,Connecticut 06801, U.S.A
Telephone: (203) 744-6230
Fax: (203) 792-7863
Telex: 969638

Rupert Neve Inc.
P.O. Box 40108, Nashville,
Tennessee 37204, U.S.A
Telephone: (615) 385-2727
Telex: 786569

Rupert Neve Inc.
7553 Sunset Boulevard, Hollywood,
California 90046, U.S.A
Telephone: (213) 874-8124
Fax: (213) 874-1406

Neve

Neve
Electronics
International
Limited

A Siemens Company

V Series

Operator Handbook

V Series Operator Handbook

CONTENTS

1. SYSTEM INFORMATION

1.1 Introduction

This handbook has three parts, system, I/O module, and monitor section information. System information provides an overview of the V Series console and includes a block diagram (Figure 1.1) showing the main functional blocks in the circuit. Next to each functional block in the diagram is the page number of the block description. Additional block diagrams show the various console configurations available to the operator.

Throughout the handbook, single key or button presses are shown upper case in <> brackets, e.g. **<OFF>**.

1.2 Modes of Operation

The console design is of the 'in-line' monitor type, each I/O module containing all the facilities for multitrack recording, overdubbing and mixdown. Two distinct signal paths are processed by each module. The channel signal path handles input sources during recording, and tape playback during mixdown. The monitor path is used primarily for monitoring multitrack sends and playback and for effects sends or returns during mixdown. The monitoring path can also provide additional tape replay inputs for very large mixdown operations.

Versatile switching allows the various I/O module sections to be configured between the two paths, so that the operator can arrange each path to give the simplest and most efficient control. Figures 1.2 to 1.10 show, in block diagram form, the four modes of operation.

Input selection and output routeing for the I/O module paths is determined by the console master status controls. The controls offer the unique feature of split console operation, where the console is split into two halves to the left and right of the master control panel. Configuring the console in this manner offers many useful new facilities, including the ability to use half of the desk for separate monitor operation. The resulting signal path flexibility allows the operator to concentrate on the creative aspects of the session rather than on the inhibitions imposed by a restrictive system.

A universal bantam patchfield facilitates insertion and cross-patching of all signal paths. The patchfield is conveniently placed for rapid visual assessment and mounted vertically to minimize the ingress of dust and debris.

1.3 V Series System Configuration

Multitrack Recording

This configuration is shown in Fig 1.2. Input mic or line signals are fed via the channel path and large fader to the multitrack routeing matrix. The inputs can be processed using the high and low pass filters, equalizer, and dynamics units. The channel path can be routed directly to the track send of the same number using **<DIR>**, or provide an audio subgroup by pressing the **<GRP>** button, which allows overall dynamic equalization and level processing to be achieved on a mix of inputs before signals are recorded on tape. The track level control provides simple level adjustment for a track send.

Simultaneous monitoring of either the multitrack sends or returns is possible with switching performed on a master basis, controlled from the centre section. The equalizer and dynamics may be configured in the monitor path from the switch matrix next to the small fader on the 1/O module, and in a similar way the auxiliaries may be configured in the monitor path prefade, precut for cue sends to the studio and postfade for monitor reverb sends.

The small fader is usually configured for monitoring but this can be reversed individually using **<SWAP>** next to the small fader or on a master basis using **<FADER SWAP>** in the centre section. The monitor signal can then be panned and routed via the 4-track routeing matrix to one of the two stereo main outputs.

Mixdown

This configuration is shown in Fig 1.3. In mixdown the configuration of the 1/O module is effectively the opposite of the multitrack recording situation. The channel path feeds the 4-track routeing matrix via the large fader and accepts primary multitrack return mix inputs with full in-path processing and auxiliary sends. The monitor path has three distinct purposes:

- it accepts secondary mix inputs with processing available if not used in the channel path. Access to the 2-track main outputs is provided on the multitrack routeing matrix.

- In a similar way effects returns can be accepted by the monitor path.

- Conversely the path can be used for channel post-fade effects sends by pressing the **<CHOP>** button. The monitor path fader controls the send level to any one of the 48 groups available from the routeing matrix.

Track Bouncing

This configuration is shown in Fig 1.4. Patch free track bouncing can easily be achieved on the console using the **<BNCE>** switch. The I/O module is configured so that the multitrack return feeds the monitor path but is routed back to the multitrack routeing matrix. By simply selecting **<BNCE>** and making a routeing selection on each track return to be bounced, the whole operation can be quickly achieved. Equalization and dynamics can be configured in the monitor path to allow processing while bouncing.

Overdubbing

The V-Series has a sophisticated monitoring and cue send system for tracklaying and overdubbing which allows the engineer total monitoring freedom in the control room whilst maintaining the correct cue sends to the studio.

The system works with interactive controls which cover the various monitoring requirements. To explain the system six diagrams are used which do not cover every situation but should give a good understanding of the system operation.

Five master controls operate the system with additional **<OD>** buttons on each I/O module. Master monitor status is controlled by three interlocking buttons **<OP> <PB> <OD>** and in addition there are **<MIXED CUE>** and **<CUES POST EQ>** options.

<OP> <PB> and **<OD>** switch control room monitoring on a master basis from multitrack send **<OP>**, multitrack return **<PB>**, and overdub **<OD>** where multitrack send is selected on individual **<OD>** switched tracks and multitrack return is selected on the backing tracks. The individual **<OD>** buttons affect cues being sent to the studio as well as switching control room monitoring in the master **<OD>** monitoring mode. The multitrack send of any track switched into **<OD>** is applied to the cues. The backing track cues (no **<OD>** selected) receive multitrack return.

The cue sends on **<OD>** tracks can also be switched to **<MIXED CUE>**, a mix of multitrack send and return, which can be varied on an individual basis with a trimmer on each I/O module. The backing track cues can be assigned to a 'follow monitor' condition using **<CUES POST EQ>**, when any monitor equalization and dynamics are also heard in the studio. The facility automatically cancels should control room monitoring be switched to **<OP>** because the cues still require **<PB>**.

<OP>

This configuration is shown in Fig 1.5. The control room monitors multitrack sends, cues monitor multitrack returns.

<PB>

This configuration is shown in Fig 1.6. Control room and cues monitor multitrack return.

<PB> and **<OD>**

This configuration is shown in Fig 1.7. Control room monitors multitrack return. Cues monitors multitrack return on backing track and multitrack send on selected overdub tracks.

<OD> and **<OD>**

This configuration is shown in Fig 1.8. Control room and cues monitor multitrack return on backing track and multitrack send on selected overdub tracks.

<OD> and **<OD>** and **<MIXED CUE>**

This configuration is shown in Fig 1.9. Control room monitors multitrack return on backing tracks and multitrack send on selected overdub tracks. Cues monitor multitrack return on backing tracks and mix of multitrack send/return on overdub tracks CUES.

<PB> or **<OD>** and **<POST EQ>**

This configuration is shown in Fig 1.10. The backing track in overdub or the complete mix in playback (no individual **<OD>** track selected) can feed the cues complete with monitor equalization and dynamics. The facility automatically cancels if **<OP>** is selected as the cues are still required to send multitrack return to the studio.

This diagram is not available at the time of issue

Figure 1.1

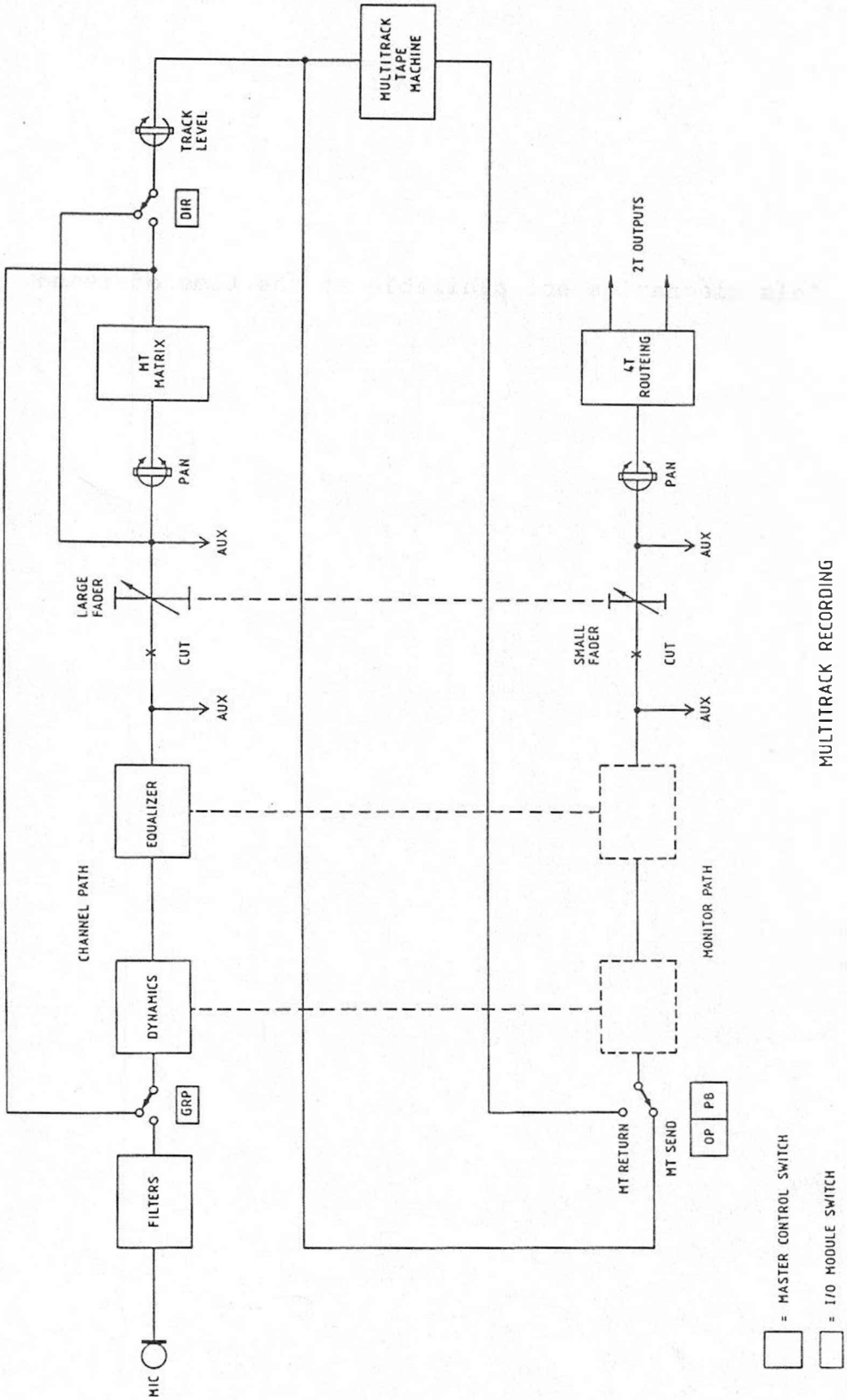

MULTITRACK TAPE MACHINE
TRACK LEVEL
DIR
MT MATRIX
PAN
AUX
LARGE FADER
CUT
AUX
EQUALIZER
CHANNEL PATH
DYNAMICS
GRP
FILTERS
MIC
2T OUTPUTS
4T ROUTEING
PAN
AUX
SMALL FADER
CUT
AUX
MONITOR PATH
MT RETURN
MT SEND
OP
PB
MULTITRACK RECORDING
= MASTER CONTROL SWITCH
= I/O MODULE SWITCH

Figure 1.2

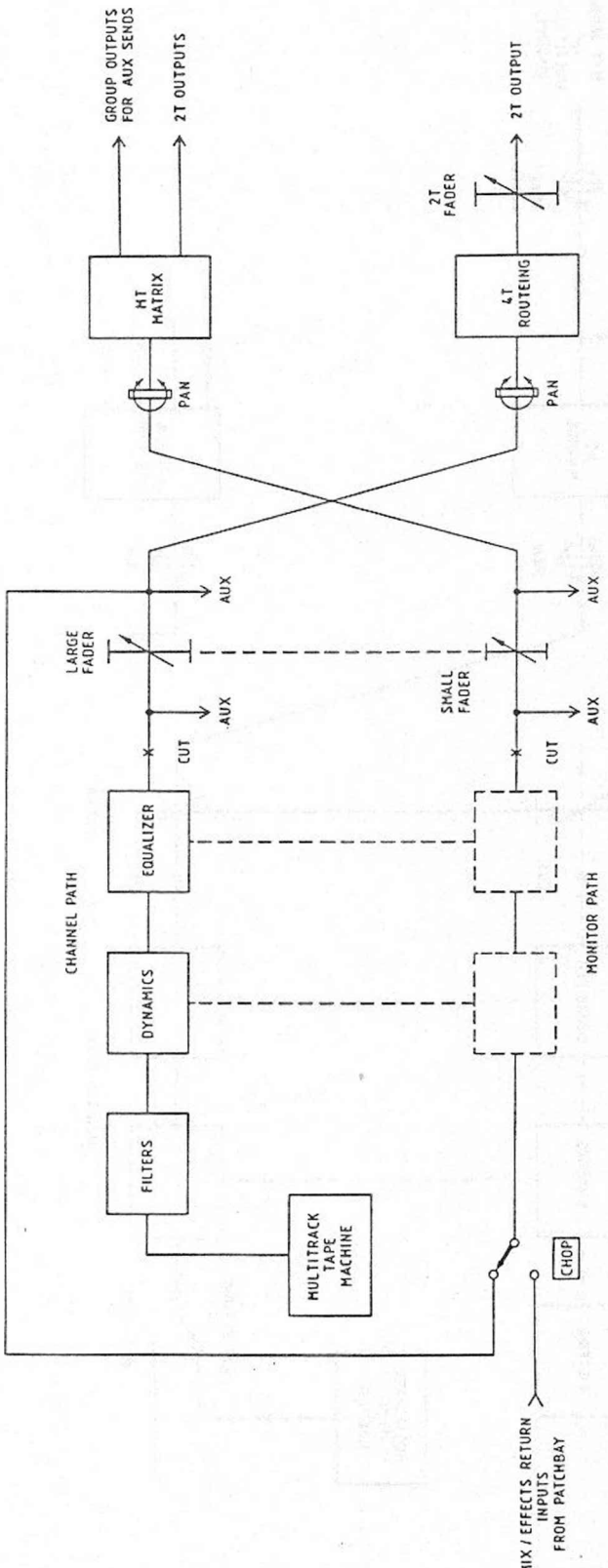
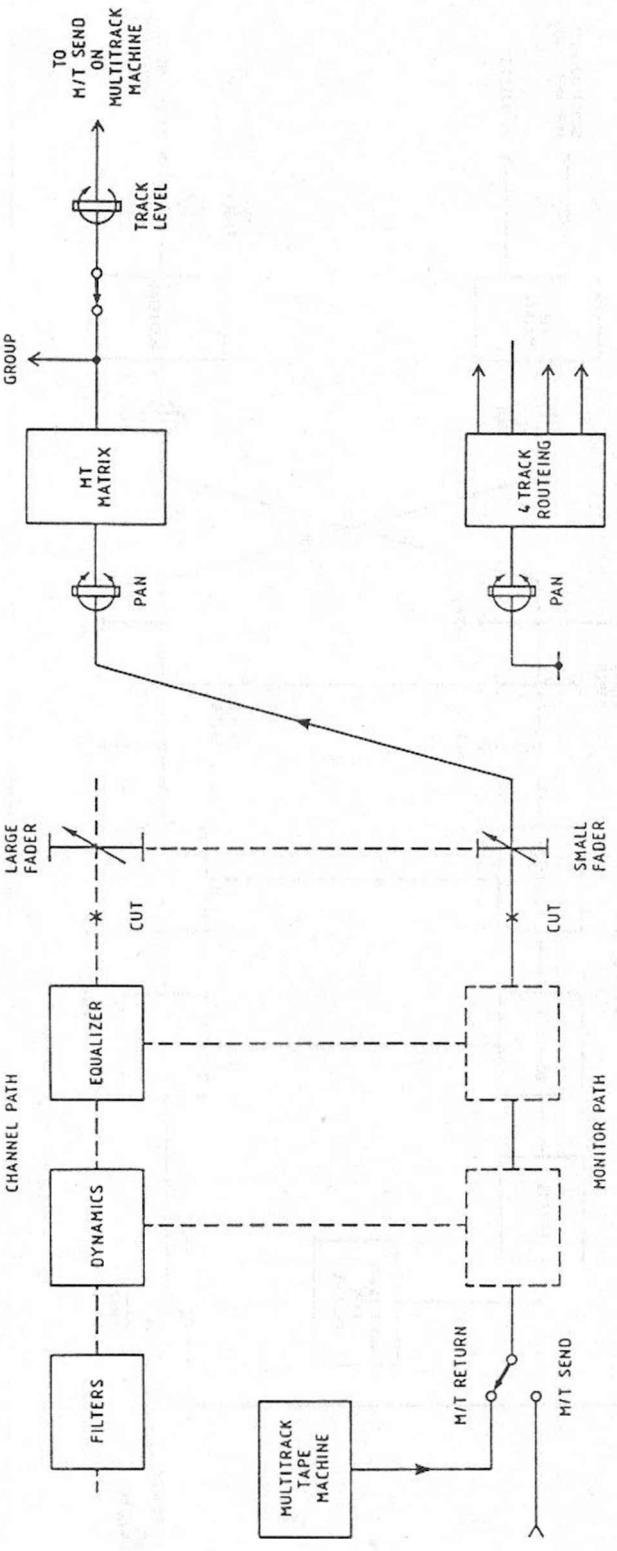

GROUP OUTPUTS FOR AUX SENDS
2T OUTPUTS
2T OUTPUT
2T FADER
MT MATRIX
4T ROUTEING
PAN
PAN
AUX
AUX
LARGE FADER
SMALL FADER
AUX
AUX
CUT
CUT
EQUALIZER
DYNAMICS
FILTERS
CHANNEL PATH
MONITOR PATH
MULTITRACK TAPE MACHINE
CHOP
MIX / EFFECTS RETURN INPUTS FROM PATCHBAY
= I/O MODULE SWITCH
MIXDOWN

Figure 1.3



TRACK BOUNCING

Figure 1.4

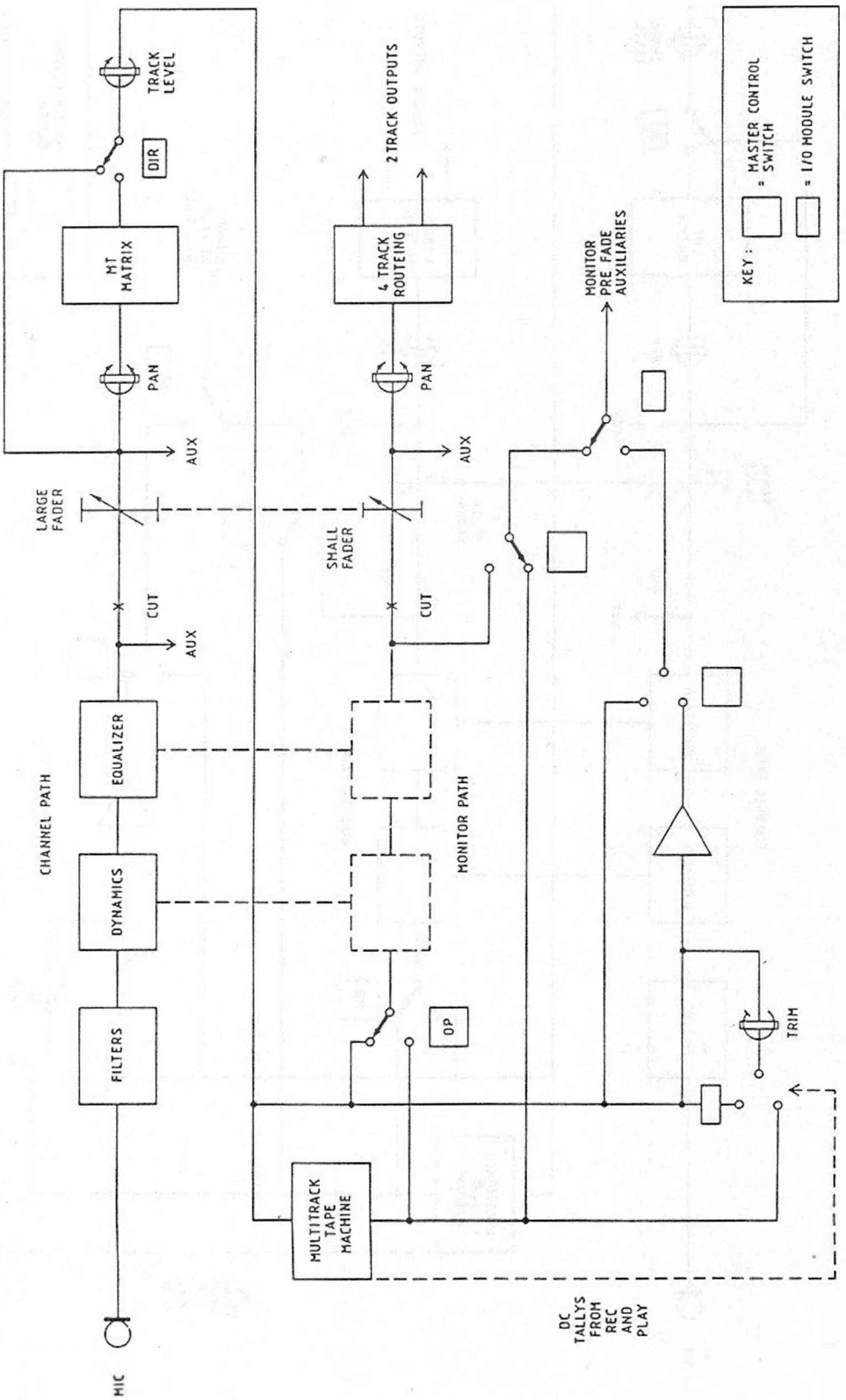

TRACK LEVEL
DIR
MT MATRIX
PAN
AUX
LARGE FADER
CUT
AUX
EQUALIZER
DYNAMICS
FILTERS
MIC
CHANNEL PATH
2 TRACK OUTPUTS
4 TRACK ROUTEING
PAN
AUX
SMALL FADER
CUT
MONITOR PATH
OP
MONITOR PRE FADE AUXILIARIES
TRIM
MULTITRACK TAPE MACHINE
DC TALLYS FROM REC AND PLAY
KEY:
= MASTER CONTROL SWITCH
= I/O MODULE SWITCH

Figure 1.5

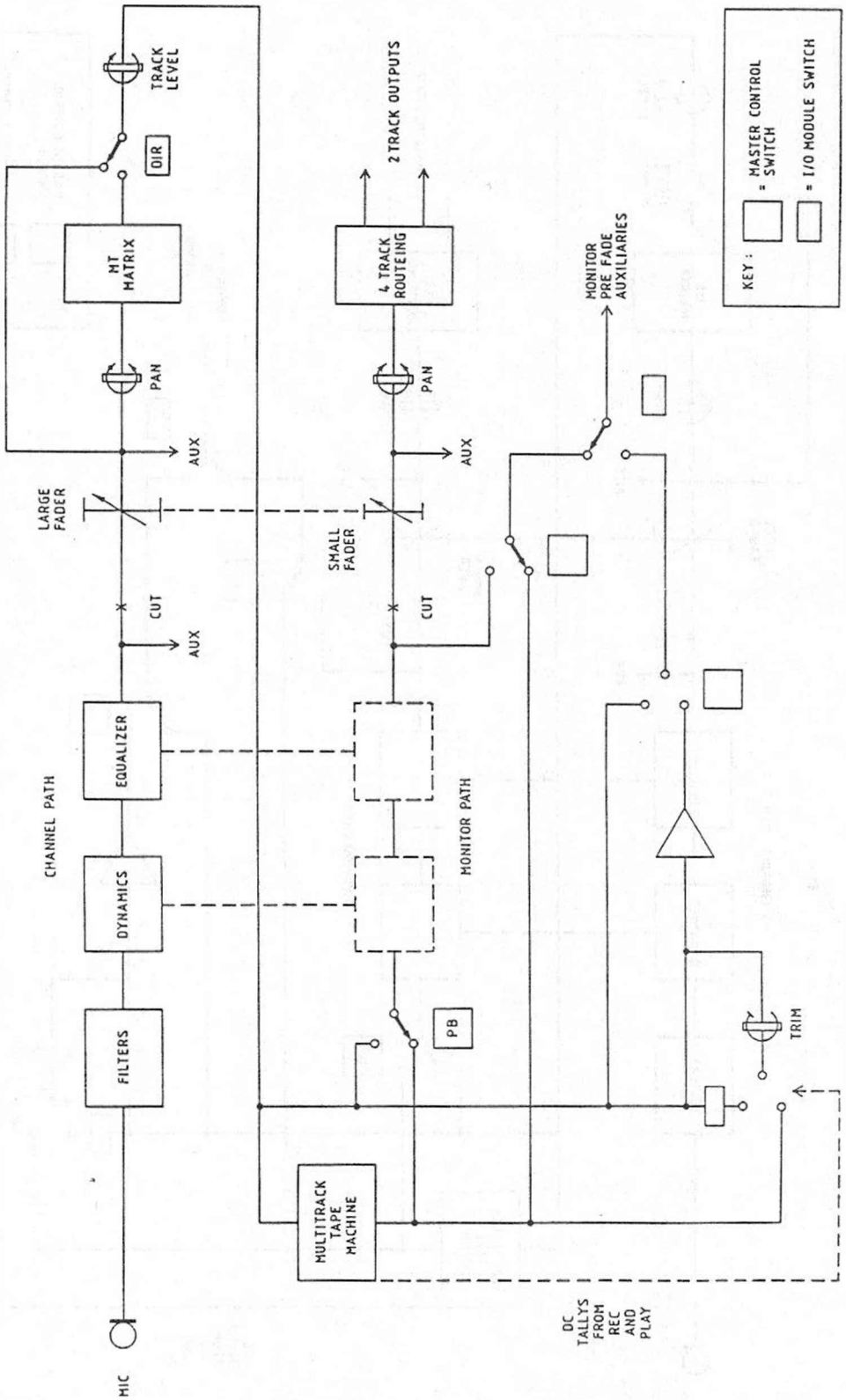

TRACK LEVEL
DIR
MT MATRIX
PAN
AUX
LARGE FADER
CUT
AUX
EQUALIZER
DYNAMICS
FILTERS
CHANNEL PATH
MIC
2 TRACK OUTPUTS
4 TRACK ROUTEING
PAN
AUX
SMALL FADER
CUT
MONITOR PATH
PB
MULTITRACK TAPE MACHINE
MONITOR PRE FADE AUXILIARIES
TRIM
DC TALLYS FROM REC AND PLAY
KEY :
= MASTER CONTROL SWITCH
= I/O MODULE SWITCH

Figure 1.6

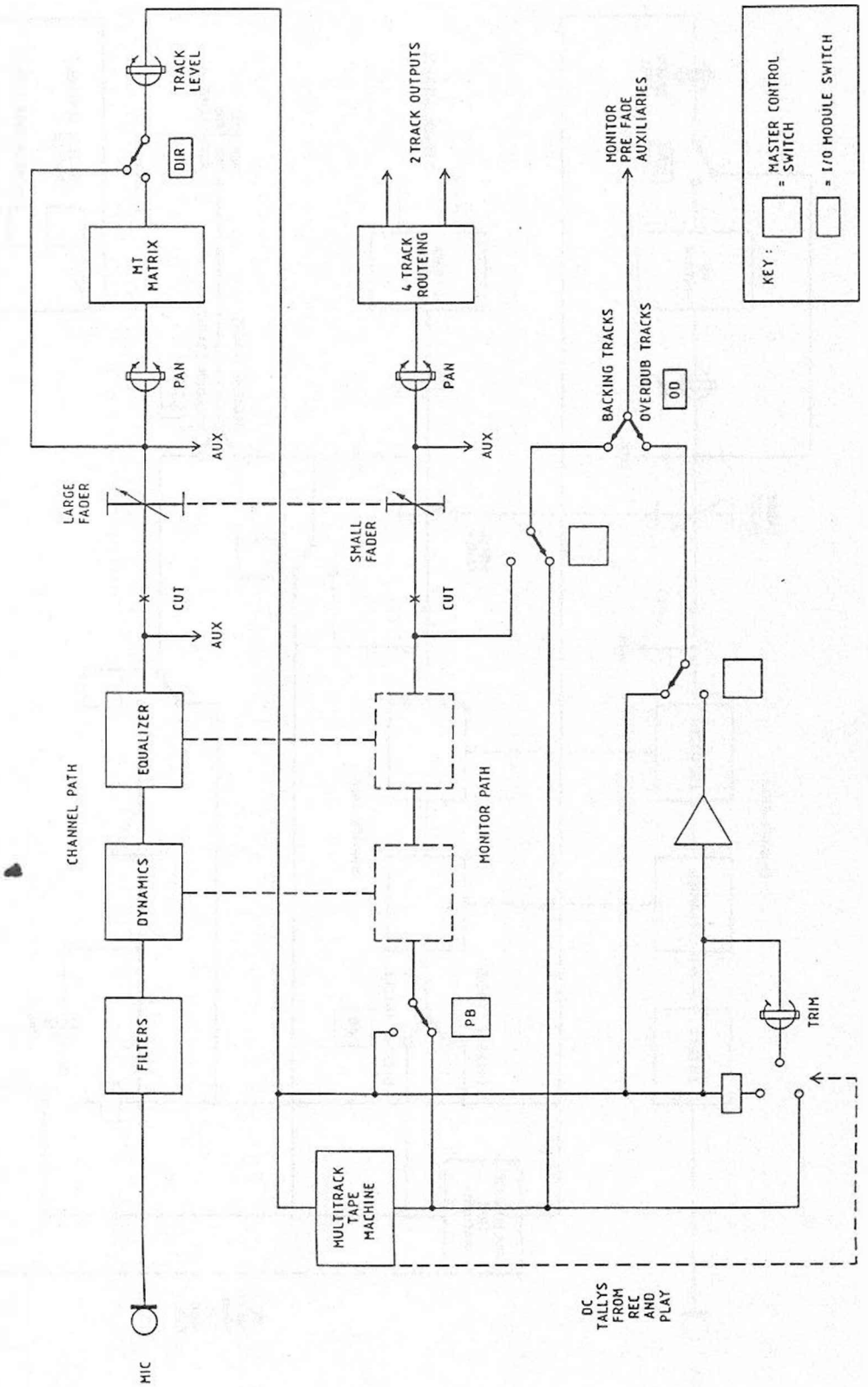

TRACK LEVEL
DIR
MT MATRIX
PAN
AUX
LARGE FADER
CUT
AUX
EQUALIZER
DYNAMICS
FILTERS
MIC
CHANNEL PATH
2 TRACK OUTPUTS
4 TRACK ROUTEING
PAN
AUX
SMALL FADER
CUT
MONITOR PATH
PB
MULTITRACK TAPE MACHINE
DC TALLYS FROM REC AND PLAY
MONITOR PRE FADE AUXILIARIES
BACKING TRACKS
OVERDUB TRACKS
OD
TRIM
KEY :
= MASTER CONTROL SWITCH
= I/O MODULE SWITCH

Figure 1.7

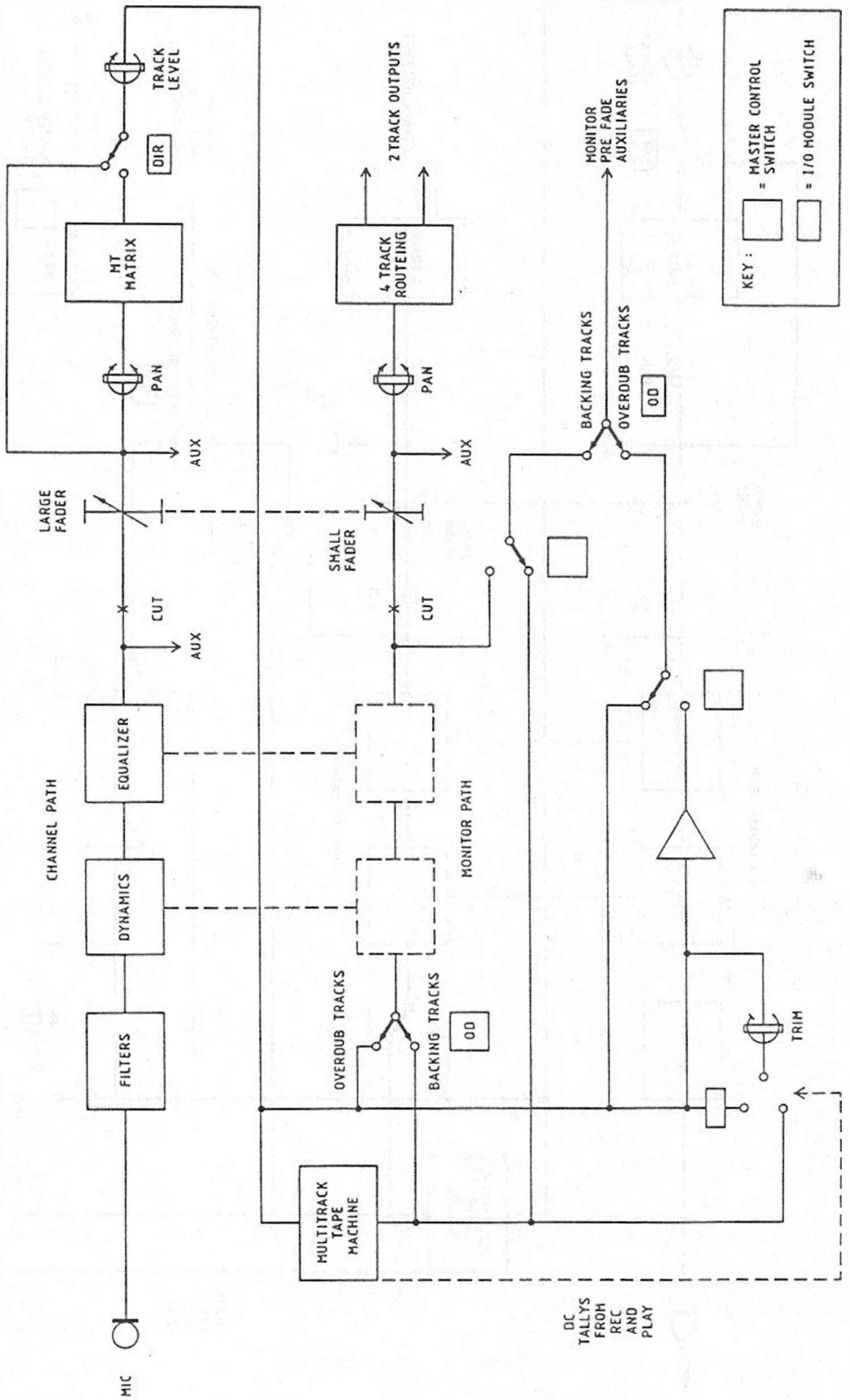

TRACK LEVEL
DIR
HT MATRIX
PAN
AUX
LARGE FADER
CUT
AUX
EQUALIZER
DYNAMICS
FILTERS
MIC
CHANNEL PATH
2 TRACK OUTPUTS
4 TRACK ROUTEING
PAN
AUX
SMALL FADER
CUT
MONITOR PATH
OVERDUB TRACKS
BACKING TRACKS
OD
MULTITRACK TAPE MACHINE
MONITOR PRE FADE AUXILIARIES
BACKING TRACKS
OVERDUB TRACKS
OD
TRIM
DC TALLYS FROM REC AND PLAY
KEY :
= MASTER CONTROL SWITCH
= I/O MODULE SWITCH

Figure 1.8

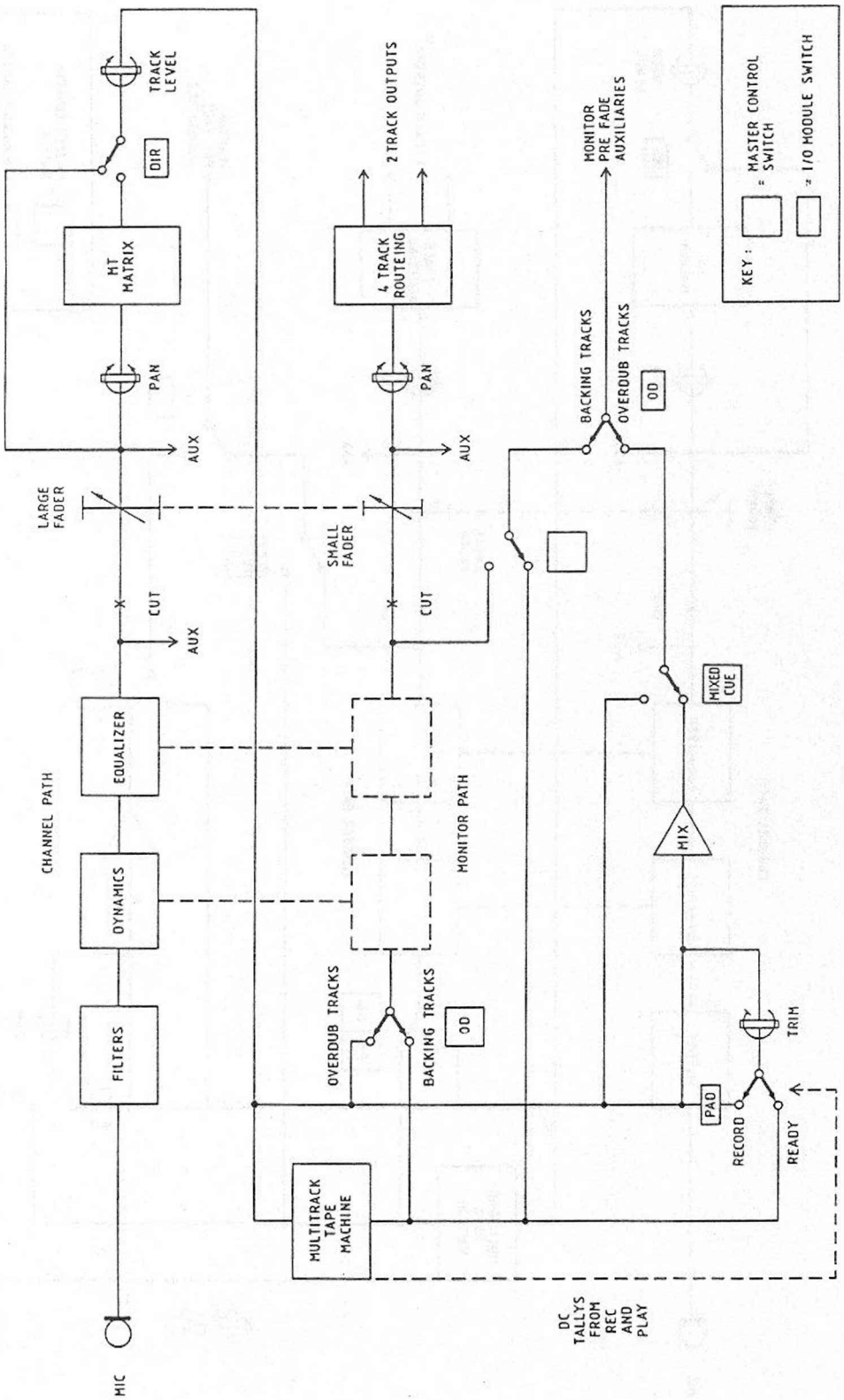

MIC
FILTERS
DYNAMICS
EQUALIZER
CHANNEL PATH
LARGE FADER
CUT
AUX
X
AUX
HT MATRIX
PAN
DIR
TRACK LEVEL
SMALL FADER
CUT
X
AUX
PAN
4 TRACK ROUTEING
2 TRACK OUTPUTS
MONITOR PATH
OVERDUB TRACKS
BACKING TRACKS
OD
MULTITRACK TAPE MACHINE
DC TALLYS FROM REC AND PLAY
BACKING TRACKS
OVERDUB TRACKS
OD
MONITOR PRE FADE AUXILIARIES
MIXED CUE
MIX
PAD
RECORD
READY
TRIM
KEY :
= MASTER CONTROL SWITCH
= I/O MODULE SWITCH

Figure 1.9

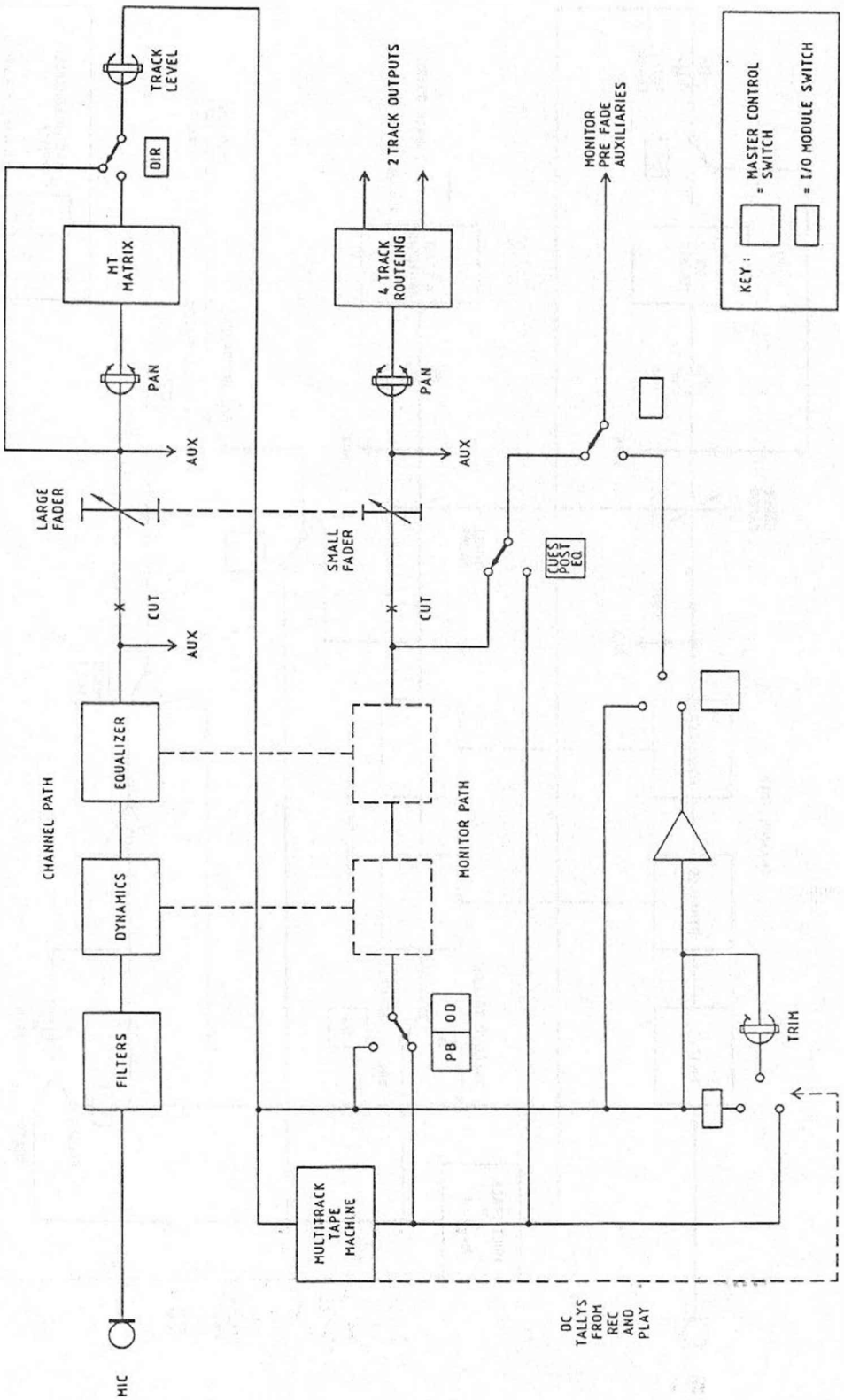

TRACK LEVEL
DIR
MT MATRIX
PAN
AUX
LARGE FADER
CUT
AUX
EQUALIZER
DYNAMICS
FILTERS
MIC
CHANNEL PATH
2 TRACK OUTPUTS
4 TRACK ROUTEING
PAN
AUX
SMALL FADER
CUT
MONITOR PATH
MONITOR PRE FADE AUXILIARIES
CUES POST EQ
PB OD
TRIM
MULTITRACK TAPE MACHINE
DC TALLYS FROM REC AND PLAY
KEY :
= MASTER CONTROL SWITCH
= I/O MODULE SWITCH

Figure 1.10

1.4 I/O Module Facilities

Refer to Fig 1.11 for the I/O Module Layout

Output Matrix

A matrix of 24 multitrack assignment buttons at the top of each channel strip selects any one, or more, of 48 mixing buses. Depending upon the state of the two **<48T ROUTEING>** buttons below the matrix, each assignment button selects either or both of two mixing buses. If the **<1-24>** routeing button is pressed the assignment buttons select buses in the range 1-24, if the other routeing button is pressed the range is switched to 25-48. When both routeing buttons are pressed each assignment button selects the appropriate bus from each range. All buttons have associated LED indicators.

Access is also provided to the 2-track mixdown buses, essentially for effects returns via the secondary (monitoring) signal path during mixdown. The pan pot selects between any odd/even numbered tracks. The bounce **<B'NCE>** switch selects the output of the corresponding multitrack replay, via the secondary path, to the multitrack matrix thus allowing much simplified bounce-down. The channel signal is automatically cancelled to prevent doubling of the monitoring signal level.

Input Section

The input section selects Mic/Line by master switching which may be reversed locally by the **<C/O>** button. The microphone gain and the trim control provide a wide dynamic range input without overloading for line level signals. The line input level is controlled by a separate stepped switch having a range of +8 to -12dB. The **<GRP>** button provides patch free audio sub-grouping and is the highest priority input. It routes the signal from the corresponding multitrack bus through the entire channel processor which becomes the submaster for the group.

The **<Ø>** button phase reverses the mic/line input only.

Filter Section

High and low pass filters on smooth controls can be individually selected by pulling the corresponding pot. The LED indicates when either or both filters are selected.

Dynamics Section

This comprises a limiter/compressor and a signal/noise gate and may be used for either general dynamic control or as a powerful effects unit.

The dynamics unit has separate threshold controls for the compressor and gate, both with an extremely wide dynamic range. The range is covered in two overlapping stages and switched by

pulling the relevant threshold knob. An LED gives indication of when the pot is pulled. Another push/pull pot controls the release time for both the compressor and gate. When the pot is pulled the compressor release is no longer manually set but is controlled by an automatic programme-dependent release circuit.

In addition to these controls the compressor has a ratio control which has a convenient law shape and extends from no compression up to limiting. The **<L/C>** button switches the compressor in and out of circuit; the **< -> >** button links the compressor control voltage to the next unit to the right, for stereo operation. The compressor control voltage is always generated and can control another module's compression even when the **<L/C>** button is not selected.

The **<GATE>** button selects the signal/noise gate and the **<KEY>** button provides an external trigger input on patch. The **<INV>** button inverts the sense of the circuit giving a gate closure when the trigger signal exceeds the threshold. A typical use for this is as a ducking circuit.

Simple metering is performed by the tri-coloured LED labelled 'Gain Reduction'. This shows reductions of greater than 1dB (green), greater than 5dB (yellow), and greater than 10dB (red).

The **<EQ/D>** button selects the channel strip equalizer into the sidechain of the dynamics unit and is the highest priority selection of the equalizer. Many special effects may be arranged by using this combination of processors.

Signal Level

The signal LED indicates from signal presence (-30dB) to overload (+26dB). The threshold is set by a master control.

Insertion Section

An independently switchable patch insertion is provided which may be selected pre or post the equalizer unit by the **<PREQ>** button. The **<IN>** button activates the insertion, and a control button **<INS>** alongside the small fader assigns the insertion to the secondary path.

Note: The insertion is 'hot-wired' and therefore always provides an output regardless of the **<IN>** button status.

Equalizer

The Neve Formant Spectrum Equalizer controls four overlapping frequency bands. Each band has a generous 18dB of cut and boost and the upper and lower bands may be switched to give a shelving characteristic. The **<IN>** button inserts the equalizer and a control button **<EQ>** next to the small fader assigns it into the secondary path.

Auxiliary Section

These sections may be sourced from either the channel or the secondary path and may be configured as either mono or stereo, offering unique flexibility. Each pair of the eight auxiliaries may become a stereo send by pressing the **<ST>** button. The left hand (odd numbered) level control becomes a pan pot whilst the right hand control sets the overall stereo level. This allows the operator to build up to four individual stereo cue sends when recording. The **<PRE>** button selects pairs to source from either pre or post of their controlling fader. The signal source for the pre-channel fader set up (ie pre cut for cues, post cut for revs) is controlled automatically by the master mixdown/record function.

Track Level Control

Located above the small fader, this control has a calibrated centre detented position and 10dB of in-hand gain. The **<DIR>** button sends the channel signal direct to its corresponding track, bypassing the multitrack matrix.

Small Fader Section

The small fader together with its respective **<SOLO>** and **<CUT>** buttons may be assigned either to the channel path or the secondary signal path by the console master status controls or switched locally by the **<SWAP>** switch. The swap LED indicates reversal of the master status. It should be noted that swapping the faders does not re-assign the auxiliaries as these are assigned to the channel or to the secondary signal paths. The **<C/O>** button reverses the master console status locally for record and mixdown mode. Its associated LED indicates when the small fader is sourcing the multitrack (M/T) matrix, avoiding any operator confusion.

In record mode the channel path goes to the multitrack matrix and the secondary path feeds the 4-track output. In mixdown this routeing is reversed, so the **<C/O>** button gives the ability (for example) to flip back to record mode on one channel for an overdub, or to allow access to the multitrack matrix for subgrouping during mixdowns.

Secondary Path Selectors

The eight buttons below the **<SWAP>** switch select the assignment of the channel strip dynamics **<DYN>**, insertion **<INS>**, equalizer **<EQ>** and auxiliaries **<AUX>** into the secondary path giving an easily scanned area to assess the signal structure of each module.

The **<MT>** button connects the input of the secondary path to the channel path post fader output to give patch free configuring of the secondary path as an effects send during mixdown.

4T Routeing Section

These buttons select the 2-track mixing buses for simultaneous monitoring during record or for mixdowns. Panning selects between Left/Right (Odd/Even) buses.

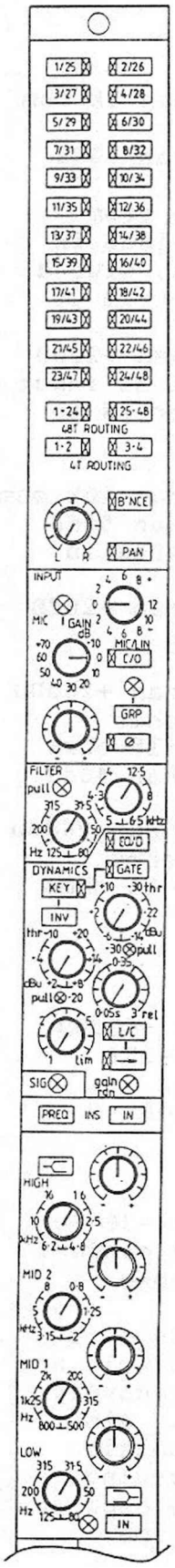
<OD> (Overdub)

This button is for overdubbing or recording and has a set of contacts which may be used as remotes. It also makes the selection for the correct monitoring **<OP>** (multitrack send), **<PB>** (multitrack return) and **<OD>** (Overdub). These master controls may be switched freely by the operator without affecting the pre-fade overdub cue sends which are also controlled by the **<OD>** button. When **<OD>** is pressed a 'mixed cue' send (mix of tape in and tape out with automatic level compensation at drop-in) may be selected using the master **<MIXED CUE>** control. A post equalizer cue mix may also be accomplished as an aid during overdubbing. This is achieved with the master **<Cues Post EQ>** switch.

<RET> is the effects return switch which 'solo safes' both channel strip paths when pressed individually, thereby allowing the strip to be an effects return, its contribution being included in the positional solo mix.

Large Fader Controls

The large fader together with the **<SOLO>** and **<CUT>** switches may be interchanged with the small fader. The **< A >** and **< B >** buttons allow groups of large faders to be cut simultaneously by means of the two master **< A >**, **< B >** cut buttons located in the master control area. The cut buses may also be activated by remote control.



Multitrack Routeing Section
(Refer to page 2 - 8)

Auxiliary Section
(Refer to page 2 - 1)

Input Section
(Refer to page 2 - 4)

Dynamics Section
(Refer to page 2 - 2)

Small Fader Section
(Refer to page 2 - 9)

Insertion and Equalizer Section
(Refer to page 2 - 5)

Mixdown and Large Fader Section
(Refer to page 2 - 6)

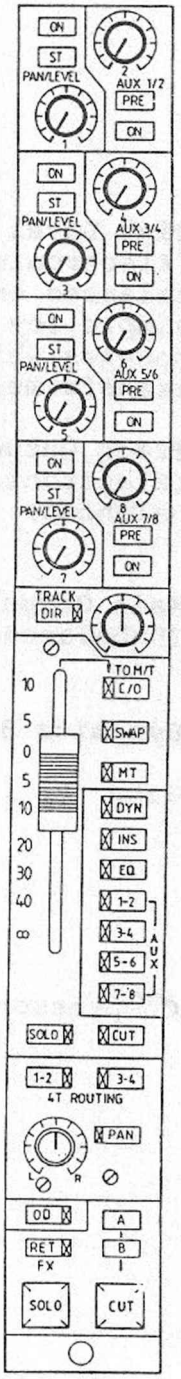


Figure 1.11 Channel Strip

1.5 Specification

Microphone input (Transformer balanced)	Input Impedance	- greater than 1k ohm balanced
	Input Balance	- greater than 70dB @ 1kHz
	Input Gain Range	- adjustable from -70dB to -10dB in 10dB steps, plus a fine gain trim of +/-10dB
	Input Headroom	- greater than +26dB above nominal input level referred to 0dBu
High Level Inputs (Electronically balanced except for simple rev return modules which have transformers)	Input Impedance	- greater than 10k ohm
	Input Balance	- greater than 50dB
	Input Gain Range	- -12dB to +8dB in 2dB steps
	Input Headroom	- greater than +26dB above 0dBu
Track Outputs (Electronically balanced)	Maximum Output	- greater than +26dBu into 600 ohms
	Output Impedance	- less than 15 ohms
	Output Balance	- greater than 40dB
Main Output (Unbalanced)	Maximum Output	- greater than +26dBu into 600 ohms
	Output Impedance	- less than 15 ohms
Dynamics Section		
Gate	Input Threshold Range	- +10dBu to -60dBu
	Attack Time	- +/-1ms +/-20%
	Release Time	- 50ms to 3s
	Hysteresis	- 10dB +/-1dB
	Depth	- 25dB
Compressor	Input Threshold Range	- +20dBu to -30dBu
	Attack Time	- 1ms/7ms dependent on programme material
	Release Time	- 50ms to 3s with automatic hold and impulse recovery circuits. Also with automatic release giving programme dependent release time.

	Compression Ratio	- variable between 1:1 and limiting
Overall Performance	Microphone EIN	- better than -125dBu (20Hz to 20kHz) when sourced from 200 ohms
	Line Input Noise	- better than -79dBu (20Hz to 20kHz) with equalizer, dynamics and insertion in circuit but not actively processing (measurements made at track outputs)
	Frequency Response	- flat +0.5dB - 1.0dB in the band 20Hz to to 20kHz reference 1kHz
	Total Harmonic Distortion	- better than 0.04% (20Hz to 20kHz) (0.09% if console fitted with VCA faders)
	Multitrack Crosstalk	- typically better than -80dB (20Hz to 20kHz)

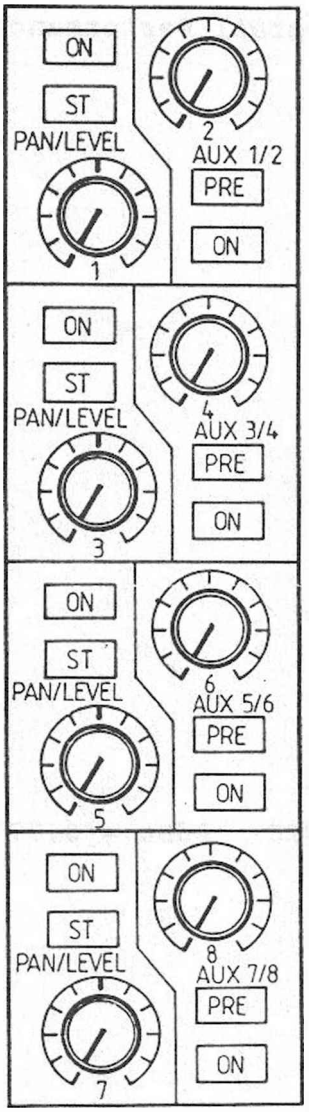
NOTE: 0dBu = 0.775V rms regardless of circuit impedance

2.1 Auxiliary Section

This section can be configured as eight mono auxiliary sends or four stereo pairs with panning facility and pre/post fader switching.

Pressing the **<ST>** button selects which pairs are switched to stereo in the corresponding section. The level control immediately below the **<ST>** button becomes a pan pot, and the level control on the right hand side of the pair becomes a stereo level control.

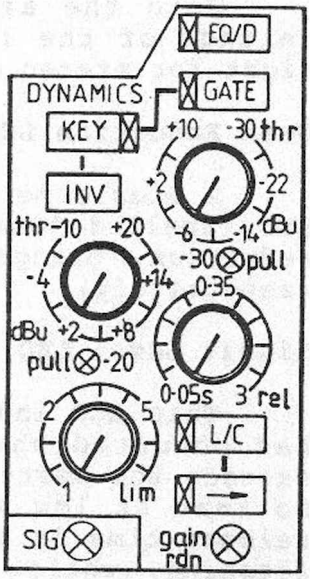
The **<ON>** buttons act as individual switches for Left and Right in stereo mode or 1 and 2 in mono mode. The **<PRE>** button switches the pair of auxiliaries pre-fader in both mono and stereo mode. Whether the **<PRE>** auxiliary is affected by the source path **<CUT>** button is controlled automatically by the master mixdown/record switching. The auxiliaries may be selected in pairs to the monitor path by pressing the buttons marked **<AUX 1/2> <AUX 3/4>** etc. alongside the small fader. The auxiliaries stay assigned to monitor or channel path independent of the fader swap system.



2.2 Dynamics Section

<EQ/D>

This button inserts the I/O module equalizer into the dynamics sidechain so that the gate or limiter/compressor triggers on the equalizer output. A typical example of use would be de-essing, but many other effects can be achieved by this configuration. The associated LED lights when the function is selected.



<GATE>

Selection of this button inserts the signal/noise gate into circuit. The threshold of operation is adjustable on the smooth control immediately below, which has a range of -30dB to +10dB. The range of the control is extended by -30dB when the knob is pulled giving a total range of 70dBs. An LED is also illuminated.

The release time of the gate and limiter/compressor is adjustable on a smooth control immediately below the threshold control described above. The range of the control is 50ms to 3 seconds. Pulling the release pot provides individual control on the gate with auto release on the limiter/compressor.

<KEY>

Pressing this button provides a dedicated patch input to the gate only, enabling the gate to be triggered by an external device or any other channel signal. The compressor operation is not affected. When **<KEY>** is selected the associated LED lights.

<INV>

This button inverts the external trigger input from the patch so that the gate closes when a signal of the required level is present at the patch. This can be used as a 'ducker' or for muteing severe breakthrough from another source.

<L/C>

Selection of this button inserts the limiter/compressor into circuit. The limiter/compressor threshold and compression ratio are adjusted by the two smooth controls to the left of the module. The threshold control has a range of -10 to +20dBu. Pulling the knob extends the range by -20dB, giving a total range of 50dB and illuminates the LED. As described above, the

release time can be set by the dual control in the gate section or can be switched to auto mode by pulling the release pot.

< -> >

When the arrow button is pressed, it links the control voltage of the limiter/compressor to the next channel to the right for stereo or quad ganging.

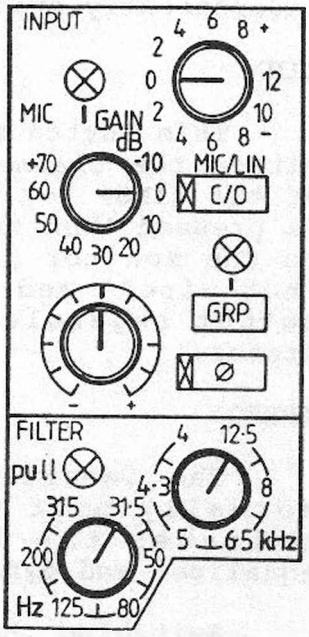
Gain Reduction LED

A simple metering function is performed by the tri-coloured LED labelled 'Gain rdn'. The LED indicates green for low gain reduction, orange for medium and red for high (1, 5, and 10dB respectively).

Signal Level LED

This LED indicates signal presence, or that signal overload has occurred when the signal going through the input module exceeds the master preset level. The time constants are arranged so that at low signal indicator thresholds a relatively long release time is given to the indicator to prevent it continually flashing, whilst at high threshold levels the release time is short, giving the normally expected characteristic of an overload indicator.

2.3 Input Section



Mic/line switching is master controlled and set depending on console status. **<C/O>** flips the inputs locally in the opposite sense to the master status. Both mic and line have stepped level controls. The range of control for the line input is from -12 to +8dB. For the mic input the range is -10 to +70dB with a fine trim of +/-10dB on a smooth control immediately below. With a total range of -20dB to +80dB, the mic input can be used for line level signals if desired.

<C/O>

This button is the mic/line changeover switch. When mic is selected the LED above the mic sensitivity control lights. When **<C/O>** is selected the master status is reversed and the LED next to the switch lights.

<GRP>

This button provides a patch free audio sub-grouping facility. On selecting **<GRP>** on any of the modules 1-48, the module channel path picks up the multitrack bus of the same number, allowing the EQ, filters, insert, and dynamics to be used on the multitrack signal as if it were a conventional channel path input signal. The channel fader now acts as an audio subgroup fader and the signal can be routed in the usual manner. Routeing back to the associated multitrack send can be achieved using the **<DIR>** button (situated above the small fader). The LED above the **<GRP>** button indicates when subgroup is selected. This is the highest priority input.

< ø >

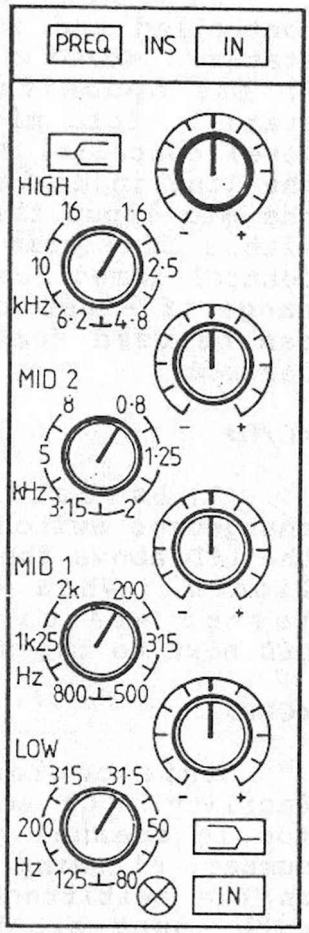
This is the phase reversal button which operates on both mic and line inputs (but not subgroup). The associated LED lights when the button is pressed.

Filter Section

The high-pass filter has a range of 31.5 to 315Hz and the low-pass a range of 4 to 12.5kHz. Both filters are smooth controls and are individually selected by pulling the corresponding knob. The LED indicates when either or both filters are selected. The filter slopes are 12dB/octave in both cases.

2.4 Insertion and Equalizer Section

Each module contains an independently switchable patch insertion.



<IN>

This button selects the insertion to either the channel or the monitor path; if the **<INS>** key next to the small fader is pressed then the insertion is assigned to the monitor path. The insertion is 'hot wired' and so always provides an output regardless of the **<IN>** button status.

<PREQ>

The insertion, when selected, is normally post EQ. Pressing **<PREQ>** switches the insertion point pre equalizer and dynamics.

Switching the equalizer and dynamics into circuit and then transferring them to the monitor path does not affect the insertion assignment.

Equalizer

The equalizer section comprises four continuously variable overlapping frequency control bands with a peaking characteristic. In addition, the high and low bands have a switch to select shelving characteristics. Each band has 18dBs of cut or boost on a smooth control next to the frequency control. The equalizer design is such that the Q automatically varies with gain on all bands in peaking and shelving modes. As the gain is increased, so is the Q.

The ranges of the frequency controls are as follows:

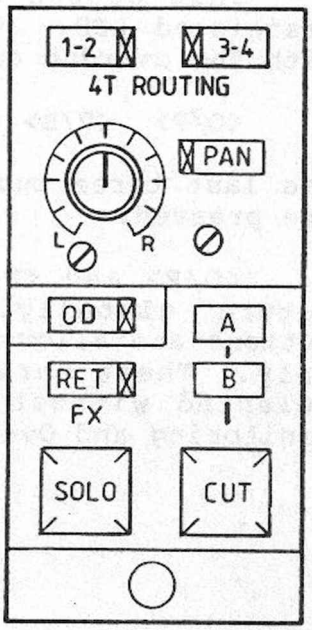
High: 1.6 to 16kHz
Mid2: 0.8 to 8kHz
Mid1: 200Hz to 2kHz
Low: 31.5 to 315Hz

<IN>

Pressing the **<IN>** button selects the equalizer to either the channel or the monitor path; when **<EQ>** is pressed (next to the small fader) the equalizer is inserted into the monitor path. The LED next to the **<IN>** button indicates when the equalizer is selected.

2.5 Mixdown and Large Fader Section

Selecting <1-2> or <3-4> gives access to the main 2-track outputs for mixdown and simultaneous monitoring during multitrack recording.



<PAN>

When pressed this button enables the pan pot opposite and allows panning between odd and even tracks selected on the routeing buttons.

Effects **<RET>**

When pressed this button allows the I/O module to be used as an effects return. When a path with effects send is soloed, the operator needs to hear the 'effect' of the return mixed in with the original; the return path therefore must not be cut. This facility allows any path to be an effects return path. On mixdown mode the monitor path may also be an effects return or send. The associated LED lights when **<RET>** is selected.

<SOLO>

The button function is dependent on master selection and record status. The switch can be selected to have a momentary, interlocking (**<I/L>**), or latching (**<LATCH>**) action and can be assigned to operate as a cut solo, positional AFL or PFL. If the tape machine is in record, solo safe is automatically set on the channel path and solo monitoring continues via the AFL/PFL buses.

The solo and cut functions remain permanently attached to their corresponding faders regardless of **<SWAP>** condition.

<CUT>

The cut circuit can be operated individually, remotely, or by master controls via the **< A >** and **< B >** buttons immediately above. If the **<CUT>** button is operated individually then the lamp glows at full brightness; if the circuit is activated remotely or by master control the lamp glows at half brightness. If both master and individual cuts are activated the lamp glows at full brightness, indicating that if the master is released the path will still be cut.

<OD>

This button enables the overdub facility and lights the associated LED. The overdub system is operated in conjunction with the overdub controls on the monitor section:

<O/P> **<P/B>** **<O/D>** **<MIXED CUE>** and **<CUES POST EQ>**

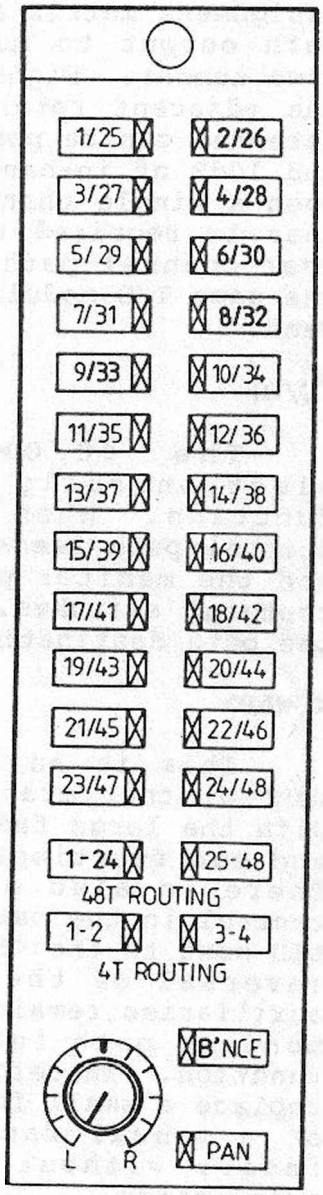
The last three buttons operate only when the individual buttons are pressed.

<O/P> and **<P/B>** allow monitoring of multitrack send and return globally. **<OD>** is enabled by the individual channel buttons and allows monitoring of tape in on the overdub channels only. These three master buttons are interlocked and can be selected without affecting the cue sends. (See Multitrack Monitoring and Overdubbing Section.)

2.6 Multitrack Routeing Section

48-track Routeing

A matrix of 24 multitrack assignment buttons and two 48-track routeing buttons select one or more of 48 output buses. Each assignment button selects either or both of two output buses, depending on the state of the two 48-track routeing buttons. If the **<1-24>** routeing button is pressed, the assignment buttons select buses in the range 1-24; if the **<25-48>** routeing button is pressed the range is switched to 25-48. If both routeing buttons are pressed each assignment button selects the appropriate bus in both ranges. Each button has an LED indicator associated with it.



4-track Routeing

The **<1-2>** and **<3-4>** buttons, located immediately below the multitrack switching matrix, allow effects returns via the monitor path to be switched to one or both of the 2-track outputs during mixdown. This arrangement effectively doubles the number of available line level inputs available.

<B'NCE>

Pressing the **<B'NCE>** (Bounce) button connects the corresponding multitrack return, via the monitor path, to the multitrack routeing matrix. The bounce down track can then be selected on the assignment buttons. The 2-track routeing is automatically cancelled to prevent any doubling of the signal level. The associated LED lights when **<B'NCE>** is pressed.

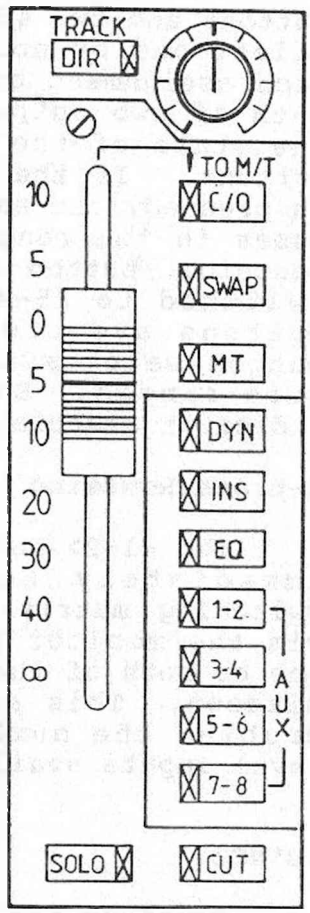
<PAN>

When pressed this button enables the pan pot and allows panning between odd and even selections on the assignment buttons. The LED lights when the button is pressed.

2.7 Small Fader Selection

<DIR>

This button bypasses the multitrack assignment matrix and selects the channel path output to multitrack send of the same number. Signal level is adjusted on the adjacent rotary control which has a detented centre position at line-up level and 10dB of in-hand gain. **<DIR>** is used when a single channel path signal is all that is required to be sent to tape and that channel path can be configured on the same I/O module as the required track send.



<C/O>

The **<C/O>** button has an electronically latched changeover function. When the LED is off, the channel path feeds the multitrack matrix and the monitor path feeds the 4-track routeing switches. When the LED is on, the path destinations are transposed.

<SWAP>

This is an individual fader swap control that transposes the small fader with the large fader; the associated solo and cut functions are also transposed. There is also a master **<FADER SWAP>** control in the main monitor section. The LED next to the **<SWAP>** button indicates a reversal of the master status. The auxiliaries remain assigned to channel or monitor path independent of the swap function. Therefore the operator can replace a small fader with a large fader, or a manual fader with an automated fader, without any reassignment of auxiliaries.

<MT>

This connects the input of the monitor path to the channel postfade output offering up to 48 additional effects sends during mixdown.

The seven buttons **<DYN>** (dynamics), **<INS>** (insert patch), **<EQ>** (equalizer) and **<1-2>**, **<3-4>**, **<5-6>**, **<7-8>** (auxiliaries) in the rectangular box by the small fader enable these facilities to

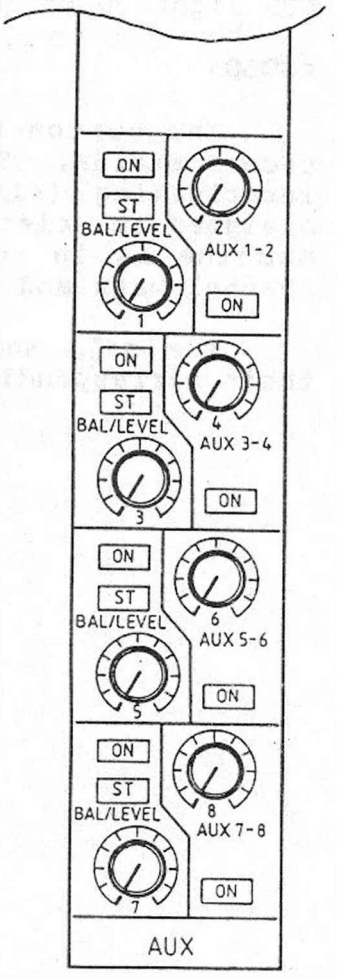
be assigned independently to the monitor path. The associated LED lights when one of the buttons is selected.

<SOLO>

The button function is dependent on master selection and record status. The switch can be selected to have a momentary, interlocking (**<I/L>**), or latching (**<LATCH>**) action and can be assigned to select cut solo, positional AFL or PFL. If the tape machine is in record, solo safe is automatically set on the channel path and solo monitoring continues via the AFL/PFL buses.

The solo and cut functions remain permanently attached to their corresponding faders regardless of path condition.

3.1 Auxiliary Master Outputs

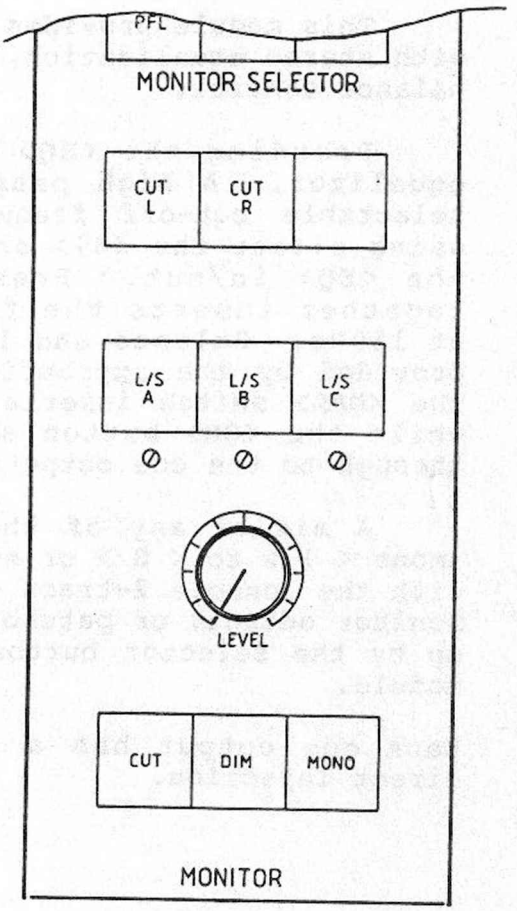


The auxiliary sends are configured as eight mono sends or switched to four stereo pairs. This is achieved by pressing the **<ST>** button next to each pair. The level control immediately below becomes a balance control and the adjacent level control becomes a stereo level control.

The auxiliary level controls feed the cue mix system, allowing the operator to build up a mix of auxiliary outputs as a cue mix.

The auxiliary level controls also adjust the level to the reverb send outputs. The **<ON>** buttons enable the cue/reverb send outputs. Each send has a patch insertion.

3.2 Control Room Monitor



This section allows stereo monitoring of the sources selected on the monitor selector facility. The feeds to the control room monitor loudspeakers have insertions on the patchfield; monitoring can be cut, dimmed or mono-mixed by selection of:

<CUT>, <DIM> or **<MONO>**

depending on the function required.

Cut Left and Cut Right can be selected individually with **<CUT L>** and **<CUT R>**.

The buttons marked **<L/S A>, <L/S B> and <L/S C>** allow selection between three different loudspeaker systems. The preset trimmers immediately below these buttons allow the level of each system to be adjusted individually. The rotary control below the presets is the master level control which adjusts all three systems.

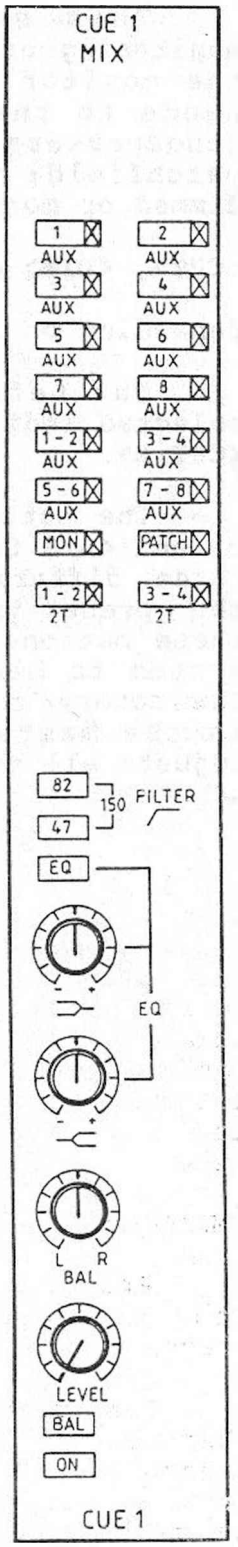
3.3 Cue Mix System

This module provides two stereo cue sends with stereo equalization, filtering, level and balance control.

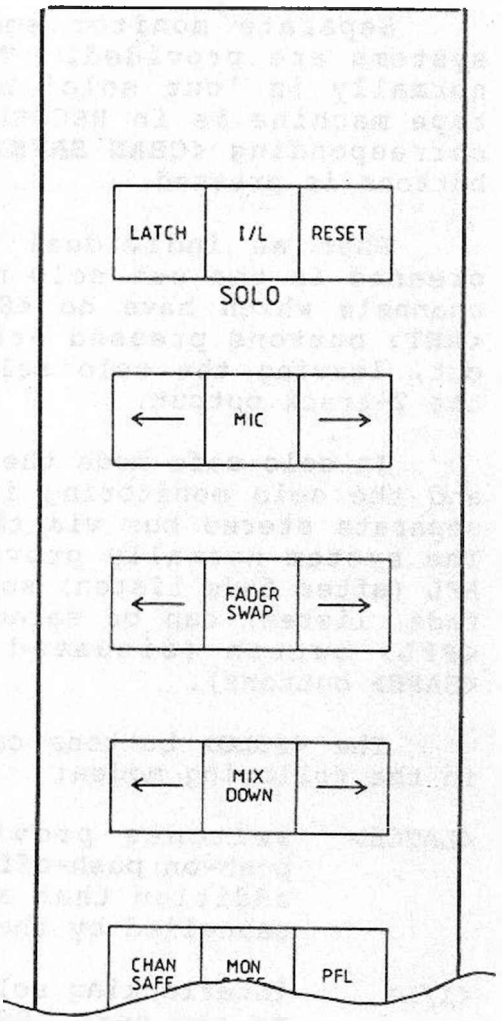
Pressing the **<EQ>** button inserts the equalizer. A high pass filter with three selectable cut-off frequencies is activated using either the **<47>** or **<82>** buttons above the **<EQ>** in/out. Pressing both buttons together inserts the filter with cut-off at 150Hz. Balance and level adjustment are provided by the appropriate rotary controls. The **<BAL>** switch inserts the balance control while the **<ON>** button switches the signals through to the cue outputs.

A mix of any of the auxiliary outputs (mono **< 1 >** to **< 8 >** or stereo **<1-2>** to **<7-8>**) with the console 2-track outputs, control room monitor output, or patchbay input can be built up by the selector buttons at the top of the module.

Each cue output has a patch insertion for direct injection.



3.4 Master Status Selector



Pressing the arrowed buttons on either **<MIC>**, **<FADER SWAP>** or **<MIXDOWN>** changes the status of channels 1-24 (for the left hand arrow) or 25-48/60 (for the right hand arrow). This allows the console to be configured with a separate monitor.

Pressing the centre button of each row resets the whole console for that function. Each of these master controls has individual channel by channel buttons which reverse the status of an individual I/O module. An LED next to each module button indicates when that channel has reversed status compared with the master status.

<MIC>

This button operates as a master mic/line changeover; the lamps indicate mic selection.

<FADER SWAP>

Pressing this button exchanges the large fader plus its solo and cut with the small fader plus its solo and cut. The normal power-up state (multitrack recording) is for the large fader to be in the channel path and the small fader to be in the monitor path; the master fader swap button reverses these positions and the lamps light indicating that reversal has taken place.

<MIXDOWN>

Pressing the **<MIXDOWN>** button alters the state of the paths from tracklaying mode to mixdown mode for multitrack tape playback and mixdown to two track.

The channel input is automatically set to line and the channel path is directed to the main 2-track outputs via the pan control (closest to the operator). In **<MIXDOWN>** mode the monitor path is directed to the multitrack pan and routeing buttons so that the small fader can control additional effects sends or returns. Conversely, in tracklaying mode, the monitor path is directed to the main 2-track outputs for simultaneous monitoring.

Solo and Master Cut System

Separate monitor and channel solo systems are provided. The systems are normally in 'cut solo' mode unless the tape machine is in RECORD or one of the corresponding **<CHAN SAFE>** or **<MON SAFE>** buttons is pressed.

When an individual solo button is pressed in the cut solo mode, all other channels which have no **<SOLO>** or effects **<RET>** buttons pressed are automatically cut, leaving the solo selected signal at the 2-track output.

In solo safe mode the path is not cut and the solo monitoring is achieved by a separate stereo bus via the main monitor. The system normally provides positional AFL (after fade listen) solo, but PFL (pre fade listen) can be selected by a master **<PFL>** button (situated next to the **<SAFE>** buttons).

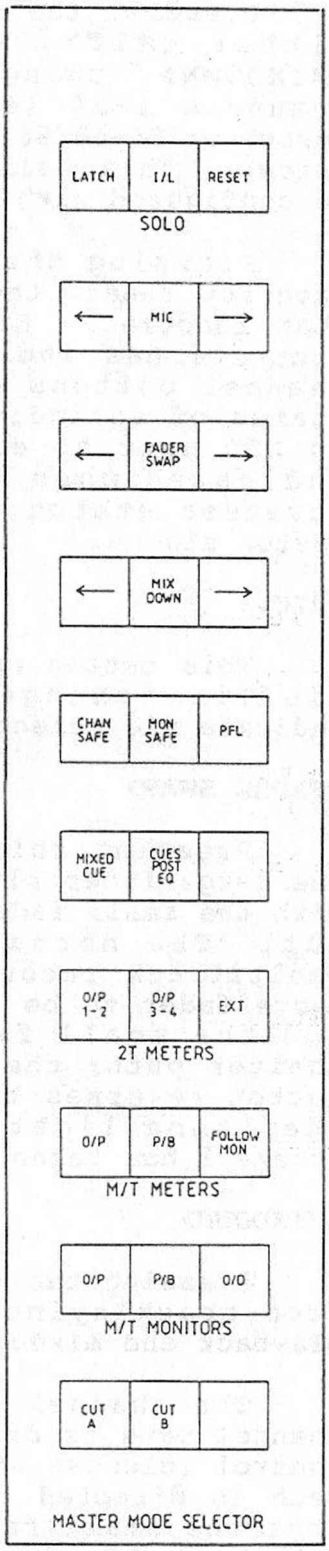
The **<SOLO>** buttons can be configured in the following modes:

<LATCH> switches provide the normal push-on push-off action with the addition that all solos may be cancelled by the master **<RESET>**.

<I/L> interlocking solo which releases as the next **<SOLO>** is pressed. A group solo can be formed by holding one button down whilst other solos are selected; all are cancelled by pressing another **<SOLO>** button, or by **<RESET>**.

Momentary action solo. A group solo can be formed by holding one button down whilst the group is selected, but the group is cancelled when the last button is released.

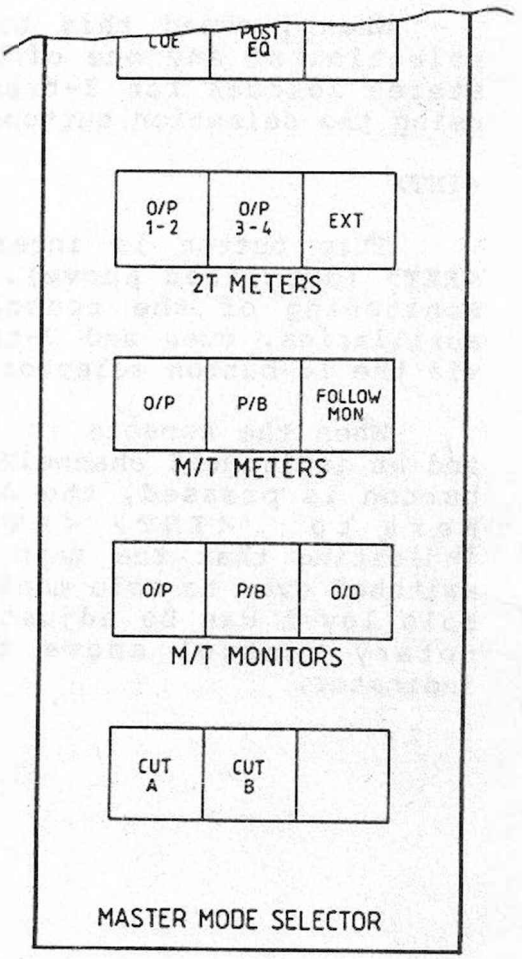
<CUT A> **<CUT B>** These buttons cut all large fader paths that have their corresponding **<CUT A>** or **<CUT B>** buttons pressed. This facility mutes or enables a group of paths simultaneously.



3.5 Meter Selection

2-track Meters

There are four bargraph meters fitted to the 2-track metering system; two of these are permanently attached to the control room monitor for metering any of the desk sources or 16 external sources as selected for control room monitoring. The other two meters follow the 3-button interlocked selector, to allow metering of the 2-track console outputs by selecting **<O/P 1-2>** or **<O/P 3-4>** and also metering of the external source selector on the control room monitor by pressing **<EXT>**.



Multitrack Meters

<O/P>

Pressing this button allows metering of the multitrack send signal.

<P/B>

This button allows metering of the multitrack return.

<FOLLOW MON>

This button allows the metering to follow multi-track monitor selection.

3.6 Monitor Selection

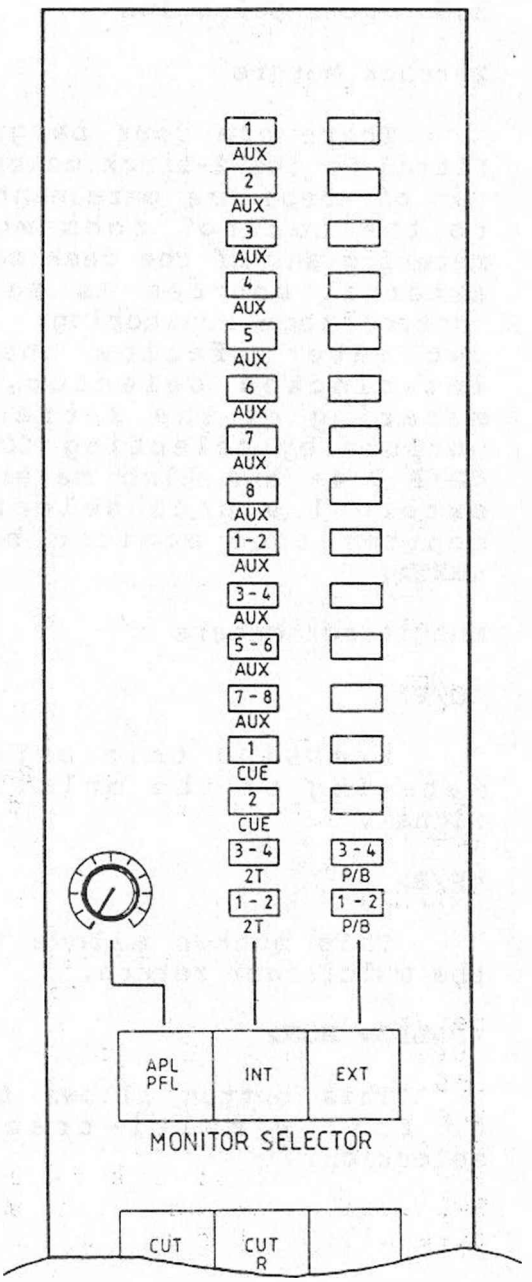
<EXT>

When pressed this button allows selection of any one of 16 external stereo sources for 2-track playback using the selection buttons above it.

<INT>

This button is interlocked with **<EXT>** (described above). It allows monitoring of the console sources, auxiliaries, cues and 2-track outputs via the 16-button selector above it.

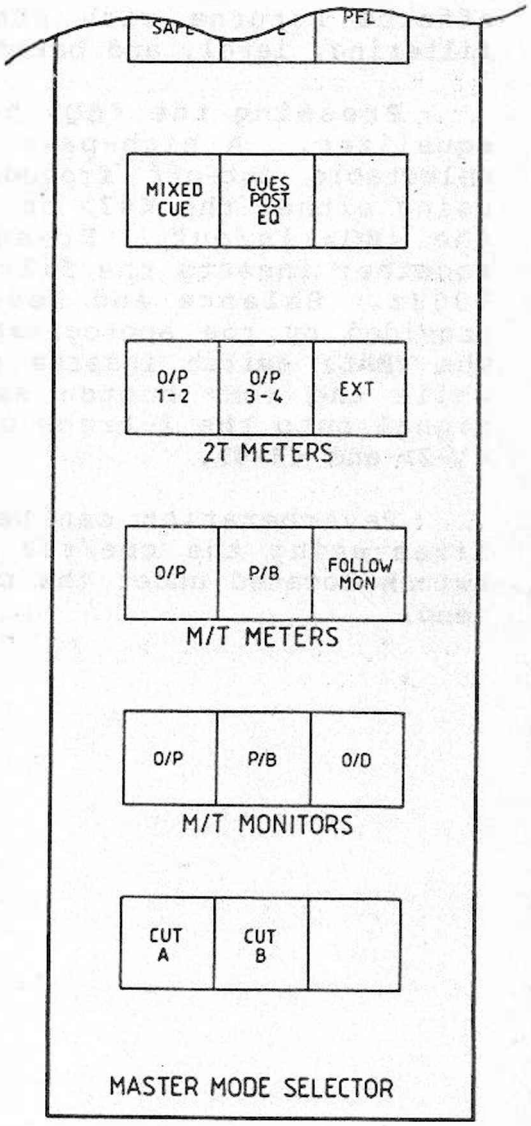
When the console is in SOLO SAFE and an individual channel/monitor solo button is pressed, the AFL/PFL lamp next to **<INT> <EXT>** lights indicating that the main monitor has switched over to solo monitoring. The solo level can be adjusted with the rotary control above the AFL/PFL indicator.



3.7 Multitrack Monitoring and Overdubbing

Multitrack Monitor Selector

The multitrack monitor selector switches the in-line monitoring paths between multitrack send and return and overdub. In overdub mode the channels that have the individual overdub buttons pressed are monitored as multitrack send; all other tracks are monitored as multitrack return.



<O/P>

Selects multitrack send. Interlocked with **<P/B>** and **<O/D>**.

<P/B>

Selects multitrack return. Interlocked with **<O/P>** and **<O/D>**.

<O/D>

Selects overdub. Interlocked with **<O/P>** and **<P/B>**. Refer to **<OD>** explanation in mixdown and large fader (Section 2.5).

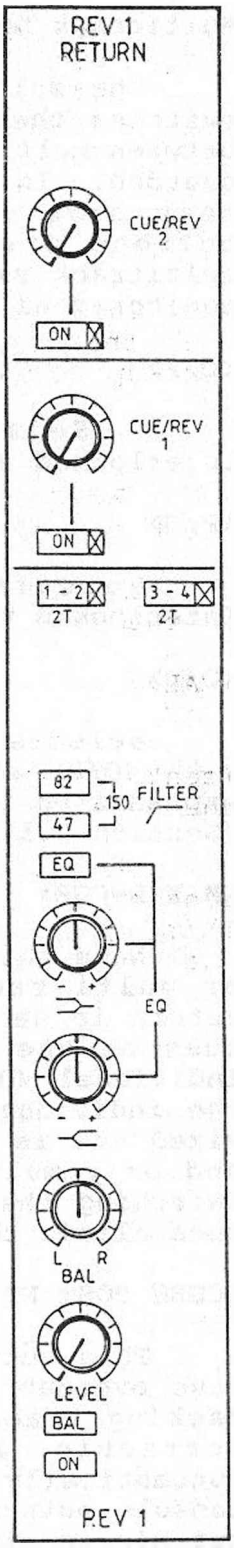
<MIXED-CUE>

When this button is pressed a mix of multitrack send and multitrack return is sent to the monitor prefade cues on the I/O modules which have individual **<OD>** buttons selected. If the individual **<OD>** is released, then mixed cue is cancelled on that module and only multitrack return is sent. Switching the control room monitor to cues allows this mix to be monitored.

<CUES POST EQ>

This button switches the cue sends on the paths that do not have overdub selected to a 'follow monitor' condition, to allow backing tracks to be heard with the same frequency/dynamics correction as the control room monitor mix. The facility automatically cancels should the engineer decide to monitor the console output using the master **<OP>** button. The backing track cue mix is still available to the artist (without processing) as it is now taken straight from the multitrack return. With this system any loss of cue signal is completely prevented regardless of control room monitor condition.

3.8 Rev Returns



The rev returns section provides facilities for four stereo reverberation/ effects returns with stereo equalization, filtering, level, and balance control.

Pressing the **<EQ>** button inserts the equalizer. A high-pass filter with three selectable cut-off frequencies is activated using either the **<47>** or **<82>** buttons above the **<EQ>** in/out. Pressing both buttons together inserts the filter with cut-off at 150Hz. Balance and level adjustment are provided by the appropriate rotary controls. The **<BAL>** switch inserts the balance control while the **<ON>** button switches the return signal onto the 2-track outputs selected by **<1-2>** and **<3-4>**.

Reverberation can be added to the cue mixes using the cue/rev control. An **<ON>** switch located under the control enables this send.

3.9 Oscillator and Signal LED Threshold Control

The oscillator can be switched to frequencies of 40Hz, 100Hz, 400Hz, 1kHz, 4kHz, 10kHz and 15kHz using the switch in the centre of the oscillator panel. Output level is controlled from the knob directly above the frequency selector switch.

<GRPs>

This key switches the oscillator signal onto the console group outputs to allow easy line-up of multitrack machines.

<2T>

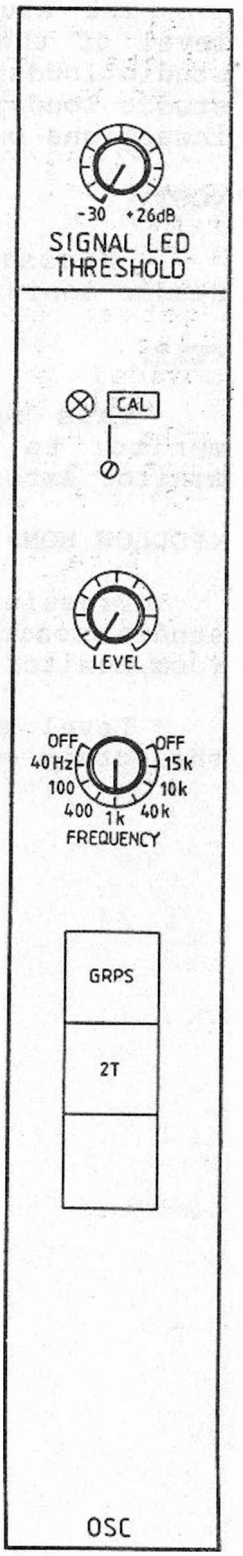
This switches the oscillator signal onto the main 2-track outputs.

The oscillator output is also available on the patchbay.

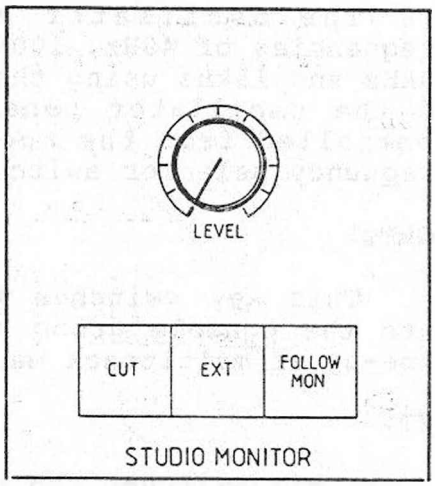
<CAL>

This button switches a calibrated level (controlled by the trimpot under the panel) to the selected oscillator outputs.

The LED threshold level master is continuously variable between -30dB and +26dB. This master controls the level indicated by the LED indicator for the channel path.



3.10 Studio Monitor



The studio monitor controls the level of the sources selected to the studio loudspeakers. The feeds to the studio loudspeakers are presented with insertions on the patch field.

<CUT>

Pressing this button cuts the studio monitor.

<EXT>

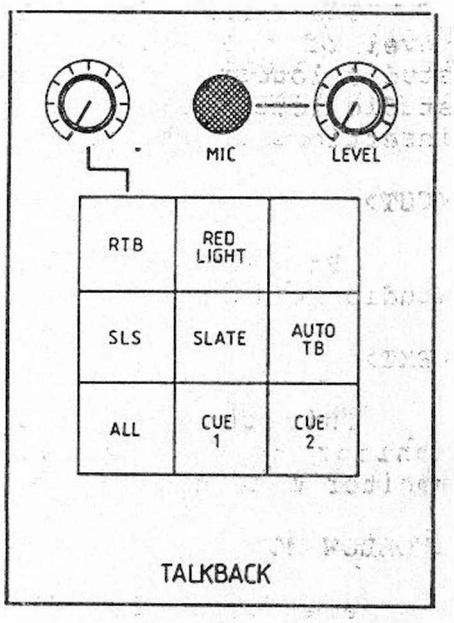
This button selects the studio monitor to follow the control room monitor external source selector.

<FOLLOW MON>

Pressing this button selects the studio monitor to follow the control room monitor.

Level adjustment is provided by the rotary control above the switches.

3.11 Talkback System



Talkback to various destinations is available as follows:

<CUE 1> Pressing either of these **<CUE 2>** buttons sends talkback to CUE 1 and CUE 2 respectively.

<ALL> Pressing this button sends talkback to all possible destinations.

<SLS> This button sends talkback to the studio loudspeakers.

<SLATE> Pressing this button sends a 30Hz tone with talkback to the multitrack and two track outputs.
The buttons listed above are momentary action (press and hold to talk).

<AUTO TB> This latching button opens Cue 1 and Cue 2 talkback channels when the multitrack is passive (parked or winding) but closes the talkback when in play.

<RTB> Return talkback from the studio to the control room is enabled when this button is pressed. Level adjustment to the small console loudspeaker is provided by the rotary control immediately above the **<RTB>** button.

<RED LIGHT> The studio warning light e.g. 'Recording In Progress' lights when this button is selected.