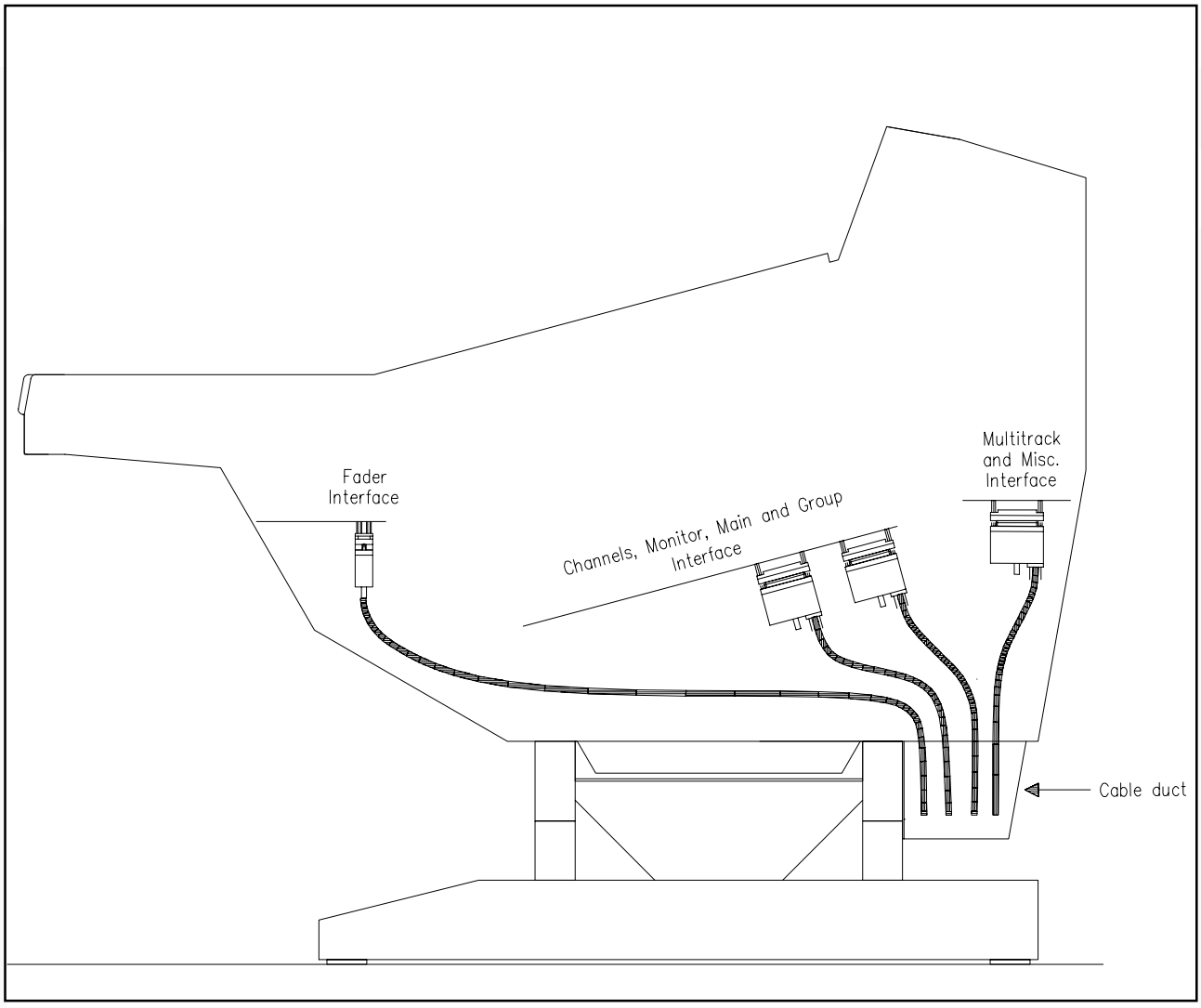
3.0
Installation & Commissioning

3.1 LAYOUT OF CONNECTORS



Note: Single fader frame does not have Fader Interface.

3.2 CONNECTORS TYPES

The connectors fitted to the console are VARICON 38 WAY & 56 WAY FIXED PLUGS (MALE).

The mating free socket details are listed below:-

Component	Calrec Ref.	Edac Ref.
Varicon 38 way free socket	400-040	516-038-000-401
Varicon 38 way metal hood	400-037	516-230-538
Varicon 56 way free socket	400-008	516-056-00-401
Varicon 56 way metal hood	400-038	516-230-556
Solder type varicon pins	400-025	516-290-520
Varicon pin extraction tool		516-280-200
Crimp type varicon pins	400-024	516-290-541
(XLR) Neutrik NC-3-FC	410-007	

3.3 CABLE TYPES

MIC LEVEL CIRCUITS.

For microphones a DOUBLE HELICAL SCREENED STRANDED CONDUCTOR INDIVIDUALLY JACKETED MULTIPAIR CABLE is recommended.
CANFORD AUDIO HSJ type or equivalent.

Size	Black	Blue
HSJ 4-pair	31-454	31-404
HSJ 8-pair	31-458	31-408
HSJ 12-pair	31-462	31-412
HSJ 16-pair	31-466	31-416

Note: Good quality individual screened pairs may also be used.

3.3 CABLE TYPES (cont.) LINE LEVEL CIRCUITS

For lines at standard level a FOIL SCREENED SOLID CONDUCTOR MULTICORE CABLE (BBC TYPE) is recommended. CANFORD AUDIO KSM type or equivalent.

Size	Ref.	BBC ref.
KSM 5-pair	31-305	BBC PSN 10/3
KSM 10-pair	31-310	BBC PSN 20/4
KSM 16-pair	31-316	BBC PSN 32/1
KSM 20-pair	31-320	BBC PSN 40/2
KSM 25-pair	31-325	BBC PSN 50/3

Notes: (i) If a more flexible cable is required, the Canford FSM SERIES or equivalent may be used.
(ii) Individual screened pair wires may be used, but where possible, it is better to use multipair cables for less bulk, weight and cost.
(iii) Inputs are best wired self terminating where possible, for minimum noise and crosstalk.

3.4 CONNECTIONS

All audio connections are Varicon 56-way and 38-way, except the surround L.S. outputs are on XLR 3M connectors. Audio connections are all balanced.

Interface	Level	Impedance	Recommend max load
Microphone I/Ps VP38 - 1 per 4chs	-78/+18dBu	1.2K/7K5	-
Line I/Ps VP56 - 1 per 12chs (plus VP38s St Lne)	-24/+18dBu	10KΩ	-
Insert Go VP56 - 1 per 12 chs (VP56)	0dBu	≤40Ω	600Ω
Insert Return VP56 - 1 per 12chs (VP56)	0dBu	20KΩ	-
Direct Outputs VP56/16 - 1 per 12chs (VP56)	0dBu (+10)	≤40Ω	600Ω
External Cuts/VCA ctrl/ Fader on - VP56 1 per 12chs (8 Grps)	5V/0V operate	-	-
Directs I/Ps VP56	0dBu	20KΩ	-
Auxiliary Outputs VP56	0dBu	≤40Ω	600Ω
Main Outputs VP56	0dBu	≤25Ω	600Ω
LS O/P XLR 3M	0dBu	≤40Ω	600Ω
Monitor LS I/Ps VP56	0dBu	20KΩ	-
Optional additional Monitor I/Ps VP56	0dBu	20KΩ	-
Main D.C Interface (Cuts/ Dims/Tone/TB etc) VP56	5V/0V operate	-	-
Optional multitrack outputs VP38	0dBu	≤40Ω	600Ω
Optional Compressor/ Limiter conns			
Inputs VP56	0dBu	20KΩ	–
Outputs VP56	0dBu	≤40Ω	600Ω

* Note - Levels maybe 4 or 6dB higher dependant on reference level

3.5 EARTHING

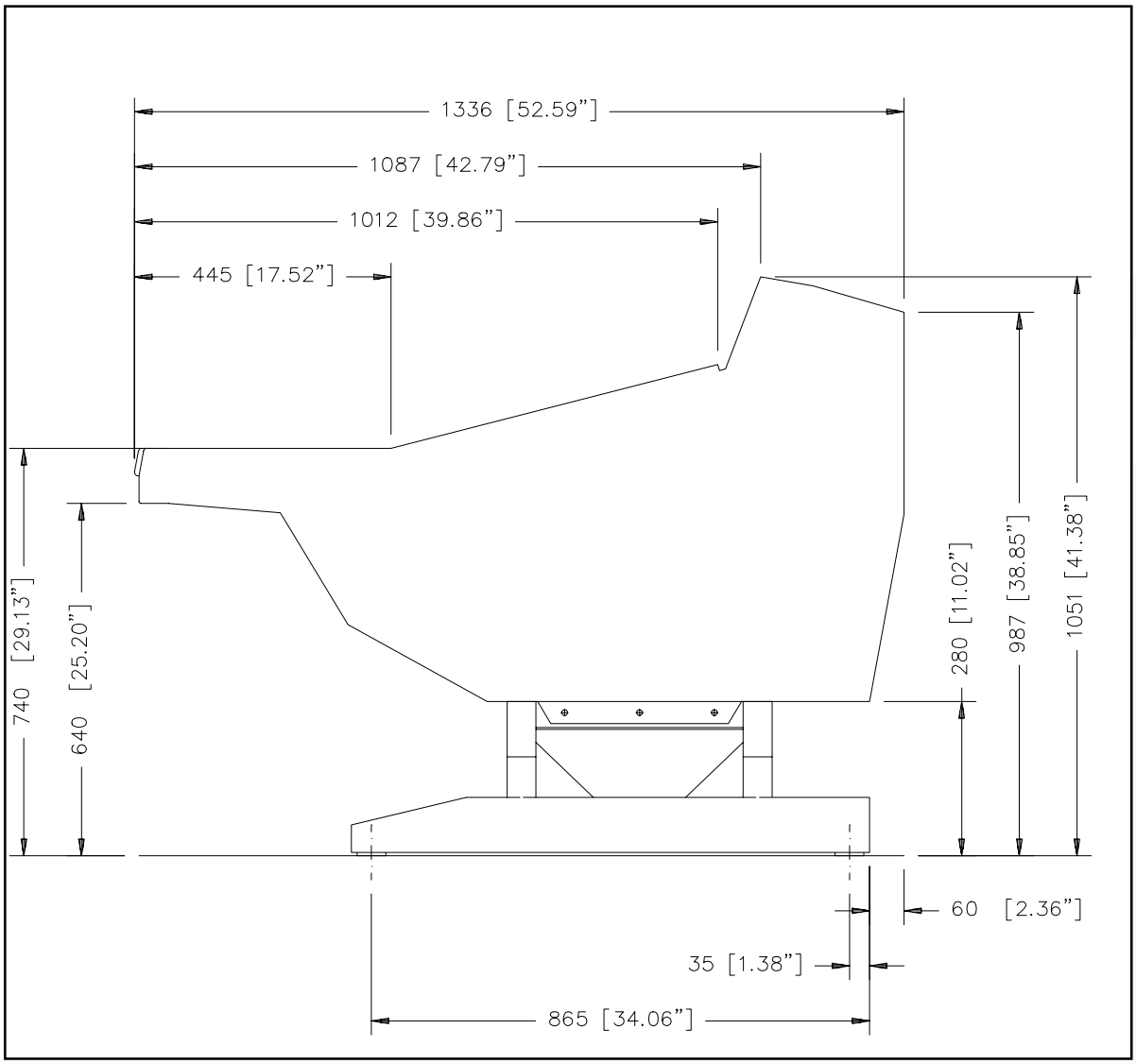
The earthing system within the console is the subject of great care and design. The analogue centre rail (CR), the dump centre rail (DCR) and the logic 0 volts (0L) are kept separate from the chassis throughout and are only brought together at the power supply interface close to the TECHNICAL EARTH bolt.

This should be connected to a good, clean earth preferably not associated with mains power supply by a substantial piece of cable.

Power supply chassis are connected to mains earth and although this connection is brought into the console at each power unit interface, it is only used for the grounding of filters used to remove mains borne interference. The DC power supplies are totally isolated from earth until they reach the technical earth.

Multi-pin audio and other interfaces all carry pins labelled CR (audio supply centre rail) and CH (Chassis). Generally multicore cable sheaths should be connected to CHASSIS to maintain full screening at the interface. Logic interfaces will generally have a 0L (logic ground) provided, and external logic switching circuits etc. should use this connection.

3.6 DIMENSIONS & WEIGHTS



Overall console length including stand.
Studio Console:

24 channel =	1260mm	[49.6"]
36 channel =	1626mm	[64.0"]
48 channel =	1992mm	[78.4"]
60 channel =	2358mm	[92.8"]
72 channel =	2724mm	[107.2"]

Outside Broadcast Console:

24 channel =	1158mm	[45.6"]
36 channel =	1524mm	[60.0"]
48 channel =	1890mm	[74.4"]
60 channel =	2256mm	[88.8"]
72 channel =	2622mm	[103.2"]

Approximate console weights:

24 channel =	145Kg	[319lbs]
36 channel =	175Kg	[385lbs]
48 channel =	205Kg	[451lbs]
60 channel =	235Kg	[517lbs]
72 channel =	265Kg	[583lbs]

3.7 POWER SYSTEM

The console is designed to operate with the following power supplies:

+18A/CR/-18A	=	analogue power
9L/0L	=	logic power
48V/CR	=	microphone phantom power
CR = Centre Rail	=	Analogue ground
OL = Zero Volt Logic	=	LEDs, Lamps & Logic ground.

The analogue power is used internally in the modules to derive +10V and -10V regulated reference voltages and also +5A (and sometimes -1A or -2A) for CMOS analogue switches.
The 9L is internally regulated to 5L for logic circuits.
Power supply units each provide all 3 supplies simultaneously in the correct proportions:

+18A/CR/-18A	at 5 amps.	] Maximum.
9L/0L	at 5 amps.	
48V/CR	at 0.3 amp.	

These supplies are isolated and diode protected so that they can be parallelled and CR, 0L grounded at the console. Each power supply is connected to the console DC interface by an 18 core cable and heavy duty 19-pin plugs and sockets.
Each rail in each power unit is separately monitored, and provided all 4 are good in a given unit a monitor line to the console in the DC connecting cable is held low. High = a failure
All power supply monitor lines are brought together at the power supply interface unit such that if any section of any power supply unit fails, a PSU FAIL lamp flashes. This may be cancelled to avoid irritation but will resume flashing if another section fails or when the desk is switched off and on again. The power supply units will operate correctly at 10% below normal mains voltage.

3.8 POWER CONSUMPTION

It is usual to provide spare capacity when the choice of the number of power supply units is made to allow for a failure without affecting performance. This is known as a "hot spare".
It also helps to share the load and keep the power supply units running at a reasonable temperature. Generally the number of power supply units provided (including a "hot spare") and the power consumption is approximately as follows:
Note: These figures assume approximately one third of the channels being stereo.

Console	No. of PSU's	Audio Amps	Logic Amps	Mains loading
36ch	5	18	15	1400W
36ch with m'trk	6	20	20	1600W
48ch	6	23	18	1800W
48ch with m'trk	7	25	23	2000W
60ch	8	28	21	2200W
60ch with m'trk	9	31	26	2400W
72ch	9	33	24	2550W
72ch with m'trk	10	36	29	2800W
84ch	10	38	27	2950W
84ch with m'trk	11	42	33	3300W
96ch	11	43	30	3350W
96ch with m'trk	12	47	36	3700W

3.9 PRE POWER CHECKS

Before connecting mains power to the power units ensure that the voltage tapping on each unit is set for the mains voltage in use. This is done at the factory prior to shipping for the given customer. Confirmation is given by a label on the back of each power supply unit. Ensure that all fuses are intact and that they are the correct rating as marked.
Each power supply unit may be energised individually, disconnected from the console if desired to ensure correct LED indication.
Power supplies should then be connected to the console by the connections leads provided, and to the mains supply (switched off) which should then be switched on energising all the power supply units simultaneously. The units are fitted with a time delay mechanism to reduce the inrush of current in this condition.
Ensure that all the LED's are illuminated on the PSU's and that the PSU FAIL indicator is not lit. (If it lights initially then cancel it and ensure it remains off.)
Check some desk selections and observe correct led indication.

4.0 Operation

4.1 GAIN & INPUT SETTINGS

Connect a source to a channel input & select as follows:-

Mono	Mono Mic 1	- ensure LINE & IP2 are not pressed (red LED)
	Mono Line 1	- select LINE (green LED) and ensure IP2 is not pressed
	(Mic or Line 2	- select MIC or LINE & press IP2 - yell LED)
Stereo	Stereo Mic	- ensure LINE is not pressed (red LED)
	Stereo Line	- select LINE (green LED)
Stereo Line	Stereo Line 1	- ensure IP2 is not pressed
	(Stereo Line 2	- select IP2 - yell LED)

If the source is a microphone, turn up the switched GAIN control and adjust the TRIM (if necessary) until the bargraph in the fader shows a level which should just occasionally illuminate the yellow LED. (The balance control can be adjusted later).
The microphone can be phantom powered by pressing the button marked 48V (red LED) and if necessary, phase reversed.
A line source would probably not need a switched gain away from the 0dB position although a restricted range is available. Adjust the TRIM if necessary for the level described above. An M/S microphone in a stereo input can be converted back to Left-Right by pressing M/S (red LED).
Mono inputs to a stereo channel can be sent down both stereo legs by use of LB (Left to Both), RB (Right to Both) when the balance control is inoperative or LB+RB when the balance control pans across both inputs (for two mono feeds) and feeds both outputs with the same panned signal. Press the channel PFL button and the source should be heard in the PFL loudspeaker, in stereo if so connected.

4.2 ROUTING

Select one of the eight stereo Groups or one of the two Main stereo outputs on the channel output selectors.
If a group is selected, then patch that Group if not normalled to a channel and select that channel to a Main Output.

4.3 FADER

Fade up the channel, the channel/group (if selected) and the selected Main to about 0dB on the faders. It should now be possible to hear the source on the main loudspeakers by pressing the channel, (and channel/group if selected), AFL button.
The input balance control can be adjusted if necessary on a stereo source in this condition.

4.4 MONITOR

Select STEREO LINE on the LS1 MONITOR panel & ensure no other buttons are pressed. The source should now be heard in the loudspeakers.
The monitor panel allows selection via 2 selector banks of Group Outputs, Auxiliary outputs as well as principal console outputs, Desk or Line (before and after tone insertion) together with a range of external inputs chosen by the customer.
A number of buttons associated with stereo monitoring allow either stereo leg to be cut, a mono reduction to be heard on the left or both loudspeakers and left or right to be heard on both loudspeakers. Right phase reverse is also provided.
There is a bright red LED AFL indicator to warn the operator when the AFL is selected from a channel or group.
The monitor output is provided with Gain & Balance controls and Cut & Dim buttons, the latter having a trim for the amount of 'dim'.
Provision is also made for alternative small loudspeakers and adjustment of AFL & PFL levels. A separate headphones level control sets a headphones output.
There is a separate (optional) LS2 MONITOR panel providing a further 24 external input selections which can be heard on LS1 by selecting SEL 3 or heard on a second pair of stereo loudspeakers controlled by additional Gain, Balance, Cut & Dim (with adjust) controls.There are separate left & right cut buttons on LS2 together with a button for hearing a mono reduction in both loudspeakers also one for right phase reverse.

4.5 METERING

With the source still operative and faded up the signal can be seen on the main meter when selected to M1 Line or M1 Desk (assuming Main 1 is in use).
The principal metering may be restricted to Line, Desk & Tone together with provision for switching to M/S (with S +20dB) but if so, another meter is usually provided which allows the following selections:-

Main 1 Line
Main 1 Desk
Main 2 Line
Main 2 Desk
Monitor Sel 1
Monitor Sel 2
Monitor Sel 3
APFL
LS Sel (follow loudspeaker 1 selection)
Tone
M/S & S +20

It should be noted that mono sources are fed to both legs of the stereo selectors on the Monitor LS panels. This means that when metering a mono source, both needles (bars) move correctly together.
However if M/S is also selected the 'M' needle (bar) will read 3dB high & this may be misleading. There are optional internal switches on the metering system to correct this situation when mono sources & M/S are selected together.

4.6 EQUALISATION & FILTERS

Now the source can be metered as well as heard it is possible to experiment with equalisation & filters. Select FILTERS (green LED) and try the effect.
The low frequency (high pass) filter can be adjusted continuously between 16Hz & 360Hz. The high frequency (low pass) filter can be adjusted continuously between 2K & 40KHz.

The equalisation is in 4 bands. Select EQ (red LED).

All four bands can be set up or down to a maximum of 15dB around a frequency set by a second knob in each band.
The bands cover HF (High Frequency) 1-16KHz, HMF (High Mid Frequency) 500-7.5KHz, LMF (Low Mid Frequency) 160-2.4KHz and LF (Low Frequency) 30-470 Hz ranges. The Q of each band is about 1.0 unless the H1 Q button is pressed (a narrower mid-band symbol) when it becomes approx. 2.5 for the LMF and HMF bands.
A button marked with a shelf symbol sets the LF and HF bands to shelving.

4.7 AUXILIARIES

These may be set on the channel or group in use by simply pressing the ON (Green LED) button on the Auxiliary to be used. In the case of Aux 5 & 6, 7 & 8 or 9 & 10, they have a common gain control, the outputs of which can be routed to either or both of their outputs.
The selection is normally POST fader and the led will be green but it may be set PRE fader by pressing the PRE button when the LED goes red.
The gain of the Auxiliary feed may be adjusted if required. Line-up is marked close to 2 o'clock. There is 5dB in hand above this.
On Consoles with in-line monitor 'path returns' it is possible to feed the Auxiliaries from monitor using the MON (Yellow LED) buttons.
Auxiliaries gain knobs are coloured as follows:-

1	Green
2	Red
3	Orange
4	Yellow
5/6	Blue
7/8	Grey
9/10	Black

These colours are repeated on the Auxiliary Master controls on the Auxiliary module panels. Here are provided Master Gain controls with 10dB in hand above line-up (at 12 o'clock) & bargraph level meters. Each output has a CUT button and the stereo outputs can be set to MONO.
It is possible to monitor and meter (on the main meter) an Auxiliary by selecting it on the LS1 MONITOR panel & following it on the meter by selecting LS SEL.
The CUT button does not cut the monitor & meter feeds.

4.8 MULTITRACK CONTROL

Multitrack Control Panel (MT4320)

The Multitrack Control Panel provides controls for multitrack routing, track AFL, channel assignment, routing interrogation and memory access. Section 3 will deal with the memory operation.

Channel Assignment

The Multitrack control panel may have up to 96 channel assignment buttons. The number of assign buttons depends on the size of the console. The channel assignment button selects the track routing controls to this channel. Only one channel may be selected at any time. The assigned channel is indicated by a green led. Pressing any assign button will cancel INTERROGATE mode. When in INTERROGATE mode, reverse interrogation is indicated by a green led.

Track Routing / AFL

There are 32 track routing buttons. When in TRACK ROUTE mode these buttons are used to select / de-select a track route from the assigned channel. A green led is used to display a selected route.

In AFL mode the buttons are used to select / de-select a track AFL. A red led is used to indicate a selected AFL.

In INTERROGATE mode the buttons become momentary and are used to reverse interrogate track routing.

In ROUTE TONE mode the buttons are used to select / de-select tone to tracks. Yellow led indication.

FROM MONITOR

Large button with red led indication. Selects the monitor path, on the assigned channel, to feed the routed tracks.

Route mode

Green led indication. Puts the track routing buttons into TRACK ROUTE mode. Cancels INTERROGATE mode, AFL mode and ROUTE TONE mode.

AFL mode

Red led indication. Puts the track routing buttons into AFL mode. Cancels TRACK ROUTE mode, INTERROGATE mode and ROUTE TONE mode.

Interrogate mode

Yellow indication. Puts the track routing buttons into INTERROGATE mode. Cancels TRACK ROUTE mode, AFL mode and ROUTE TONE mode.

Route tone mode

Red led indication. Puts the track routing buttons into ROUTE TONE mode. Cancels INTERROGATE mode, TRACK ROUTE mode and AFL mode. Can be disabled when On-Air.

Omni tone

Red led indication. Selects tone to all track outputs. Can be disabled when On-Air. This button is only active when in ROUTE TONE mode.

Multitrack Bargraphs (MY4385)

There are 32 bargraphs with a button and led for each track output. The buttons are used to select / de-select track AFL only. Red led indication.

Reset Panel (TY4321)

Reset/Error

Large button with red led which indicates the error status of the processing system. When enabled the Reset button can be used to reset all the Transputers in the processing network.

On-Air panel (YW4325)

On-Air

On-Air status is fed into the control system to allow tone to track outputs to be inhibited.

AFL

Track AFL status is fed into logic for AFL led.

Channel module (PQ4641)

The channel module PRE/POST or DIRECT leds indicate that one or more tracks are routed from the channel path.

Fader module (IM4644)

The fader module has a 'Multitrack' led to indicate that one or more tracks are routed from the monitor path.

4.9 MULTITRACK MEMORY CONTROL

The software control system provides the facility for storing up to 99 multitrack memory settings. The controls for the memory system are provided on the Multitrack Control panel.

Numeric keypad
Used to select a memory number between 01 and 99. The numbers appear in the User window.

Lock Red LED
This puts the control pael into safe mode. When selected it prevents any changes to the routing, prevents any Tone selection and prevents memory LOADing. AFL, INTERROGATE and SAVE functions remain operational.

Status window
Displays memory status information. 'Valid' indicates that the contents of the memory location are valid. 'Free' indicates that the memory location is available for use. 'Erasing' indicates the a memory location is currently being erased. 'Erased' indicates that the erase operation is complete.
This window may also be used to display fault reports.

User window
Displays information as entered by the operator at the key pad. Also used to request confirmation of load/save/delete/clear operations.

Load
Requests a load operation. This can be done in either of two ways: selecting the memory number via the numeric keypad then pressing load or, pressing load then selecting the memory number. The user is always required to press the enter key to initiate the load.

Save
Requests a save operation. The operation of this function is similar to the 'Load' operation.
The user is always required to press the enter key to initiate the save.

Enter
This button is for confirmation.

Clear
This button is used to cancel an operation when prompted for confirmation.
In TRACK ROUTE mode, this button clears all track routes on the assigned channel.
Can be inhibited when On-Air.
In AFL mode, this button clears all track AFLs.
In ROUTE TONE mode, this button clears all tone to tracks selections.

Shift
The shift key is used to obtain additional functions on the keypad.
Shift-1 searches backwards to find the previous free memory location.
Shift-3 searches forwards to find the next free memory location.
Shift-4 steps backwards through memory locations.
Shift-6 steps forwards through memory locations.
Shift-Clear erases a memory location.

4.10 MULTITRACK ADDITIONAL INFORMATION

Clear FlashRom Memories: If SHIFT + CLEAR are held down during boot-up, the user window indicates CLR FROM and the operating system erases the entire FlashRom and regenerates the line-up and cleardown memories.

Line-up/Cleardown Memory: The first time a console is ever booted (normally in the factory) it requires a memory to boot with and so two factory default memories are generated; line-up and cleardown (memories 98 & 99). Memory 99 is used as a starting point when the FlashRom has been erased.
For the purposes of the multitrack routing system these memories are identical.
They contain no track routes and force the channel assignment to CH1. Line-up and Cleardown memories can be deleted or overwritten as required.

Hidden memory: This is the name given to memory 0. The operator does not have access to the hidden memory and it is maintained exclusively by the control system. The hidden memory is updated approximately every 24 seconds, providing the control system is not in use.
The console always boots up with the hidden memory.

Boot up: When the console boots up, all memories are transferred from FlashRom to DRAM. It is necessary for all memory locations to be valid in DRAM whether the user has saved anything to them or not. If a memory location has not been used i.e. FREE, a copy of the hidden memory is put in it. Therefore if any FREE memory location is loaded onto the console it will be a copy of the hidden memory on boot up.

Delete: This function is used to free up a memory location. When deleted, the contents of the memory location are not erased, just flagged as FREE or available for use. The FREE location can be loaded if required and will still contain the same information. The advantage of this is that it provides an undelete feature. NB: if the console is re-booted the FREE location with be filled with a copy of the hidden memory.

Shutdown: The FlashRom Operating System (FROSTY) manages the memory system in the console. When a power-fail is detected either by turning the power off or by other power failure, the software control system informs FROSTY and two courses of action may be taken:

1) During normal operation FROSTY will indicate 'SHUTDOWN' in the status window and self-terminate. The control system will continue running for a short but indeterminate amount of time before stopping. The console now requires a reset.

2) If FROSTY is part way through an important memory management operation, it will suspend the operation and indicate 'POWER!!!' in the status window. If the power is restored it will indicate 'POWER OK' in the status window and complete its operation before 'SHUTDOWN'.

FROSTY: As the power may be removed completely during memory management operations FROSTY will indicate its start-up status when next booted and report any problems.
The following start-up messages may be observed:

RUNNING	- start-up OK. FROSTY has resumed normal operation.
CLEAR	- start-up OK. FROSTY is resuming an operation previously terminated.
FIXED	- problem detected on start-up. FROSTY has attempted to fix the problem.
BK ERASE	- FROSTY has had to erase a memory block, data may be lost. This message should never been seen on boot-up. Indicates a serious problem.

4.11 DIRECT OUTPUTS & MIX MINUS

Each channel has a Direct Output - at balanced line level with a gain control, pre/post fader select, Talkback (momentary) select button and LISTEN (momentary) select button.
There is 10dB in hand on the gain control. The pre button position may be internally selected to be pre eq or pre fader.
Associated with the channel Direct Outputs are 2 mix minus systems. These are mono and consist of 2 select buttons to 2 Bus's (1 & 2) (internally selectable pre/post fader) and 2 select buttons to the Direct Output (1 & 2, 2 having priority over 1).
When a number of channels are connected to Bus 1 (for example) and one channel is selected by button 1 to the O/P (Direct Output) then those channels so selected including that selected to be the output mix together to that output.
If the channel selected to be an output is also making a contribution to the bus, then its input is cancelled on the channel direct output.
This allows a whole matrix of channels to be set up in a MIX MINUS system where the contribution from each channel is not heard on the channel Direct Output but all the other channels are heard.
The Direct Output would in this case be fed to a Studio Loudspeaker with no contribution from the local microphone (due to the Mix Minus).
A group of studios are typically linked in this way where each studio hears contributions from all other studios via the loudspeaker.
It is possible using Busses 1 & 2 to set up 2 such matrices simultaneously. The mix minus system may be internally selected to be pre or post fader.

4.12 TONE

A Tone oscillator is fitted to the console which can be set to 12 switched frequencies:-

20Hz	30Hz	50KHz	100Hz
200Hz	500Hz	1KHz	2KHz
5KHz	10KHz	15KHz	20KHz

The output from the oscillator is 0dBu or +4dBu (balanced) at very low impedance (to avoid loading effects) but this can be trimmed $\pm$10dB.
There is a button to reduce the output level -60dB and another one to substitute PINK NOISE.
The tone may be selected to all group Direct Outputs and to each Main Output and to Multitrack outputs. On Main outputs the tone is injected after the DESK outputs and thus appears only at the LINE outputs.
This allows rehearsal to continue by monitoring the Desk Outputs whilst sending an alignment tone to Line.
Another button indicates a stereo identification system with sequences of short interruptions which can be observed on the meters to confirm left and right.
Further detail of this is given in Section 5.6.
There is an additional facility providing speech indentification of left and right outputs interspersed with the interrupted tone sequence.
The Tone oscillator is immobilised when the ON-AIR button is selected even when switched on.

4.13 TALKBACK

The console is fitted with a talkback microphone and amplifier with automatic gain control. The gain can be set for a given operator on a separate gain control and should then remain reasonably constant despite his movements.
The talkback can be selected to several destinations.

Main 1 through 4
Aux 1 through 10 or Aux Master (all 10 simultaneously)
Slate (all Multitrack outputs)
External outputs 1 to 3
Studio Talkback
Omni - all selections simultaneously

The talkback to Main Outputs & Omni is inhibited when ON AIR is selected.
The Slate output to Multitrack is accompanied by a 30Hz low level tone (Slate oscillator) for tape search when spooling.
There is a reverse talkback system comprising an input intended to be from the studio with a gain control (RTB) and a second external input with a gain control (EXT). The reverse talkback is fed into the PFL mixer left input.

4.14 STUDIO LOUDSPEAKER

Provision is made at the top of the console for feeding signals to loudspeakers and headphones in the studio.
Selections can be made as follows:-

Main 1 (Desk)
Main 2 (Desk)
External inputs 1 to 3
LS (Follow Monitor LS Selection)

There are separate gain controls for the loudspeaker and phones outputs which are in Stereo. There is a CUT button & cut is automatic in certain conditions to avoid howl round - see section 5.10.

4.15 COMPRESSOR/LIMITERS & EXPANDER / NOISE GATES

The DL3678 & DF4041 modules, several of which may be fitted in the upper part of the console, are outboard units requiring to be connected to the channel, group or main insert. They operate at standard line level (0dBu) and are balanced in & out.
The first unit comprises separate limiter & compressor circuits with a common gain reduction bargraph up to 24dB. Limiting is shown separately also on a Peak Limit LED. The limiter & compressor may be switched in independently & the complete module can be bypassed - when the DYN button is not pressed.
In all off conditions the effect of the limiter & compressor may be observed dimly on the gain reduction bargraph.
The second unit is similar in principle being an expander with a separate noise gate circuit.

The compressor has the following controls:-

Ratio:	:	1.5/10 variable
Threshold:	:	-20/+10dB variable
Attack:	:	Normal 4 m sec at 5:1 Fast 0.2 m sec at 5:1
Recovery:	:	0.1 to 4 secs variable with AUTO facility which is 0.1 to 1.5 secs dependent on programme
Make-up gain:	:	0 to 20dB variable
Voice-over:	:	Line level balanced input (may be used when compressor is OFF)
Compressor:	:	ON button with yellow LED
Links 1 & 2:	:	Buttons to connect to 2 link busbars

The limiter has the following control/features:-

Ratio:	:	Fixed 100/1
Threshold:	:	-4/+16dBu variable
Attack:	:	Fixed 100u secs
Recovery:	:	0.1 to 4 secs variable with AUTO facility whichis 0.1 to 1.5 secs dependant on programme
Peak Limit:	:	Yellow LED
Limiter:	:	ON button with yellow LED

The compressor and limiter normally respond to the higher of the left and right signals. An internal option allows the mono reduction of left and right (-3dB) to take control if the stereo coherence is such that this exceeds left or right. This renders it unnecessary to under-drive the stereo outputs which an operator may otherwise do to guard against the possibility of a higher than desired mono level.

The expander has the following controls:-

Ratio	:	Normal, varies with level 1.5/1 to 5/1. Fixed 2/1 (button)
Threshold	:	0/-40dBu variable
Attack	:	Normal 4 m-sec. FAST (button) 50 u-sec
Recovery	:	75ms to sec variable
Depth	:	0/40dB variable (extent of expansion below threshold)
Bargraph	:	Up to 20dB gain reduction
Links	:	1 & 2 to external busses or pairs

The noise gate has the following controls:-

Gate	:	Button with LED indication. All expander controls apply except Ratio becomes infinite.
Gate Delay	:	0/1 sec variable - in addition to normal 6dB gate hysteresis.
Both units:-		
DYN-IN	:	Button with LED indication - when OFF gives total bypass condition except that bargraph operates as a preview at reduced intensity.

These units may be used in MONO by ignoring right channel.

5.0 General Information

5.1 SPECIFICATION

Measurements are with 22-22KHz filters unless otherwise stated. All specifications are in the frequency range 40-15KHz unless otherwise stated. Measurements specified are with equaliser and dynamics out of circuit. 0dBu = 0.775 volts RMS dBq = CCIR QUASI-PEAK

Inputs

All inputs are normally electronically balanced. Mic inputs have transformer option.

Sensitivity: (in 6dB steps)	Mic 1 & 2	=	+12dBu to -72dBu Electronic I/P -12dBu to -72dBu Transformer I/P
	Line 1 & 2	=	+12dBu to -18dBu
Trim range:	Mic & Line I/P's	=	±6dB
Maximum input levels:	Microphone I/P's	=	+24dBu
	Line level I/P's	=	+28dBu

Line 1 & 2 circuits will operate normally with up to +50V at the input.

Input impedance:	Mic Electronic	=	≥1.2KΩ -24 to -72dBu (Hi gain) ≥7.5KΩ +12 to -18dBu (Lo gain)
	Mic Transformer	=	≥1.2KΩ (Full range)
	Line level I/P's	=	≥10KΩ

Common mode rejection (CMR)

Mic Electronic - hi gain - 200Ω source	=	>75dB at 1KHz >60dB at 15KHz
Mic Transformer - Full range - 200Ω source	=	>80dB at 1KHz >65dB at 15KHz
Line 1 & 2 - 40Ω source	=	>60dB at 1KHz >40dB at 15KHz
Other inputs (Insert Returns, Dir & Tape I/Ps) -40Ω source	=	>40dB at 1KHz

Outputs

Maximum output levels:	Principal outputs (transformer) incl. Main Line Outputs 1-4 (Stereo & Mono) and all auxiliaries.	=	+28dBu into 10KΩ +25.5dBu into 600Ω at 1KHz
	Other outputs (electronic)	=	+28dBu into 10KΩ +25.5dBu into 600Ω

Output impedances:	Transformer	=	25Ω
	Electronic	=	40Ω
Output balance:	Transformer	=	-40dB at 1KHz
	Electronic	=	-40dB at 1KHz
Output common mode rejection:	Transformer	=	-70dB
	Electronic	=	-50dB

Outputs can withstand an input of +12dBu from a source impedance of 10Ω. All main, auxiliary & direct outputs can withstand phantom power backfeed.

Headroom

Microphone inputs:	=	36dB with 8dB of auto gain ranging
All other inputs to outputs at 0dB gain	=	28dBu

Fader Tolerances	Working range ±10dB	=	±0.5dB
	-10 to -30dB	=	1dB
	Below -30dB	=	±5dB

Frequency Response

Into 600Ω or 10KΩ in parallel with 22nF all settings.

Mics & Lines = ±0.25dB 40Hz to 15KHz

Microphone inputs have fixed LF/HF filters.

(measured to main O/P) 12dB/octave = ≤ -6dB at 10Hz; ≤ -18dB at 100KHz (contin. falling)

Phase Difference Left to Right = ≤ 5° (no EQ); ≤ 15° (with EQ)

Harmonic Distortion

Mic & Line inputs from 200Ω & 40Ω respectively to outputs in 600Ω

+6dBu, 40Hz to 5KHz = ≤ 0.04% (-68dB)

+20dBu, 40Hz to 5KHz = ≤ 0.1% (-60dB)

Noise

1 Channel from line input (terminated with 40Ω) at line up 0dB via channel set as group to main output = -85dBu RMS; -74dBq

48 Channels routed but faded down via channel set as group to Main output at 0dB = -82dBu RMS; -71dBq

1 channel to track output at 0dB = -86dBu RMS; -75dBq

Microphone equivalent input noise (200Ω termination): Hi gain = -127dB RMS; -116dBq (CCIR); -126.5dB RMS + transformer input

Crosstalk

Mic & Line inputs from 200Ω & 40Ω respectively to outputs in 600Ω signals at 0dBu.

Signal to mono channel via channel set as group to main output.

Measured at output of similar chain = ≤ -85dB at 1KHz; ≤ -75dB at 15KHz

Adjacent track outputs = ≤ -80dB at 1KHz; ≤ -70dBu at 10KHz

Mono channel panned left or right - measure right or left = ≤ -72dB at 1KHz

Left/Right on stereo channel = ≤ -70dB at 1KHz; ≤ -55dB at 10KHz

Cut off: Fader = ≤ -90dB at 1KHz; ≤ -80dB at 15KHz

Level pot = ≤ -66dB

Routing switch = ≤ -80dB

Cuts = ≤ -90dB at 1KHz; ≤ -80dB at 15KHz

Metering

A range of PPM and VU meters available. Stereo bargraphs with PPM or VU characteristics.

0dB Ref level can be set to 0dBu, +4dBu, +6dBu or +8dBu.

5.2 REPLACING & EXCHANGING MODULES

Modules and circuit cards may be removed and plugged in with the console switched on. It is advisable however to switch off before exchanging the 5 volt stabiliser and the processor cards in the multitrack section (if fitted).

5.3 STEREO WIDTH

The stereo width circuit may be seen in the CIRCUITS DESCRIPTION section - No.14 Stereo Processor. It is well known that the width of a stereo image is a function of the difference component of signal between left & right - usually given the symbol S

$$\text{and} \quad S = \frac{L - R}{\sqrt{2}}$$

The Mono component of a stereo image is M

$$\text{and} \quad M = \frac{L + R}{\sqrt{2}}$$

The stereo width control therefore passes left and right unchanged in the central detent, produces $\frac{L + R}{2}$ at each output in the MONO position (Same level as L or R alone) and produces 2L - R at the left output and 2R - L at the right output in the "WIDE" position with corresponding variable states in-between.

2L - R & 2R - L represent a considerable increase in the " S " component (width) ie.

$$S = \frac{(2L - R) - (2R - L)}{\sqrt{2}}$$

$$= \frac{3L - 3R}{\sqrt{2}}$$

$$= \frac{3}{\sqrt{2}} (L - R) \text{ (ie. X 2.12)}$$

5.4 M/S WORKING

From the above it can be seen that it is possible to carry Left & Right information in the form M and S (Sum & Difference).
This technique has been exploited in many areas of the audio industry over the years such as stereo microphone design using one omni (M) receiver and one gradient (S) receiver and then matrixing the M & S signals to produce left & right as follows:-

$$\text{Left} = \frac{M + S}{\sqrt{2}}$$

$$\text{Right} = \frac{M - S}{\sqrt{2}}$$

(These formulae are compatible in reverse as follows:-

$$M = \frac{L + R}{\sqrt{2}}$$

$$S = \frac{L - R}{\sqrt{2}}\ )$$

The advantage of course is that the M signal represents a mono reduction of L & R at an appropriate level which is always a requirement. The S series console channel inputs all have provision for M/S inputs and conversion back to L & R via the M/S button to the formulae above.

5.5 DESK & LINE OUTPUTS

All Calrec consoles have Desk & Line Main Outputs both Stereo & Mono. This is essentially a BBC technique where the alignment tone is injected after the desk outputs and before the line outputs (which follow the desk outputs).

This is so that rehearsal can proceed whilst monitoring the desk outputs & simultaneously sending a tone to line.The Line output is the principal console output but Desk outputs besides being used as above can be distributed to the Studio Loudspeaker and to other studios as required for cue purposes.

5.6 STEREO IDENTIFICATION SYSTEM

The stereo identification system circuit can be seen in the CIRCUITS DESCRIPTION section - No. 20, 2 sequences are available:-

1 EBU which interrupts the left signal only once every 3 seconds and does not affect the right signal.

2 BBC "GLITS" system which interrupts the left signal once every 4 seconds and interrupts the right signal twice in the intervening period. The period of the interruptions is such that it can easily be seen on a PPM or VU meter or bargraph The button to initiate these sequences is found on the TONE (oscillator) section. The sequences affect only the Main Output. In addition there is optional speech identification of left & right main outputs interspersed with the interrupted tones.

5.7 AUTO GAIN RANGING

The Q^2 series consoles have a basic headroom of 28dB above standard line-up level 0dBu (peaking at +8dBu). This approach produces an excellent noise performance throughout a channel particularly in the equaliser section which can produce the bulk of channel noise. The BBC and others in the past have required an input headroom of 32dB or even 36dB up to the channel fader particularly in Outside Broadcast situations where an unexpected input overload can occur and pulling back the fader does not remove the distortion. For these rare situations a new technique in design has been evolved at Calrec which allows the noise figure to be uncompromised for the majority of the time. Rather than have the headroom available the whole time (with a compromised noise figure) it is only made available for the brief period of high signal input, by exchanging input gain for fader gain.
This is in no way a compressor but simply allows the operator to control the gain on the channel fader up to 36dB input headroom for the duration of the high signal.
Pre-fed signals are in fact limited but they would be drastically overloaded anyway with a signal close to a normal headroom figure of 36dB.

5.8 LINE 2 TO AUX 10

This button found on the MASTER CONTROL panel automatically switches Mono Line 2 inputs and stereo line inputs directly to Aux 10 in lieu of the normal pre/post feeds Aux 9 is immobilised. The Aux 10 Leds confirm the connection. This allows Aux 10 which is a stereo buss to be used as a multitrack monitor system in stereo with pan controls from each track, on consoles which do not have the monitor faders.

5.9 REMIX

This button found on the MASTER CONTROL panel switches all channels to Mono Line 2 input and stereo line inputs. This is to allow multitrack tape replay through the console. The Line inputs are at standard 0dBu level in this condition with no input gain control. A track may be disconnected from this mode and reconnected to (say) a mic input by pressing the button marked DUB on the channel.

5.10 RECORD/REPLAY

These buttons on the MASTER CONTROL panel switch the signals (internally selected) on the MONO monitor faders to Record & Replay sources. The multitrack metering is also switched by these controls.

5.11 FLIP

This button on the MASTER CONTROL panel exchanges all channel faders with the monitor fader including CUT, AFL & PFL. Individual faders can be flipped separately or reverse flipped as required to opt out of the Master Flip.

5.12 INPUT 2 CHANGEOVER

This button on the MASTER CONTROL panel selects the Mic or Line inputs 2 on all channels (internally selected). Channels may be selected to Input 2 individually of course.

5.13 SLS/PA INHIBITS

CIRCUIT DESCRIPTION No. 15 refers to this principle.
Basically the Studio Loudspeaker is muted when (& only when) all the following conditions are met on any channel.

The channel is selected to MIC
The channel is routed to a GROUP or MAIN
The channel fader is off the backstop
The GROUP (if selected) is routed to MAIN
The group fader is off the backstop (if selected)
The main fader is off the backstop

The PA (Public Address System), which is deemed to be Aux 1 or 2, is only energised when the above conditions are met except for the mic selection. The PA inhibit is an internal option in the faders. The system allows PA only to be heard when the console is 'On-Air'.

5.14 SURROUND SOUND

A button on the channel modules marked SURROUND directs left and right signals to odd Groups and Main only and directs centre and surround signals to even Groups and Main.

A Front/Back pan allows the channel signal to be panned between front (L, R and centre) outputs and Surround output in addition to the normal left/right pan.

The Surround Sound monitor panel allows the DESK MODE to be set for normal STEREO, 4 TRACK and 5 TRACK. In the 4 TRACK mode, the outputs from the console are Main 1: Left and Right, Main 2: Centre and Mono Surround and the loudspeaker monitor outputs are provided at these positions. There are two outputs for Surround connected together. In the 5 TRACK Mode Left and Right Surround are taken and monitored separately from Auxiliary 10 Output thus featuring the Aux 9/10 pan control to move the Surround left-right across the rear sector.

The Surround monitor panel enables comparisons to be made between the two Surround conditions (as well as normal DESK STEREO), the ENCODER left-right signal (for compatibility) and the DECODER Surround presentation. This involves the connection of an external encoder and monitor decoder. Provision is made for the latter to be switched between STEREO, MONO and SURROUND when this facility is available on the decoder.

Finally two joysticks are provided for surround panning on a channel by feeding from a channel insert go as input (just left on a stereo) and returning the four outputs as follows:-

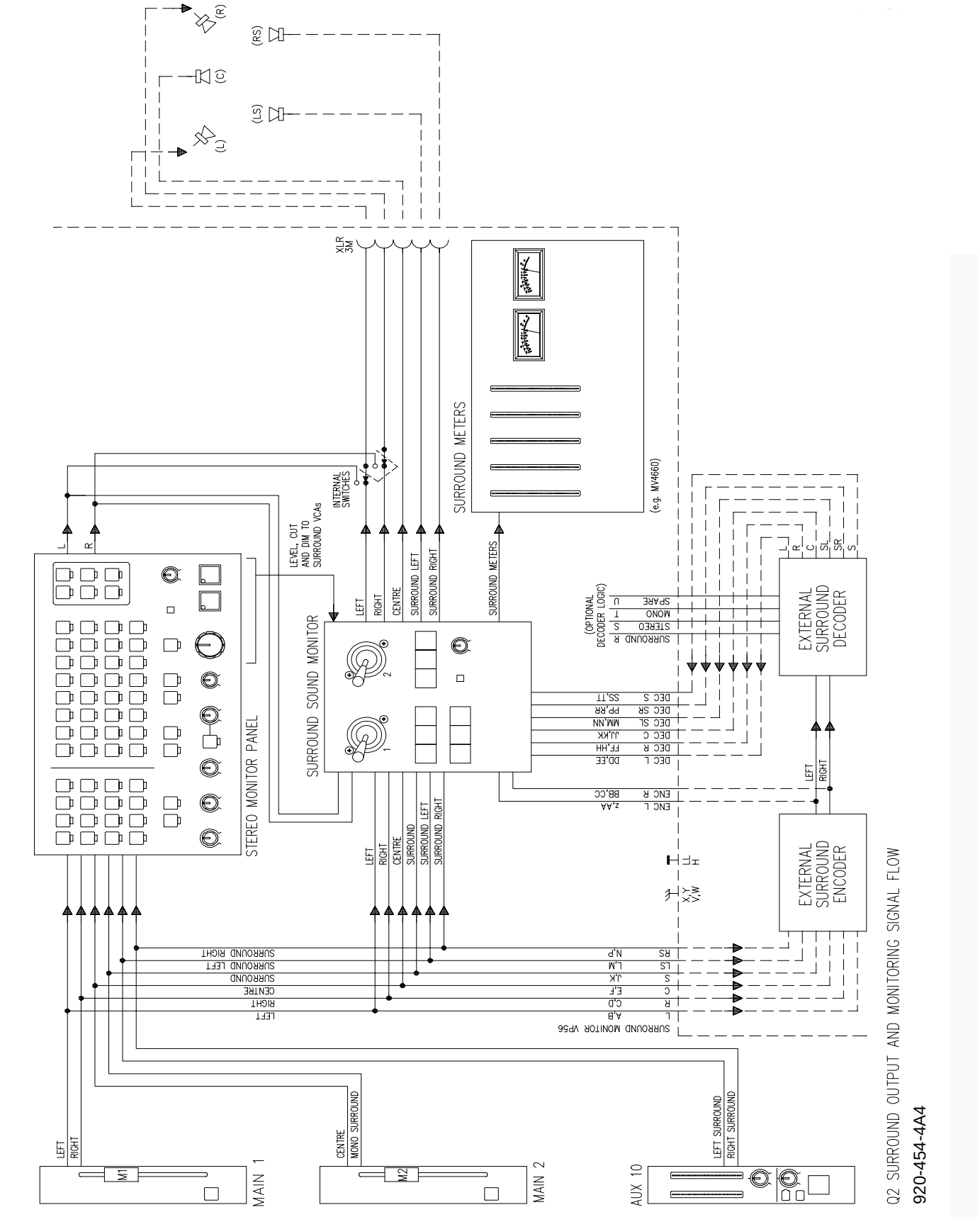
LEFT AND RIGHT FRONT RETURNS:-

1. To the insert return on the same stereo channel routed to an odd group or inputs.
2. To the insert return on another stereo channel routed as above.
3. To the direct input on a spare odd numbered group routed to the Main output.

LEFT AND RIGHT BACK RETURNS:-

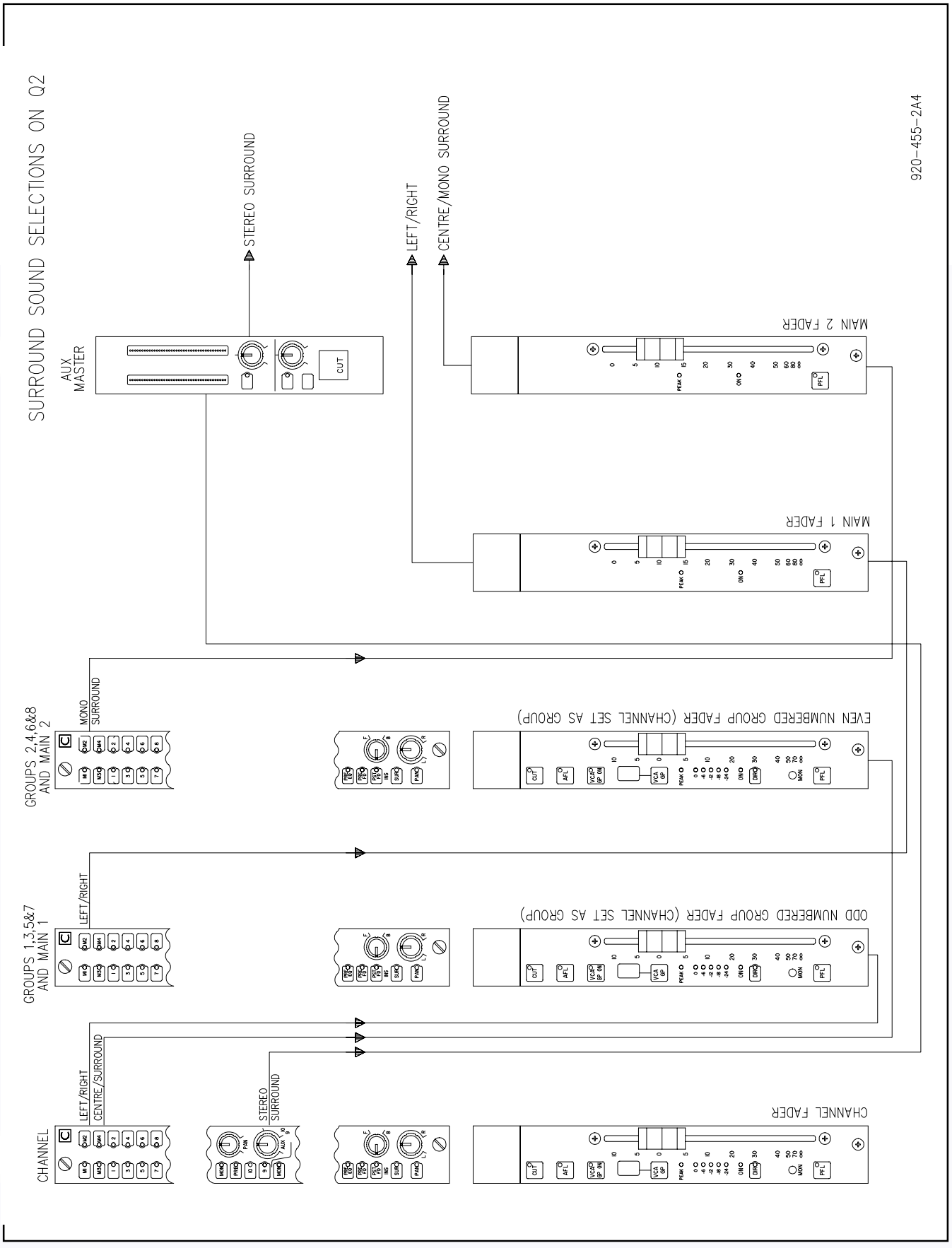
1. To the insert returns on a spare stereo channel with only the Auxiliary 10 active.
2. To the direct input on any spare group with only the Auxiliary 10 active.

See illustrations on the following 2 pages.



Q2 SURROUND OUTPUT AND MONITORING SIGNAL FLOW

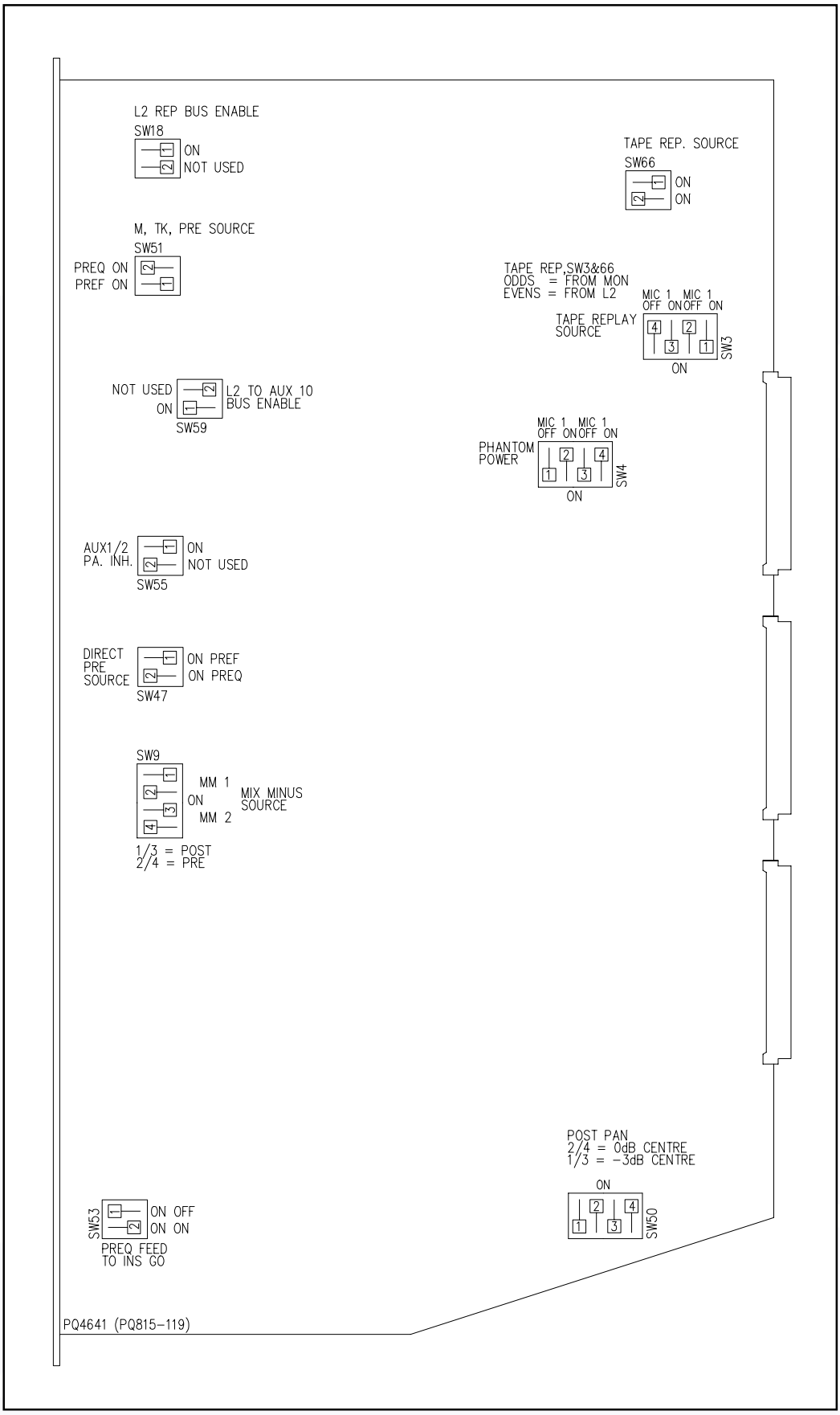
920-454-4A4


SURROUND SOUND SELECTIONS ON Q2
920-455-2A4
AUX MASTER
CUT
STEREO SURROUND
LEFT/RIGHT
CENTRE/MONO SURROUND
MAIN 2 FADER
MAIN 1 FADER
EVEN NUMBERED GROUP FADER (CHANNEL SET AS GROUP)
ODD NUMBERED GROUP FADER (CHANNEL SET AS GROUP)
CHANNEL FADER
GROUPS 2,4,6&8 AND MAIN 2
GROUPS 1,3,5&7 AND MAIN 1
CHANNEL
MONO SURROUND
LEFT/RIGHT
CENTRE/SURROUND
STEREO SURROUND
PFL
AFL
CUT
MON
DIR
VCA GP
VCA GP ON

6.0 DIL Switch Settings

DIL SWITCH SETTINGS **Page**

PQ4641 MONO MIC/LINE CHANNEL



PQ4641 MONO MIC/LINE CHANNEL DIL SWITCHES

SW53 PRE EQUALISER FEED to INSERT SEND OUTPUT (no insert selected)
SECT. 1 ON for NO FEED
SECT. 2 ON for PREQ FEED

SW59 LINE 2 to AUX 10 ENABLED from MASTER button
SECT. 1 ON for ENABLED (SECT. 2 not used)
SECT. 2 ON for PREQ FEED

SW9 MIX MINUS SOURCE
SECTS. 1 & 3 ON for POST FADER (SECTS. 1 & 2 = Mix Minus 1)
SECTS. 2 & 4 ON for PRE FADER (SECTS. 3 & 4 = Mix Minus 2)

SW55 AUX 1/2 PA INHIBIT (AUX 1 & 2 O/P's cut at fader off)
SECT. 1 ON for INHIBIT AUX 1
SECT. 2 ON for INHIBIT AUX 2

SW51 MULTITRACK PRE SOURCE
SECT. 1 ON for PRE FADER
SECT. 2 ON for PRE EQ

SW47 DIRECT OUTPUT PRE SOURCE
SECT. 1 ON for PRE FADE
SECT. 2 ON for PRE EQ

SW18 LINE 2 REPLAY BUS ENABLED (for REMIX or TAPE REPLAY via L2)
SECT. 1 ON for ENABLED (SECT. 2 not used)

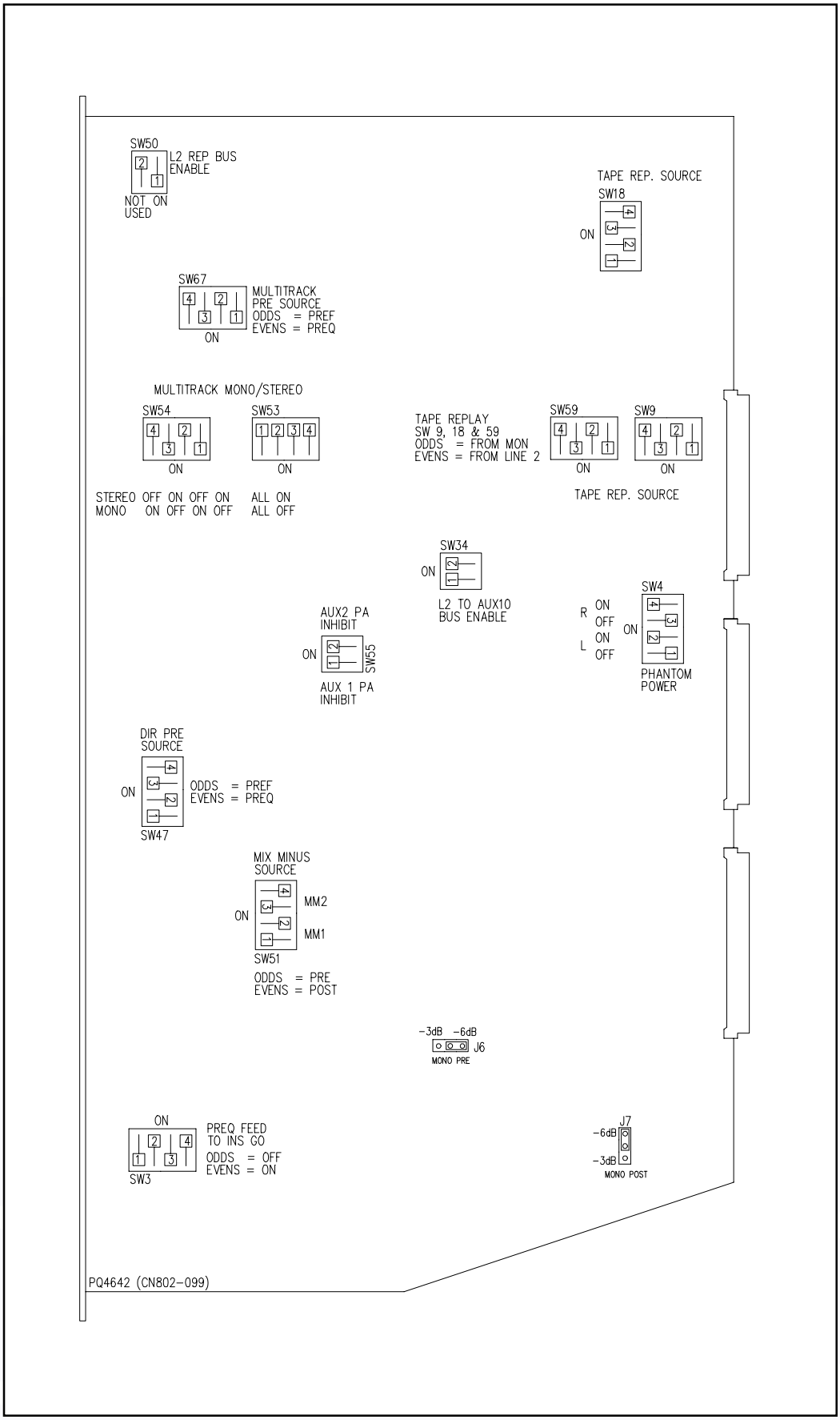
SW4 PHANTOM POWER
SECTS. 1 & 3 ON for POWER OFF (SECT. 1 & 2 = MIC 1)
SECTS. 2 & 4 ON for POWER ON (SECTS. 3 & 4 = MIC 2)

SW's 3 & 66 TAPE REPLAY SOURCE (**preset at factory**)

ODD SECTS. ON for console with SEPARATE MONITOR FADERS
EVEN SECTS. ON for console with NO MONITOR FADERS (TAPE REPLAY from LINE 2)

SW50 PANS 0dB or -3dB at centre
SECTS. 1 & 3 ON for -3dB at centre
SECTS. 2 & 4 ON for 0dB at centre

PQ4642 STEREO MIC/LINE CHANNEL



PQ4642 STEREO MIC/LINE CHANNEL DIL SWITCHES

SW4 PHANTOM POWER 1, 3 = OFF, 2, 4 = ON

SW3 PRE EQUALISER FEED to INSERT SEND OUTPUT (no insert selected)
SECTS. 1 & 3 ON for NO FEED
SECTS. 2 & 4 ON for PREQ FEED

SW34 LINE 2 to AUX 10 ENABLE
SECT 1 ON for LINE 2 to AUX 10 ENABLED

SW55 AUX 1/2 P.A. INHIBIT
SECT. 1 ON for AUX 1 PA INHIBITED
SECT. 2 ON for AUX 2 PA INHIBITED

SW51 MIX MINUS SOURCE
SECTS. 1 & 3 ON for PRE FADER (SECTS. 1 & 2 = Mix Minus 1)
SECTS. 2 & 4 ON for POST FADER (SECTS. 3 & 4 = Mix Minus 2)

SW67 MULTITRACK PRE SOURCE
SECTS. 1 & 3 ON for PRE FADER
SECTS. 2 & 4 ON for PRE EQ

SW47 DIRECT OUTPUT PRE SOURCE
SECTS. 1 & 3 ON for PRE FADER
SECTS. 2 & 4 ON for PRE EQ

SW50 LINE 2 REPLAY BUS ENABLED (for REMIX or TAPE REPLAY via L2)
SECT. 1 ON for ENABLED (SECT. 2 not used)

SW's 9, 18 & 59
TAPE REPLAY SOURCE (**preset at factory**)
ODD SECTS. ON for console with SEPARATE MONITOR FADERS
EVEN SECTS. ON for console with NO MONITOR FADERS (TAPE REPLAY from LINE 2)

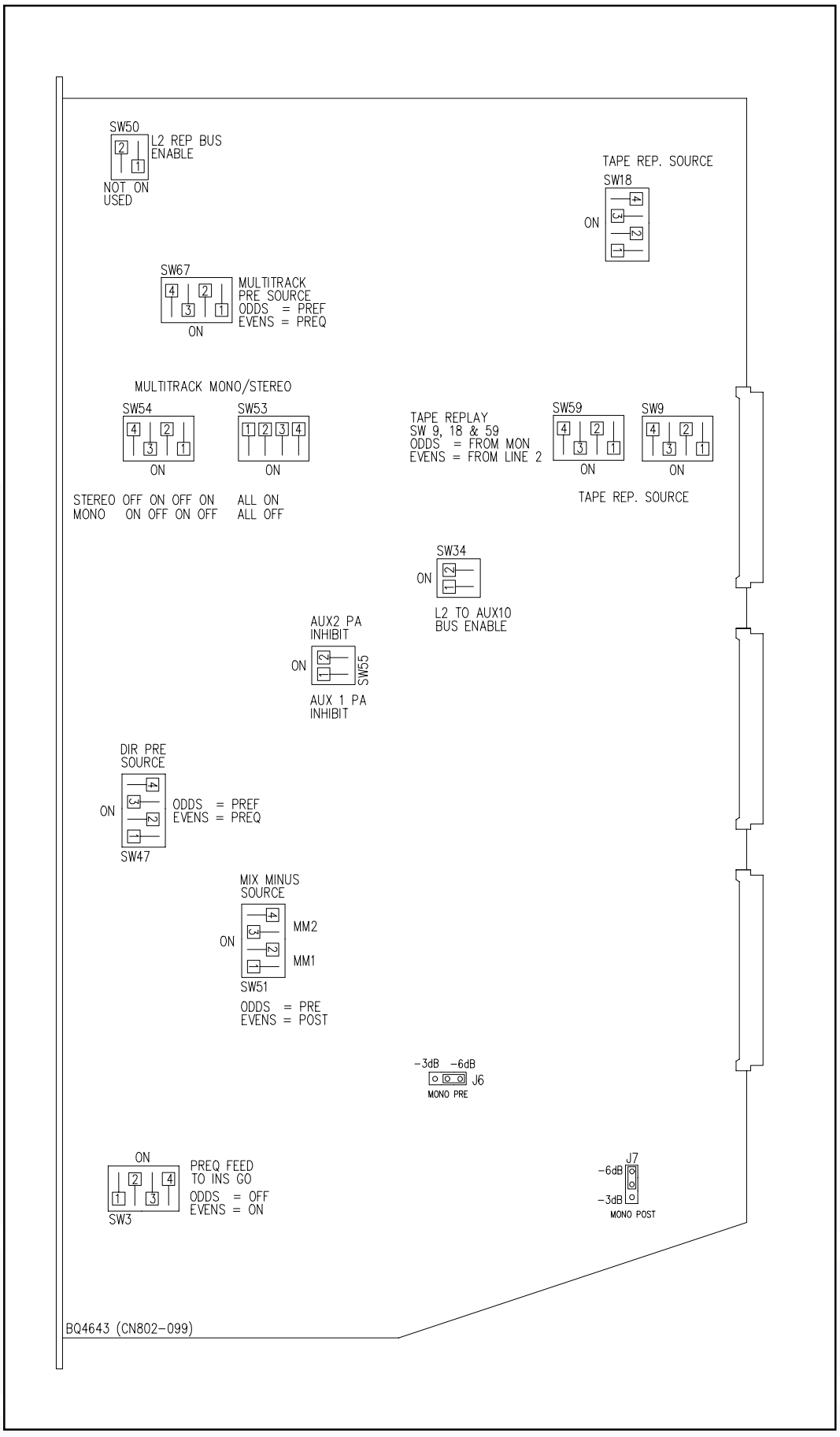
SW's 53 & 54
MULTITRACK MONO or STEREO
SW53 ALL SECTS. ON + SW54 SECTS. 1 & 3 ON for NORMAL STEREO OPERATION with optional PAN control

SW53 ALL SECTS. OFF + SW54 SECTS. 2 & 4 ON for NORMAL STEREO OPERATION with no PAN selected. Selection of PAN mixes LEFT & RIGHT signals to MONO & PAN CONTROL pans the MONO signal between ODD & EVEN output to MULTITRACK

J6 MONO PRE MIX LEVEL SHOWN - 6 MIX MOVE LEFT for - 3 MIX

J7 MONO POST MIX LEVEL SHOWN - 6 MIX MOVE DOWN for -3 MIX

BQ4643 STEREO LINE CHANNEL



BQ4643 STEREO LINE CHANNEL

SW3 PRE EQUALISER FEED to INSERT SEND OUTPUT (no insert selected)
SECTS. 1 & 3 ON for NO FEED
SECTS. 2 & 4 ON for PREQ FEED

SW34 LINE 2 to AUX 10 ENABLE
SECT 1 ON for LINE 2 to AUX 10 ENABLED

SW55 AUX 1/2 P.A. INHIBIT
SECT. 1 ON for AUX 1 PA INHIBITED
SECT. 2 ON for AUX 2 PA INHIBITED

SW51 MIX MINUS SOURCE
SECTS. 1 & 3 ON for PRE FADER (SECTS. 1 & 2 = Mix Minus 1)
SECTS. 2 & 4 ON for POST FADER (SECTS. 3 & 4 = Mix Minus 2)

SW67 MULTITRACK PRE SOURCE
SECTS. 1 & 3 ON for PRE FADER
SECTS. 2 & 4 ON for PRE EQ

SW47 DIRECT OUTPUT PRE SOURCE
SECTS. 1 & 3 ON for PRE FADER
SECTS. 2 & 4 ON for PRE EQ

SW50 LINE 2 REPLAY BUS ENABLED (for REMIX or TAPE REPLAY via L2)
SECT. 1 ON for ENABLED (SECT. 2 not used)

SW's 9, 18 & 59

TAPE REPLAY SOURCE (**preset at factory**)
ODD SECTS. ON for console with SEPARATE MONITOR FADERS
EVEN SECTS. ON for console with NO MONITOR FADERS (TAPE REPLAY from LINE 2)

SW's 53 & 54

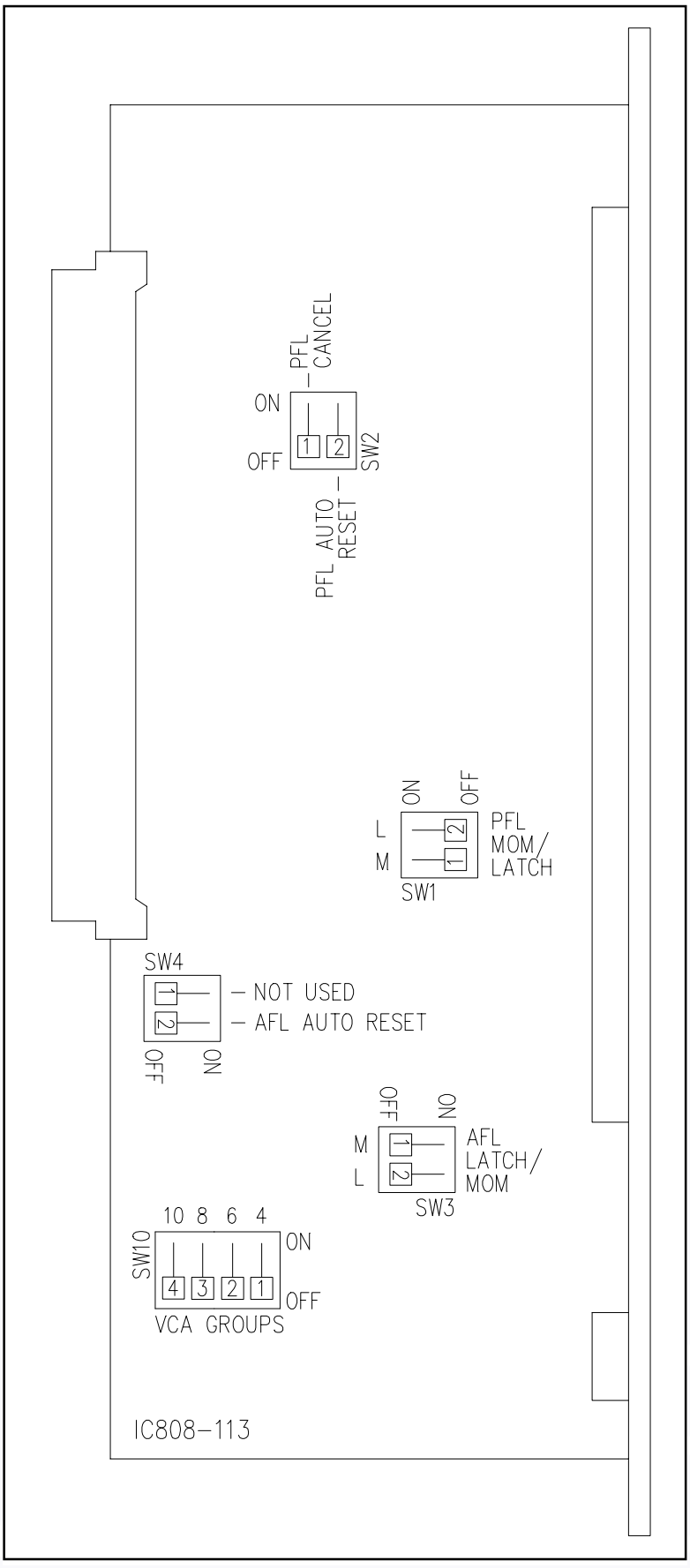
MULTITRACK MONO or STEREO

SW53 ALL SECTS. ON + SW54 SECTS. 1 & 3 ON for NORMAL STEREO OPERATION with optional PAN control.
SW53 ALL SECTS. OFF + SW54 SECTS. 2 & 4 ON for NORMAL STEREO OPERATION with no PAN selected. Selection of PAN mixes LEFT & RIGHT signals to MONO & PAN CONTROL pans the MONO signal between ODD & EVEN output to MULTITRACK

J6 MONO PRE MIX LEVEL SHOWN - 6 MIX MOVE LEFT for - 3 MIX

J7 MONO POST MIX LEVEL SHOWN - 6 MIX MOVE DOWN for -3 MIX

IC4061 CHANNEL FADER



IC4061 CHANNEL FADER DIL SWITCHES

SW1 PFL button MOMENTARY or LATCHING.

RIGHT = PFL MOM = PFL button MOMENTARY.
LEFT = PFL LATCH = PFL button LATCHING.

SW2/1 PFL CANCEL when fader opens.

DOWN = OFF
UP = ON = Opening fader cancels PFL selection if latched.

SW2/2 PFL timed AUTO RESET.

DOWN = OFF = No effect.
UP = ON = PFL button long press acts as momentary, PFL short press latches when SW1 is in latch position.

SW3 AFL button MOMENTARY or LATCHING.

RIGHT = AFL MOM = AFL button MOMENTARY.
LEFT = AFL LATCH = AFL button LATCHING.

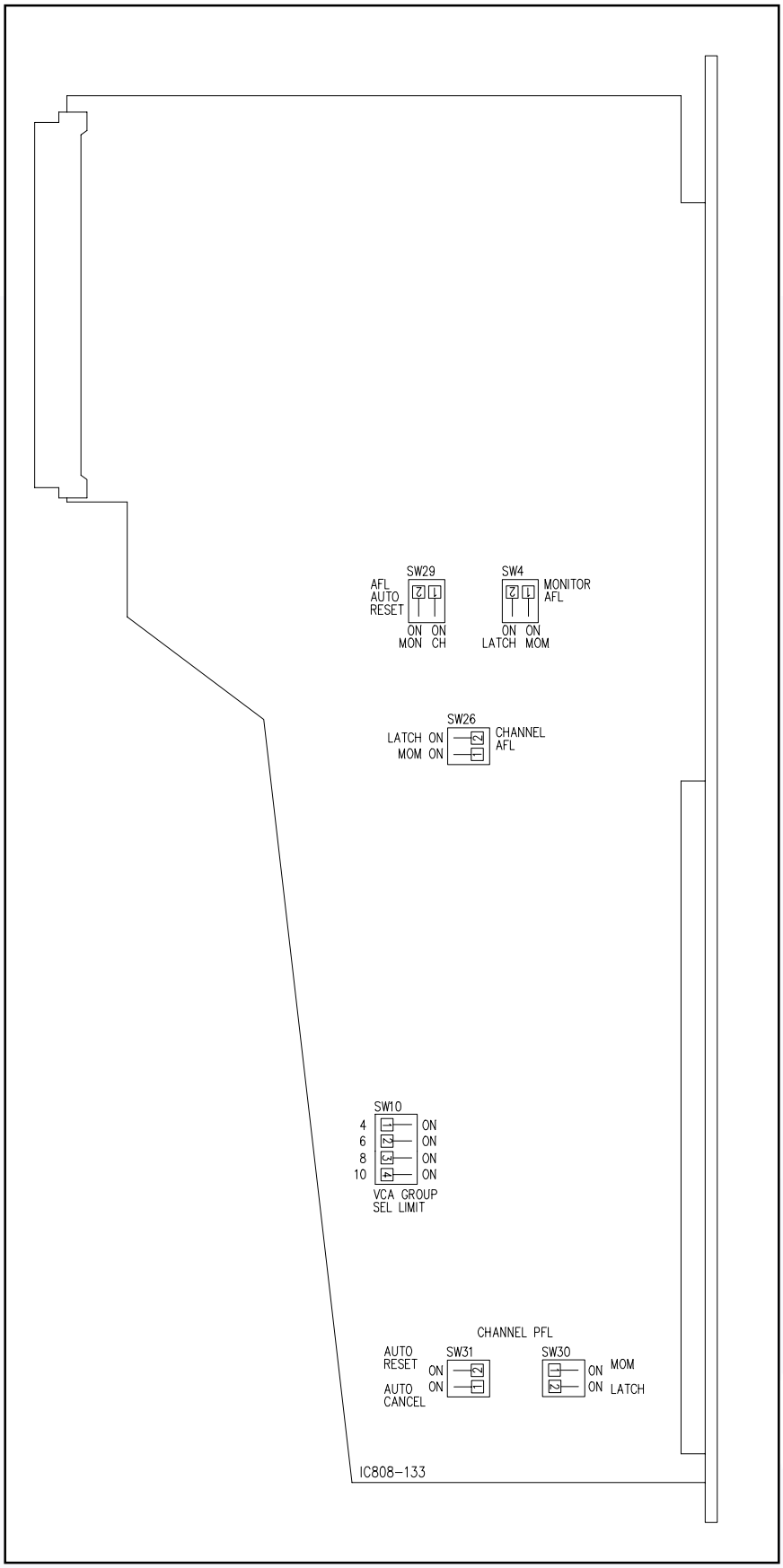
SW4 AFL timed AUTO RESET.

LEFT = OFF = No effect.
RIGHT = ON = AFL button long press acts as momentary, AFL short press latches when SW6 is in latch position.

SW10 VCA GROUPS

UP = ON for 4 switches for 4, 6, 8 or 10 VCA Groups.

IM4644 & IM4991 MONO CHANNEL + MONITOR FADERS
IS4645 & IS4992 STEREO CHANNEL + MONITOR FADERS



IM4644 & IM4991 MONO CHANNEL + MONITOR FADERS DIL SWITCHES
IS4645 & IS4992 STEREO CHANNEL + MONITOR FADERS DIL SWITCHES

SW30 Channel PFL button MOMENTARY or LATCHING

SECT. 1 ON for MOMENTARY
SECT. 2 ON for LATCHING

SW31 Channel PFL button CANCELLED when fader opens

SECT. 1 ON for AUTO CANCEL

SW31 Channel PFL TIMED AUTO RESET

SECT. 2 ON for LONG PRESS acting as MOMENTARY & SHORT PRESS LATCHING when SW30 SECT. 2 is set for LATCHING.

SW26 Channel AFL button MOMENTARY or LATCHING

SECT. 1 ON for MOMENTARY
SECT. 2 ON for LATCHING

SW29 Channel AFL TIMED AUTO RESET

SECT. 1 ON for LONG PRESS acting as MOMENTARY & SHORT PRESS LATCHING when SW26 SECT. 2 is set for LATCHING

SW4 Monitor AFL button MOMENTARY or LATCHING

SECT. 1 ON for MOMENTARY
SECT. 2 ON for LATCHING

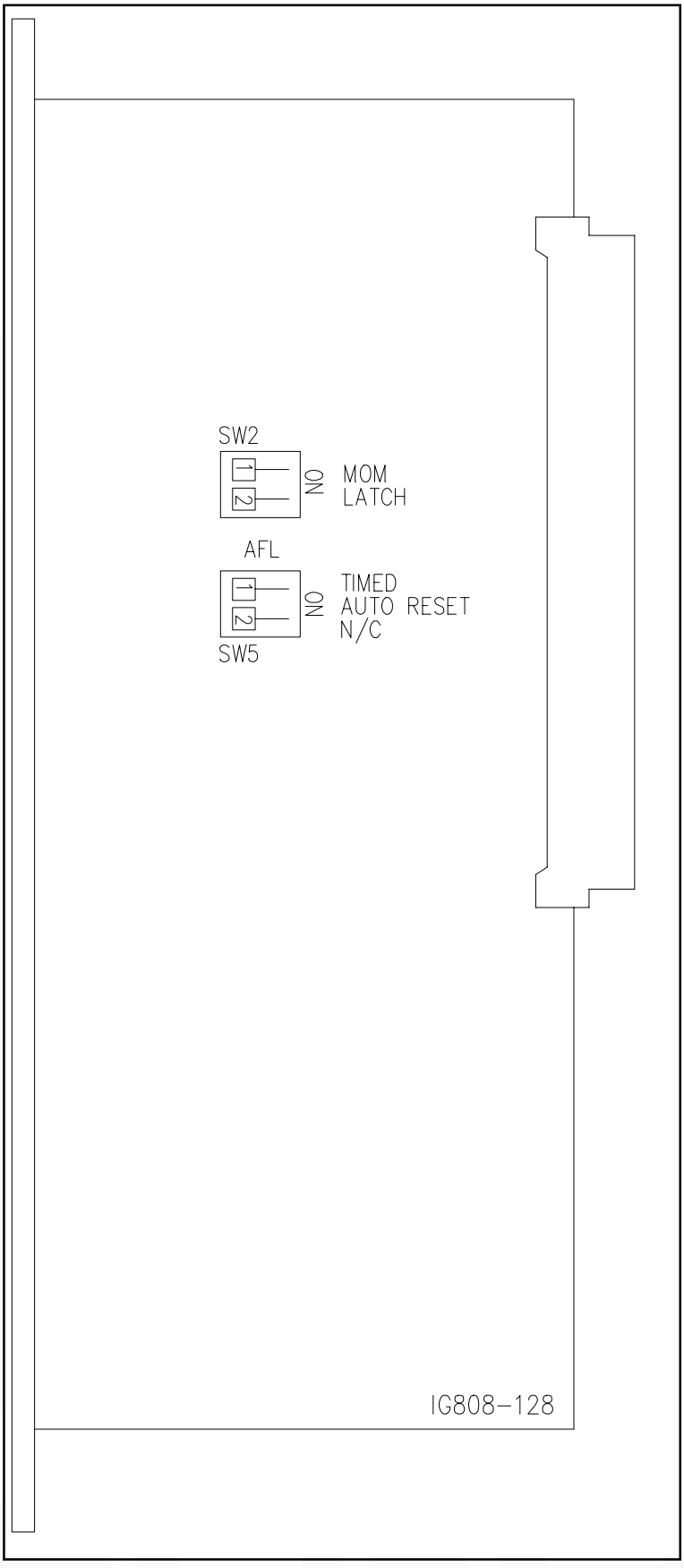
SW29 Monitor AFL TIMED AUTO RESET

SECT. 2 ON for LONG PRESS acting as MOMENTARY & SHORT PRESS LATCHING when SW4 SECT. 2 is set for LATCHING.

SW10 VCA Groups

SECT. 1 ON for 4 VCA Groups
SECT. 2 ON for 6 VCA Groups
SECT. 3 ON for 8 VCA Groups
SECT. 4 ON for 10 VCA Groups

IG4314-2 VCA GROUP FADER



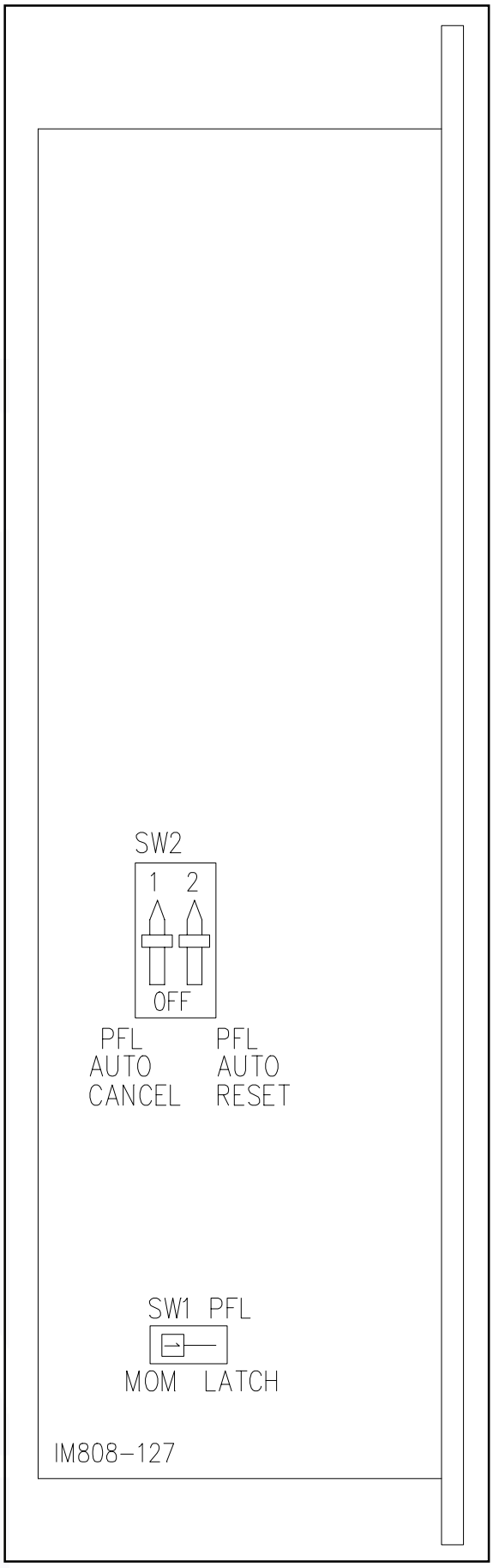
IG4314-2 VCA GROUP FADER

VCA AFL Button Momentary or Latching.

SW2 SECT 1 ON for MOMENTARY.
SECT 2 ON for LATCHING.

SW5 SECT 1 ON for LONG PRESS acting as MOMENTARY and SHORT PRESS LATCHING, When SW2 SECT. 2 is set for LATCHING.

IM4316-2 MAIN FADER



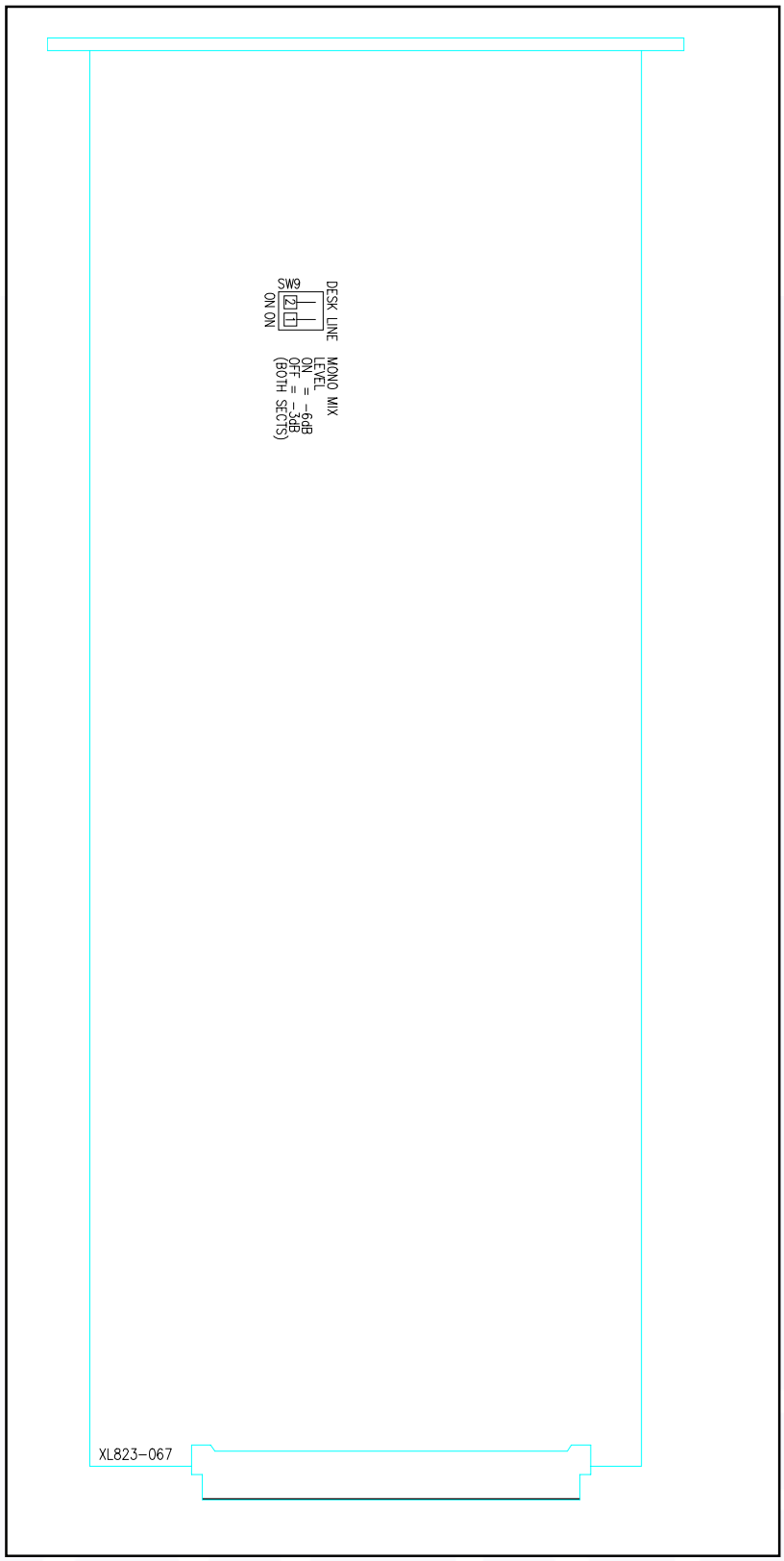
IM4316-2 MAIN FADER

SW2 MAIN PFL BUTTON CANCELLED when FADER OPENS.
MAIN PFL BUTTON TIMED AUTO RESET.

SECT 1 ON for AUTO CANCEL
SECT 2 ON for LONG PRESS ACTING as MOMENTARY and SHORT PRESS LATCHING, when SW1 is SET for LATCHING.

SW1 MAIN PFL BUTTON MOMENTARY ON or LATCHING.

XL4317 -2 MAIN OUTPUT

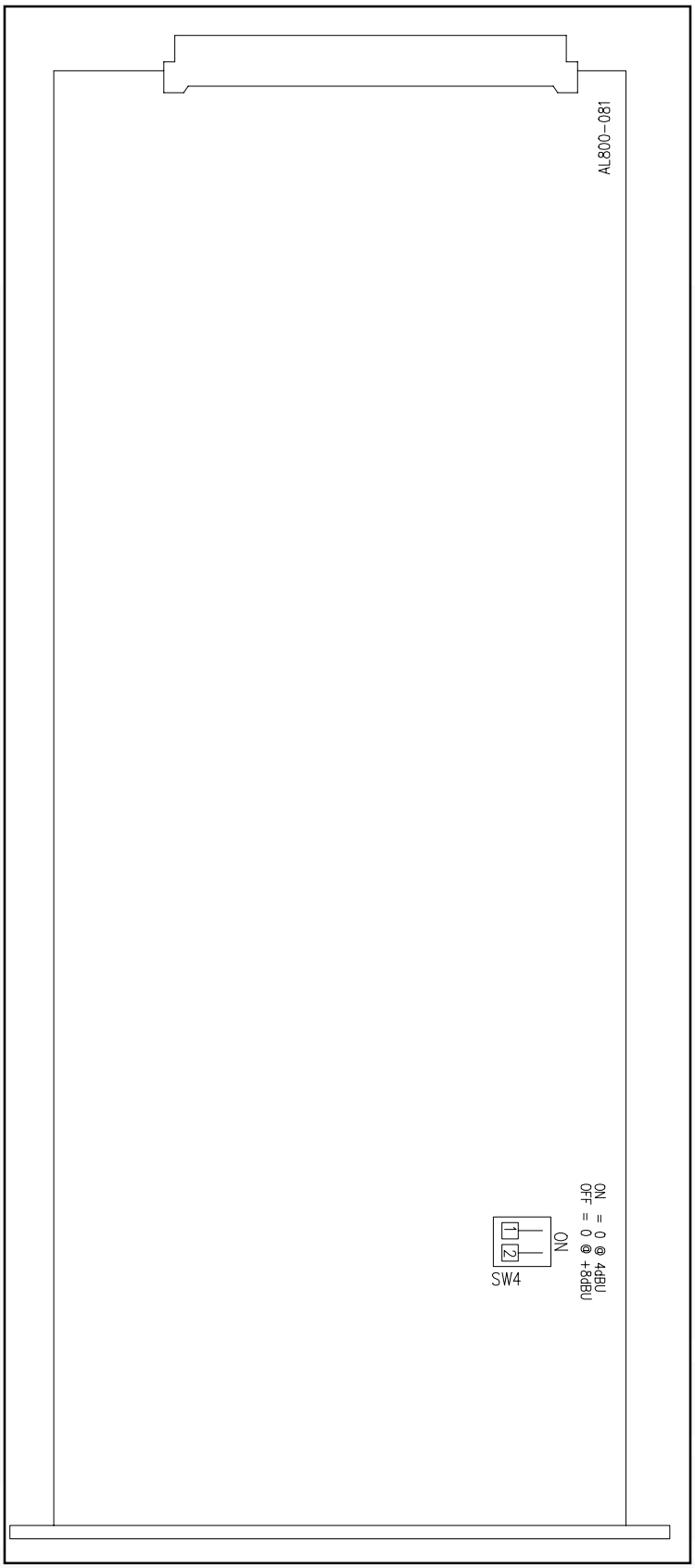


XL4317-2 MAIN OUTPUT DIL SWITCHES

SW9 MONO LINE & DESK OUTPUTS MIX from LEFT & RIGHT

SECTS. 1 & 2 ON for -6dB MIX
SECTS. 1 & 2 OFF for -3dB MIX

AL4318-2 MONO AUXILIARY OUTPUT

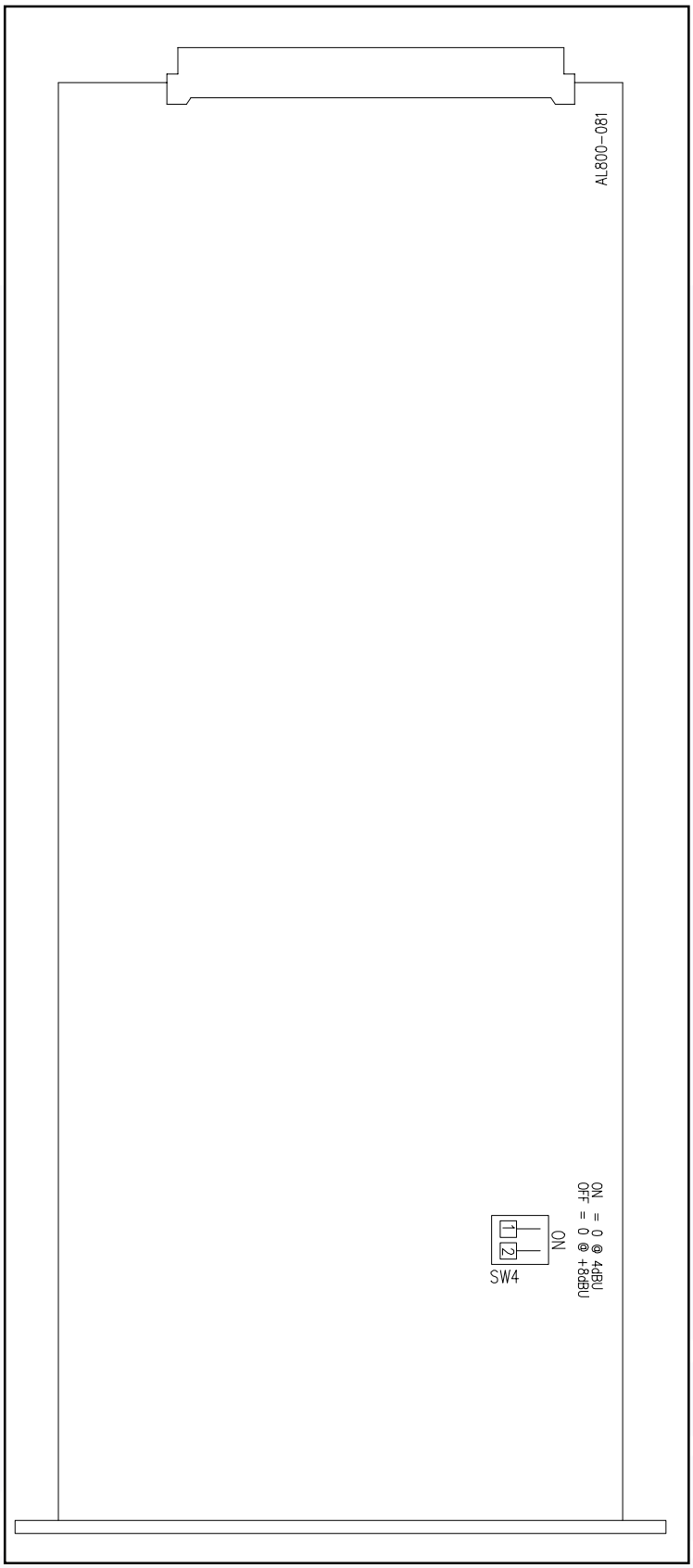


AL4318-2 MONO AUXILIARY OUTPUT DIL SWITCHES

SW4 Reading of 0 with +8 or +4dBu INPUT LEVEL.

SECT 1 NOT USED ON THIS ASSEMBLY.
SECT 2 ON for A reading of 0 with an INPUT OF 4dBu.

AL4319-2 STEREO AUXILIARY OUTPUT

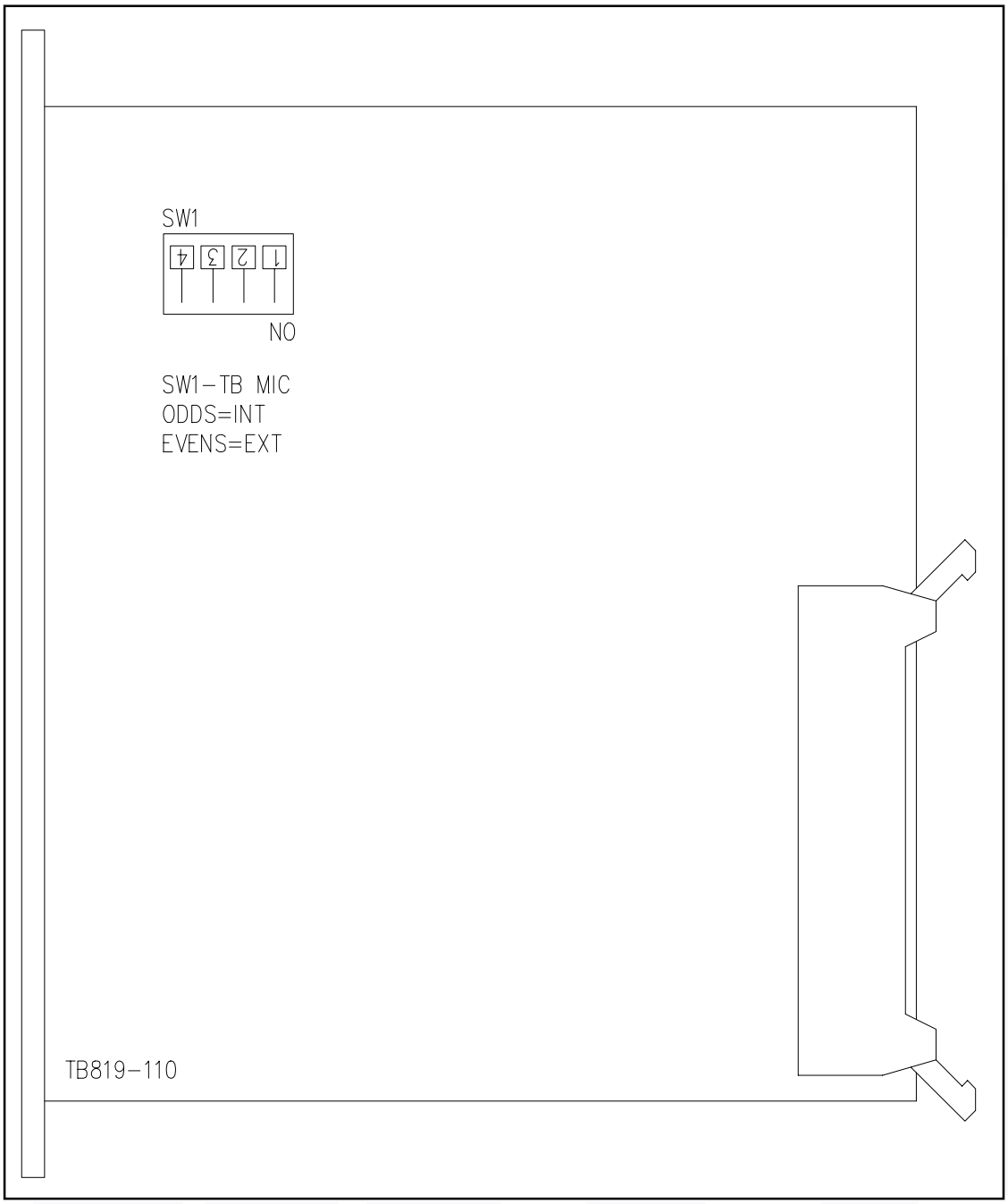


AL4319-2 STEREO AUXILIARY OUTPUT DIL SWITCHES

SW4 Reading of 0 with +8 or +4dBu INPUT LEVEL.

SECT 1 = ON for A READING of 0 with an INPUT of +4dBu on the RIGHT METER.
SECT 2 = ON for A READING of 0 with an INPUT of +4dBu on the LEFT METER.

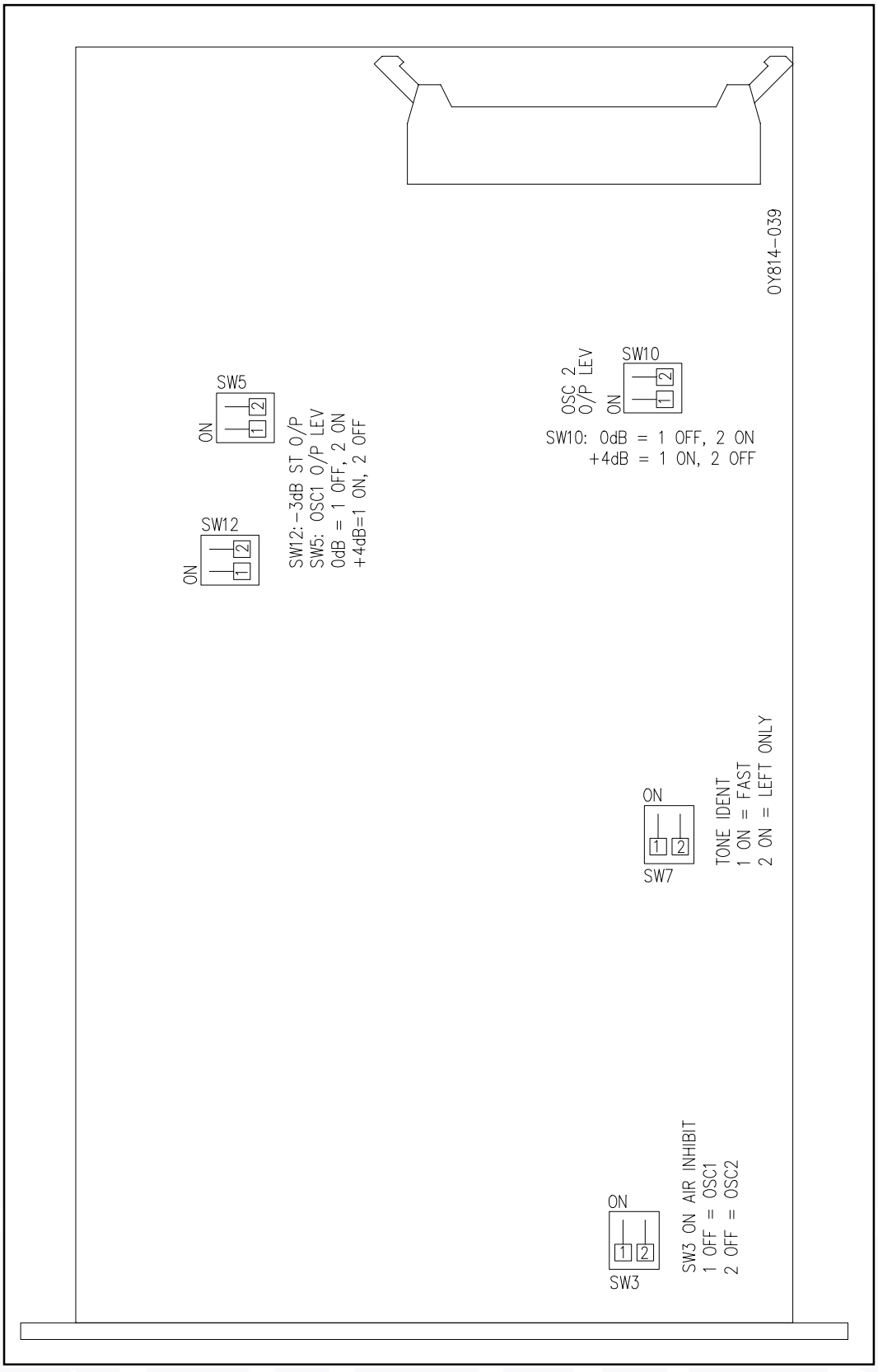
TB4323-2 TALKBACK



TB4323-2 TALKBACK DIL SWITCHES

SW1 SECT 1 & 3 ON and SECTIONS 2 & 4 OFF INTERNAL MIC.
SECT 1 & 3 OFF and SECTIONS 2 & 4 ON EXTERNAL MIC.

OY4653 OSCILLATOR



OY4653 OSCILLATOR DIL SWITCHES

SW3 ON AIR INHIBIT.

SECT 1 OFF OSC 1 SUBJECT TO INHIBIT.
SECT 2 OFF OSC 2 SUBJECT TO INHIBIT.

SW5 OSC 1 OUTPUT LEVEL.

0dBu = SECT 1 OFF SECT 2 ON.
4dBu = SECT 1 ON SECT 2 OFF.

SW7 VOICE IDENT.

SECT 1 = ON = FAST
SECT 2 = ON IDENT ON LEFT ONLY.

SW10 OSC 2 OUTPUT LEVEL

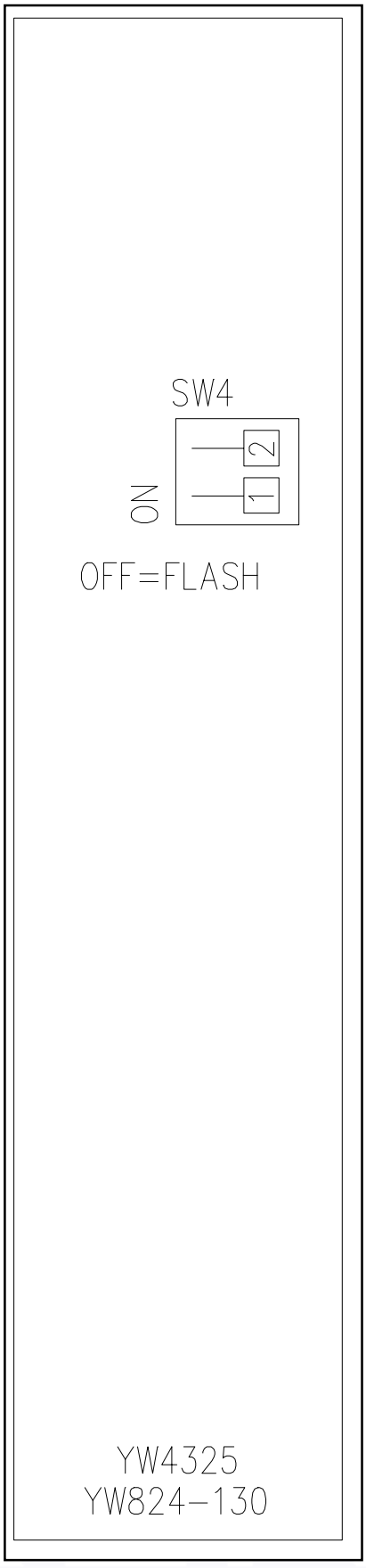
OdBu = SECT 1 OFF SECT 2 ON.
4dBu = SECT 1 ON SECT 2 OFF.

SW12 STEREO OUTPUT LEVEL

SECT 1 ON = LEFT AT -3dB.
SECT 2 ON = RIGHT AT -3dB.

SECT 1 OFF = LEFT AT 0dB.
SECT 2 OFF = RIGHT AT OdB.

YW4325 BROADCAST

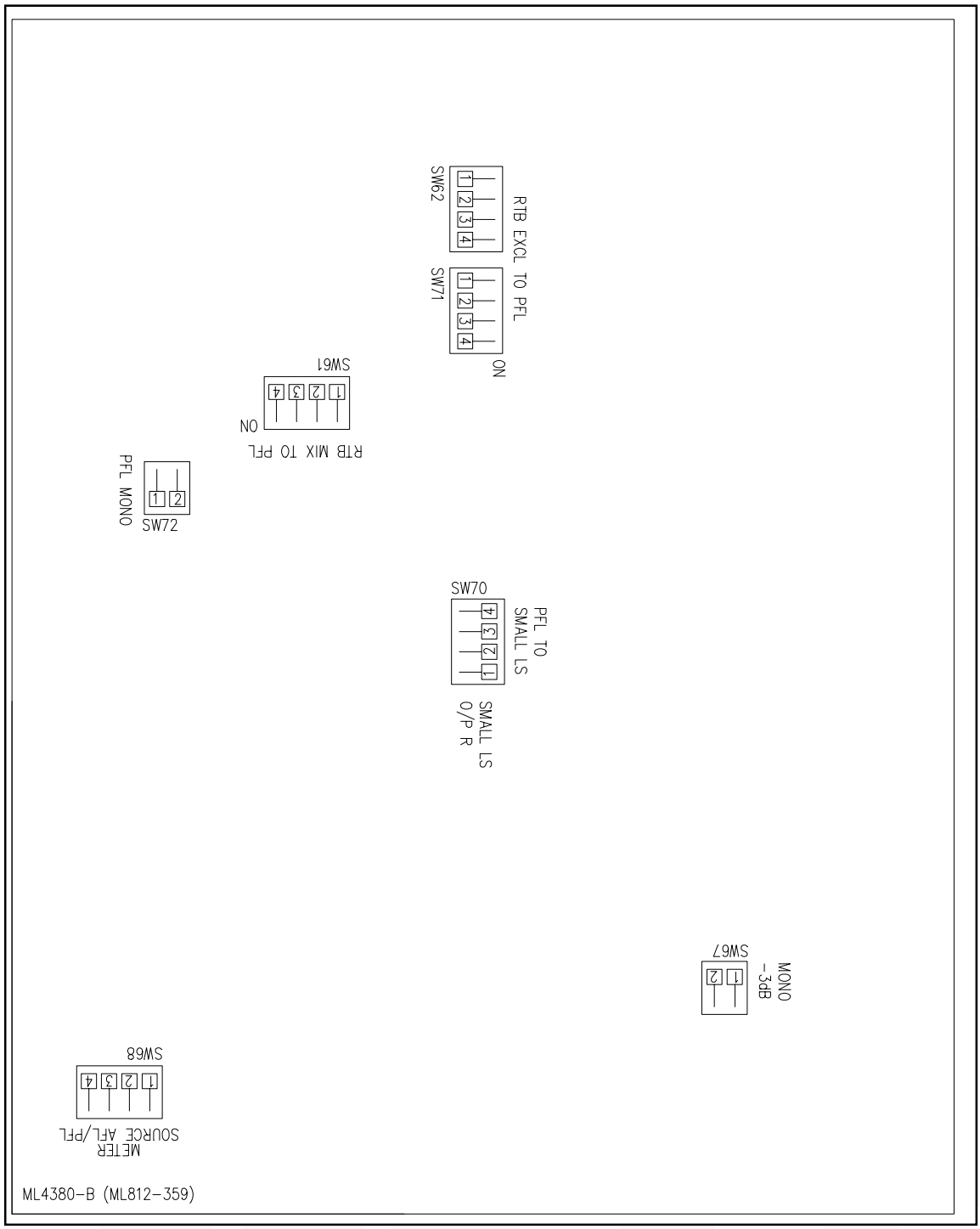


YW4325 BROADCAST DIL SWITCHES

SW4

SECT 1 & SECT 2 OFF. CAUSES AFL LED TO FLASH.

ML4380-2 MONITOR LOUDSPEAKER



ML4380-2 MONITOR LOUDSPEAKER

SW61 SECT 1 ON MIXES PFL LEFT TO SMALL LS LEFT.
SECT 2 ON MIXES PFL RIGHT TO SMALL LS RIGHT.

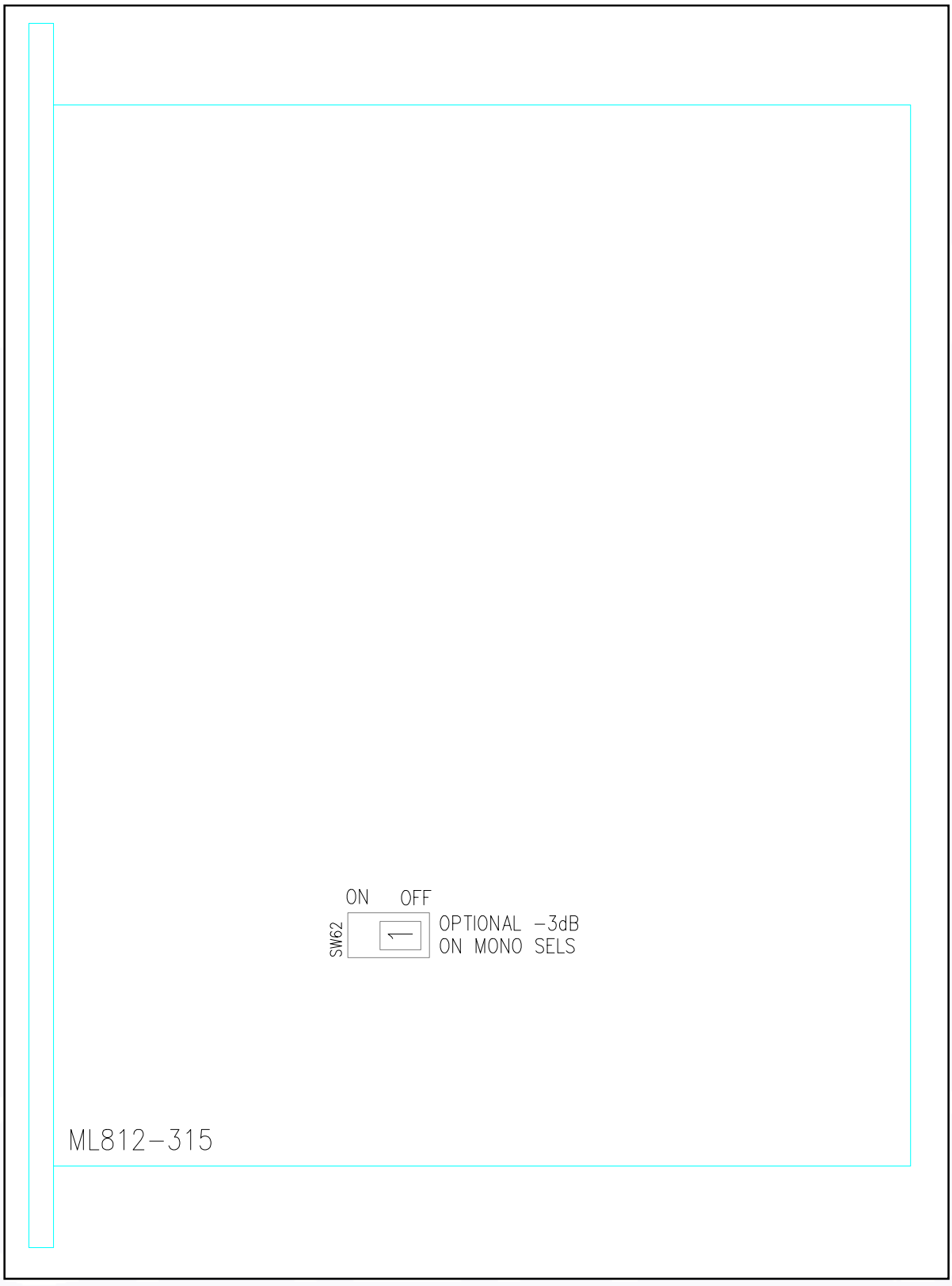
SW62 When set to ON causes a MONO SOURCE SELECTION to REDUCE the LEVEL on the MONITORING by 3dB.

SW67 SECT 1 ON MIXES RTB with PFL LEFT.
SECT 2 ON MIXES RTB with PFL RIGHT.

SW68 ALL SWITCHES OFF FEEDS PFL TO PFL LS.
ALL SWITCHES ON FEEDS RTB TO PFL LS.
SECT 1 & 2 CONTROL LEFT LS
SECT 3 & 4 CONTROL RIGHT LS.

SW69 ON MONOS PFL SIGNAL TO LEFT & RIGHT LEGS.

ML4231 LS2 MONITOR

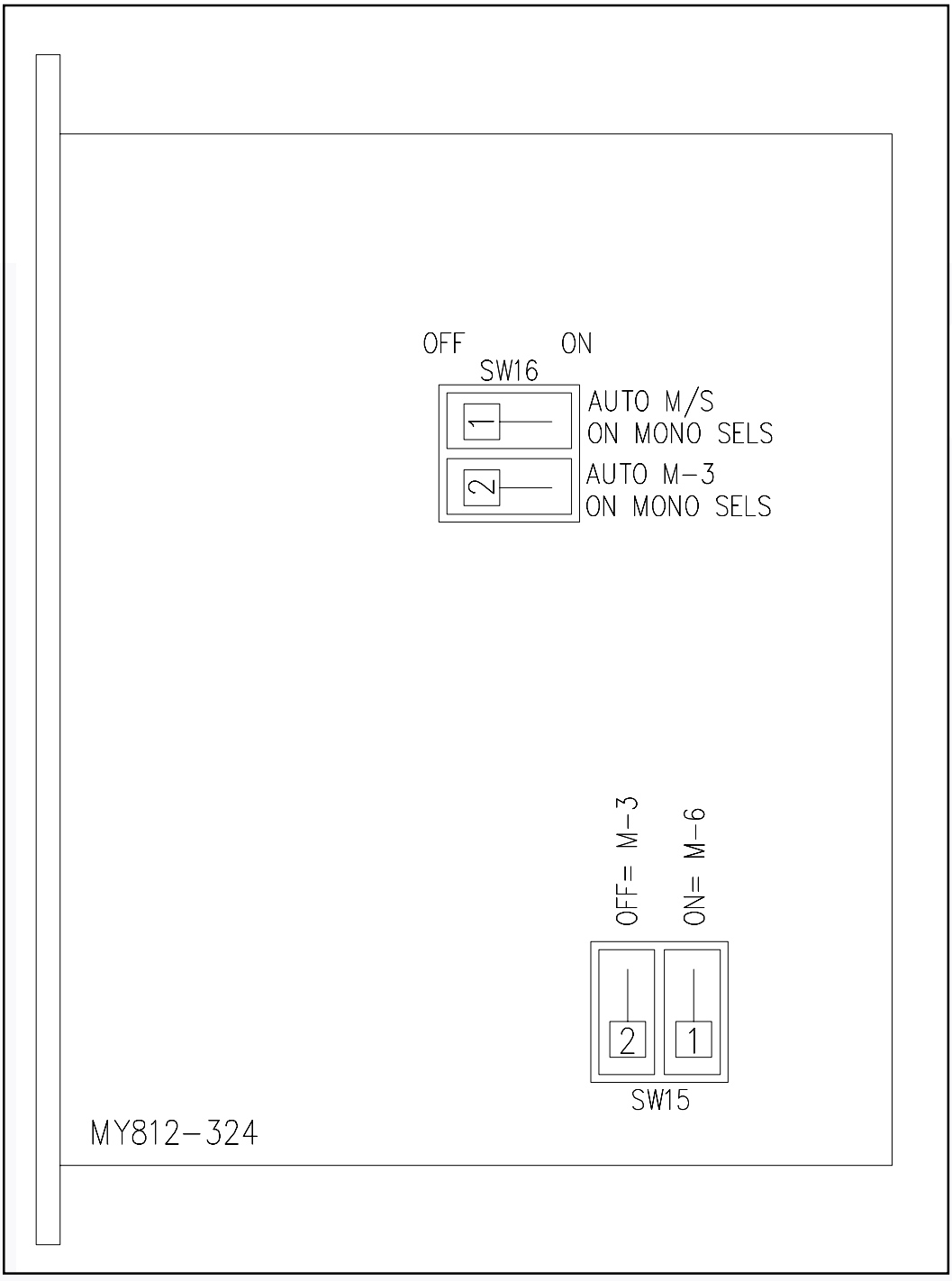


ML4231 LS2 MONITOR DIL SWITCHES

SW62 Optional -3dB on MONO SELS :-

UP = OFF.
DOWN = ON which reduces meter levels -3dB when a mono source & M/S are selected (to correct the M level).

MY3680 METER SELECTOR



MY3680 METER SELECTOR DIL SWITCHES

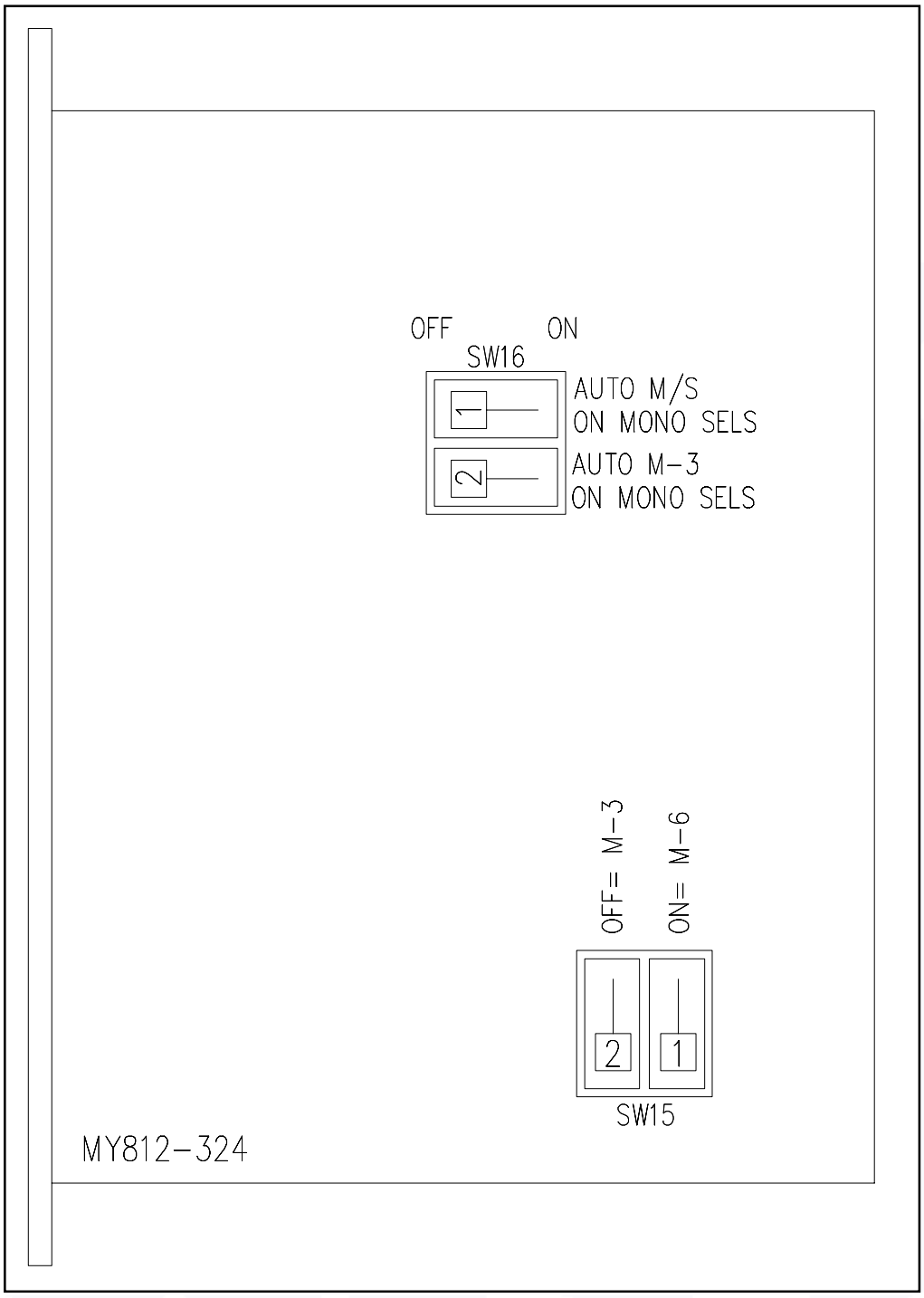
SW13 AUTO SWITCH to M/S for MONO SELS :-

LEFT = OFF = No effect.
RIGHT = ON = Metering is automatically changed over to read M and S when a mono source is selected (M/S button illuminates).

SW14 AUTO M -3dB for MONO SELS :-

LEFT = OFF = No effect.
RIGHT = ON = M Metering is reduced -3dB to read correctly when a mono source is selected.

MY3875 METER SELECTOR - PRINCIPAL FUNCTION



MY3875 METER SELECTOR - PRINCIPAL FUNCTION DIL SWITCHES

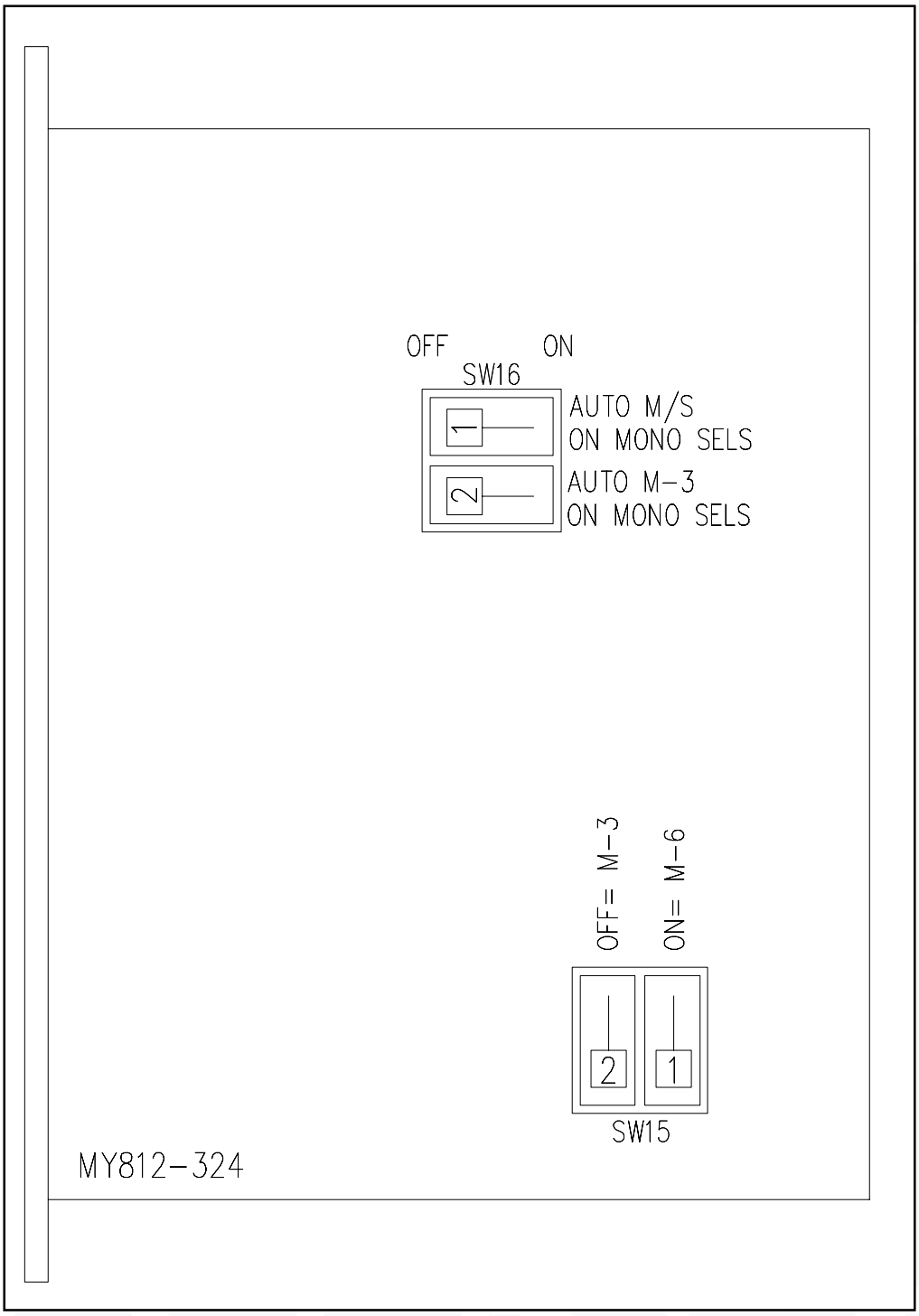
SW13 AUTO SWITCH to M/S for MONO SELS :-

LEFT = OFF = No effect.
RIGHT = ON = Metering is automatically changed over to read M and S when a mono source is selected (M/S button illuminates).

SW14 AUTO M -3dB for MONO SELS :-

LEFT = OFF = No effect.
RIGHT = ON = M Metering is reduced -3dB to read correctly when a mono source is selected.

MY3876 METER SELECTOR - MAIN FUNCTION



MY3876 METER SELECTOR - MAIN FUNCTION DIL SWITCHES

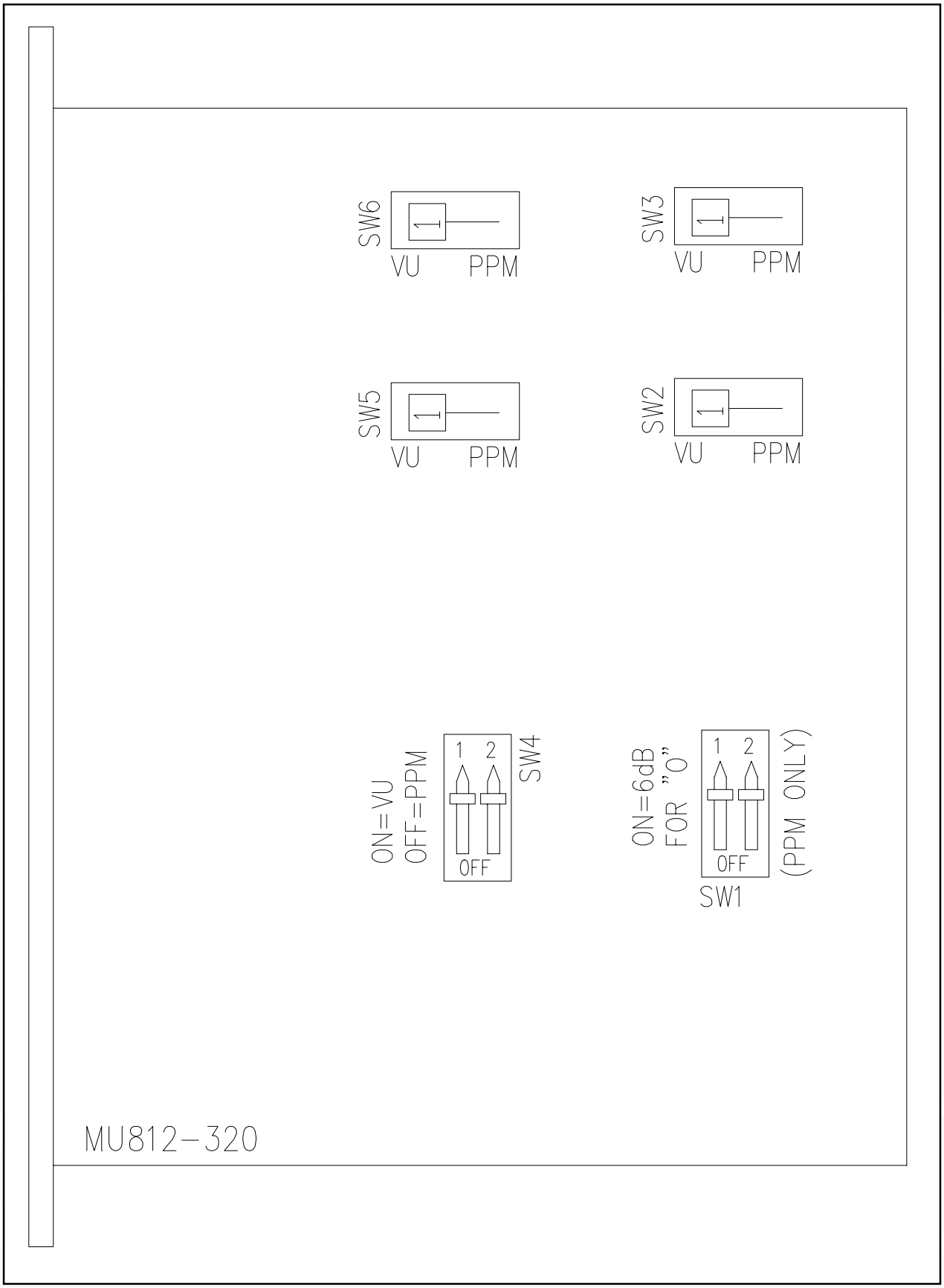
SW13 AUTO SWITCH to M/S for MONO SELS :-

LEFT = OFF = No effect.
RIGHT = ON = Metering is automatically changed over to read M and S when a mono source is selected (M/S button illuminates).

SW14 AUTO M -3dB for MONO SELS :-

LEFT = OFF = No effect.
RIGHT = ON = M Metering is reduced -3dB to read correctly when a mono source is selected.

MU3804 RED/GREEN STEREO BARGRAPH



MU3804 RED/GREEN STEREO BARGRAPH DIL SWITCHES

SW1 +6dBu at the scale "0" position (PPM only):-

1	=	LEFT BAR	}	UP = ON	=	+6dBu at scale "0".
2	=	RIGHT BAR	}	DOWN = OFF	=	+8dBu at scale "0".

SW2 PPM/VU characteristics, LEFT BAR :-

LEFT = PPM.
RIGHT = VU.

SW3 PPM/VU characteristics, STET.

LEFT = VU.
RIGHT = PPM.

SW4 PPM/VU characteristics :-

1	=	LEFT BAR	}	UP = ON	=	VU.
2	=	RIGHT BAR	}	DOWN = OFF	=	PPM.

SW5 PPM/VU characteristics, RIGHT BAR :-

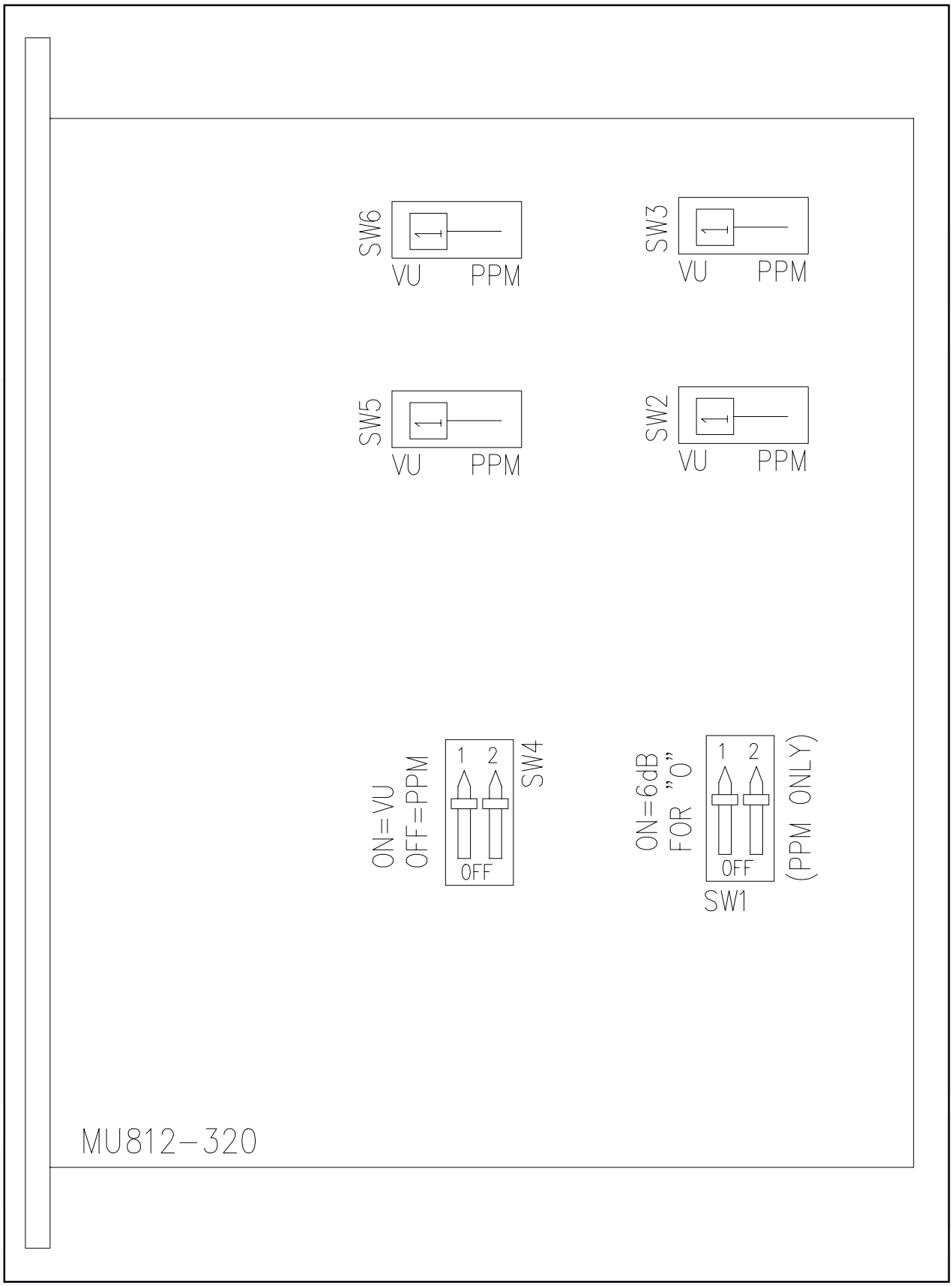
LEFT = VU.
RIGHT = PPM.

SW6 PPM/VU characteristics, RIGHT BAR :-

LEFT = VU.
RIGHT = PPM.

N.B. All the above switches should be in the same position (i.e. VU or PPM) to achieve proper performance (It is remotely possible to have different characteristics on LEFT and RIGHT BARS when used for other than stereo metering.)

MU4333-2 LARGE STEREO BARGRAPH (REV. COL.)



MU4333-2 LARGE STEREO BARGRAPH (REV. COL.) DIL SWITCHES

SW1 +6dBu at the scale "0" position (PPM only):-

1 = LEFT BAR } UP = ON = +6dBu at scale "0".
2 = RIGHT BAR } DOWN = OFF = +8dBu at scale "0".

SW2 PPM/VU characteristics, LEFT BAR :-

LEFT = PPM.
RIGHT = VU.

SW3 PPM/VU characteristics, LEFT BAR :-

LEFT = VU.
RIGHT = PPM.

SW4 PPM/VU characteristics :-

1 = LEFT BAR } UP = ON = VU.
2 = RIGHT BAR } DOWN = OFF = PPM.

SW5 PPM/VU characteristics, RIGHT BAR :-

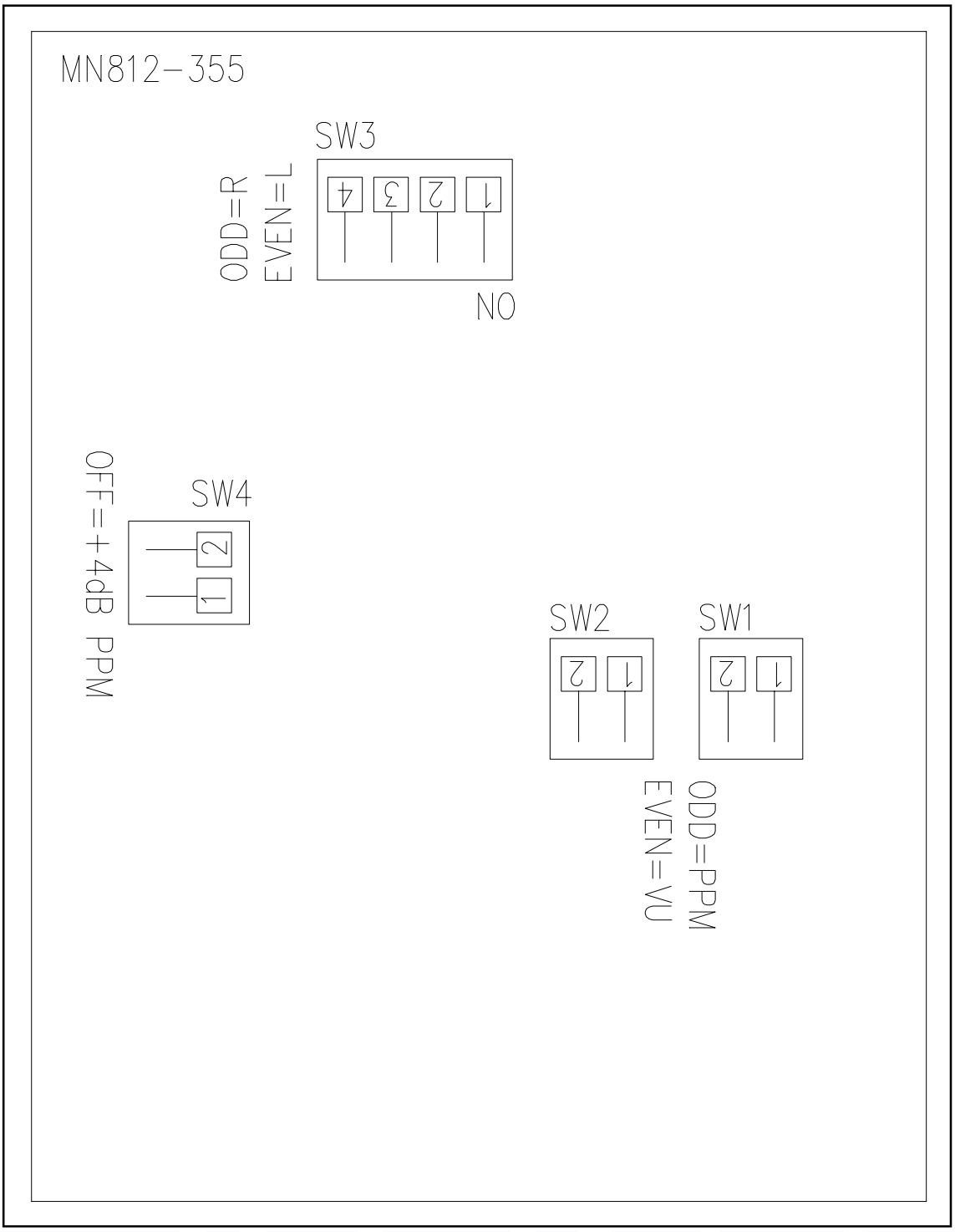
LEFT = VU.
RIGHT = PPM.

SW6 PPM/VU characteristics, RIGHT BAR :-

LEFT = VU.
RIGHT = PPM.

N.B. All the above switches should be in the same position (i.e. VU or PPM) to achieve proper performance (It is remotely possible to have different characteristics on LEFT and RIGHT BARS when used for other than stereo metering.)

MU4383 LARGE VU METER



MU4383 LARGE VU METER DIL SWITCHES

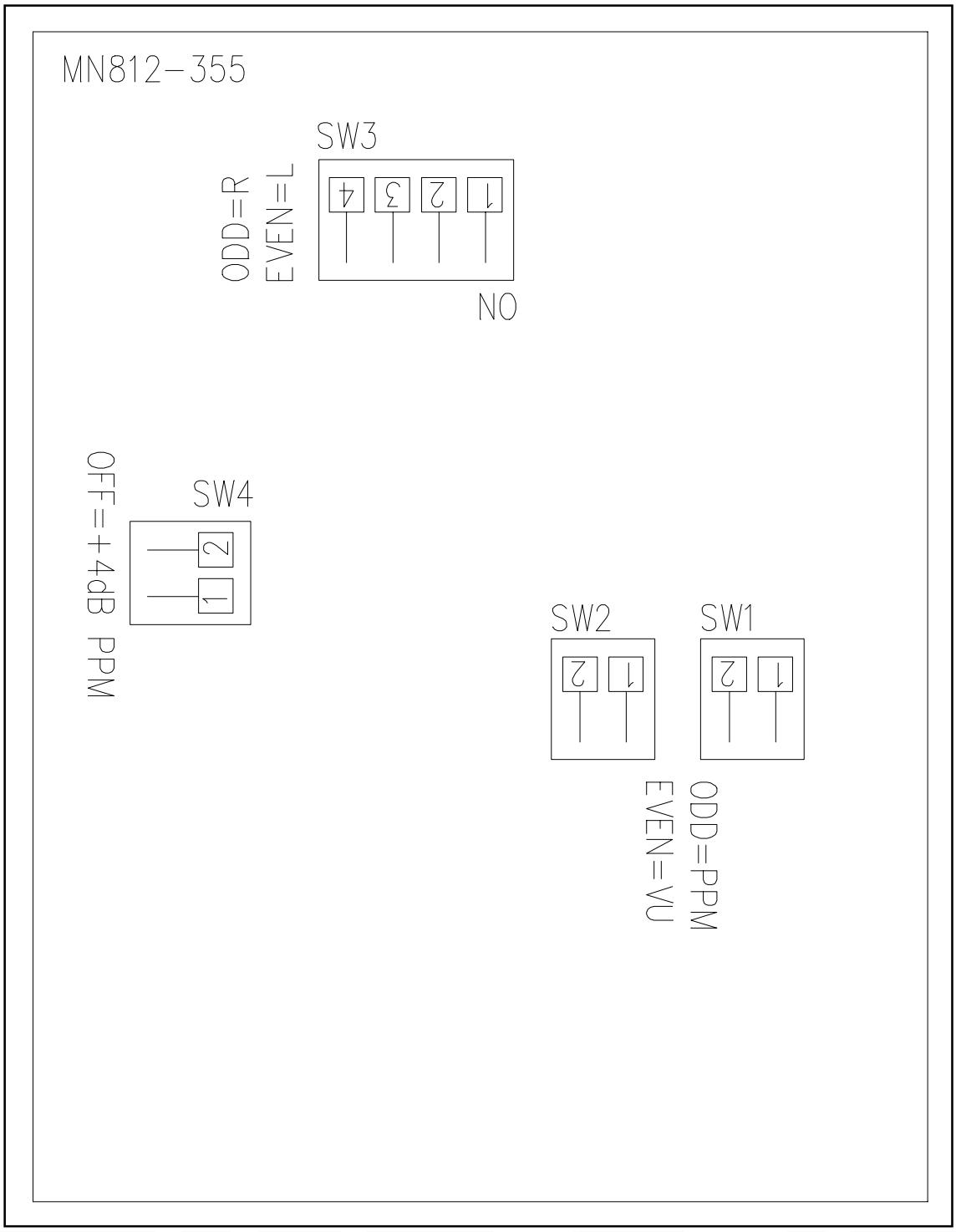
SW3 SECT 1 & 3 ON SELECT RIGHT METER FEED TO BE SOURCE
SECT 2 & 4 ON SELECT LEFT METER FEED TO BE SOURCE.

SW1 SECT 1 ON PPM CHARACTERISTIC.
SECT 2 ON VU CHARACTERISTIC.

SW2 SECT 1 ON PPM CHARACTERISTIC.
SECT 2 ON VU CHARACTERISTIC.

SW4 SECT 1 ON REDUCES GAIN TO UNITY.
SECT 1 OFF INCREASES GAIN BY 4dB.

MU4382 LARGE PEAK PROGRAMME METER (WEST COAST SCALE)



MU4382 LARGE PEAK PROGRAMME METER (WEST COAST SCALE) DIL SWITCHES

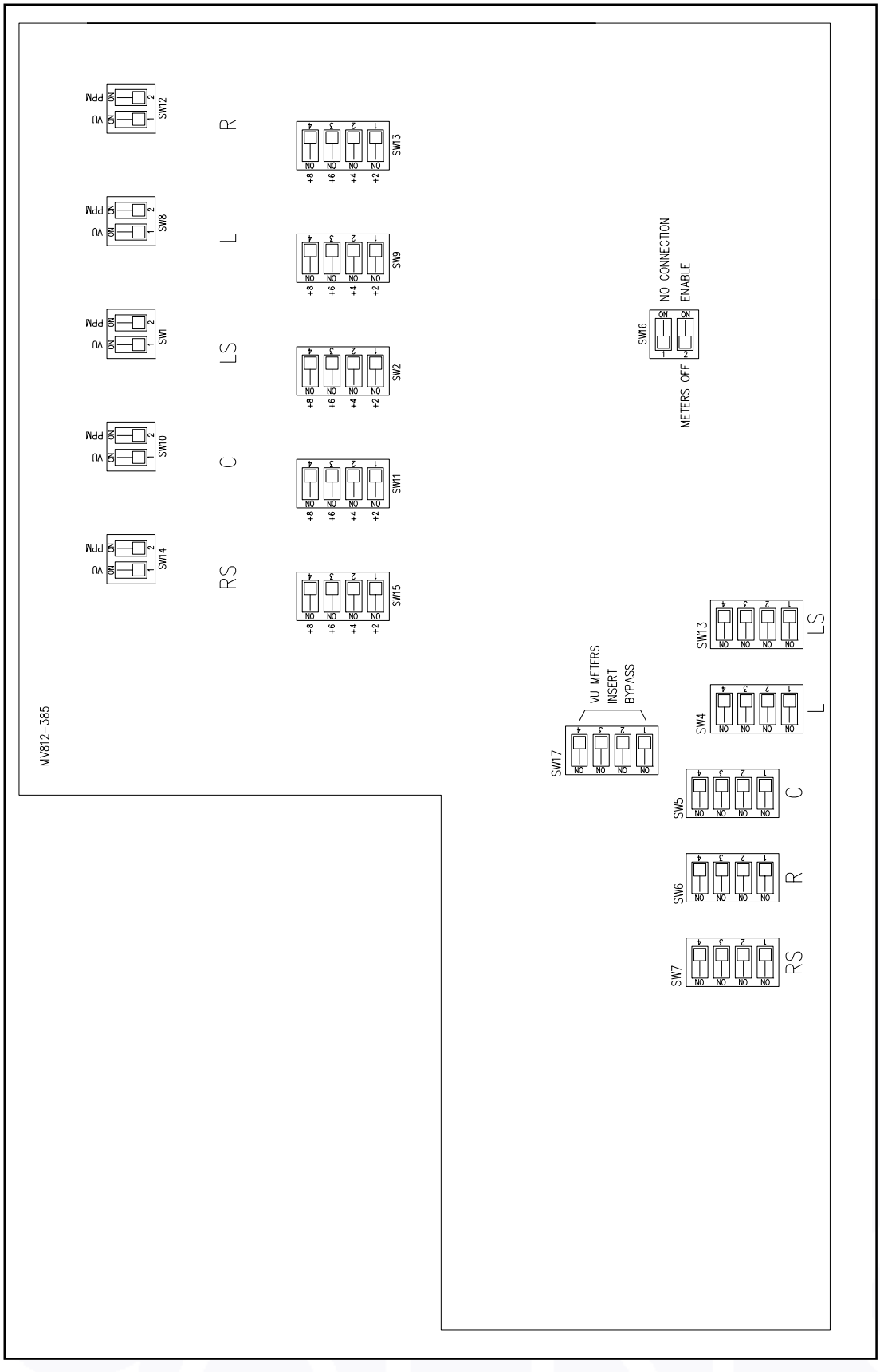
SW3 SECT 1 & 3 ON SELECT RIGHT METER FEED TO BE SOURCE
SECT 2 & 4 ON SELECT LEFT METER FEED TO BE SOURCE.

SW1 SECT 1 ON PPM CHARACTERISTIC.
SECT 2 ON VU CHARACTERISTIC.

SW2 SECT 1 ON PPM CHARACTERISTIC.
SECT 2 ON VU CHARACTERISTIC.

SW4 SECT 1 ON REDUCES GAIN TO UNITY.
SECT 1 OFF INCREASES GAIN BY 4dB.

MV4660 SURROUND SOUND METER PANEL



MV4660 SURROUND SOUND METER PANEL DIL SWITCHES

SW1
SW8
SW10
SW12
SW14

LS, L, C, R, RS VU or PPM select switches
Section 1 ON = VU, section 2 ON = PPM

SW2
SW9
SW11
SW13
SW15

LS, L, C, R, RS Input Sensitivity switches
Section 1 ON = +2dB
Section 2 ON = +4dB
Section 3 ON = +6dB
Section 4 ON = +8dB

All Sw's OFF for VU setting above

SW16 METERS OFF ENABLE.
Section 1 (not used)
Section 2 ON = Enabled

SW17 VU METERS INSERT BYPASS
Sections 1-4 ON = Bypass
There is provision in the system for Insertion Jacks before the VU Meters, if these are wired Sections 1 - 4 should be OFF.

SW3
SW4
SW5
SW6
SW7

LS, L, C, R, RS Bargragh signals Internal or External
Sections 1 + 2 = Internal (via 26 way ribbon cable)
Sections 3 + 4 = External (via 37 way D-type connector)

DL3678-2 COMPRESSOR/LIMITER

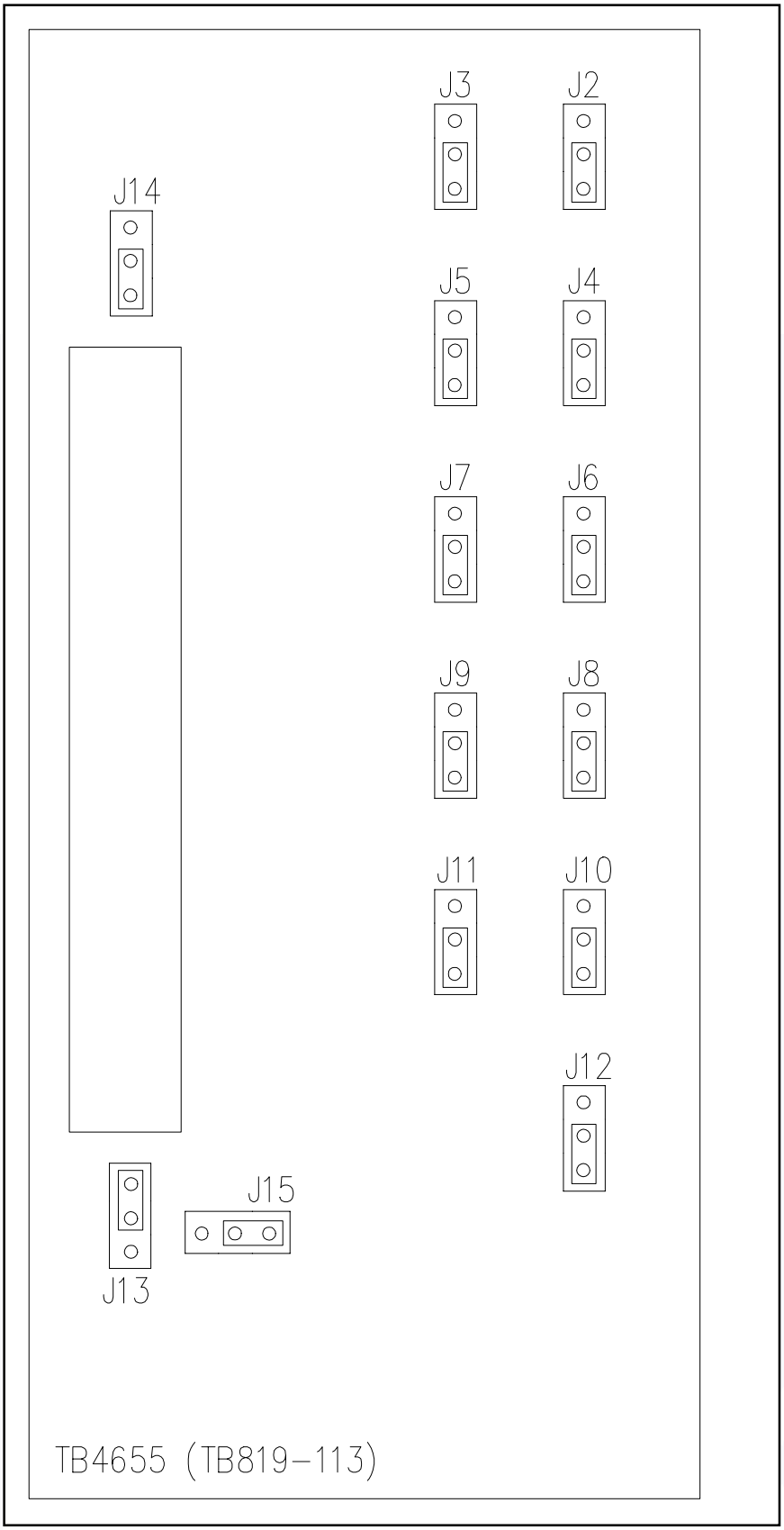
DL3678-2 COMPRESSOR/LIMITER DIL SWITCHES

SW2 "M" detection:-

DOWN = OFF.
UP = ON = Detection of reduced mono signal into side chain (see note).

N.B. The compressor and limiter normally respond to the higher of the left and right signals. SW2 allows the mono reduction of left and right (-3dB) to take control it the stereo coherence is such that this exceeds left or right. This renders it unnecessary to "under-drive" the stereo outputs to guard against the possibility of a higher than desired mono level.

TB4655 TALKBACK SELECT PANEL



TB4655 TALKBACK SELECT PANEL

OPTIONAL LINKS

In the positions shown, the Talkback switches will still operate when ON-AIR. The board provides ON-AIR INHIBIT options for the outputs, by plugging the relevant link into the alternative position. See detail below.

J2 = AUX 1
J3 = AUX 2
J4 = AUX 3
J5 = AUX 4
J6 = AUX 5
J7 = AUX 6
J8 = AUX 7
J9 = AUX 8
J10 = AXU 9
J11 = AUX 10
J12 = MAIN 1, 2, 3 & 4
J13 = SLATE (Multitracks Outputs)
J14 = EXT 1, 2 & 3
J15 = STB (Studio or Sound Talkback)

Note:
1. "OMNI" & "AUX MASTER" are always inhibited when ON-AIR.
2. "OMNI" does not operate "SLATE".

ADDENDUM

UPDATES TO THE Q2 CONSOLE DESIGN

The following specific operational or feature changes have been made from the first Q2 consoles as described in the original Q2 technical manual:

PQ4641 Channel Module

Aux 5/6: these now share a common level control and operate as per aux 7/8.

Monitor fader aux. facilities: individual aux sends can now be accessed from channel fader and monitor fader. An additional 'mon' button has been provided with each aux to enable the monitor input to feed the aux send.

Aux 1 'Bird Beater' facility: AUX 1 can now be controlled by the master 'Bird-Beater' switch. When this switch is 'on', and an individual AUX 1 send is switched 'on', closing the fader or muting the channel turns AUX 1 to 'on'.

TB4655 Talkback Panel

This is physically smaller and has less switches. The ones missing were spares. The remaining switches now have the option of dimming the Monitor loudspeakers.

OY4324 Oscillator

The internal switch enabling an external input to the oscillator has been replaced with an external switch on the oscillator panel.

ML4380-2 Monitor LS panel

Remote cut & dim functions are now provided. The LS level knob is physically larger.

WI4646 Surround Monitor Panel

The panel only activates the new Surround meter panel in the upstand when 4 or 5 track monitoring is selected. The Surround level controls are subject to the main monitor LS level control.

ML 4659 Studio LS module

The headphone output and level control have been removed. They have been replaced with a variable dim control which goes from 'off' to maximum. This can act as a remote cut function.

Groups

Eight channels have been designated as mic/group modules. When acting as mic inputs, the group meters derive their feed off the group buss. When the module acts as a group, the relevant meter derives its feed post the group fader, thus reading the actual group output.

UPDATES TO THE Q2 CONSOLE DESIGN (CONTINUED).

IS4645 Small Fader

A new multitrack pre/post switch has been provided. This allows for the feed to the multitrack buss to be sent pre or post the small fader. A new switch allows the insert to be sent pre or post the small fader. The aux 1-5 & 6-10 switches have been removed. Auxes can now be fed individually from the small or large fader.

IM4644 Large Fader

The switches for VCA routing, channel input/direct output meter select and PFL are now all recessed to avoid accidental operation. The channel input/direct output meter select switch is now larger (it is now the same type and size as the switches which turn the auxes ‘on’).

XF4658 New Automatic X-Fade panel

This panel allows for 8 stereo circuits in four modules to be controlled by external devices.
Each circuit is faded ‘out’ by default. Each circuit has opto-isolated switches which fade it ‘in’ on receipt of an external tally and ‘out’ by removal of the tally. Variable in and out timing is provided for. indicators are: Green for fully faded in and Red for fully faded out.
When both Red & Green are on, the setting is between fully ‘in’ and fully ‘out’.

IM4991 & IS4992 Stereo and Mono, Channel and Monitor fader modules

Now has 'FDR LINK' (fader link) switch. See page 24 & 26.

Q2

Notes:

USER REGISTRATION

Please complete this end user registration form as soon as you receive this manual. This will allow us to not only provide you with any manual update sheets &/or modification information, but also with information on new product developments which may be of interest to you.
Completion of this registration form will ensure that we send all technical correspondence directly to you at the address you have indicated.

The form, once completed should be returned to Calrec at the following address.

User Registrations
Calrec Audio Ltd
Nutclough Mill
Hebden Bridge
West Yorkshire
HX7 8EZ
England
UK

or alternatively it can be faxed back to us on +44 (0) 1422 845244

Console Type: Q2

Serial Number (located on the base panel):.....
Date Received: .....
Name: .....
Department: .....
Company: .....
Address: .....
.....
.....
.....
Post/Zipcode: .....
Tel No: .....
Fax No: .....
Email: .....

Customer comments:.....
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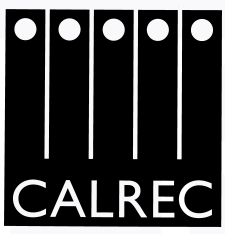
Q2

Notes:



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