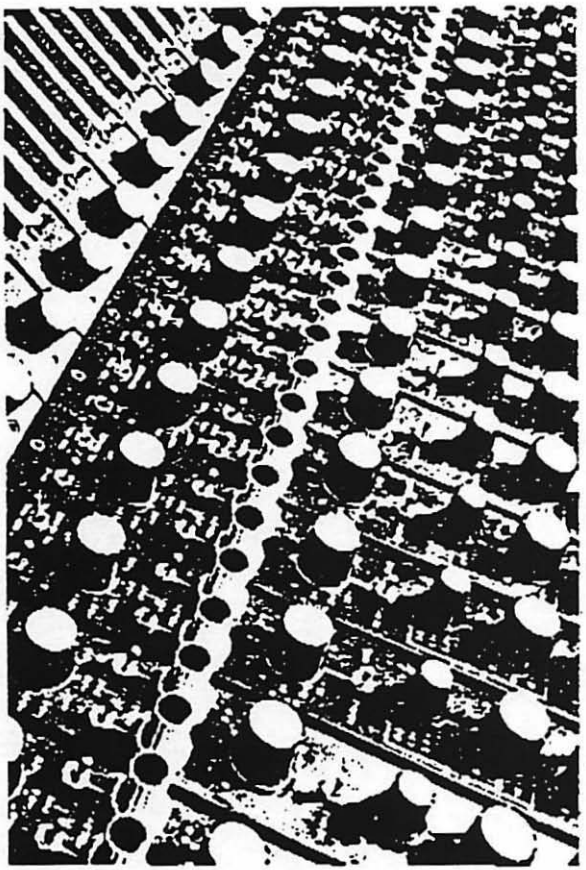
Triad 'B' Series Mixing Consoles.



A moderately priced, comprehensive range of mixing consoles, available in a standard configuration with 18 input channels, 8 output groups and 16 monitor returns, or to order, virtually any number of inputs and outputs can be supplied. General construction is based closely on our 'A' Series of consoles, using a similar all metal construction with wood trim panels. The electronics are also based on the 'A' Series, using the same high quality components throughout. Comprehensive patching facilities are provided and each console is supplied complete with high quality power supplies. Microphone phantom powering is provided as standard. Metering is normally by 17 V.U. meters, 16 reading group outputs or machine returns, and one auxiliary which may be switched to read echo, foldback or oscillator levels. Upon request, 'A' Series dual scaled P.P.M./V.U. meters can be fitted. The Triad 'B' Series of consoles offers facilities designed for modern multi-track recording at a cost which makes them ideally suitable for smaller recording and broadcast studios or mobile work

'B' Series monitor unit.

1. Sync/normal switch and indicator lamp. This allows monitoring of selected tape tracks while the console is monitoring line outputs.
2. Two independent foldback controls which may be switched pre- or post-fader.
3. Echo send control, switchable to one of four busses.
4. Meter control, allowing meter to read group output or machine return. An auxiliary 'meter couple' switch, ensures that all meters follow console monitoring mode.
5. Echo return, level control and switch to assign echo to either monitor or group outputs.
6. Monitor selection push-buttons, assigning group monitor signal to any of four speakers.
7. Monitor gain control. A master monitor gain control is situated on a central auxiliary module, which also contains machine return selection push-buttons and a high quality lining up oscillator with switched frequencies of 20Hz, 50Hz, 100Hz, 500Hz, 1KHz, 5KHz, 10KHz, 12KHz and 15KHz. The oscillator output is available on the patch bay and may also be switched to the output groups.
8. Monitor mute switch.

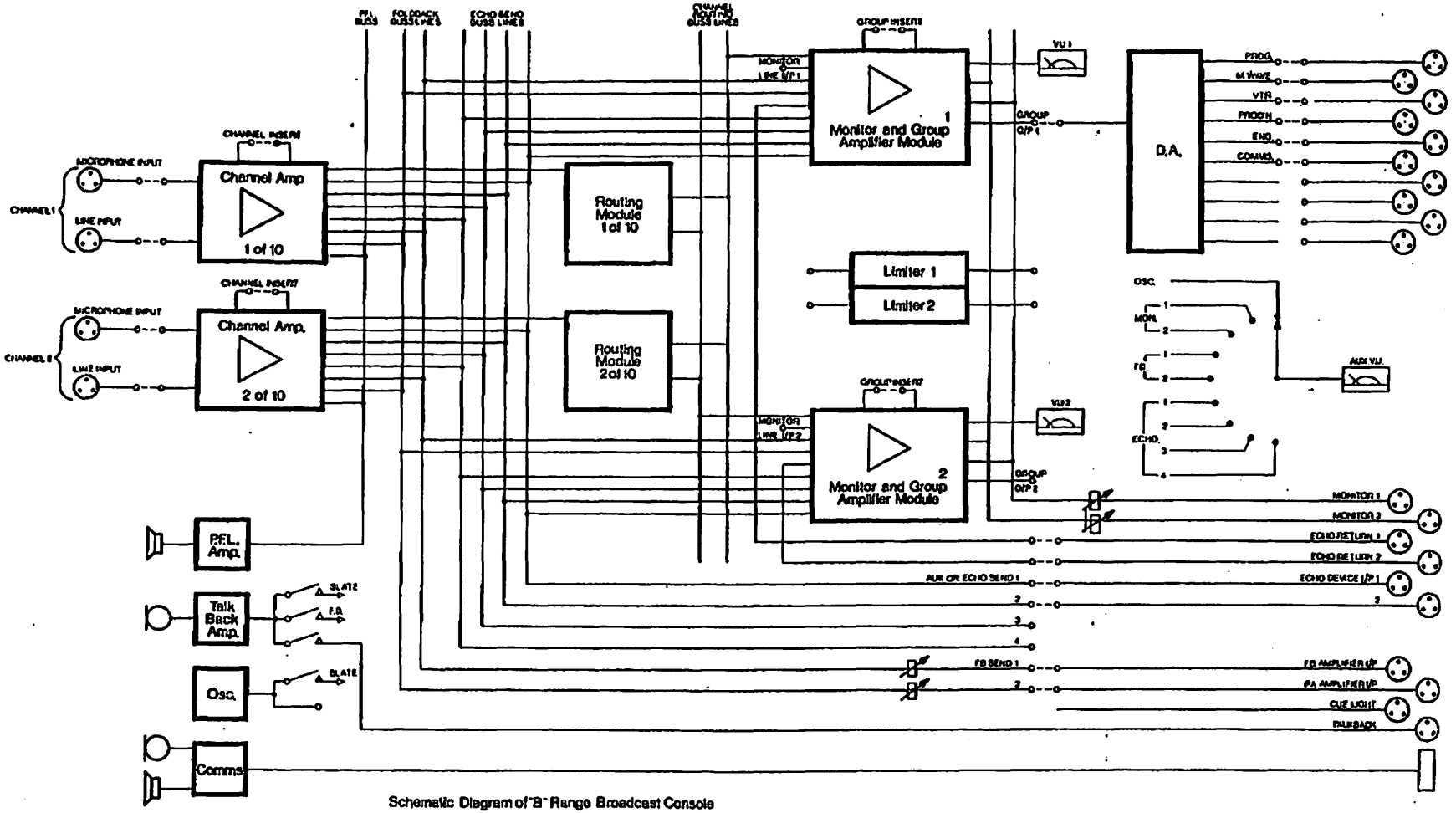
'B' Series channel amplifier.

1. Input controls. Each channel input may be selected to microphone or line. A single attenuator control gives gain from −20 to −60 dBm on microphone and +5 to −10 dBm on line. The microphone input is normally 1·2K floating, with reversible phase controlled by a front panel switch. Line input is 30k unbalanced.
2. Two independent foldback controls may be switched pre- or post-fader.
3. High frequency equalizer giving up to 16 dB or lift or cut at either 8 or 10 kHz.
4. Mid-frequency equalizer giving up to 16 dB of lift or cut at either 1·4, 2·8, 4·1, 5·6 or 7·0 kHz.
5. Low-frequency equalizer giving up to 16 dB of lift or cut at either 60 or 120 Hz. A separate switch allows a 50Hz 12 dB per octave roll off filter to be brought into circuit, and an E.Q. in/out switch allows the complete equalizer section to be by-passed.
6. Echo level control, with send to one of four echo busses.
7. Channel mute switch.

Each input channel has a Penny+ Giles conductive plastic fader with overpress operation of pre-fader listen.

Channel routing is accomplished by an 8 push-button unit which also contains a stepped compatible pan pot control.

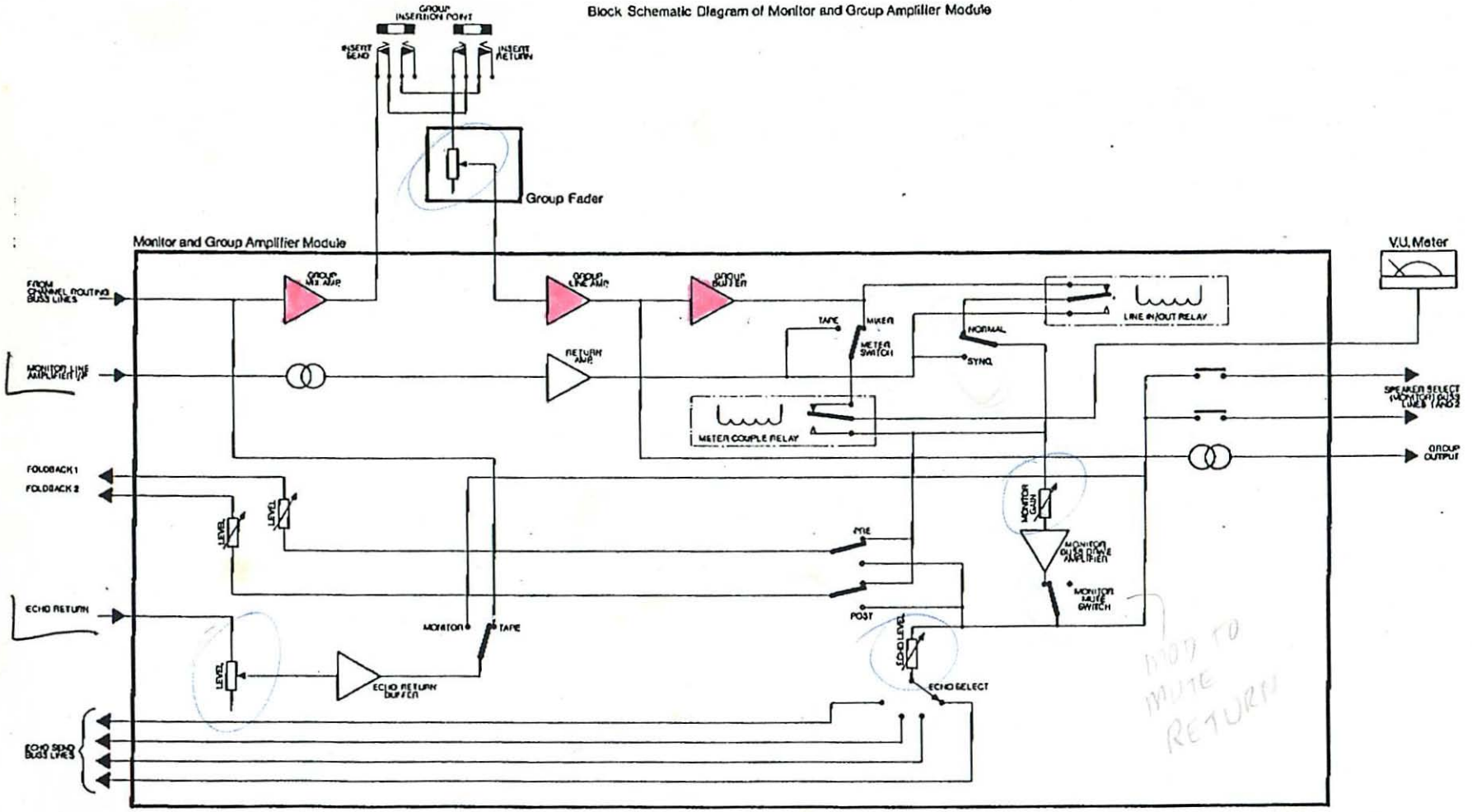
All module construction is of steel, normally finished in matt black stove enamel with white legends. Printed circuit boards are of highest quality fibreglass, and only the highest grade components are employed.



Schematic Diagram of "B" Range Broadcast Console

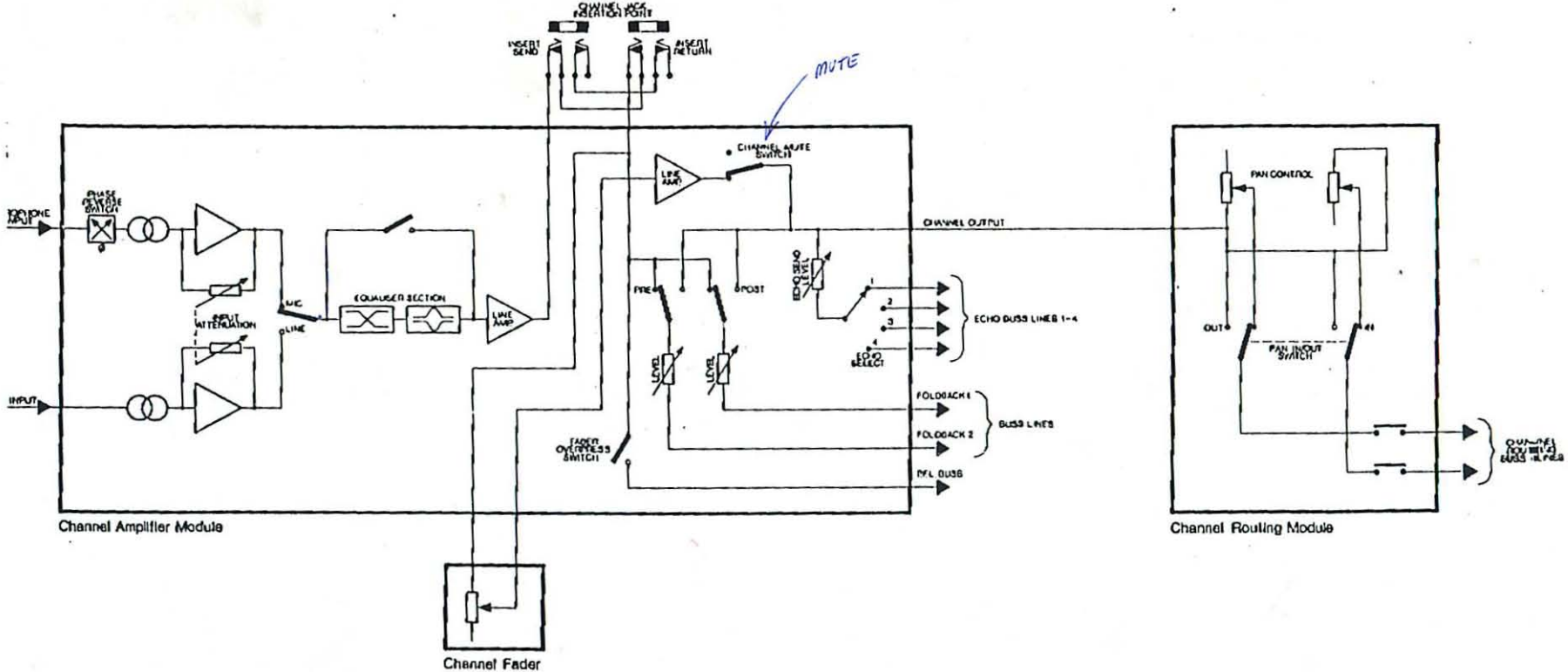
TRIAD

Block Schematic Diagram of Monitor and Group Amplifier Module



TRIAD

Block Schematic Diagram of Channel Amplifier and Channel Routing Modules



TRIAD

TRIAD 'B' RANGE SOUND MIXER

Operational Description

General

All configurations of 'B' Range consoles are built up from 4 basic modules:-

1. The Channel Amplifier which provides microphone/line amplification and equalisation plus facilities for initiating echo and foldback signals.

2. The Monitor Unit which provides group amplification, monitoring facilities and speaker selection. This unit also includes facilities for sending echo and foldback signals from the monitor channel. The echo-return signal is controlled at this unit.

3. The Routing Module which routes the signal from the Channel Amplifier to any output group and provides compatible panning between odd and even groups.

4. The Oscillator Unit which provides a local 9 frequency test oscillator and also contains the Master Foldback level controls and Master Monitor level control.

These units are assembled in a modular format to meet the customer's specified number of input channels, output channels and monitors and together with the faders, VU meters and auxiliaries make up the complete system.

Signal System

Input Channels

All microphone and line inputs to the console appear on XLR connectors at the rear termination panel. From here they are wired via the jackfield, where insertion points are available, to the inputs of the Channel Amplifiers. The amplifier input presents a balanced floating input of 1·2KΩ nominal resistance to microphone and an unbalanced input of 30KΩ nominal resistance to line. Where specified, a transformer is included in the line input path to provide balanced input. The microphone signal feeds via the NORMAL/REVERSE phase switch and mic. input transformer to the input-attenuator (GAIN) switch. The line signal feeds directly to the input-attenuator. The input-attenuator (GAIN) switch is a dual function control giving stepped attenuation from + 5dB to -10dB on the line input and from -20dB to -60dB on the microphone input. Following the GAIN switch a MIC/LINE selector switch selects the required input mode and the signal path progresses to the comprehensive Equaliser.

The Equaliser is in 3 sections providing control of the LOW, MID and HIGH bands of the audio spectrum. Each section embodies a FREQUENCY SELECT switch and a CUT/LIFT control. The high frequency section provides continuously variable cut/lift up to ±16dB selectable at 8 or 10 kHz. The mid-frequency section provides continuously variable cut/lift up to ±16dB selectable at 1·4:2·8: 4·1:5·6:7·0 kHz and the low-frequency section provides continuously variable cut/lift up to ±16dB selectable at 60 or 120Hz. The high and low frequency sections give 'Shelf' characteristic curves and the mid section curves are 'Bell' shaped.

Included in the Equaliser is a 50Hz cut-off 12dB/octave high-pass filter which can be switched in or out by a separate toggle switch. The whole Equaliser, including the high-pass filter, may be by-passed by means of the EQ IN/OUT switch. After the Equaliser the signal is routed via an amplifier section to the jackfield where an insertion point is available (designated Channel Send to Limiter/Channel return from Limiter) which may be used for connecting auxiliary devices into the channel. From the jackfield the signal feeds to the Channel Fader which permits level control of the channel signal. This fader which is normally a P & G conductive plastic type is fitted with a microswitch which operates on 'overpress' to feed a PFL (prefade listen) signal to the PFL buss line. The PFL signal may appear on a local speaker built into the console superstructure or on the main monitor speakers, as specified by the customer's requirements. From the Channel Fader the main signal path continues through a further amplifier section to the Channel Routing Module. Prior to this point the echo-send and foldback signals are derived. The echo-send signal is fed via two ECHO controls consisting of a level control and a 4-way rotary selector switch which will route the signal to one of 4 echo buss lines. Two separate FOLDBACK level controls route foldback signal to two foldback buss lines. The foldback signals may be derived individually before or after the channel fader by the PRE/POST selector toggle switches. A channel MUTE pushbutton is included in the signal chain which, when depressed, will mute all signals emanating from the channel except PFL. The foldback signal is not muted when the associated PRE/POST foldback selector switch is in PRE position. The foldback buss signals after passing through mixing amplifiers are routed via the FOLDBACK MASTER level controls (1 & 2 situated on the Oscillator Unit panel) to the jackfield, where insertion points are available (designated FB send/ FB Amp. Input) and finally to the rear termination panel (FB Sends). The foldback 1 signal path is switchable (after the MASTER level control) to an alternative output termination designated Spkr FB. The 4 echo signal buss lines are also fed via mixing amps to the jackfield insertion points (designated Echo Send/Echo Device Input) and thence to the rear termination panel (Echo Sends).

Output/Monitoring Channels

The main signal from the Channel Amplifier output feeds directly to the associated Channel Routing Module. This module permits routing of the channel signal to one or more output groups by depressing the pushbutton(s) related to the group(s) selected. Where panning between groups is required the module should be switched into the panning mode by selecting the 'IN' position on the PAN IN/OUT switch. In this mode the L/R PAN control will pan the signal between the odd and even

numbered groups selected on the routing pushbuttons. The pan control is not a continuously variable control but is switched through five positions either side of centre to achieve accurate stereo compatibility of all settings.

From the Routing Module the signal is routed to the selected group mix-amp and thence via the jackfield where insertion points are available (designated Group Send to Limiter/Group Return from Limiter) to the associated Group Fader which controls the group signal level. From the group fader the signal continues through a final group line-amp back to the jackfield where further insertion points are available (designated Group Output/Tape Machine Input) and thence to the Output at the rear termination panel (Tape Machine Inputs). After the group line-amp the signal path is tapped-off through a buffer amp to provide a secondary signal chain for monitoring of the group output.

When the console is being used for recording onto tape the output(s) of the tape machine will be coupled back into the mixer via the Tape Machine Output connections at the rear termination panel: from here the tape output signal will route via the jackfield points to the input of the monitor chain where it becomes available for monitoring. In this recording mode the following monitoring facilities are available:-

i With the SYNC/NORMAL switches on the individual Output/Monitor Units switched to NORMAL, the MIXER OUT/TAPE OUT Pushbutton (on the Engineer's Panel) will switch the inputs of all the monitor (speaker) buss drive-amps, between Mixer Output and Tape Output for the purpose of comparing listening quality.

ii The METER-COUPLE Pushbutton (on the Engineer's Panel) will couple all the VU meters to the inputs of their respective monitor (speaker) buss drive-amps. In this mode the VU meters will follow the MIXER OUT/TAPE OUT Pushbutton switching and provide simultaneous signal level indication. With the METER-COUPLE pushbutton released the VU meters can be individually switched between mixer-out and tape-out by the TAPE/MIXER switch on each Output/Monitor Unit.

iii When the SYNC/NORMAL switch is switched to SYNC, the input of the monitor (speaker) buss drive-amp on the associated monitor channel is connected to tape-out to provide over-dub facility on that channel. An indicator lamp situated by the SYNC/NORMAL switch illuminates to indicate SYNC mode.

On each Output/Monitor Unit a MONITOR GAIN control will adjust the monitor listening level and 4 SPEAKER SELECT Pushbuttons will route the output of the monitor (speaker) buss drive-amp to one or more of the monitor speaker outputs (designated MONITOR 1 thru 4) situated on the rear termination panel. A monitor MUTE pushbutton will mute the output from the monitor channel without muting the main signal output from the group. The MUTE pushbutton will illuminate when depressed.

Associated with each Output/Monitor Unit are the following additional facilities:-

i Two independent foldback signals derived from the monitor output. The foldback feeds are individually switchable before or after the MONITOR GAIN by means of two FOLDBACK PRE/POST selector switches. Following each switch is a FOLDBACK LEVEL control which feeds the signal to the foldback buss lines.

ii A monitor echo-send signal derived after the MONITOR GAIN, feeds via two ECHO controls consisting of a level control and a rotary 4-way selector switch which routes the echo signal to any one of 4 echo buss lines.

The monitor echo and foldback signals follow the mode of the SYNC/NORMAL switch. The monitor MUTE pushbutton mutes the echo and foldback signals. Foldback is not muted when the PRE/POST switch is in PRE position.

iii The echo-return signal is routed via the rear termination panel and jackfield insertion points (designated Echo Device Output/ Echo Return) to the Output/Monitor Unit, where the return signal level is controlled by the ECHO RETURN potentiometer. After the potentiometer the signal continues via a buffer-amp to the MONITOR/TAPE toggle switch which selects the echo return either to monitor only or into the group output.

Auxiliaries

The console auxiliary functions are normally contained on 3 modules:-

Engineer's Panel

This panel contains 5 illuminating pushbuttons which provide the following functions:-

i TALKBACK TO STUDIO: this non-locking pushbutton activates the talkback microphone channel, permitting talkback to the studio, whilst dimming the control-room loudspeaker level. The talkback signal appears on an XLR connector on the rear termination panel (TB).

ii TALKBACK SLATE: this non-locking pushbutton activates the talkback microphone channel to permit announcements onto tape via the mixer group outputs, whilst dimming the control room loudspeaker level.

iii TALKBACK TO FOLDBACK: this non-locking pushbutton activates the talkback microphone channel to permit announcements onto the Foldback circuits, whilst dimming the control room loudspeaker level.

iv MIXER-OUT/TAPE-OUT: this is a locking pushbutton functioning as described in Monitoring section.

v METER COUPLE: this is a locking pushbutton functioning as described in the Monitoring section.

Producer's Panel

This panel contains 3 illuminating pushbuttons providing functions as follows:-

i CUE LIGHT: this is a locking pushbutton which provides 24v.dc to the 5-pin cannon outlet on the rear terminational panel (Cue) for the purpose of operating a cue light relay.

ii TALKBACK TO FOLDBACK and TALKBACK TO STUDIO are non-locking pushbuttons which duplicate the functions on the Engineer's Panel.

Auxiliary Panel

This contains the following facilities:-

A built-in alignment Oscillator with 9 frequencies, 20Hz: 50Hz: 100Hz: 500Hz: 1kHz: 5kHz: 10kHz: 12kHz: 15kHz selected by the rotary FREQUENCY selector switch. The output of the oscillator is adjusted by the LEVEL control potentiometer. An ON/OFF switch is provided and the SLATE/JACK toggle switch routes the oscillator output either to the jackfield outlet point or across the mixer group outputs.

The two FOLDBACK MASTER controls provide overall adjustment of the foldback levels. A PHONES/SPEAKER + PHONES switch selects Foldback 1 to an alternative cannon output on the rear termination panel (Spkr FB).

A MONITOR MUTE locking pushbutton (illuminating) mutes all monitor speakers simultaneously.

3 locking pushbuttons (illuminating) designated 16 TRACK: STEREO 1: STEREO 2 will select the respective tape machine outputs from the rear termination panel to the monitor line inputs for monitoring purposes.

The MONITOR MASTER control provides overall adjustment of the monitor-speaker listening levels.

An additional VU meter is provided on the console to monitor the signal levels of the Oscillator Output, Foldback, Echo and Monitor lines. This AUX. VU METER is switched across each line by the adjacent rotary selector switch.

The foregoing description covers the operational system of the standard 'B' range console. The system is essentially the same whether comprising a 10 input 2 output console or a 24 input 16 output format, although there may be some variations in system configuration brought about by customer requirements.

When the console is used for Radio/TV broadcast applications, as distinct from music recording, the group output of the desk may feed a distribution amplifier with the multiple outputs routed to several locations. The outputs of the distribution amplifier(s) will be normalled via the jackfield to the rear termination panel. Under these circumstances some of the comprehensive monitoring facilities on the desk may be superfluous, e.g. the SYNC/NORMAL switch SYNC position for overdubbing and the 3 pushbuttons on the Auxiliary Panel designated 16T: Stereo 1: Stereo 2. The output of the tape machines will usually be returned to line input of Channel Amplifiers to facilitate the machine being used for play-in purposes.

TRIAD 'B' RANGE BROADCAST

SOUND MIXER

3. Performance.

3.i Frequency Response.

With all equalisers set in 'flat'position the response from any input to any output shall be within ± 1.0 dB 20 Hz to 20 kHz.

3.2 Noise.

With 5 channels selected to Group and console set for zero gain the unweighted noise 20 Hz to 20 kHz measured at Group Output shall be better than -75 dBm.

With Microphone Amplifier gain 60 dB and input terminated 200 ohms the noise shall be not less than - 124 dB relative to input.

3.3 Distortion.

Total harmonic distortion at 1 kHz shall be better than 0.02% at group output with input attenuator set at -20 and input signal level adjusted for + 10 dBm output.
Maximum output not less than 20 dBm.

4.0 Detail Facilities.

4.1. Input Channels

10 Input Channel Modules: each comprising

Microphone Input (1.2K ohms nominal impedance - balanced floating)
Line Input (600 ohms bridging - balanced floating)
Phase Reverse
Input Attenuator
2 Auxiliary Feed level controls(Foldback) switchable Pre/Post fader
HF Equaliser ± 16dB at 2 frequencies
MID Equaliser ± 16 dB at 5 frequencies
LF Equaliser ± 16 dB at 2 frequencies
Equaliser in/out
HI PASS Filter (50 Hz cut-off 12 dB/Octave)
1 Auxiliary Feed level control (Echo Send) switchable to any 1 of 4 busses
Channel Mute

10 Channel Routing Modules: each comprising

Group Select 1 and 2
Panning Potentiometer
10 P & G Slide Faders (Channels) with PFL overpress

4.2 Output/Monitor Channels
2 Monitor Channel Modules: each comprising

Sync/Normal select
2 Auxiliary Feed level controls (Foldback) switchable Pre/Post monitor gain control.
1 Auxiliary Feed level control (Echo Send) switchable to any 1 of 4 busses
Mixer/Tape meter select

4.2 Echo Return level control (switchable Monitor/Tape)
Speaker Select 1 and 2
Monitor Gain
Monitor Mute
2 P & G Slide Faders (Groups)

4.3 Auxiliaries

1 Auxiliary Module: comprising

Oscillator frequency select (9 frequencies)
" level
Foldback Master 1 level control
Phones/Speaker & Phones select
Foldback Master 2 level control
Monitor Mute
Monitor Master level control

1 Engineers Panel: comprising
Talkback to Studio pushbutton
Talkback to Foldback "
Talkback Slate "
Mixer/Tape Out Master "
Meter Couple Master "
Cue Light "

5.0 Metering

2 VU or Peak Programme meters (Group Outputs monitoring)
1 VU meter (Auxiliary/Monitor/Oscillator outputs monitoring)

6.0 Switching and Signal Distribution

i Each input channel is switchable Mic/Line
ii Each input channel can be pushbutton routed to either or both of two output groups. If both groups are selected a panoramic potentiometer is included.
iii Inputs and Outputs are terminated in 3 pin X-L-R connectors on rear panel.
lv The echo send busses terminate in X-L-R connectors 1 thru 4 and the signal from any input or monitor channel can be routed to any one of these outputs.

RECOMMENDED SPARES LIST.

B RANGE 10-2 BROADCAST DESK.

TRANSISTORS.

QTY	TYPE
4	2N3054
12	BC413
12	BC416
12	40361
12	40362

ZENER DIODES.

6	IN4751A (30v)
6	IN4749A (24v)

DIODES.

12	IN4148
6	IN4002

CAPACITORS.

6	4.7mfd. 35v Tant.
6	22 mfd " "
4	2.2mfd " "
4	10mfd 25v "
2	1000/35

RESISTORS.

6	27 ohms
6	100 " w/w
6	2K2 " w/w

RELAYS.

2	CCPR1/E
3	CPR1/A

POTS.

6	22K ohm log.
6	100k
4	10k

SWITCHES.

4	Apem-toggle
2	Elma-rotary
2	Jeanrenaud-push

LAMPS.

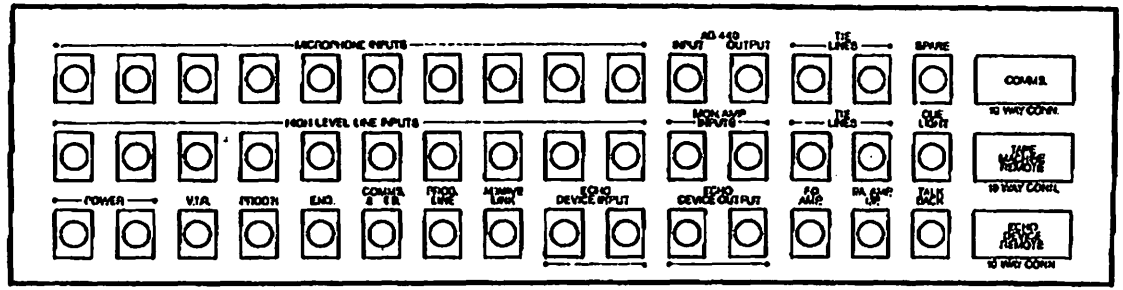
12	28v.40mA

MODULES

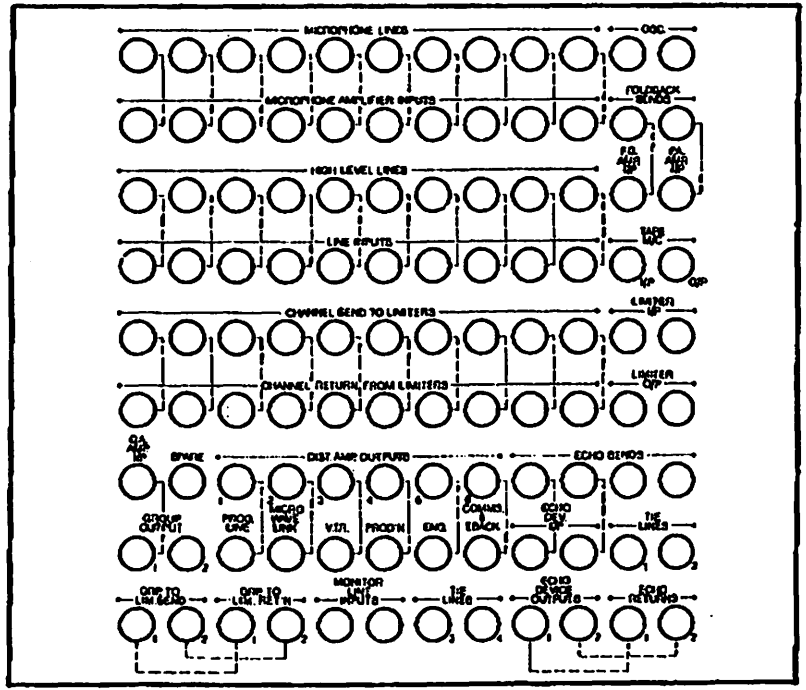
1	Monitor/Group.Amp Module
1	Fader
1	Channel Amp Module

Jackfield and Rear Connector Panel Layouts

Rear Connector Panel

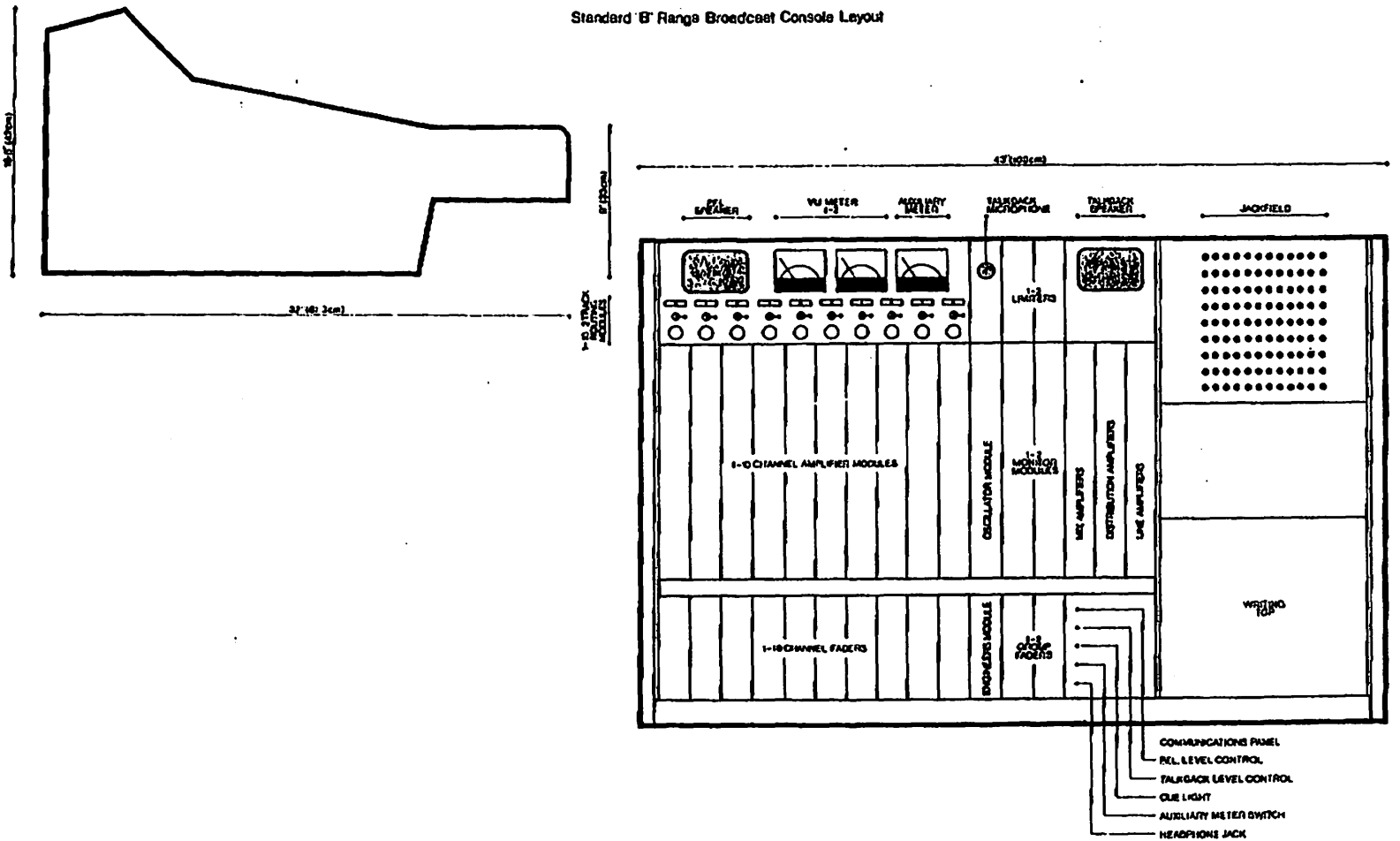


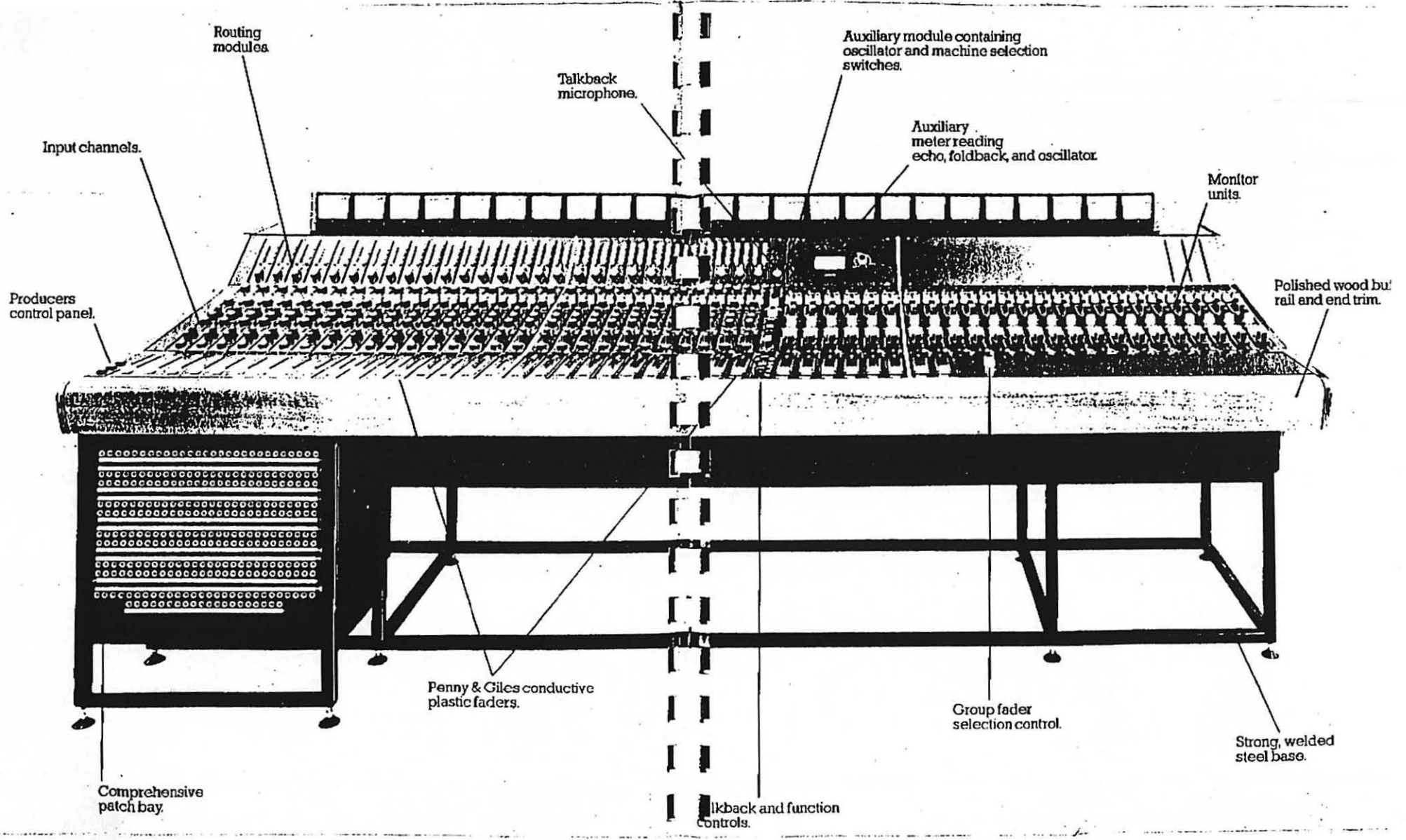
Jackfield Layout

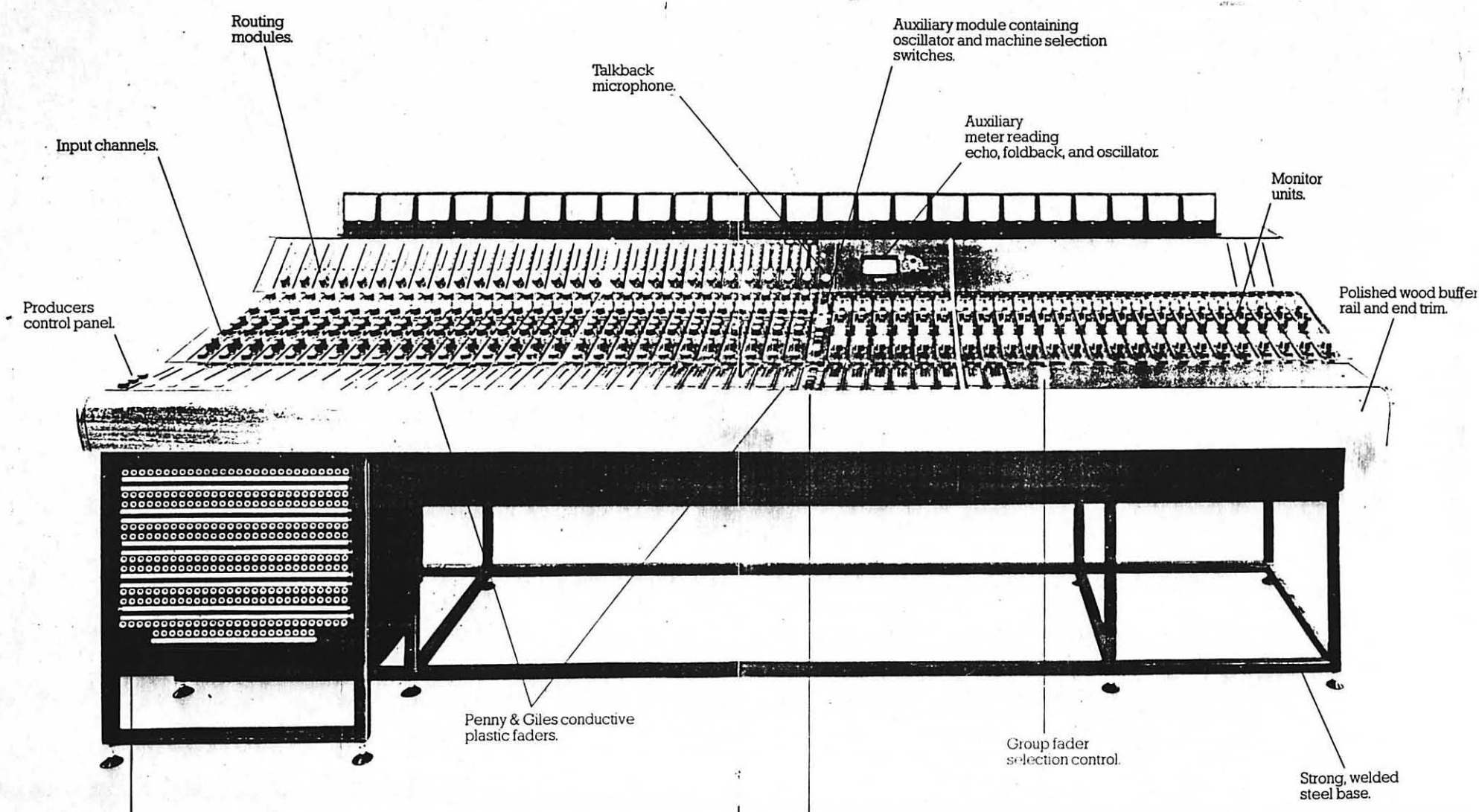


TRIAD

Standard 'B' Range Broadcast Console Layout




Routing modules.
Auxiliary module containing oscillator and machine selection switches.
Talkback microphone.
Auxiliary meter reading echo, foldback, and oscillator.
Input channels.
Monitor units.
Producers control panel.
Polished wood bu rail and end trim.
Penny & Giles conductive plastic faders.
Group fader selection control.
Strong, welded steel base.
Comprehensive patch bay.
lkback and function controls.


Routing modules.
Auxiliary module containing oscillator and machine selection switches.
Talkback microphone.
Auxiliary meter reading echo, foldback, and oscillator.
Input channels.
Monitor units.
Producers control panel.
Polished wood buffer rail and end trim.
Penny & Giles conductive plastic faders.
Group fader selection control.
Strong, welded steel base.

NOT IMPLEMENTED

11/3/81

TRIDENT
AUDIO
DEVELOPMENTS LTD
MANUFACTURERS OF 'TRIAD' EQUIPMENT

To improve Square Wave Response of a 'B' Input Channel

In the mic amp section C 61 (6800pf) and C 62 (150pf) should be removed.

A zobel network is added across the secondary winding of the mic transformer. The network consists of a capacitor of 1000pf in series with a resistance of 24K ohms.

A 22pf capacitor is wired between the base and collector of Q4.

In the EQ section C 45 (470pf) should be removed.

T R I A D 1st April 1976.

Equaliser headroom modification to 'B' Range channel Modules.

This modification allows for more headroom of the E.Q. section. It consists of a 5dB attenuator at the input of the E.Q. amp, and a 5dB increase in gain ofthe insert send amplifier.

Components

Attenuator.

1X 8K2 resistor — 2OFF
1X 15K resistor

Gain increase

1 X 5K6 resistor
1 X 22MFD at 25 volts tantalum capacitor. - 2 OFF

Attenuator wiring

Remove the screened wire from the lower wiper contact of the E.Q. in/out toggle switch. Solder the 8K2 resistor to this contact. The wire which was removed is now soldered to the free end of the 8K2 resistor. The 12K resistor is now soldered from the same contact of the switch to P.C.B. pin 31. This completes the wiring of the attenuator.

15.K

Gain increase wiring

The 5K6 resistor is soldered to the emitter of Q17(BC 416). The positive end of the 22MFD capacitor is then soldered to the free end of the 5K6 resistor. The negative leg of the capacitor is then soldered to the ground of the insert send amplifier, which is, for example, the junction of R59(6K8) and R60(82K).

Shepperton Studios, Shepperton, Middlesex. Tel.Chertsey (09328) 60241

Registered in England No. 1063578
Trident Audio Developments Limited
Directors M.F. Toft, J.A. Hartfield, N.J. Sheffield, B.F. Sheffield, W.A. Hope, A.C.A.

TRIAD

T R I A D 1st April 1976.

'B' Range Channel Module Output Line Amplifier Gain Modification.

This modification increases the gain of the output line amplifier to 10dB.

Components required.

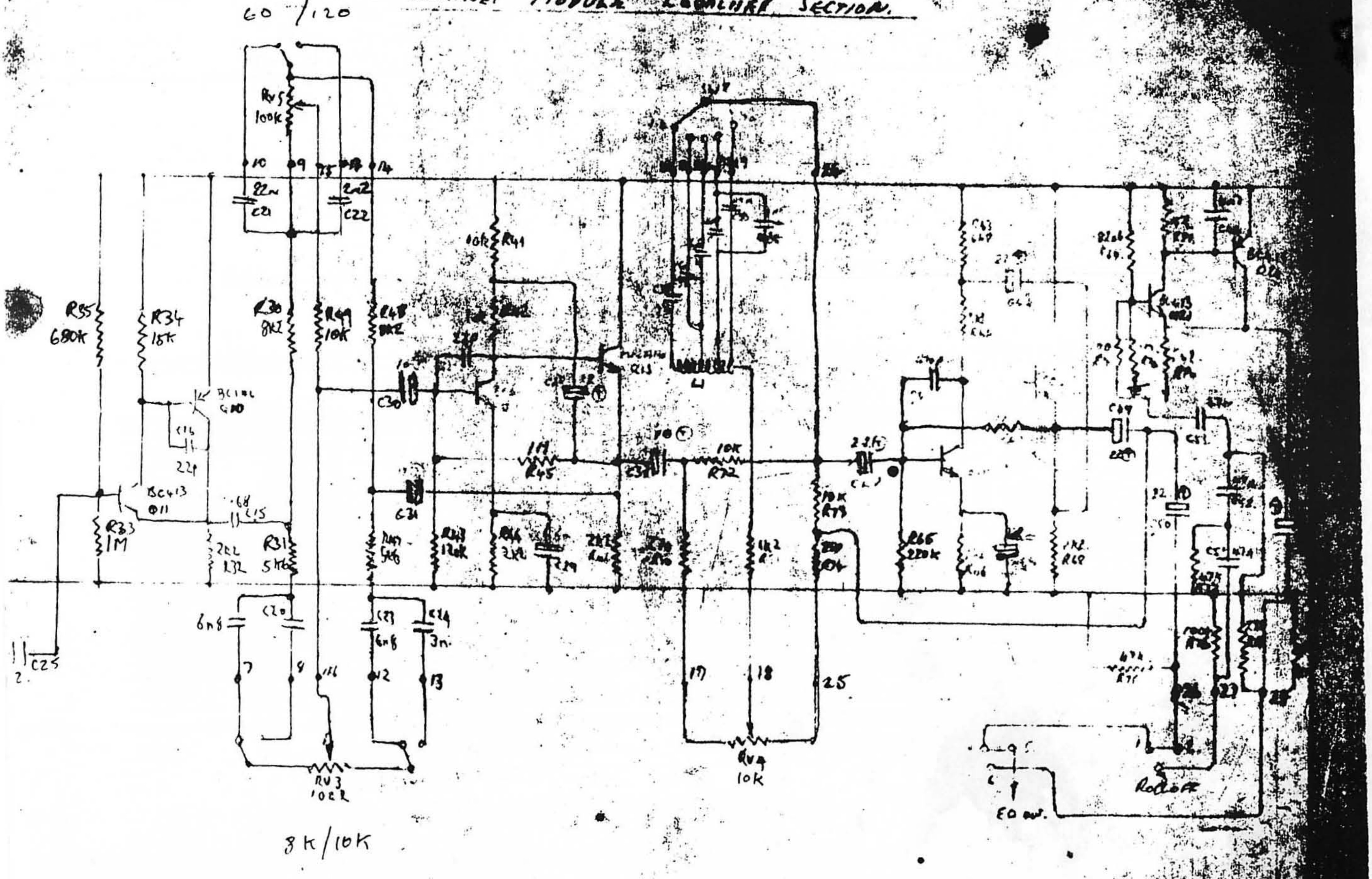
1 X 2K2 resistor

1 X 22MFD at 25 volts tantalum capacitor.

Wiring.

The 2K2 resistor is soldered to the emitter of Q22 which is a BC 416 transistor. The positive leg of the 22MFD capacitor is connected to the other end of the 2K2 resistor. The negative leg of the capacitor is then soldered to the ground of the output line amplifier, which is that portion of printed circuit track which connects R83(82K) and R86(6K8) to the emitter of Q23(BC 413). This completes the modification. For neatness the P.C.B. should be drilled to house these components.

B RANGE CHANNEL MODULE EQUALISER SECTION.

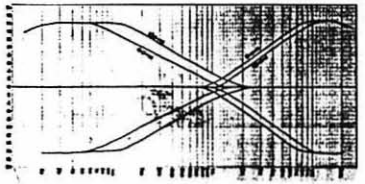


Performance.

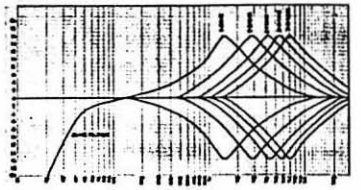
On standard 'B' Series consoles, 8 group faders are supplied, and these may be switched to feed outputs 1–8 or 9–16. If a console is fitted with 16 group routing, 16 group faders are supplied.
Auxiliary controls on each console control talkback to studio or foldback, cue light switching etc.
A standard patch bay contains 8 x 20 G.P.O. style jack sockets giving access at all important points of the audio chain. Fully protected remote power supplies giving 45v. for audio electronics and 24v. for lamps and relays, are supplied with each console.
Each 'B' Series console is supplied with an individual test report and technical handbook.

Typical performance of production console:
Input impedance –
Microphone 1·2K floating
Line input 30K unbalanced
Tape return input 30K unbalanced

Output impedance –
<30 ohms unbalanced



Noise – Unweighted with 20Hz–20KHz bandwidth at group output with 5 channels selected to group, and console set for zero gain <–75dBm.
Microphone amplifier with 60dB gain relative to 200 ohms input <–124dBm.



Distortion – Line input to group output at OdBm <0·1%.
20Hz – 20kHz – Microphone input to group output at OdBm <0·15%.
Console gain – Input gain switch controls amplification or attenuation of input signal so that all sections of the console are normally working at 'O' V.U. (+4dBm) except for the group outputs, which give a further 5dB of gain when the group fader is at maximum. In this position, maximum output is better than +20dBm.
Frequency response – Any input to any output with all equalizers in flat position ± 1dB 20Hz–20kHz.