mbi

SERIES 20

USER GUIDE

© Soundcraft Electronics Ltd. 1993
All rights reserved
Parts of the design of this product may be protected by worldwide patents.

Issue 1, June 1993
Part No. ZM0025

Information in this manual is subject to change without notice and does not represent a commitment on the part of the vendor. Soundcraft Electronics Ltd. shall not be liable for any loss or damage whatsoever arising from the use of information or any error contained in this manual.

No part of this manual may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, electrical, mechanical, optical, chemical, including photocopying and recording, for any purpose without the express written permission of Soundcraft Electronics Ltd.

It is recommended that all maintenance and service on the product should be carried out by Soundcraft Electronics Ltd. or its authorised agents. Soundcraft Electronics Ltd. cannot accept any liability whatsoever for any loss or damage caused by service, maintenance or repair by unauthorised personnel.

Soundcraft Electronics Ltd.
Cranborne House,
Cranborne Road,
Cranborne Industrial Estate,
Potters Bar,
Herts.,
England.
EN6 3JN.

Tel: 0707 665000
Fax: 0707 660482

Contents

Introduction 1

Precautions and Safety Instructions 3

Installation 5

Connection Details 6

Audio Connections 7

Special Audio Input Connectors 8

Installation Procedure 8

Modules 9

Module Block Diagrams 11

Module Descriptions 15

Mono Mic/Line S20M/ME, Mic/Mic S20MM/MME 17

Stereo Module S20S/SE 27

Telco Module S20T/TE 35

Control Room & Studio Monitor Modules S20CM & S20SM 42

Output Module S20OP 49

Meter Interfaces 52

Meterbridge Monitor S20MBS 53

Meterbridge Talkback S20MTB 54

Meterbridge 8 Way Input Selector Module S20MS8 55

ICL Module S20ICL 56

UCL Module S20UCL 57

Timer Module S20TIM 58

Source Selector Module S20SL 59

Telephone Hybrid Module S20TBU 60

Appendices **61**

Technical Specifications *62*

Dimensions *64*

Configurations *65*

Warranty *66*

Introduction

Introduction

The MBI Series 20 is designed for full stereo operation throughout, using completely modular, plug-in units. It is supplied with the compliment of units and particular operational configuration initially specified by the customer. However, inbuilt features of the console, in conjunction with the modular construction of its functional units, enable different configurations to be easily achieved on site. Also, if the console is not initially fitted with a full compliment of available unit modules, or additional facilities are required later, extra modules may be added in the existing frame.

This manual therefore describes the full range of different plug-in modules available.

The Series 20 plug-in modules are so designed that they can be plugged into the main frame motherboard without any main frame re-wiring. The meterbridge modules slide into the meterbridge and plug via a flexible cable link into a meterbridge power and signal distribution connector. The connectors are arranged such that any single width (35mm) meterbridge module can be accommodated with power and bus signals.

Precautions and Safety Instructions

General Precautions

Avoid storing or using the mixing console in conditions of excessive heat or cold, or in positions where it is likely to be subject to vibration, dust or moisture. Do not use any liquids to clean the fascia of the unit: a soft dry brush is ideal. Use only water or ethyl alcohol to clean the trim and scribble strips. Other solvents may cause damage to paint or plastic parts.

Avoid using the console close to strong sources of electromagnetic radiation (e.g. video monitors, high power electric cabling): this may cause degradation of the audio quality due to induced voltages in connecting leads and chassis. For the same reason, always site the console power supply away from the unit .

Caution! **In all cases, refer servicing to qualified personnel.**

Handling and Transport

The console is a very rugged unit. However, care in handling and transportation will ensure a long and trouble-free life. At all times avoid applying excessive force to any knobs, switches or connectors.

Power supplies & cables

Always make sure that the power supply has been set to the same source voltage as the mains supply.

Always use the power supply and power cable supplied with the mixer: the use of alternative supplies may cause damage and voids the warranty; the extension of power cables may result in malfunction of the mixing console.

Warning! **Always switch the power supply off before connecting or disconnecting the console power cable, removing or installing modules, and servicing. In the event of an electrical storm, or large mains voltage fluctuations, immediately switch off the PSU and unplug from the mains.**

Signal Levels

It is important to supply the correct input levels to the console, otherwise signal-to-noise ratio or distortion performance may be degraded; and in extreme cases damage to the internal circuitry may result. Likewise, on all balanced inputs avoid sources with large common mode DC, AC or RF voltages, as these will reduce the available signal range on the inputs. Note that 0dBu = 0.775V RMS.

The microphone inputs are designed for use with balanced low impedance (150 or 200Ω) microphones.

Caution! **DO NOT use unbalanced microphones or battery powered condenser microphones with the +48V phantom power switched on: degraded performance or damage to the microphone may result.**

Installation

Connection Details

Audio Connections

Special Audio Input Connectors

Installation Procedure

Modules

Installation

The Series 20 mainframe is designed for table top or stand mounting . Alternatively, by removal of the lower side trim sections, the console may be recessed within the furniture of the studio. Refer to diagrams for dimensions and support points. All electrical connections are made at the rear bay of the console and space is provided within the mainframe external dimensions for cable trunking to enter and leave via access holes in the lower and side structure. Full access must be allowed to the vertical rear surface for removal of the back panels. Within are housed the electrical connections for power and audio circuits (all plug in type connectors) and module retaining transit screw. Refer to diagrams for connector details. Module removal for service requires access at the rear bay for removal of connectors and transit screw and extraction of module from mainframe. All module assemblies include their own connection systems, the mainframe contains no active electronics parts. During the planning stage of the studio complex, it is recommended that a study is made of the full range of modules available for the Series 20 and that cabling to the console location contains spare capacity to permit expansion.

Connection Details

All connections for interface of console with studio are inside the rear console bay. Each 8 way section of the console has a rear cover with five retaining screws.

Power

The MBI Series 20 uses a CPS450M Power Supply which is a 19" rack mount unit 2U high. The power system uses a bipolar 17 volt amplifier supply and 15 volt DC logic supply to control crosstalk and noise. This places a restriction on the cable type and length fitted to the power supply connector. A multicore cable transfers the Power Supply outputs to the power connector plug on the console frame. The length of the supplied lead is 5 metres. If a longer lead is required the powerlines must be wired using substantial conductors not less than 0.75sq.mm section for bipolar and 15 volt section. Complete the connection of power unit cables at both ends before applying AC power.

Earthing

The console audio common circuits and power supply 0v circuits join with the console frame electrical earth at the power connector earth star point module, usually located at the right hand end of the console, close to the S20OP output module. The earth star point module may alternatively be positioned at the left hand end of the console. This is the technical earth for the console and any earth wires to or from external equipment must terminate at this point. The power supply unit frame is earthed by AC power ground for safety. The console audio system must be connected to ground or technical earth independently in accordance with good studio practice. This technical earth should be bonded to the incoming mains earth in accordance with local electrical safety standards.. All audio connectors include an audio ground circuit. This is pin 1 of 3 pole XLR types and the case contact of jack types. To avoid hum loops when connecting audio circuits, do not join pin 1 of XLR connectors to the plug case terminal.

Power Distribution

Audio and logic power are separately distributed from the power input connector to the console main motherboard and meterbridge distribution PCBs.

A design consideration of the Series 20 console and power supply is to provide two thirds of the maximum available power to the channel modules, and one third to the meterbridge modules. This is more than sufficient for the various combinations of modules that may be encountered in all frame sizes up to 32 way. Beyond this it may be necessary, depending on number of modules, to use an additional power supply, feeding the console from either end. If this is found necessary then the audio and logic supplies from each power supply need to be isolated at the console centre profile.

All modules are protected by current limit fusible resistors on power input tracks to prevent damage to console harness wiring in the unlikely event of module failure.

The CPS450M power supply is fully protected against short circuits that may occur accidentally to the console wiring or connectors.

Audio Connections

Audio Inputs

In all cases input circuits are balanced electronically, however, microphone inputs have a transformer balance option. Phase continuity is preserved between inputs and outputs.

Mono mic/line channels use XLR type connectors, absolute phase is pin 2 + phase although either pin 2 or pin 3 may be standardised by the customer. Note that 48v phantom power is available for mic inputs on pin 2.3 (0v 1).

Stereo and telco input channels use D-type multiway connectors of 25 and 15 way. Pin out information is shown in Section 5 of this manual.

To operate with unbalanced equipment, the unused phase (XLR pin 3 : D-type pin as allocated) should be connected to pin 1 or audio 0v as listed.

When using channel module inputs with outside programme sources, via cables rented from the telephone authority, suitable interface equipment approved by the authority must be added externally to the console. The S20 TBU Telephone Hybrid module provides a UK BT Approved interface for Telco modules.

Mono mic/line channel insert send/return is unbalanced, ring + sleeve on an A gauge jack.

Audio Outputs

Audio outputs from the console are electronically balanced capable of driving up to 100 metres of cable. Optional transformer outputs are available for desk left, right and mono outputs.

Channel direct outputs are internally linked on each module to provide customer source options.

Mono mic/line S20M/ME direct output is on a A gauge jack (tip + ring - sleeve 0v). Stereo and telco module direct outputs appear on the D-type connectors. Each 'input' connector also has a direct output feed.

Output module, S20OP, provides stereo with derived mono outputs for desk out, aux 1 and aux 2. Transformer balance options exist only for desk out. These outputs all appear on an EDAC (VARICON) 38 way fixed female connector on the rear of the module. Desk output L, R, and Mono also appear on male XLRs.

Output impedances are approximately 50 ohms electronic balance and 75 ohms transformer balance. Optimum performance and overload margins are obtained when driving loads of 10K ohms or more. The SSM balanced line drivers used on the electronic balanced outputs will drive loads as low as 600 ohms.

All console performance figures are quoted with greater than 10K ohm loads.

The telephone authority should be consulted before connecting any output to rented cables.

Special Audio Input Connectors

Monitor Module Types S20CM and S20SM

Monitor modules S20CM/SM provide inputs for five external stereo programme sources, eg. tape-recorder outputs, off-air receivers, station output, other studio outputs. These circuits connect into the rear of the module via the EDAC 38 way multiway connector. The module loads the selected input circuit by 10K ohm balanced electronically. Unselected inputs are not loaded. Nominal sensitivity is 0dBu. External input 5 may be interchanged for the telco mix bus by internal links.

The guest headphone switchbank has a separate external input for use with alternative sources. This input is similar to the other externals.

Loudspeaker outputs are electronically balanced on A gauge jacks (tip + ring - sleeve 0v). Nominal output sensitivity is 0dBu.

Headphone outputs are unbalanced on A gauge jacks (tip - left, ring - right, sleeve - common).

The S20CM control room monitor module has two parallel outputs for presenter/operator headphones, one on the front face of the module the other on the rear panel. The guest headphone output only appears on the rear panel.

The S20SM studio monitor module provides two headphone outputs, both of which appear only on the rear panel.

The recommended headphone impedance is 400-600 ohms.

Installation Procedure

Siting Of Console

There are two main ways in which the console can be supported and positioned. It may be sited on its own as a separate free standing unit or alternatively, it may be integrated with other items of furniture as a flush-mounted mixing console. In either case, adequate provision must be made to allow access to the rear of the unit.

The opening in the rear of the console allows access to the connectors on the modules and meterhood units. In order to make connections and adjustments there, sufficient working space should be allowed behind the console. A minimum distance of one metre is recommended between the console and any obstruction behind it. Alternatively, provision could be made to move the console forward whenever rear access is required.

The underneath load-bearing surfaces are indicated in figure 1.. Tapped bushes are located on the inside of these surfaces. M6 metric bolts may be inserted into these as required to fasten the console in position. The dimensioned locations of bushes are shown in figure 1. It is suggested that longitudinal bars can be used to support and fasten the console in position.

When the console is to be used as a free-standing unit, it should be supported at a suitable operating height on furniture which is capable of bearing the total weight of the equipment or on a suitable mounting stand. A 24 way console with modules weights approximately 100Kg and a 32 way console weights about 125Kg.

When the console is to be integrated with furniture or other equipment as a flush-mounted unit, its lower end trims may be removed. This will facilitate satisfactory positioning with other units. The overall lengths of the console without the end trims are shown in the Appendices. Trim thickness is approximately 20mm.

Modules

Modules are sent already positioned and secured inside the main console. Do not attempt to remove a module until the console has been properly sited and reference has been made to the following:

Module Removal And Replacement

After the console has been properly positioned, remove the rear covers by loosening the fixing screws. Remove and discard the one transit retaining screw located at the bottom rear of each module, using a No. 2 'pozidriv' screw-driver. To remove a module, disconnect all plugs and sockets from its rear panel and undo the two countersunk screws located at the top and bottom of the front panel. Grasp the module by the handle provided at its upper end and grip a control knob at its lower end. Using a rocking motion towards and away from the front of the console, free the module from its connector socket. Withdraw it straight out from its position in the console.

To replace a module, lower the module into position keeping its board positioned vertically. Note that the lower part of the console frame is formed into a rear guide bar. Make sure that the rear panel of the module clears this by keeping the module well towards the front of the console when lowering it. The board will then locate into its connector socket. Exert a firm pressure on the module about a third of the way up its panel to bed it home and replace the two retaining screws. Since incorrect insertion of a module may cause the edge connectors to mis-mate, it is recommended that power is switched off prior to module replacement until sufficient experience in correctly carrying out this procedure is gained.

Module Siting Within Console

The motherboard bussing system used in the console permits the operation and function of any module to be independent of its position. Operating formats required can be obtained by suitable arrangement of the modules and script space, if fitted.

Cabling

The identification of individual wires connected to each pin are given on the Connector Pin Out listing and on the circuit diagram for each different type of module. To find which circuit diagram applies to any particular module, refer to the 'List of Illustrations' in the manual. Using the data supplied, cables may be prepared in advance of receiving the equipment if so required.

Two 80mm diameter holes are provided in the bottom of the rear bay of each 8 way section to accept the audio cable harness between the console and the studio equipment. Additionally, an 80mm hole is provided in each chassis end plate, behind the lower trim, for cable access when the desk is recessed into studio furniture. Each module in the console carries its own audio interface connectors on the rear panel directly in line with the module front panel. The audio harness should be fanned-out to present individual connectors in the correct positions. This may be done in advance of installation.

Power supply connection to the console from the power unit is made via the supplied lead to the power input connector. This connector is sited on the meterbridge power and distribution connector panel and will normally be found on the far left panel when viewed from the rear of the desk. The connector carries all necessary DC voltages and earth (ground) conductors for safe operation of the desk. The power unit must not be connected to the AC power supply until the connections have been made.

Power Supply Chassis - Siting

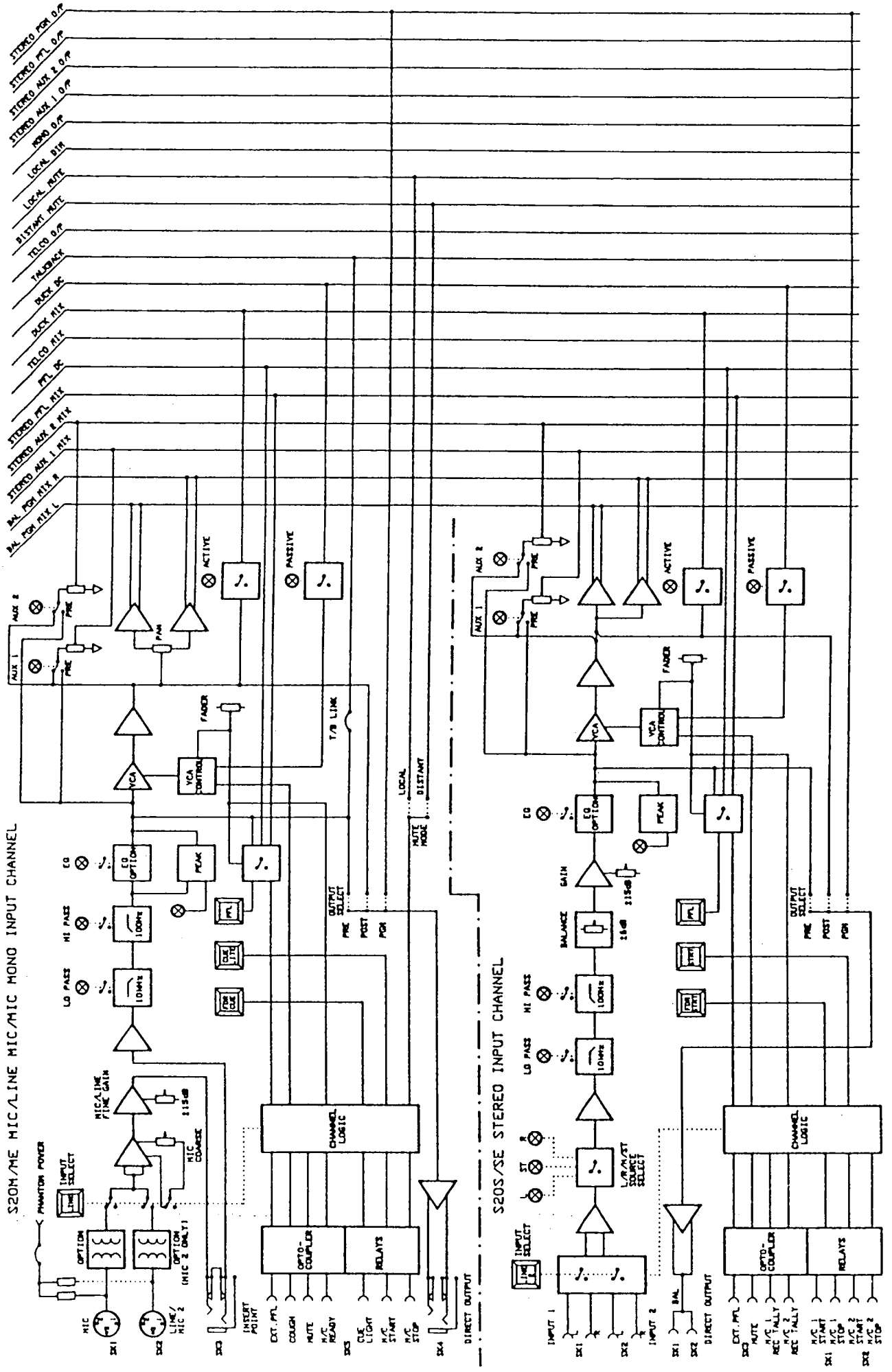
The power supply for the equipment is contained in a 2u 19" rack chassis assembly. A preferred housing for the assembly on site is one which is specifically designed to receive a 19" chassis. In any case, provision must be allowed for adequate vertical ventilation to dissipate heat generated within the unit. It should not, therefore, be laid flat to the floor nor close up against a ceiling which might prevent air circulating through it. The weight of the power unit is 13Kg. With the above provisos, it may be placed in any convenient location which is within reach of the power cable harness supplied for its connection to the console. This harness is 5 metres long. Be careful not to locate the unit near to any hum-sensitive equipment and, in particular, it should not be placed underneath the mixing console.

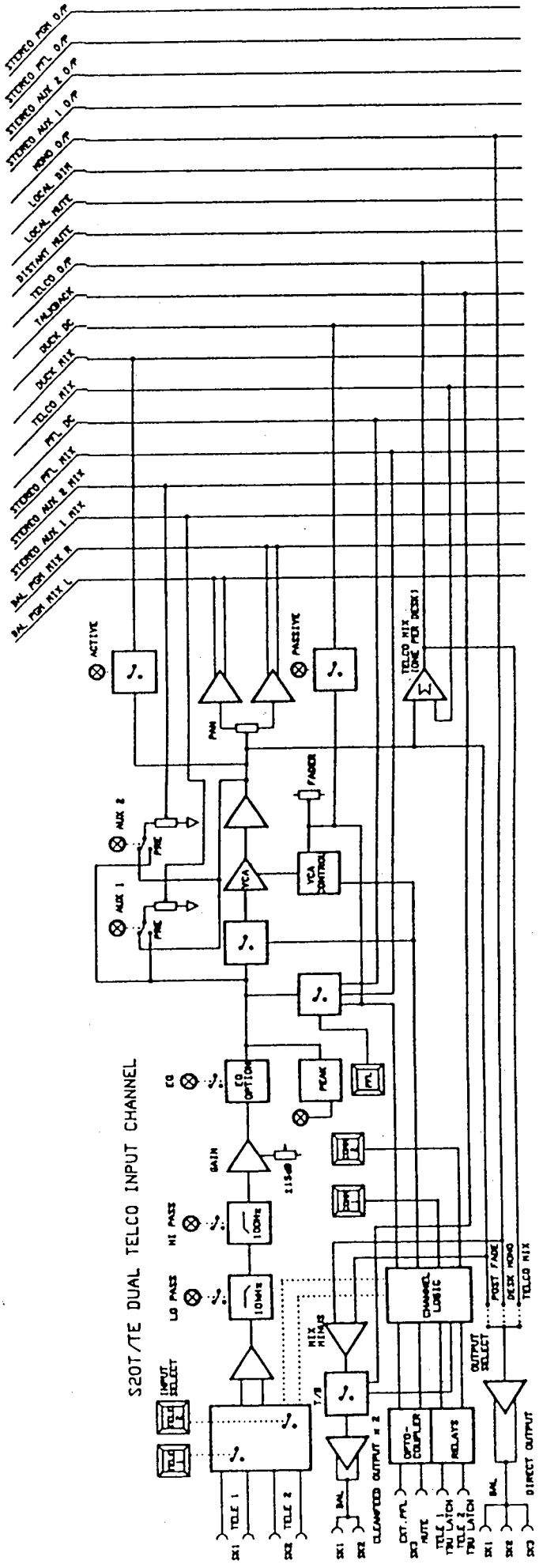
Electrical Earthing

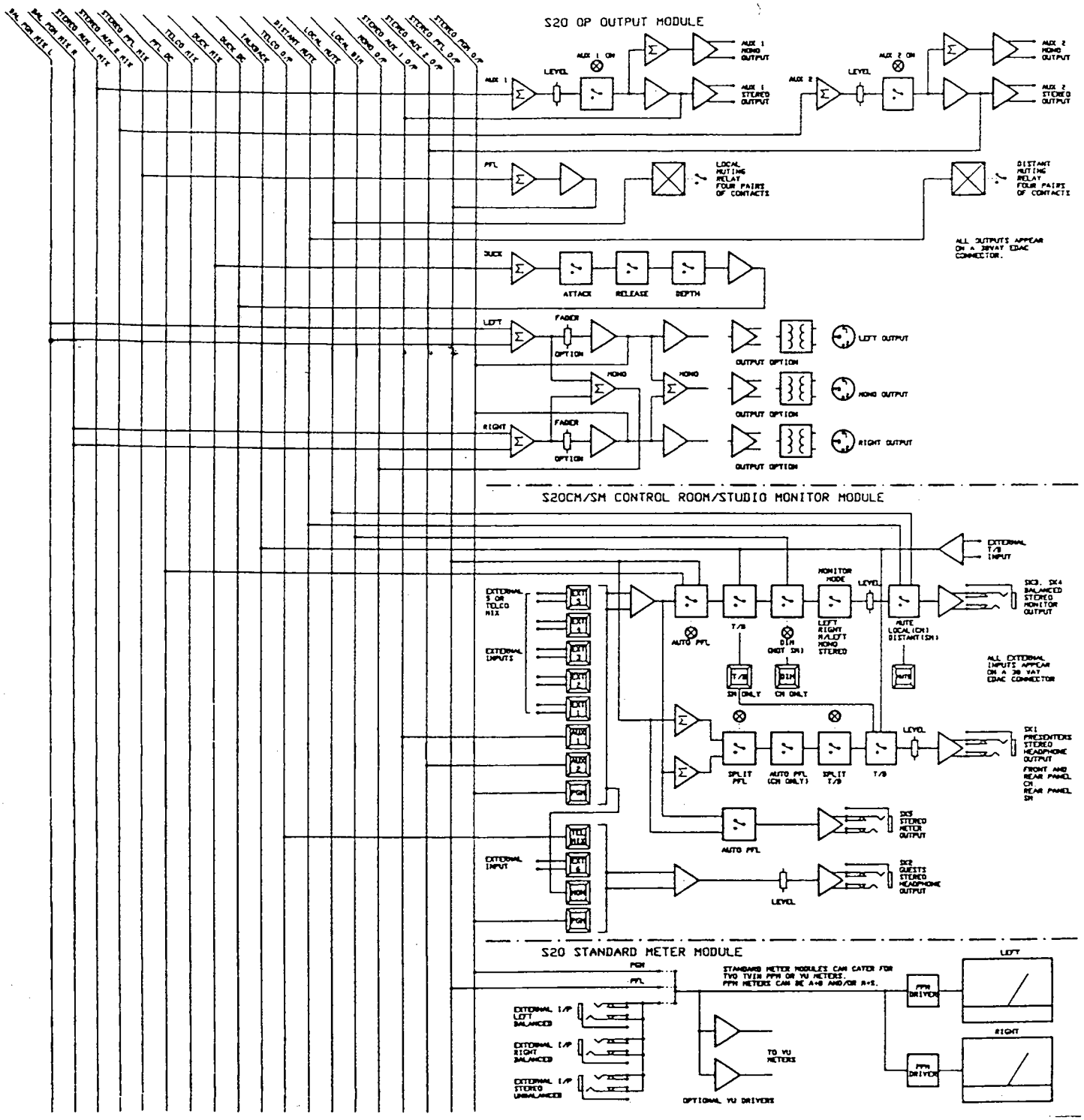
Salient points concerned with the earthing of the equipment are enumerated below. The points made must be adhered to and the procedures described should be properly carried out if trouble due to common impedance coupling, hum loops, and noise interference is to be avoided.

- The power supply chassis is earthed to AC power ground only by the earth wire in its 3-pin connector.
- The zero volt output line of the power supply unit must not be connected to the rack of the power supply.
- The console zero volt circuits and console chassis metalwork are commoned only at the power supply earth star point module.
- Console zero volt circuits and console chassis metalwork must be connected to the installation technical earth - which must be a CLEAN AC power earth. A terminal inside the rear of the console is provided to accept the installation technical earth.
- Do not connect console audio ground terminals to earth via external equipment (eg. not fortuitously, via connectors and cables to the common ground circuit of unbalanced earthed equipment). In particular, since all audio connectors of the console include an audio ground circuit, this being pin 1 of the 3 pole XLR types, do not join this pin to the plug case terminal.

Module Block Diagrams


S20M/ME MIC/LINE MIC/MIC MONO INPUT CHANNEL
S20S/SE STEREO INPUT CHANNEL
STEREO PGM O/P
STEREO PFL O/P
STEREO AUX 2 O/P
STEREO AUX 1 O/P
MONO O/P
LOCAL DIM
LOCAL MUTE
DISTANT MUTE
TELCO O/P
TALKBACK
DUCK DC
DUCK MIX
TELCO MIX
PFL DC
STEREO PFL MIX
STEREO AUX 2 MIX
STEREO AUX 1 MIX
BAL PGM MIX R
BAL PGM MIX L
AUX 2
AUX 1
PRE
PAN
ACTIVE
PASSIVE
FADER
VCA
VCA CONTROL
T/B LINK
LOCAL
DISTANT
MUTE MODE
EQ
EQ OPTION
PEAK
HI PASS
LO PASS
100Hz
10kHz
GAIN
±15dB
BALANCE
±6dB
PFL
CUE LITE
PGM CUE
OUTPUT SELECT
PRE
POST
PGM
MIC/LINE FINE GAIN
±15dB
MIC COARSE
PHANTOM POWER
INPUT SELECT
LINE
MIC
OPTION
OPTION (MIC 2 ONLY)
MIC
LINE / MIC 2
INSERT POINT
CHANNEL LOGIC
OPTO-COUPLER
RELAYS
EXT. PFL
COUGH
MUTE
M/C READY
CUE LIGHT
M/C START
M/C STOP
DIRECT OUTPUT
L/R/ST SOURCE SELECT
L
R
ST
INPUT 1
INPUT 2
BAL
M/C 1 REC TALLY
M/C 2 REC TALLY
M/C 1 START
M/C 1 STOP
M/C 2 START
M/C 2 STOP
SK1
SK2
SK3
SK4
SK5


S20T/TE DUAL TELCO INPUT CHANNEL
STEREO PGM O/P
STEREO PFL O/P
STEREO AUX 2 O/P
STEREO AUX 1 O/P
MONO O/P
LOCAL DIM
LOCAL MUTE
DISTANT MUTE
TELCO O/P
TALKBACK
DUCK DC
DUCK MIX
TELCO MIX
PFL DC
STEREO PFL MIX
STEREO AUX 2 MIX
STEREO AUX 1 MIX
BAL PGM MIX R
BAL PGM MIX L
ACTIVE
PASSIVE
PAN
FADER
AUX 2
AUX 1
VCA
VCA CONTROL
EQ
EQ OPTION
PEAK
GAIN
HI PASS
LOW PASS
INPUT SELECT
MIX MINUS
CHANNEL LOGIC
OUTPUT SELECT
POST FADE
DUCK MONO
OPTO-COUPLER
RELAYS
TELE 1
TELE 2
CLEANFEED OUTPUT x 2
DIRECT OUTPUT
BAL


S20 OP OUTPUT MODULE
AUX 1
LEVEL
AUX 1 ON
AUX 1 MONO OUTPUT
AUX 1 STEREO OUTPUT
AUX 2
LEVEL
AUX 2 ON
AUX 2 MONO OUTPUT
AUX 2 STEREO OUTPUT
PFL
LOCAL MUTING RELAY FOUR PAIRS OF CONTACTS
DISTANT MUTING RELAY FOUR PAIRS OF CONTACTS
ALL OUTPUTS APPEAR ON A 36WAY EDAC CONNECTOR.
DUCK
ATTACK
RELEASE
DEPTH
LEFT
FADER
OPTION
MONO
RIGHT
OUTPUT OPTION
LEFT OUTPUT
MONO OUTPUT
RIGHT OUTPUT
S20CM/SM CONTROL ROOM/STUDIO MONITOR MODULE
EXTERNAL T/B INPUT
EXTERNAL S OR TELCO MIX
EXTERNAL INPUTS
MONITOR MODE
LEVEL
LEFT RIGHT M/LEFT MONO STEREO
AUTO PFL
T/B
DIM (NOT SM)
SM ONLY
CM ONLY
AUTO LOCAL(CM) DISTANT(SM)
SK3, SK4 BALANCED STEREO MONITOR OUTPUT
ALL EXTERNAL INPUTS APPEAR ON A 36 WAY EDAC CONNECTOR
SPLIT PFL
AUTO PFL (CM ONLY)
SPLIT T/B
SK1 PRESENTORS STEREO HEADPHONE OUTPUT
FRONT AND REAR PANEL CM
REAR PANEL SM
SK5 STEREO METER OUTPUT
AUTO PFL
EXTERNAL INPUT
SK2 GUESTS STEREO HEADPHONE OUTPUT
LEVEL
S20 STANDARD METER MODULE
PGM
PFL
STANDARD METER MODULES CAN CATER FOR TWO TYPE PPM OR VU METERS. PPM METERS CAN BE A+B AND/OR A+S.
EXTERNAL I/P LEFT BALANCED
EXTERNAL I/P RIGHT BALANCED
EXTERNAL I/P STEREO UNBALANCED
TO VU METERS
OPTIONAL VU DRIVERS
PPM DRIVER
PPM DRIVER
LEFT
RIGHT

Module Descriptions

Mono Mic/Line S20M/ME, Mic/Mic S20MM/MME 17

Stereo Module S20S/SE 27

Telco Module S20T/TE 35

Control Room & Studio Monitor Modules S20CM & S20CM 42

Output Module S20OP 49

Meter Interfaces 52

Meterbridge Monitor S20MBS 53

Meterbridge Talkback S20MTB 54

Meterbridge 8 Way Input Selector Module S20MS8 55

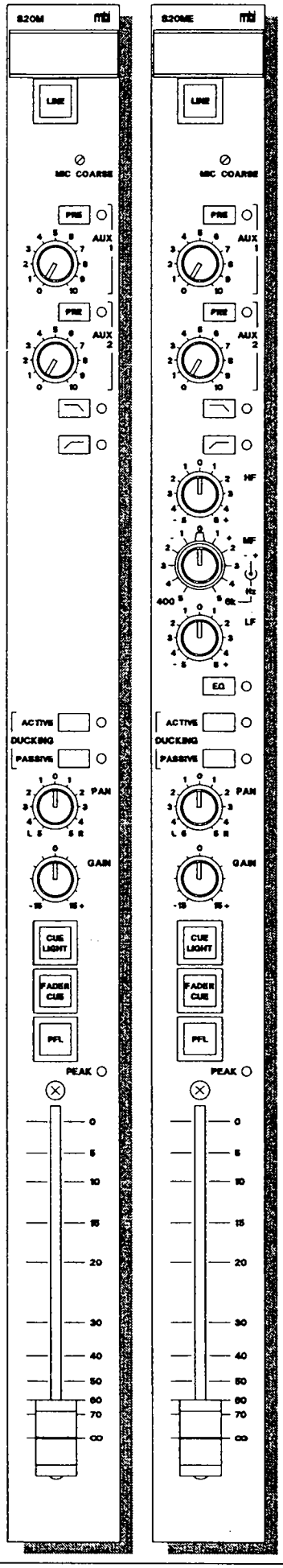
ICL Module S20ICL 56

UCL Module S20UCL 57

Timer Module S20TIM 58

Source Selector Module S20SL 59

Telephone Hybrid Module S20TBU 60



Mono Mic/Line S20M/ME

Mono Mic/Mic S20MM/MME

Inputs - M/ME

Mic and line. Input impedances are 1K2 ohms and 20K ohms respectively. Electronic balance on both inputs, with optional transformer balance on microphone input.

Inputs - MM/MME

Two Microphone inputs. Impedances and balance options as above.

48v PHANTOM POWER

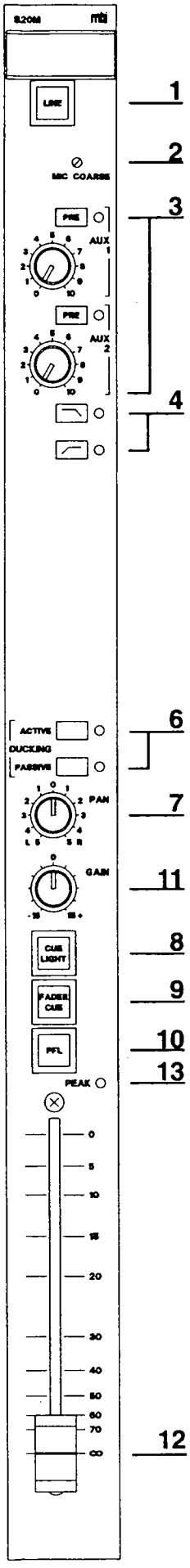
Is available for the microphone input as a link option. This is factory set at phantom power off. This phantom power link is common between the two mic inputs on MM/MME variants.

Talkback Bus

The module pre-fade signal may be fed, via link option, onto the talkback bus enabling the use of a presenter's microphone for a talkback audio source. This is in addition to the channel direct out selection.

Auxiliary Sends

Two auxiliary sends are provided both switchable independently pre or post VCA. Each auxiliary send has a level control feeding the respective stereo motherboard busses equally.



Mono Mic/Line S20M/ME

Mono Mic/Mic S20MM/MME

Input Select

1 The input select **LINE(MIC2)** switch causes a 4013 latch to change state and effect a number of operations:

- Change-over RL1, and thus MIC or LINE(MIC2) audio input together with SSM 2017 input amplifier gain.
- Enable machine remote start/stop control when switched to LINE.
- Enable cue light control when switched to MIC (MIC1/MIC2).
- Enable monitor mute mode when switched to MIC (MIC1/MIC2).
- Enable COUGH mute when switched to MIC (MIC1/MIC2).
- Illuminate LED in input select switch body when switched to LINE (orMIC2).
- Resets ACTIVE or PASSIVE mode selection when the input is changed over.

Input select operation is optionally inhibited, by link LK4, when the fader is opened. This link is fitted on manufacture unless specifically ordered out.

The Input Select is reset to MIC (MIC1) when the console is powered up.

2 Mic input gain is controlled by the preset **MIC COARSE** gain control. This is accessible by screw-driver through the front panel. This control provides a gain range to cope with inputs of -25 to -70dBu and is common for the two Mic inputs on the MM/MME variants.

This coarse gain control is disabled in line mode by RL1.

Auxiliary Sends

3 Two auxiliary sends are provided. Both are switchable via their respective **PRE** switch between pre or post-VCA. Each auxiliary send has a **LEVEL** control feeding its respective stereo buses equally.

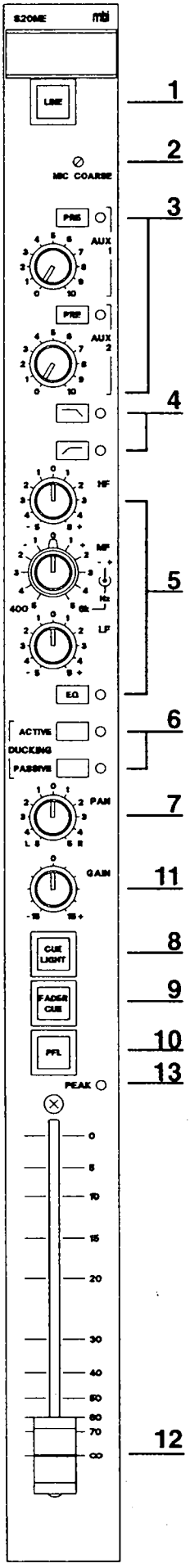
Each of the Auxiliary Sends has an LED to indicate when pre-VCA is selected.

Filters And Equaliser

4 Two **FILTERS** are provided. They are both post insert return and each has a fixed frequency as follows:

- The Low-Pass has its -3dB point at 10kHz and has a slope of 12dB/octave
- The High-Pass has its -3dB point at 100Hz and has a slope of 12dB/octave

Each filter can be switched into the signal path by its respective switch. An associated LED indicates when the filter is in circuit.



5 The **EQUALISER** section is only fitted to the ME/MME variants and has three bands.

The **HF** section has a shelving response at 10kHz and provides 15dB cut or boost.

The **MF** section has a bell response. The MF control is dual concentric: the outer section sweeps the peak response point between 350-7kHz, the inner section provides 15dB cut or boost.

The **LF** section has a shelving response at 100Hz and provides 15dB cut or boost.

The Equaliser may be switched in or out of the signal path by means of the **EQ** switch. An associated LED indicates when it is in circuit.

VOICE-OVER (DUCKING)

The Series 20 continues the MBI ducking feature whereby ACTIVE channel(s) reduce PASSIVE channels by determined parameters.

6 The channel module may be designated **ACTIVE** (red LED indication), **PASSIVE** (green LED indication) or NEUTRAL (neither indicator). The channel logic will not permit more than a single state selection.

An ACTIVE channel feeds a post-fader audio signal, via the motherboard bus, to the output module S20OP for processing. The output module shapes the signal by means of attack and release time constants and returns a DC voltage, according to the 'depth' of reduction selected, to the PASSIVE control bus. An ACTIVE signal must be greater than 0dBu threshold before the ducking circuit responds.

A PASSIVE channel is reduced in level by the control signal on the PASSIVE bus. This control signal is mixed with the channel fader DC level and applied to the VCA.

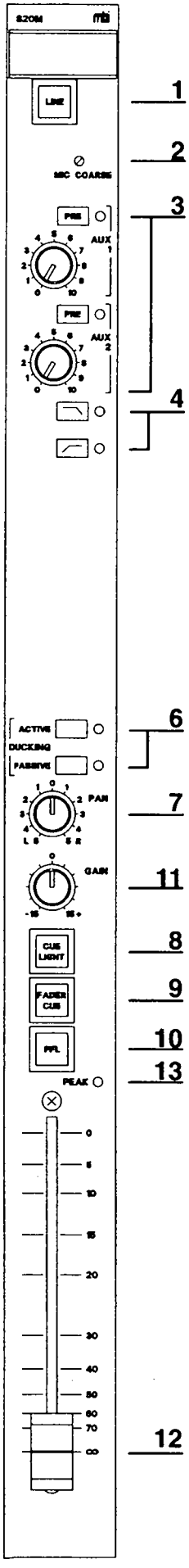
A channel not selected ACTIVE or PASSIVE neither contributes nor responds to the ducking system.

Any number of channels may be selected ACTIVE or PASSIVE for combined operation of the ducking system.

Logic switching toggles the selected function on and off with reset of previous alternate function. Both ACTIVE and PASSIVE functions are reset (to NEUTRAL) by the input selector and on power-up.

Pan

7 A full left/centre/full right **PAN** control with centre detent is provided. The control is post-VCA.



Remote Control Of External Equipment

The S20M/ME and S20MM/MME provide two remote control outputs which are separately dependent on the input select switch for operation.

In MIC mode a single relay output is provided for 'speak now' or 'channel open' indication to a studio presenter. Two such outputs are provided on the S20MM/MME.

In LINE mode both 'start' and 'stop' relay contacts are provided (S20M/ME only).

The controls are rated at 10W and may be momentary or latching as determined by link option LK10.

The relay drive logic is controlled by two momentary switches CUE LIGHT and FADER CUE.

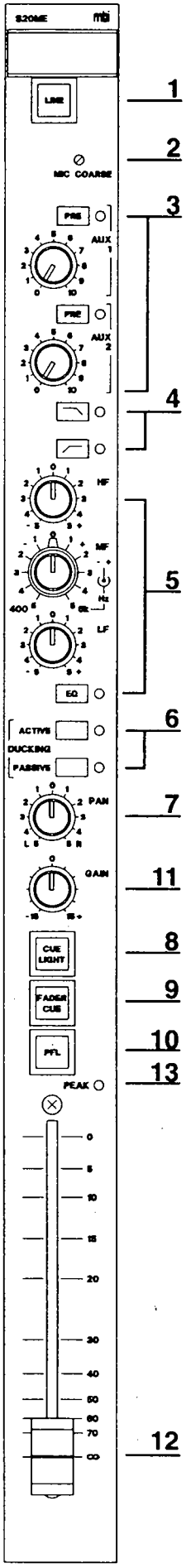
8 Operation of the **CUE LIGHT** switch issues a START command which is enabled to either 'cue light' or 'machine' according to the module input selection. A switch LED illuminates to show that the command has been issued. A second operation of the CUE LIGHT switch will issue a STOP command, cancel the LED illumination and reset the circuit for the next START operation. (Fader-activated STOP may be enabled by link option LK15.)

9 The **FADER CUE** switch prepares the logic to issue a START command when the Fader is opened. Again this START command is enabled by the input select to either 'cue light' or 'machine'.

The FADER CUE switch LED illuminates at partial brightness when the switch is pressed to indicate the circuit is primed. Opening the Fader issues the START command and raises the LED to full brightness. Subsequently, closing the Fader issues a STOP command and restores the switch LED to partial brightness.

Operational change-over is possible between FADER CUE and CUE LIGHT switches. A START command issued by the CUE LIGHT switch may be followed by a STOP command issued by closing the Fader. This is achieved by pressing CUE LIGHT to issue the START command, opening the Fader (if not already open). Press FADER CUE, the Fader Start LED will illuminate at full brightness and the CUE LIGHT LED will extinguish. Closing the Fader will now issue a STOP command and set the FADER CUE LED to partial brightness.

Similarly, a START command issued by the FADER CUE switch and the Fader may be followed by a STOP command from the CUE LIGHT switch. This is achieved by pressing FADER CUE, opening the Fader, press FADER CUE again, the FADER CUE LED will extinguish and the CUE LIGHT LED will illuminate. The STOP command will be issued when the CUE LIGHT switch is subsequently pressed.



Pre-fade Listen

10 The module pre-fade signal is directed to the pre-fade bus on operation of the **PFL** switch.

Mono channel pre-fade signal is applied equally to the stereo pre-fade bus.

The PFL switch is latching and is operative when the Fader is closed. Opening the Fader resets a latched PFL to off.

The PFL logic provides outputs to switch pre-fade audio via solid state switch IC10 to the pre-fade bus and to operate the AUTO PRE-FADE to monitor switch if this has been pre-selected.

Gain and Level Control

11 In both Mic and Line modes a fine **GAIN** control of ±15dB with centre detent for 0dB gain in line mode. This control is situated close to the PFL switch for operational ease.

Total module gain in Mic mode is thus 85dB with fader fully open.

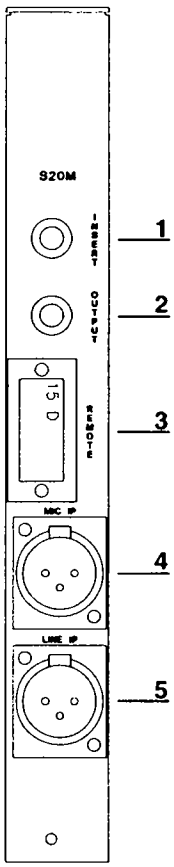
12 The **FADER** is a conductive plastic fader. The Fader controls a VCA type DBX 2150A. The VCA is trimmed by presets P2 (symmetry), P3 (300mV at VCA Pin 3 - fader infinity), P4 (zero preset).

Module output level is increased by moving the Fader away from the operator.

13 Module **PEAK** level is sampled pre and post-equaliser section and displayed on an LED adjacent to the fader open position.

The sample circuit is preset to illuminate the LED at 3dB below clipping.

Rear Connector Panel



Channel Direct Output

1 The **DIRECT OUTPUT** is link selectable between post-VCA (pre PAN), pre-VCA (post EQ) and desk mono out. The electronic balanced output has an impedance of 50 ohms and is capable of driving up to 100 metres of cable.

Connector - A gauge jack

Tip	+
Ring	-
Sleeve	Ground

Channel Insert Point

2 The **INSERT POINT** is post-gain and pre-filters/pre-eq unbalanced. The Send impedance is 50 ohms, and the Return impedance is 40K ohms nominally.

Connector - A gauge jack

Tip	Send
Ring	Return
Sleeve	Common

Remotes Connector

3 The 15-way D-type **REMOTES** connector provides an interface for the following functions:

15 way D (fixed male)		Pin		
Machine start relay(line)	Contact 1	1	2	Contact 2
Machine stop relay(line)	Contact 1	3	4	Contact 2
'Machine Ready' Opto-Isolator Input LED	Anode	5	6	Cathode
Cue light relay(mic)	Contact 1	7	8	Contact 2
Input 2 Cough mute Opto-Isolator Input LED	Anode	9	10	Cathode
Input 1 Cough mute (mic only) Opto-Isolator Input LED	Anode	11	12	Cathode
+14V logic from S20		13		
External prefade Listen Opto-Isolator Input LED	Anode	14		
0V GND + External PFL Opto-Isolator Input LED	Cathode	15		

Machine remotes and cue light are isolated relay contacts.

To operate CHANNEL MUTE, COUGH CUT and Ext. PFL connect the Opto-Isolator Cathode pin to GND and Anode pin to +14v logic.

There is a 1K5 resistor in series with the Anode on each of the Opto-Isolator LEDs.

PFL External Control

External control of module PFL, via remote D type connector SK5, is opto-coupled to the PFL logic. Either an external 12/14v +ve +0v applied to pins 14.15 or a switch loop applied to pins 13.14 will cause the channel pre-fade to operate.

An external pre-fade command will illuminate the PFL switch LED, operate Auto Pre-fade and switch audio to the pre-fade bus.

External pre-fade is internally non latching, and in the case of a 'studio' mic channel could be used as a reverse talkback switch obviating the need for a separate talkback/loudspeaker system.

Channel Mutes External Control

The S20M/ME has two external MUTE inputs, a CHANNEL MUTE and a COUGH MUTE. The S20MM/MME has an individual COUGH MUTE per input. These mutes can be used as cough cuts under presenter control. On the S20M/ME the COUGH MUTE only mutes the channel when selected to MIC, whereas the CHANNEL MUTE mutes the channel irrespective of the input selected. Channel pre-fade and source to talkback both remain active in either mute mode.

Mute inputs are both opto-coupled with connection on the REMOTE D range connector SK5.

Inputs

4 The **MIC** input is electronically balanced with an input impedance of 1K2 ohms. There is an optional transformer input available.

5 The **LINE** input is electronically balanced with an input impedance of 20K ohms.

Note: On the MM/MME variants there are two MIC inputs. Both have optional transformer inputs.

The connections are as follows:

XLR type 3 pin	Pin 1	Ground
	Pin 2	+
	Pin 3	-

Link Options

48V Phantom Power

This is available for the microphone inputs as a link option, and is factory set as phantom power OFF. The phantom power link is common between the two Mic inputs on MM/MME variants.

Talkback Bus

The module pre-fade signal may be fed, via a link option, onto the talkback bus enabling the use of a presenter's microphone for a talkback audio source. This is in addition to the channel direct out selection.

Channel Logic Functions

The Series 20M/ME uses digital logic programmed with on board links to perform the main operational switching. Some of the links are factory programmed options specified to order whilst others are 'handbag' links easily set by an engineer. These links are not intended as anything other than preset function options.

Monitor Mutes Internal Control

When selected to MIC and fader is open the channel can be selected to command monitor muting. Three link options are provided (**to ISSUE 3**):

(1) LOCAL MUTE. Cuts local loudspeakers when mic is 'live'.

(2) LOCAL DIM. Reduces local loudspeaker level by 20dB when microphone is live.

(3) DISTANT MUTE. Cuts loudspeakers in area common with live microphone For example, when a Series 20 mixer is installed in a control room operated by an engineer, the associated studio programme talent will have microphones and monitor loudspeakers. It is these studio loudspeakers that are cut by the distant mute.

It is perfectly acceptable to have some Series 20 modules allocated to local mute/dim for self-operation and others allocated to distant mute for engineer operation.

Two link options are available **from ISSUE 4**: one associated with each input. Either input may be selected to LOCAL MUTE or DISTANT MUTE.

The LOCAL DIM option is not available from Issue 4.

It is possible to set different MUTE commands between inputs, e.g. Input 1 may be set to LOCAL MUTE and Input 2 may be set to DISTANT MUTE and vice versa.

The Link options and default settings are shown below. The factory defaults are shown in **bold** type.

Link Summary

LK1 48V Phantom Power ON/**OFF**

LK2 Pre-fade audio to T/B bus (**not fitted**)
(Do not fit to more than one module per desk)

LK3 Direct Output select - Pre-fade, Post-fade, **Mono Desk output**

LK4 **Disable** input selector on fader open

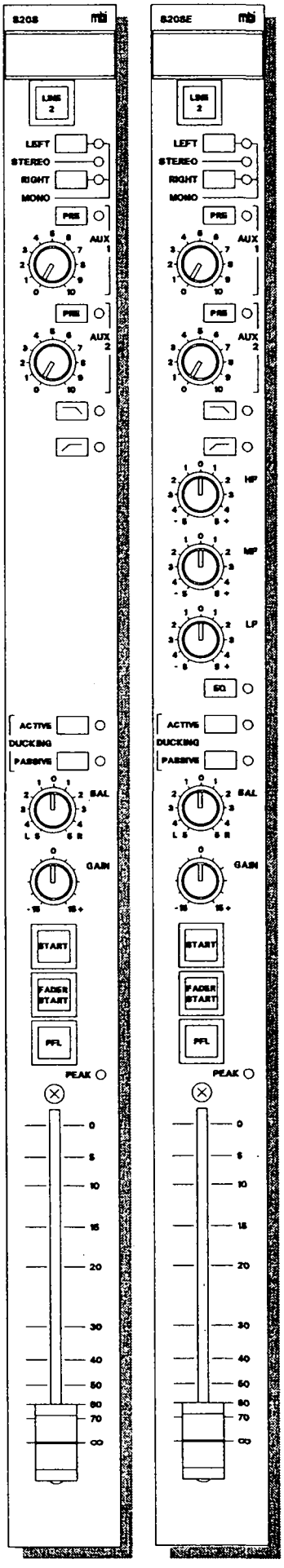
LK10 Start option, **A = Momentary**, B = Latching

LK12 Fader Start switch 'bright up'
A = Machine Ready tally, **B = Fader Open**

LK15 Position B selects fader stop when in push switch start/stop mode,
Position A = Normal

Mic mute mode (Issue 3 PCB), A = Distant Mute, B = Local Dim,
C = Local Mute.

Mic 1 and Mic 2 mute mode (Issue 4 PCB), A = Distant Mute,
B = Local Mute. Defaults are Mic 1 - **Local Mute**, Mic 2 - **Distant Mute**.

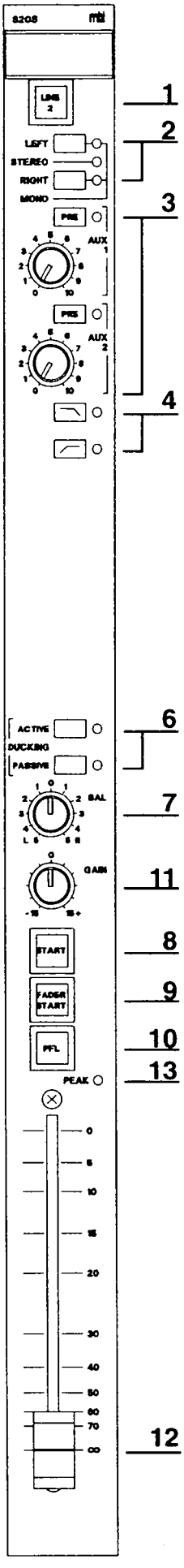


Stereo Module S20S/SE

The Series 20 stereo modules S20S (without equaliser) and S20SE (with equaliser) have electronic balance dual stereo inputs, switched by the input select switch. High specification D range multi-pin connectors are used to carry stereo audio inputs, stereo audio output and machine remotes for convenient installation. For example, a tape recorder replay, record and remote start commands and tallies may be connected to a stereo module using a single connector.

Each input and its associated signals are carried on one 25-way D-range connector. Other module remote controls are provided on a 15-way D-range connector.

The selected input is terminated with approximately 20K ohms, the unselected input is unterminated. The Input Select switch controls input selection and remote machine control routing.



Stereo Module S20S/SE

Input Select

1 The input select **LINE 2** switch causes a 4013 latch to change state and effect a number of operations:

- Change-over RL1, and thus LINE 1 or LINE 2 audio input.
- Enable machine remote start/stop control appropriate to selected input.
- Enable RECORD TALLY mute appropriate to selected input.
- Illuminate LED in input select switch body when switched to LINE 2.
- Reset ACTIVE or PASSIVE mode selection when input changed over.

Input select operation is optionally inhibited, by LK3 link, when the fader is opened. This link is fitted on manufacture unless specifically ordered out.

Input select is reset on power-up to LINE 1.

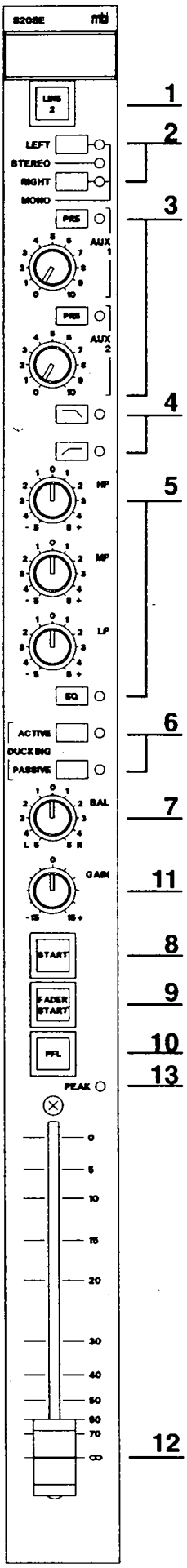
Mono/Stereo Switching

2 The module can be selected to LEFT input on left and right channels, RIGHT input on left and right channels or MONO (left + right) on left and right channels. The switching is directly active on the audio signals, no logic is used.

An LED triple is used to indicate the switch state. The uppermost switch and adjacent red LED indicate left input mono, the middle yellow LED (no switch) indicates normal stereo, the lower switch and adjacent green LED indicates right input mono. Left + right mono is achieved by selecting both switches and the red and green LEDs will illuminate to indicate the selection.

Auxiliary Sends

3 Two stereo auxiliary sends, **AUX 1** and **AUX 2**, are provided on the S20S/SE modules, both switchable immediately **PRE** or post-VCA. Each auxiliary send has a level control feeding the respective stereo motherboard bus. The S20OP output module provides summed output both in stereo and derived mono. An associated LED indicates when each send is switched to pre-VCA.



Filters and Equaliser

4 Two **FILTERS** are provided. Each has fixed frequency as follows:

- The High-Pass filter has its -3dB point at 100Hz and has a slope of 12dB/octave
- The Low-Pass filter has its -3dB point at 10kHz and has a slope of 12dB/octave

Each filter can be switched into the signal path by its respective switch. An associated LED indicates when each filter is in circuit.

The **EQUALISER** is only fitted to the S20SE module.

5 The Equaliser has three bands with a fixed-frequency bell response at **MF** (3.5kHz) and shelving response at **LF** (130Hz) and **HF** 10kHz. Each frequency has a ±15dB cut and boost control. The LED indicator adjacent to the **EQ** switch shows when the Equaliser is in circuit.

Voice-over (ducking)

The Series 20 continues the MBI ducking feature whereby ACTIVE channel(s) reduce PASSIVE channels by determined parameters.

6 The channel module may be designated **ACTIVE** (red LED indication), **PASSIVE** (green LED indication) or NEUTRAL (neither indicator). The channel logic will not permit more than a single state selection.

An ACTIVE channel feeds a post-fader audio signal, via the motherboard bus, to the output module S20OP for processing. The output module shapes the signal by means of attack and release time constants and returns a DC voltage, according to the 'depth' of reduction selected, to the PASSIVE control bus. An ACTIVE signal must be greater than 0dBu threshold before the ducking circuit responds.

A PASSIVE channel is reduced in level by the control signal on the PASSIVE bus. This control signal is mixed with the channel fader DC level and applied to the VCA.

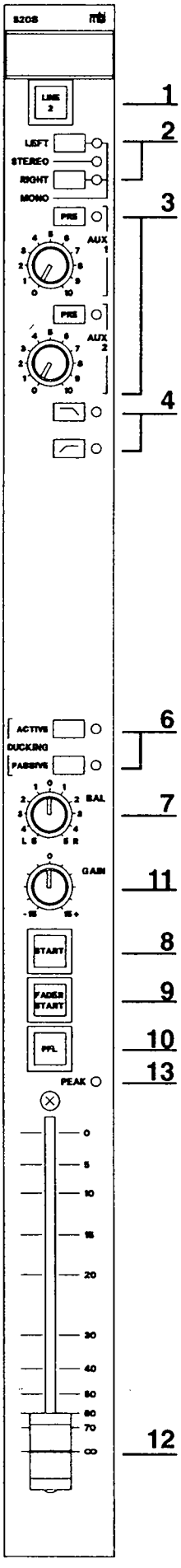
A channel not selected ACTIVE or PASSIVE neither contributes nor responds to the ducking system.

Any number of channels may be selected ACTIVE or PASSIVE for combined operation of the ducking system.

Logic switching toggles the selected function on and off with reset of previous alternate function. Both ACTIVE and PASSIVE functions are reset (to NEUTRAL) by the input selector and on power-up.

Balance

7 The **BAL**ance control provides ±6dB around the centre detent.



Remote Control of External Equipment

The S20S/SE provides two remote control outputs which are separately dependent on the input select switch for operation.

In LINE 1 and LINE 2 modes both 'start' and 'stop' relay contacts are provided.

The contacts are rated at 10W and may be momentary or latching as determined by link option LK4.

The relay drive logic is controlled by two momentary switches START and FADER START.

8 Operation of the **START** switch issues a START command which is enabled to either 'machine' according to which module input is selected. A switch LED illuminates to show that the command has been issued. A second operation of the START switch will issue a STOP command, cancel the LED illumination and reset the circuit for the next START operation.

9 The **FADER START** switch prepares the logic to issue a START command when the fader is opened. Again this START command is enabled by the input select to either 'machine'.

The FADER START switch LED illuminates at partial brightness when the switch is pressed to indicate the circuit is primed. Opening the Fader issue the START command and raises the LED to full brightness. Subsequently, closing the Fader issues a STOP command and restores the switch LED to partial brightness.

Operational change-over is possible between FADER START and START switches without causing the machine to stop. A START command issued by the START switch may be followed by a STOP command issued by closing the Fader. This is achieved by pressing START to issue the START command, opening the Fader (if not already open). Press FADER START, the Fader Start LED will illuminate at full brightness and the START LED will extinguish. Closing the Fader will now issue a STOP command and set the FADER START LED to partial brightness. Alternatively, Fader Stop may be enabled by placing LK5 in position B.

Similarly, a START command issued by the FADER START switch and the Fader may be followed by a STOP command from the START switch. This is achieved by pressing FADER START, opening the fader, press FADER START again, the FADER START LED will extinguish and the START LED will illuminate. The STOP command will be issued when the START switch is subsequently pressed.

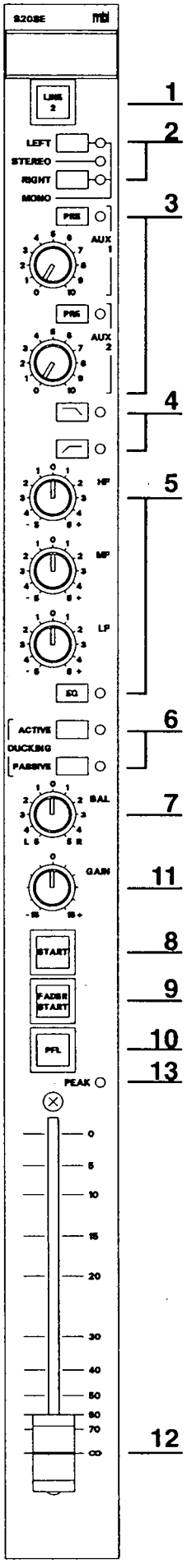
Pre-fade Listen

10 The module pre-fade signal is directed to the pre-fade bus on operation of the **PFL** switch.

The pre-fade signal is in stereo, post-balance and post-EQ.

The PFL switch is latching and is operative when the Fader is closed. Opening the Fader resets a latched PFL to off.

The PFL logic provides outputs to switch pre-fade audio via solid state switch IC10 to the pre-fade bus and to operate the AUTO PRE-FADE to monitor switch if this has been pre-selected.



Gain and Level Control

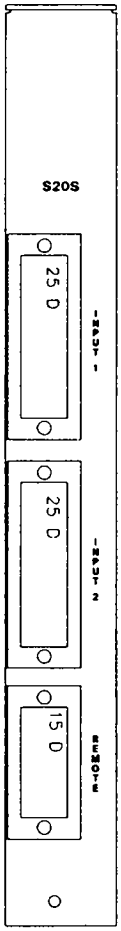
11 The **GAIN** control has a range of ±15dB with a centre detent at a nominal 0dB gain. This control is situated close to the PFL switch for operational ease.

12 The **FADER** is a conductive plastic fader. The Fader controls a VCA type DBX 2150A. The VCA is trimmed by presets P4,P5 (symmetry), P3 (300mV at VCA Pin 3 - fader infinity), P6 (zero preset).

Module output level is increased by moving the fader away from the operator.

13 Module **PEAK** level is sampled post-equaliser section and displayed on an LED adjacent to the fader open position.

The sample circuit is preset to illuminate the LED at 3dB below clipping.



Rear Connector Panel

Machine 1 (SK1)

25-way D Connector (Fixed female)		Pin		
Chassis Earth		1		
0V (Signal)		2	3	
Machine Play tally	Cathode	4	5	Anode
+14V (logic)		6		
Gnd (logic)		7		
Machine 1 Record tally Opto-Isolator LED	Cathode	8	9	Anode
Machine 1 Stop command relay	Contact 1	10	11	Contact 2
Machine 1 Start command relay	Contact 1	12	13	Contact 2
Module Output Right Channel	-ve	14	15	+ve
Module Output Left Channel	-ve	16	17	+ve
0V (audio)		18		
-16V (audio)		19		
+16V (audio)		20		
0V (audio			21	
Module Input Right Channel	+ve	22	23	-ve
Module Input Left Channel	+ve	24	25	-ve

Machine 2 (SK2)

25-way D Connector, pinout as above.

Read 'Machine 1' as 'Machine 2'.

Remotes (SK3)

15-way D Connector (fixed male)				
Play tally mix (SK1.4 + SK2.4)		1		
(SK1.5 + SK2.5)		2	3	no connection
External PFL Inputs (Opto-Isolator LED)		4	5	Anode
	common	6		Cathode
External Mute Opto-Isolator LED	Anode	7	8	Cathode
+14 V Logic		9	10	
No Connection		11	12	no connection
0V Logic GND		13		
No connection		14	15	no connection

Machine Stop and Start are isolated contacts.

To operate Rec, tally, Ext. PFL or Mute connect the Cathode pin to 0V GND and Anode pin to +14V logic

There is a 1k5 resistor in series with the Anode on each of the opto-isolator LEDs.

PFL External Control

External control of module PFL, via remote D type connector SK3, is opto-coupled to the pre-fade logic. Two inputs are provided on pins 4.5 with pin 6 common.

An external pre-fade command will illuminate the PFL switch LED, operate Auto Pre-fade and switch selected input audio to the pre-fade bus.

External pre-fade is internally non-latching, and can be used to check monitor, on line up, a tape recorder or a similar piece of equipment which is physically remote from the console.

Channel Mutes External Control

The S20S/SE has three possible mutes under external control.

Two of the mutes are driven from the record tally indication given by recording machines and may be used to mute the channel output (thus avoiding possible howlround if the fader is inadvertantly opened) whilst still providing machine replay monitoring on pre-fade. The active mute is controlled by the input select switch. The mute inputs appear on pins 8.9 on the two 25 way D connectors convenient for machine-to-channel wiring.

The third mute control is an overall channel mute (PFL still available) and appears on the remote 15 way D connector (pins 7.8).

All mutes are opto-coupled.

Link Options

Channel Logic Functions

The Series 20S/SE uses digital logic programmed with on board links to perform the main operational switching. Some of the links are factory programmed options specified to order whilst others are 'handbag' links easily set by an engineer. These links are not intended as anything other than preset function options.

Channel Direct Out

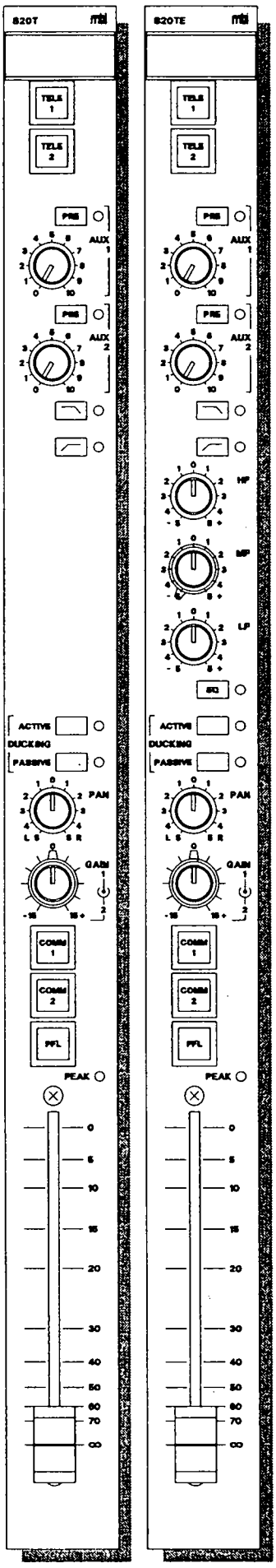
Link selectable between pre VCA/post VCA/desk out. Link LK1 selects left direct out and LK2 selects right direct out. These links are user programmable.

The outputs are electronic balanced, impedance 50 ohms, are capable of driving upto 100 metres cable and appear on both 25-way D connectors pins 16.17 (left) and 14.15 (right). The direct output can be used as the 'record' source for a tape recorder, DAT recorder or cartridge/cassette recorder connected to the channel or as other required.

Link Summary

Factory default settings are shown in **bold** type.

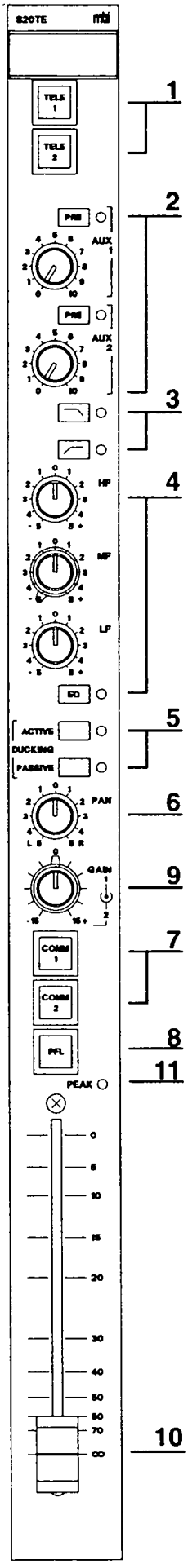
LK1 & LK2	Left and Right direct output select. Pre-fade, post-fade, **Stereo PGM**.
LK3	**Disable** input selector on fader open.
LK4	Start option, **A = Momentary**, B = Latching
LK5	Position A selects Fader Stop when in push switch Start/Stop mode, **Position B = Normal**.



Telco Module S20T/TE

The Series 20 telco modules S20T (without equaliser) and S20TE (with equaliser) have two electronically balanced inputs, switched by the input select switches, TELE 1 and TELE 2. High specification D-range multi-pin connectors are used to carry audio inputs, audio output and hybrid remotes for convenient installation.

Each input and its associated signals are carried on 15-way D-range female connectors, SK1,2. Other module remote controls are provided on a 15-way D-range male connector, SK3.



Telco Module S20T/TE

1 The selected input is terminated with approximately 20K ohms, whilst the non-selected input is unterminated. Input select switches for **TELE 1** and **TELE 2** may be selected individually or together.

A Mix Minus clean feed output is individually generated per input.

Auxiliary Sends

2 Two mono auxiliary sends, **AUX 1** and **AUX 2**, are provided on the S20T/TE modules, both are switchable immediately pre or post-VCA. Each auxiliary send has a level control feeding the respective stereo motherboard bus. The S20OP output module provides summed output both in stereo and derived mono. Each Aux Send carries a mix of TELE 1 and TELE 2.

Filters and Equaliser

3 Two **FILTERS** are provided. Each has a fixed frequency as follows:

- The High-Pass Filter has its -3dB point at 100Hz and has a slope of 12dB/octave
- The Low-Pass Filter has its -3dB point at 10kHz and has a slope of 12dB/octave

Each Filter can be switched into the signal path by its respective switch. An associated LED indicates when each filter is in circuit.

The **EQUALISER** is only fitted to the S20TE module.

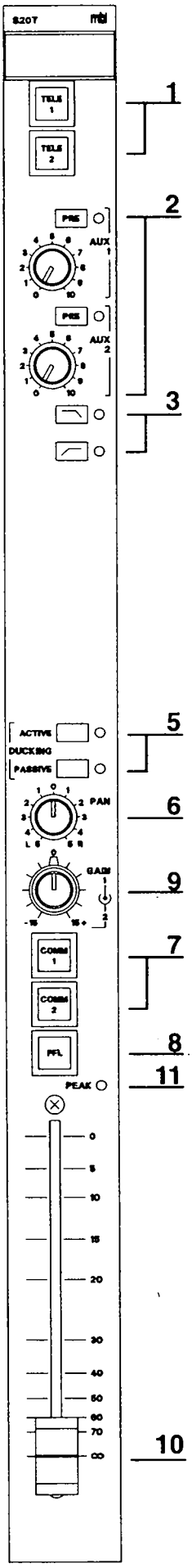
4 The Equaliser has a three bands with a fixed frequency bell response at **MF** (3.5kHz) and shelving response at **LF** (130Hz) and **HF** (10kHz). Each frequency has a ±15dB cut and boost control. The LED indicator adjacent to the EQ switch shows the equaliser in circuit.

Voice-over (ducking)

The Series 20 continues the MBI ducking feature whereby ACTIVE channel(s) reduce PASSIVE channels by determined parameters.

5 The channel module may be designated **ACTIVE** (red LED indication), **PASSIVE** (green LED indication) or NEUTRAL (neither indicator). The channel logic will not permit more than a single state selection.

An ACTIVE channel feeds a post-fader audio signal, via the motherboard bus, to the output module S20OP for processing. The output module shapes the signal by means of attack and release time constants and returns a DC voltage, according to the 'depth' of reduction selected, to the PASSIVE control bus. An ACTIVE signal must be greater than 0dBu threshold before the ducking circuit responds.



A PASSIVE channel is reduced in level by the control signal on the PASSIVE bus. This control signal is mixed with the channel fader DC level and applied to the VCA.

A channel not selected ACTIVE or PASSIVE neither contributes nor responds to the ducking system.

Any number of channels may be selected ACTIVE or PASSIVE for combined operation of the ducking system.

Logic switching toggles the selected function on and off with reset of previous alternate function. Both ACTIVE and PASSIVE functions are reset (to NEUTRAL) by the input selector and on power-up.

Pan

6 The **PAN** control is normally configured for full left/centre/full right, with centre detent. However, placing the LK4 links in the B position causes Tele 2 input to pan opposite to Tele 1. This allows the operator to place the two callers opposite each other in the stereo image.

Communications

7 Off-air communication with the caller is provided via the COMM 1 (Tele 1) and COMM 2 (Tele 2) switches. Selecting either one of these switches places the module in PFL mode, selects the relevent Hybrid latch relay, and routes the desk T/B bus to the relevent cleanfeed output. A two way conversation may then take place to allow the operator to adjust levels and set up the call.

Remote Control of External Equipment

The S20T/TE provides two sets of isolated control outputs for hybrid switching. These are activated by either Tele 1, COMM 1 or Tele 2, COMM 2. Normally open contacts are provided on SK1, pins 2,3 (Tele 1), SK2, pins 2,3 (Tele 2), and normally closed contacts for both inputs on SK3, pins 1,2 (Tele 1), pins 3,4 (Tele 2).

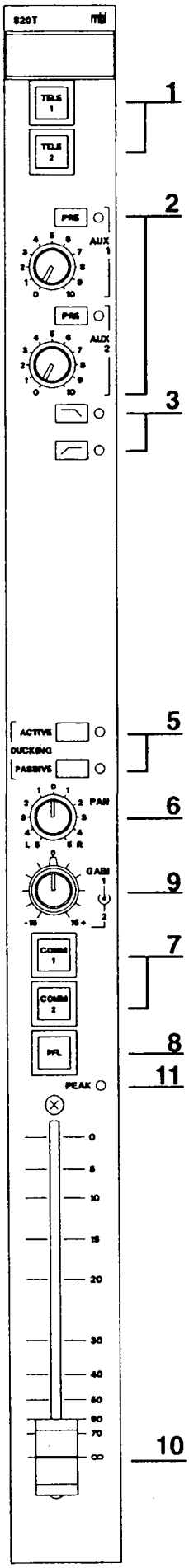
Pre-fade Listen

8 Module **PFL** is directed to the pre-fade bus on operation of the PFL switch.

PFL is of the selected input, either Tele 1, Tele 2, or both.

PFL is latching and operative when the Fader is closed. Opening the Fader resets a latched PFL to off.

The PFL logic provides outputs to switch pre-fade audio via solid state switch IC19,20 to the pre-fade bus and to operate the AUTO PRE-FADE to monitor switch if this has been pre-selected.



Gain and Level Control

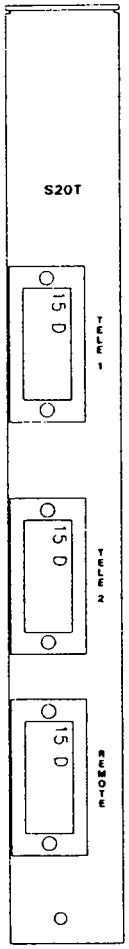
9 The **GAIN** control has a range of ±15dB with centre detent at nominal 0dB gain. Separate gain controls are provided for each of the inputs and are situated close to the PFL and COMMS switches for ease of use.

10 The **FADER** is a conductive plastic fader. The Fader controls a VCA type DBX 2150A. The VCA is trimmed by presets VR15, VR16 (symmetry), VR12 (300mV at VCA Pin 3 - fader infinity), VR11 (zero preset).

Module output level is increased by moving the Fader away from the operator.

11 Module **PEAK** level is sampled post equaliser section and displayed on an LED adjacent to the fader open position.

The sample circuit is preset to illuminate the LED at 3dB below clipping.



Rear Connector Panel

Input 1 (SK1) 15-way D Connector (fixed female)

		Pin		
0V audio		1		
Hybrid unit latch relay contacts		2	3 normally open	
0V audio		4, 5, 6		
Input	+ve	7	8	-ve
Direct output	+ve	9	10	-ve
No connection		11, 12		
Clean feed	+ve	13	14	-ve
No connection		15		

Input 2 (SK2) 15-way D Connector (fixed female)

0V audio		1		
Hybrid unit latch relay contacts		2	3 normally open	
0V audio		4, 5, 6		
Input	+ve	7	8	-ve
Direct output	+ve	9	10	-ve
No connection		11, 12		
Clean feed	+ve	13	14	-ve
No connection		15		

Remotes (SK3) 15-way D Connector (fixed male)

Hybrid 1 latch relay contacts		1	2 normally closed	
Hybrid 2 latch relay contacts		3	4 normally closed	
No connection		5		
Direct output	-ve	6	7	+ve
0v audio		8		
Ext. Mute opto-isolator	Anode	9		
No connection		10,11,12		
+14v logic		13		
Ext. PFL opto-isolator	Anode	14		
0v logic + opto-isolator Cathodes		15		

Hybrid latches are isolated relay contacts.

To operate Ext. Mute, Ext.PFL connect the Anode pin to +14v logic.

PFL External Control

External control of module PFL, via remote D type connector SK3, is opto-coupled to the pre-fade logic. Input is on SK3 pins 14, 15.

An external pre-fade command will illuminate the PFL switch LED, operate Auto Pre-fade and switch selected input audio to the pre-fade bus.

Channel Mute External Control

The S20T/TE has an external mute input that may be used to mute the channel output. This is opto-coupled and appears on the remote connector, SK3 pins 9,15.

Link Options

Channel Logic Functions

The Series 20T/TE uses digital logic programmed with on board links to perform the main operational switching. Some of the links are factory programmed options specified to order whilst others are 'handbag' links easily set by an engineer. These links are not intended as anything other than preset function options. A summary of the link options is shown below.

The factory default settings are shown in bold type.

LK1 **In position R, module powers up with TELE 1 selected to OFF.** In position S, module powers up with TELE 1 ON.

LK2 Comms Mute mode, **A = Local Mute**, B = Local Dim.

LK3 Direct Output select, Post-fade, Telco mix, **PGM Mono.**

LK4 Contra Pan, Position B, TELE 2 pans opposite to TELE 1. **Position A**, both inputs pan together.

Channel Direct Out

Link selectable between post VCA, Telco mix or desk mono. This link is user programmable.

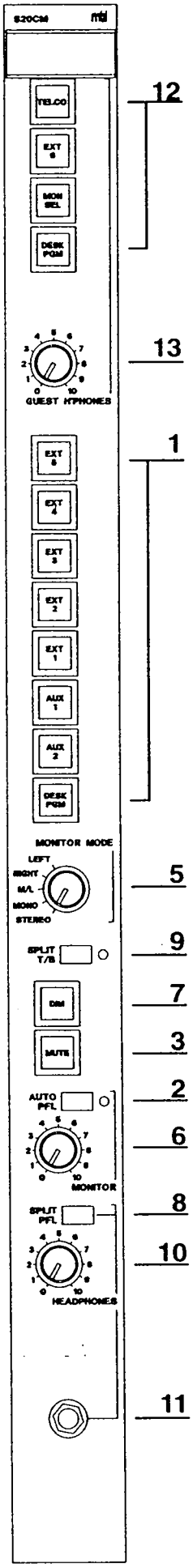
The output is electronically balanced, has an impedance of 50 ohms and is capable of driving up to 100 metres cable and appears on all 15 way D connectors, pins 9,10 SK1,2 and pins 7,6 SK3. The direct output can be used as the 'record' source for a tape recorder, DAT recorder or cartridge/cassette recorder connected to the channel or as otherwise required.

Telco Mix

The TELCO MIX facility is a post-fade mix of all Telco inputs to the console as selected on Telco module Input Selectors. The facility is provided for those customers that need to record incoming telephone calls without local voice or for feeding to studio guests who do not wear headphones without the risk of acoustic feedback.

Only one Telco Mix amplifier (IC15 on Telco Channel Audio circuit ED3111B) is fitted per console.

To achieve a mix of a microphone channel pre-fade and Telco channels, R113 (10k ohms) can be fitted to Mono Input modules (issue 4).



Control Room & Studio Monitor Modules S20CM & S20SM

The Series 20 monitor modules S20CM and S20SM are basically the same with a common printed circuit board and components. The main physical differences exist as panel details, with a front panel presenter headphone jack omitted on the S20 SM studio monitor. The operational function differences are achieved with internal links and the re-designation of the DIM button (S20CM control room) to TB (talkback) on the S20SM studio monitor.

Similar to the channel modules, the monitor S20CM and S20SM feature a mixture of direct audio and logic controlled switching with on-board links providing customer options.

The monitor modules both have two separate monitoring chains for operator/presenter and guest use - S20CM. (Studio loudspeaker/headphone 1 and headphone 2 - S20SM)

Loudspeaker And Presenter Headphones (headphone 1 - S20SM)

The module provides switch selection of eight stereo monitor sources. (The inputs are a mixture of bus feeds and five external inputs.) L.S. mode, L.S. mute, L.S. dim (S20CM only), talkback to loudspeaker/headphone 1 (S20SM only), auto pre-fade to loudspeakers, split PFL to presenter headphone (headphone 1 - S20SM) (pre-fade being automatically switched to headphone with no user option). Level control of loudspeaker and headphone outputs.

Guest Headphone (headphone 2 - S20SM)

Switch selection of four stereo sources and level control of headphone output.

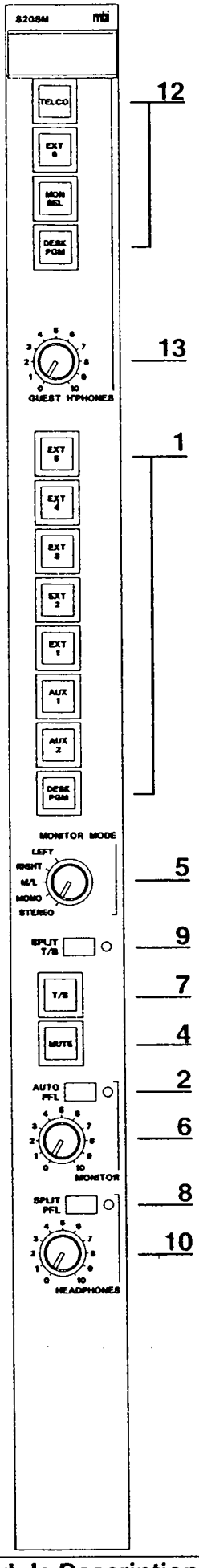
Each monitoring path is described below.

Loudspeaker/Headphone Presenter - S20CM Headphone 1 - S20SM

1 The **SOURCE** is selectable between the following:

1	External input 5 or Telco mix
2	External input 4
3	External input 3
4	External input 2
5	External input 1
6	Auxiliary 1 output
7	Auxiliary 2 output
8	Desk programme

The external inputs appear on a rear panel mounted EDAC 38-way multipin connector. All audio inputs to the monitor bank are latching relay switched, controlled by the select logic, the front panel push buttons being momentary action with internal LED illumination.



The button caps and diffusers are removable by gripping the sides of the cap between two fingers and gently pulling off. A printed legend may be inserted between the diffuser and the cap. When refitting ensure the cap is correctly clipped into place or it may be dislodged in use.

Four internal links choose between external input 5 and the Telco mix bus.

The selected input is terminated by an electronically balanced circuit which has an input impedance of approximately 30K ohms. Non-selected inputs are un-terminated.

An output from the 'monitor' select relay bank is fed to the 'guest' relay select bank. Relay operation is achieved by a codec circuit which provides switch de-bounce and one-at-a-time selection. The select system powers up on "DESK PGM".

LOUDSPEAKER CHAIN

Pre-fade Monitoring

2 The loudspeaker chain has **AUTO PFL** pre-selection, which provides pre-fade listening of any channel input PRE-FADE. The headphone 1 chain is designed to give auto pre-fade without operator pre-selection.

Any channel PRE-FADE will appear on the operators headphones and on the meter output jack automatically.

DIM (S20CM Only)

3 This function reduces loudspeaker output level by a fixed amount (20dB standard) when the **DIM** button is pressed. Additionally, the DIM function is selected when reverse talkback is received. The switch LED illuminates to indicate manual or automatic DIM.

The attenuation level may be adjusted by changing R17 (left channel) and R18 (right channel). Standard 20dB resistor values are 220K, a 12dB attenuation is achieved with resistors value 68K ohms.

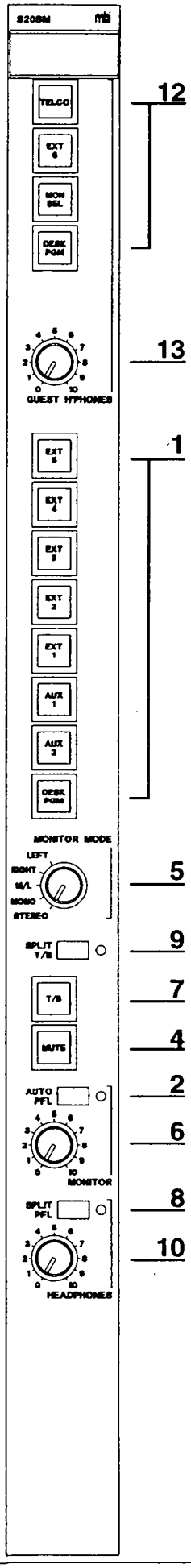
Talkback

The control room monitor S20CM has an external talkback input together with a dc remote control for activation. All connections are made via the rear panel 38-way EDAC connector.

The loudspeaker chain is factory set to receive talkback. If the user wishes, links LK1 and LK2 may be moved from position A to position B and talkback will then be inhibited from the chain and only heard on headphones.

Talkback dc remote is activated by loop connection of pins FF.HH on the EDAC connector.

Additional to switching talkback, the monitor is dimmed by a preset amount to improve intelligibility. The attenuation is separate from the DIM circuit and is preset in the factory by R12 and R14 to 20dB (R12, R14 = 220K ohms); the attenuation may be altered if desired to 12dB (R12, R14 = 68K ohms).



Talkback S20SM

4 Talkback to studio on the S20SM is provided by re-designation of the S20CM DIM switch to TB (talkback). Internally, the difference is the presence of three inserted-on-manufacture links. T/B link 1 enables talkback control, T/B links 2 and 3 disable the DIM circuit operation from switch and from local DIM bus.

Talkback sources are either TB bus and/or external talkback input.

Monitor Mode

5 This five position switch sets the stereo/mono working of the loudspeaker outputs. The normal STEREO position of the switch feeds left and right loudspeaker outputs with the stereo monitor input, the MONO switch position sums the left and right signals and feeds the loudspeaker outputs equally. The M/L (mono on left) position cuts the right loudspeaker and feeds mono sum to the left loudspeaker. The remaining two positions, RIGHT and LEFT, feed only the right and left loudspeaker respectively with their corresponding 'stereo' leg.

Loudspeaker Level

6 The loudspeaker **LEVEL** is a full range level control where full output is 0dBu, minimum output is lower than -70dB.

The level control may be range restricted to -20dB on either or both legs by removing link across R29 1K ohms, left channel, and link across R28 1K ohms, right channel.

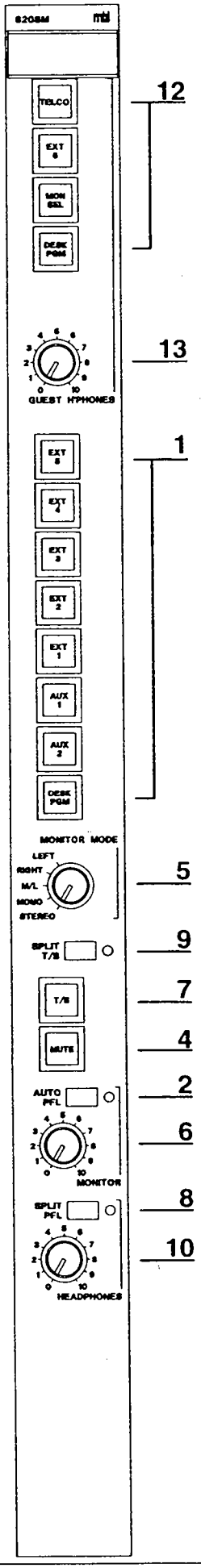
Loudspeaker Mute

The loudspeaker outputs may be muted automatically, when a local or adjacent area microphone fader is opened, by Mute Select link selection of local or distant mute bus.- Link position A selects distant bus, link position B local bus. The appropriate links must also be made in S20M/ME mono mic/line channels.

7 A latching manual **MUTE** may be initiated by the front panel MUTE switch. The switch LED will illuminate to indicate automatic or manual mute operation.

Loudspeaker Outputs

The left and right loudspeaker outputs are electronic balanced, source impedance 50 ohms, and appear on rear panel A gauge jacks -tip, +phase ,ring, -phase, sleeve, signal 0V. The outputs are capable of driving up to 100 metres of cable and should be loaded with greater than 2K ohms.



PRESENTER HEADPHONE CHAIN

The presenter/operator headphone chain receives its normal input from the eight way monitor selector system with common sourcing to the loudspeaker chain.

Pre-Fade

The headphones are designed to switch automatically to PRE-FADE whenever an input channel pre-fade switch is pressed. The headphone outputs are switched in stereo.

8 The **SPLIT PFL** switch is latching and prepares summing amplifiers for use in place of stereo pre-fade.

When any channel pre-fade is pressed the headphone right output is switched to mono sum of monitor selector and the headphone left output to pre-fade mono sum.

Talkback

The headphones are fed with the same talkback source as the loudspeaker chain.

An incoming talkback command will switch both headphone outputs mixing programme to talkback but dimming the programme by approx. 20dB to improve intelligibility. The attenuation level may be adjusted by changing R53 (Left) and R56 (Right) (design 82K ohms).

9 The **SPLIT TB** switch is latching such that when a talkback command is received programme mono is routed to left headphone output and talkback to right headphone output.

Split TB may be used in conjunction with split pre-fade ensuring that a presenter/operator always has console output on headphones.

Level Control

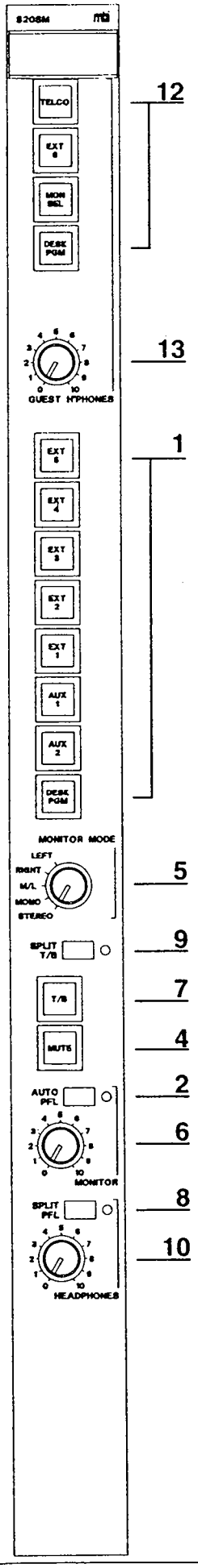
10 The **HEADPHONES** level control is a dual section full range control acting equally on both outputs. Maximum output level is +12dBu.

The range of the level control may be restricted to -8dB by removing link across R63(1K ohms) -left channel and link across R64(1K ohms) - right channel. This restriction ensures that the headphone output cannot be turned completely off.

Headphone Output

11 The presenter/operator headphone stereo output appears on two A gauge jacks. One jack is mounted on the module front panel for direct headphone connection, the other is on the module rear panel for routing to headphone outlet built in to console furniture on installation.

Each jack is fed by separate headphone amplifier connected tip-left, ring-right, sleeve-common 0V. The front panel jack and associated power amplifier are omitted from S20SM.



Guest Headphone

12 The guest headphone output is fed in stereo from the four switch input selector at the top of module. The inputs available are:

1	TELCO mix
2	External input (EXT 6)
3	Main monitor selector output (MONSEL)
4	Program (DESK PGM)

All inputs are selected by relays driven by codec logic. The switches are momentary with LED indication of selected source. The guest headphone output powers up on "DESK PGM".

Pre-fade and Talkback

No pre-fade or talkback can be sent to guest headphones.

Level Control

13 A full range stereo **LEVEL** control is provided. No range restriction components are fitted.

Headphone Outputs

The guest headphone appears on a rear panel unbalanced stereo A gauge jack (tip-left, ring-right, sleeve-common 0V). Recommended load impedance is greater than 400 ohms, driven by on-board power amplifier.

Monitor Meter Output

A monitor meter output is provided on both S20CM and S20SM. This output is fed from and follows monitor input selection. Pre-fade automatically overrides this selection when any channel pre-fade is pressed.

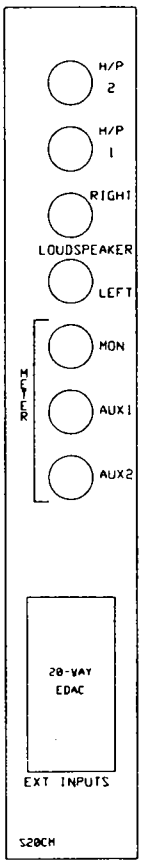
Two level trim presets (P1 - left, P2 - right) are fitted to balance monitor selector to pre-fade level.

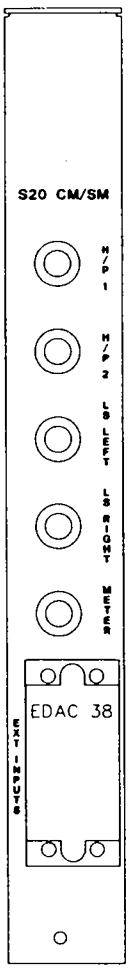
The meter output is on a rear panel A gauge jack (tip-left, ringright, sleeve-common).

Monitor Meters

The Series 20 offers a range of monitor meters including twin PPM, full size mono PPM, VU meters and horizontally mounted bargraph.

Modules are available with single and dual meters of each variety.





EDAC 38 way (fixed female)

Pin +	Pin -				
A	B	External	1	input	left
C	D				right
E	F	External	2	input	left
J	K				
L	M	External	3	input	left
N	P				
R	S	External	4	input	left
T	U				
V	X	External	5	input	left
W	Y				
Z	AA	'Guest' external		input	left
BB	CC				
DD	EE	Talkback audio			
FF	HH	Talkback DC/Ground			
JJ	KK	Not used			
MM	NN	Not used			
PP	RR	Not used			
SS	TT	Not used			
H		Ground			
LL		Ground			

Loudspeaker outputs

(left and right)
Balanced

(A gauge jacks)

Tip	+
Ring	-
Sleeve	Ground

Headphone outputs

(Presenter + guest S20CM)
(H/P1 + H/P S20SM)
Unbalanced

(A gauge jacks)

Tip	Left
Ring	Right
Sleeve	**Common**

Monitor meter

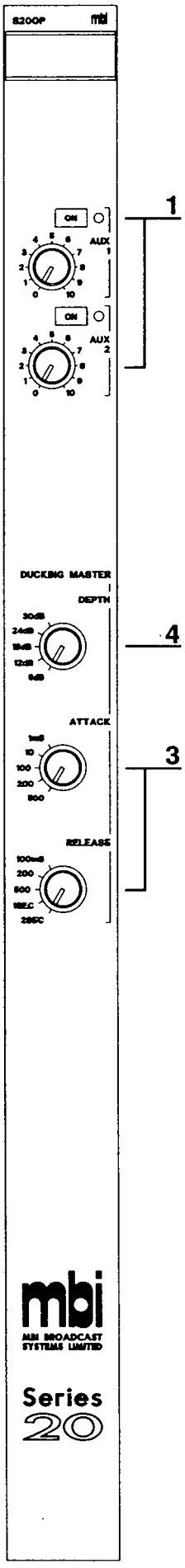
(A gauge jack)

Tip	Left
Ring	Right
Sleeve	Common

Summary of Link Options

LK1, LK2	Position A enables T/B on monitors, position B disables. (Factory default settings: **S20SM = A, S20CM = B**)
T/B Link 4	Fit if Ext. T/B is unbalanced.
Mute Select	A = Distant B = Local
Misc	Links across R28, R29, R63, R64 may be cut to leave low level on monitors and/or headphones with level controls at zero. Telco links may be fitted to replace Ext 5 with Telco mix on main monitor switch bank.

Output Module S20OP



The S20OP output module contains the bus mix and output amplifiers for pre-fade, auxiliaries and programme. Additionally, voice-over (ducking) master controls and relay outputs for external equipment control from local/distant mutes, are also situated in the S20OP.

Auxiliary Outputs

1 Full range master level controls for **AUX 1** and **AUX 2** are situated at the top of the module together with **ON** switches, and LED indicators for each aux output.

Each auxiliary output appears in stereo, with derived mono, on the EDAC 38 way multi-pin connector. The outputs are electronically balanced with an impedance of 50 ohms, capable of driving 100 metres of cable. The auxiliary outputs are also returned to the motherboard for monitoring purposes. With Aux master controls at maximum the output level is +10dB.

Programme Output

The left and right balanced mix busses are amplified and appear in stereo, with derived mono, on XLR type and in parallel with the EDAC 38 way multi-pin connector. The programme outputs are also returned to the motherboard bus for monitoring purposes.

The derived mono output appears on the output connectors and is also fed to the motherboard to be used as a component of the mix minus outputs of the telco modules. If the S20OP is fitted with the fader option then the derived mono output is post fade at the output connectors and pre-fade on the motherboard.

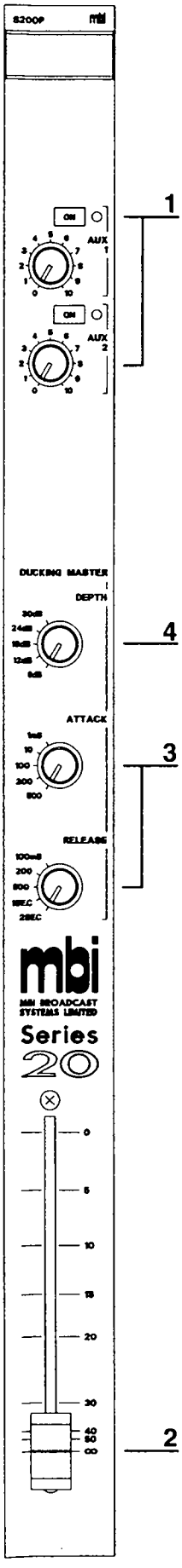
Output Options

The programme stereo and derived mono outputs are supplied in standard form as electronic balanced, source impedance 50 ohms, capable of driving 100 metres of cable. The load impedance is recommended to be greater than 600 ohms before signal degradation due to loading becomes a problem.

Transformer balance options are available, at extra cost, on programme stereo and mono outputs. The transformer used is the Lundahl 1517 high quality output transformer. The use of the transformer coupled output will slightly degrade the low frequency performance of the console, limiting the maximum output to +20dBu, 0.1% THD at 30Hz. This is not considered a problem for normal use.

Gain And Level Control

As stated above the auxiliary master outputs have a full range level control normally operating at mark 7. Scale mark 10 equates to +10dBu output with a single channel routed and set at scale mark 10.



2 The programme output in a standard S20OP module has no level control, the mix and outputs are set by design. The S20OP, however, is available with an optional output fader. This fader is a conductive plastic type, impedance 10K ohms log taper. This fader is an audio fader and is **not** the same type used to control VCA level in the input modules.

The fader is inserted by omitting R77, R92 and links LK1/LK2 and adding C77 and C89 as well as the fader. The fader plugs onto a Methode header in the same manner as the channel modules.

The fader increases output level away from the operator. The normal operating position is fully open.

Pre-fade

The S20OP contains the mix and output amplifiers IC19 for pre-fade. The pre-fade signals are connected to the motherboard bus system for monitoring purposes only and are not output from the module for external connection.

The motherboard bus system supplies the pre-fade signal to all channel module positions for use by S20CM and SM monitor modules and also, via the power connector harness, to the meterbridge distribution connectors for loudspeaker and meter monitoring.

No level adjustments are provided, all levels are design set.

Voice-over (ducking)

Audio signals routed on channel modules (S20M/ME, S/SE, T/TE) to be ACTIVE are summed from the motherboard active bus and processed by IC18 and IC17.

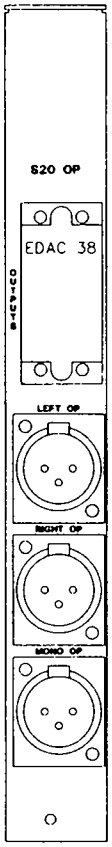
3 A choice of 5 **ATTACK** time constants (1mS : 10mS : 100mS : 200mS : 500mS) are selected by switch S4 and a choice of 5 release time constants (100mS : 200mS : 500mS : 1S : 2S) by S5. These selections are by Operator choice dependent on the desired aural effect.

4 The amount of level reduction of channels selected to PASSIVE is adjusted by the **DEPTH** control, which has five switched settings of 6dB : 12dB : 18dB : 24dB and 30dB.

Only channels selected to ACTIVE will generate a control signal and only channels selected to PASSIVE will respond to the ducking system. If no ACTIVE signal is present, channels set to PASSIVE will contribute to the programme mix bus controlled only by channel gain and fader controls.

ACTIVE and PASSIVE selection and attack/release/depth settings may be changed at any time but it is recommend that ACTIVE selection is made with care to avoid unintentional ducking.PASSIVE action takes place on individual channel VCA. Any post VCA channel output to DIRECT OUTPUT, and in S20T/TE telco modules clean feed mix minus summation, as well as the programme mix will be reduced in level (ducked) on all channels set to PASSIVE.

The summation ratios in S20T/TE telco modules between channel mono out and desk mono out are thus correct for consistent mix minus generation.



Remote Controls

The S20OP provides two sets of switching outputs controlled by each of the LOCAL and DISTANT mutes.

Each mute controls a set of four outputs. Each set provides three earth and voltage free relay contacts which close when a mute signal is present. These contacts are each rated at 1 amp or 60v DC maximum, and although the relay manufacturer quotes an AC rating this is not recommended, for safety reasons, for the Series 20OP module.

The fourth switched output of each set comprises desk logic 0v and a switch-on-mute 14v DC limited by internal resistance to 10mA. This output is sufficient to operate a solid state AC relay directly for use in illuminating 'ON AIR' and red lights.

All switched outputs appear on the EDAC 38 way multi-pin connector.

Rear Connector Panel

EDAC 38 way (fixed female)

Pin +	Pin -			
A	B	Aux 1	Mono	
C	D	Aux 2	Mono	
E	F	Aux 1	Left	
J	K	Aux 1	Right	
L	M	Aux 2	Left	
N	P	Aux 2	Right	
R	S	No connection		
T	U	Distant mute	1	normally open relay contacts
V	X		2	normally open relay contacts
W	Y		3	normally open relay contacts
Z	AA		4	(Z +12V on operate), AA 0v logic.
BB	CC	Local mute	1	normally open relay contacts
DD	EE		2	normally open relay contacts
FF	HH		3	normally open relay contacts
JJ	KK		4	(JJ +12V on operate), KK 0v logic.
MM	NN	Desk mono out		
PP	RR	Desk left out		
SS	TT	Desk right out		
H		Aux output ground 0v audio		
LL		Desk output ground 0v audio		

Desk out left	XLR type 3 pin chassis mount male
Desk out right	XLR type 3 pin chassis mount male
Desk out mono	XLR type 3 pin chassis mount male

(All XLRs wired as follows: Pin 1 Gnd, Pin 2 +, Pin 3 -)

Meter Interfaces

A common meter interface card connects to the meterbridge distribution connector for power and stereo audio bus inputs. Additionally, board mounted A gauge jacks permit the input of unbalanced monitor stereo from the monitor module S20CM or S20SM or balanced external left and right inputs. It is not possible to use the unbalanced and balanced inputs simultaneously as the unbalanced signals are connected through the contacts of the external input jacks.The unbalanced jack is connected tip-left, ring-right, sleeve-common. The balanced jacks are connected tip- +phase, ring- -phase, sleeve-common.

On board user selectable links determine the audio source fed to the meter(s).

Links 1-4 A	select external or monitor input jacks.
Links 1-4 B	select pre-fade from PFL bus.
Links 1-4 C	select program from PGM bus.
Link 5	ground isolate for sleeves of external inputs.

(Note:Monitor input is monitor module source selector automatically overridden by pre-fade)

The meter interface card connects to meter drivers and external switches as follows, providing all audio and power requirements.

Plug P1 - 10 way ribbon to MBI PPM driver SC3125

P2 - 10 way methode to Surrey Electronics/BBC AM20/5 PPM driver

P3 - 4 way ribbon to external switch module for control of M/S and S+20 modes of AM20/5

P4 - 4 way ribbon to MBI PPM LED illumination cards

The meter interface card is normally used to interface with stereo PPM drivers or stereo bargraphs. Circuitry is provided on board to sum the stereo input signal to drive mono meters. Additionally, this circuitry can be configured as a stereo or mono VU driver.

Series 20 PPM Driver - Stereo

The PPM driver printed circuit board fixes directly to a Sifam twin PPM by means of the meter terminals. All connections to the driver are made via an 10 way ribbon cable to the meter interface card.

The driver printed circuit board has electronic balanced inputs for left and right channels, feeding two Surrey Electronics PPM 5 drive cards. Additionally, a peak indicator monitors the mono sum of the stereo inputs (option - not normally fitted).

On board preset adjustments are provided for both PPM 5 drivers. P1 and P4 set PPM 3, P2 and P5 set PPM 6 and P3 and P6 set electrical and mechanical zero.

An adjustment P7 is also provided to set the level point at which a peak indicator will illuminate. This is factory set to be +8dBu (PPM 6) where fitted.

PPM illumination is provided by LEDs set in the meter housing. Power is supplied to the illumination pcb from the interface card via a 4 way methode connector.

Meterbridge Monitor S20MBS

The S20MBS is a 4 module width unit that may be placed in any location of the meterbridge.

The unit provides two independently controlled monitor feeds to the loudspeaker.

Input 1 is taken from the stereo pre-fade bus fed permanently to S20 MBS via the 14 way transition connector. The stereo pre-fade is internally mixed to mono before the Level 1 control.

Input 2 (nominal sensitivity - 0dBu) is available in two options. Option 1 (supplied as standard) is a stereo unbalanced input on a A gauge jack (tip - left, ring - right, sleeve - common) internally mixed to mono before the Level 2 control. Option 2 is a mono electronically balanced input on the A gauge jack (tip +, ring -, sleeve 0v).

The loudspeaker output will mute in the presence of a control signal issued from any S20M/ME channel set to LOCAL MUTE.

Additionally, two unbalanced talkback and DC control inputs are provided (nominal sensitivity - 0dBu). These inputs are on two A gauge jacks (tip - audio, ring - DC ground to operate, sleeve - common/DC ground).

A link option on the printed circuit board provides either a mix of TB1 + TB2 audio (link position B) as a common TB signal or a single talkback input on one jack with a parallel output on the other jack for 'daisy chaining' to other modules (link position A).

An internal preset talkback level control provides tamper-proof talkback reception. Talkback audio is only connected to the loudspeaker when the DC control signal is present, ie. when a jack 'ring' contact is connected to logic DC ground (jack 'sleeve').

When talkback is switched to the loudspeaker, the audio mix of Input 1 and Input 2 is 'dimmed' by 20dB to improve clarity.

Power, pre-fade input and mute control are all supplied via the 14 way transition connector plugged into the meterbridge distribution connector accessible through the rear of the console.

Meterbridge Talkback S20MTB

The S20TB talkback module is a double width module and provides eight switched talkback outputs. The outputs are unbalanced at a source impedance of 50 ohms approximately.

Each output may be separately selected by link option to normally receive an unbalanced External Cue (link position B) or feed of unbalanced 'desk mono' output (link position A). This 'desk mono' output is derived internally to the S20TB from the programme left and right outputs.

Each talkback output is controlled by a momentary (non latching) switch, which is not illuminated.

A continuous electronic balanced talkback output is available from the module.

Talkback Source

The audio talkback source is controlled by link options within the module from three inputs. The selected option is routed via a simple FET limiter, the threshold of which is adjusted-on-test by preset control VR2, to the output selectors.

Audio Source 1

Module stalk mounted electret microphone. Link LK9 routes microphone amplifier to limiter input.

Audio Source 2

Talkback bus. If a mono channel S20M/ME prefade-to-talkback link option LK2 has been made, this bus source is connected to the limiter via links LK10.

Audio Source 3

External Talkback. An external electronic balanced input (nominal sensitivity 0dBu) is available on the module external connector. This may be connected to the limiter via link LK11.

Note: only one talkback source may be used.

Talkback audio may be sent to the talkback bus, for use by S20T/TE telco and S20SM studio monitor modules, by link LK12.

Links LK10 and LK12 may not be fitted at the same time.

All external connections to the S20TB module appear on a 37 way D range connector accessible from the rear of the console.

Internal connections are from the 14 way transition connector plugged into the distribution connector accessible from the rear of the console. This connector carries DC power, desk programme, mute, and talkback bus.

Meterbridge 8 Way Input Selector Module S20MS8

This module is a double width, 8 stereo input selector for monitor or channel input expansion.

Non-latching switches, with internal LED indication of selection, drive on board relays via codec logic.

All relay contacts are earth and volt free and latch on selection to a balanced stereo output.

Power is supplied to the module via the ribbon cable connection to the meterbridge distribution connector.

The selector switches may be user labelled.

The module may also be used for switching 8 mono inputs and their associated clean feed outputs. Also available is a 4 stereo input version in a single width module, S20MS4.

ICL Module S20ICL

The Series 20 ICL module is used in conjunction with an input module to send cleanfeed and talkback to a control or telephone line. The cleanfeed may be the cleanfeed output of the S20T/TE module or may be created within the ICL module if the associated input module is a mono or stereo module.

The control/phone line may alternatively be fed from an External Input such as a Ring Main Selector.

Inputs are provided for talkback from either the Technician or the Producer. Technician talkback is an input from the meterbridge bus and Producer talkback is an external input. When talkback is sent the selected source is dimmed by 20dB.

The ICL output level is variable from -12dB to -6dB when connected to a 600 ohm line. Output impedance is 600 ohm.

Connections are provided for telephone type handsets and ringing generators that may be switch to the line to provide for two way conversation prior to going on air. The ICL also has an on board ring detector and call light to indicate if a "call" has been received. When a call is received, selecting the Tele Answer switch routes the line away from the ICL output to a handset. The call is terminated by selecting the Tele Answer switch again or, if wired, replacing the handset on the hook.

The Call switch routes the line away from the ICL output to the input from a ringing generator. The ICL output stage is transformer isolated from the telephony circuit for protection against ringing voltages.

The S20ICL normally sends to a S20UCL via the control/phone line.

Suitable protection apparatus, approved by the local BT/PTT, may be required before connecting any equipment to a telephone line.

UCL Module S20UCL

The Series 20 UCL module is the receiving end of a control/phone line.

The line input has exactly the same telephony circuit as the ICL and is used for two way conversation via the handsets with the ICL.

The audio input amplifiers are transformer isolated from the line input and telephone circuit. A receive level control is provided which gives a gain range of -10dB to +20dB. The output of the UCL is balanced and would normally be fed into the studio or control room monitoring system.

The S20UCL receives from a S20ICL via the control/phone line.

Suitable protection apparatus, approved by the local BT/PTT, may be required before connecting any equipment to a phone line.

Timer Module S20TIM

Simple Mode

The upper display, timer 1, is designed to run in simple mode. There is a choice of two inputs to operate the timer. Referring to Drawing no. ED3199A Issue 1, placing LK1 in position A allows the timer to be activated from the local mute bus. Every time a mic fader routed to local mute is opened, the timer will reset and start counting. When the fader is closed the timer will stop and display the lapsed time. The timer will reset to zero and start counting when any mic fader routed to local mute is opened.

Alternatively the timer may be operated via the fader start opto-isolator. Applying a voltage of 5-15 volts across SK1 pins 2 positive and 1 negative will reset and start the timer. Removing the voltage will stop the timer. SK1 pin 7 provides +14v and SK1 pin 9 provides 0v for switching via an external relay. LK1 must be placed in position B to disable local mute operation. Refer to Drawing no. ED3199A.

Complex Mode

The lower display, timer 2, is designed to work with the 8 pushbuttons below it. Operation is as follows:

Set Intro Selecting this pushbutton causes the button to flash and a discs intro time can be entered into the timer via the 'SET MINS', 'SET SECS', 'UP' and 'DOWN' pushbuttons. When the desired intro time has been entered, the SET INTRO button is pushed once more to end this operation.

Set Track This pushbutton functions exactly as the 'SET INTRO' switch except that this time a discs track length is entered into the timer.

Having set the intro time and track length the timer now displays the intro time. The timer can be started via the 'START/STOP' pushbutton or via the opto-isolators on SK2. The start and stop inputs require momentary pulses and the fader start input requires a latching input to keep the timer counting.

The timer will count down to zero from the preset intro time and then revert to counting up to the preset track length, from the intro time. For example, preset intro time = 10 seconds. Preset track length = 2 minutes. The timer will count down to zero and then from 11 seconds to 2 minutes.

Changing the direction link will change the counting direction on the track time. For example, preset times as above. The timer will count down from 10 seconds to zero and then from 1 minute 50 seconds to zero.

Relay outputs are provided for intro time (timeout 1) and track length (timeout 2). These are activated when either of the times reach zero.

The timer may be stopped and restarted via the pushbutton on the module or via the start/stop opto-isolators.

The reset pushbutton resets the timer back to ZERO.

Source Selector Module S20SL

The Series 20 source selector module is designed to control the Series 30 selector rack. The Series 20 selector contains all the logic necessary to select either two banks of ten stereo inputs or one bank of twenty stereo inputs. The module also supplies power to the rack. The rack connector Pin Out is shown in Section 5.

The stereo inputs are normally used to expand the input sources to either the stereo input modules or monitor modules. The rack unit may also be used for mono sources with a corresponding cleanfeed.

The Source Selector module will not function, nor will the LED indicators illuminate unless the module is connected to the rack unit.

Each Source Selector module uses two relay switching cards S30 SLR. The S30 SLR pre-wired Selector Rack is capable of housing eight relay switching cards and thus four S20 SL modules may be used.

The S30 SLR is a 3U 19" rack unit using 56-way EDAC connectors for audio connection.

Switch operation may be disbaled when the Fader is open by connecting 'FADER OPEN' on the SL module to 'DISABLE' on Socket SK3.

Telephone Hybrid Module S20TBU

This module is designed to interface between an S20 T/TE Telco module Input + Clean Feed output and a Telephone Line. An S20 T/TE Telco module requires two S20 TBU if both inputs are used withg telephone lines.

The S20 TBU is fitted in a single width meterbridge module and uses a Sonifex HY02-EC telephone hybrid card.

The S20 TBU is connected to a meterbridge transition connector for power and to a 15-way D connector (free male type) which connects directly to the S20 T/TE Telco module.

Refer to Sonifex HY02 manual for data and connection information to telephone line.

Appendices

Technical Specifications

Dimensions

Configurations

Warranty

Input Impedance

Mic	1K2 Ω
Line (mono and stereo)	20K Ω

Input transformer balance optional extra on mic input only.

Channel Gain

Mono mic:	*coarse*	-25 to -70dB screwdriver adjustable
	fine	±15dB
Mono & stereo line:	*fine*	±15dB

Pan Range

OFF/-3dB centre/OFF

Balance Range

± 6dB

Hi Pass Filter

Frequency 100Hz -3dB 12dB/octave

Lo Pass Filter

Frequency 10kHz -3dB 12dB/octave

Crosstalk

Less than -60dB @ 1kHz

Common Mode Rejection Ratio

Better than -60dB @ 1kHz
-50dB @ 10kHz

Noise

Mic EIN	-129dB 150 ohm source
Line	< -80dB

THD

Less than 0.05% at +10dBu output (100Hz)

Max Output

Greater than +22dBu into greater than 2K Ω
Peak LEDs indicate 3dB before clipping

Output Impedance

Cleanfeed (mix minus)	Less than 50Ω
Main output Left,Right,Mono	
Electronically Balanced	Less than 50 Ω
Transformer Balanced	Less than 75 Ω

Frequency Response

40Hz to 20kHz	+0.5dB
reference 1kHz 0dBu output	

Equaliser Option

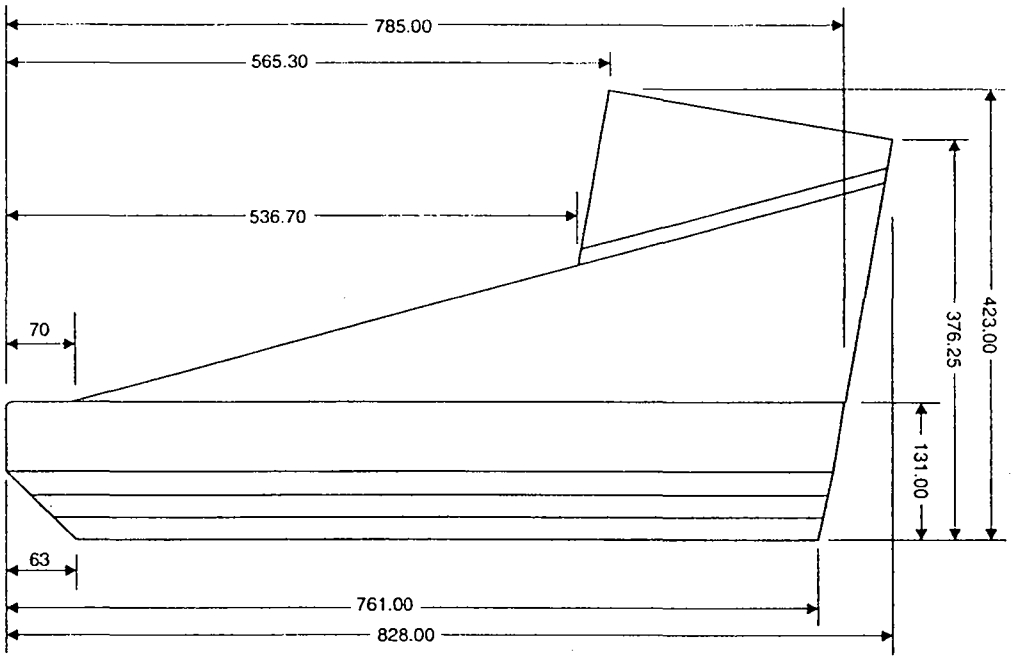
Mono	LF 100Hz	± 15dB shelving
	MF sweep 350Hz - 7KHz	± 15dB
	HF 8KHz	± 15dB shelving
Stereo	LF 130Hz	±15dB shelving
	MF 3.5KHz	± 15dB shelving
	HF 8KHz	± 15dB shelving

Note: 0dBu = 0.775V rms Reference frequency 1kHz

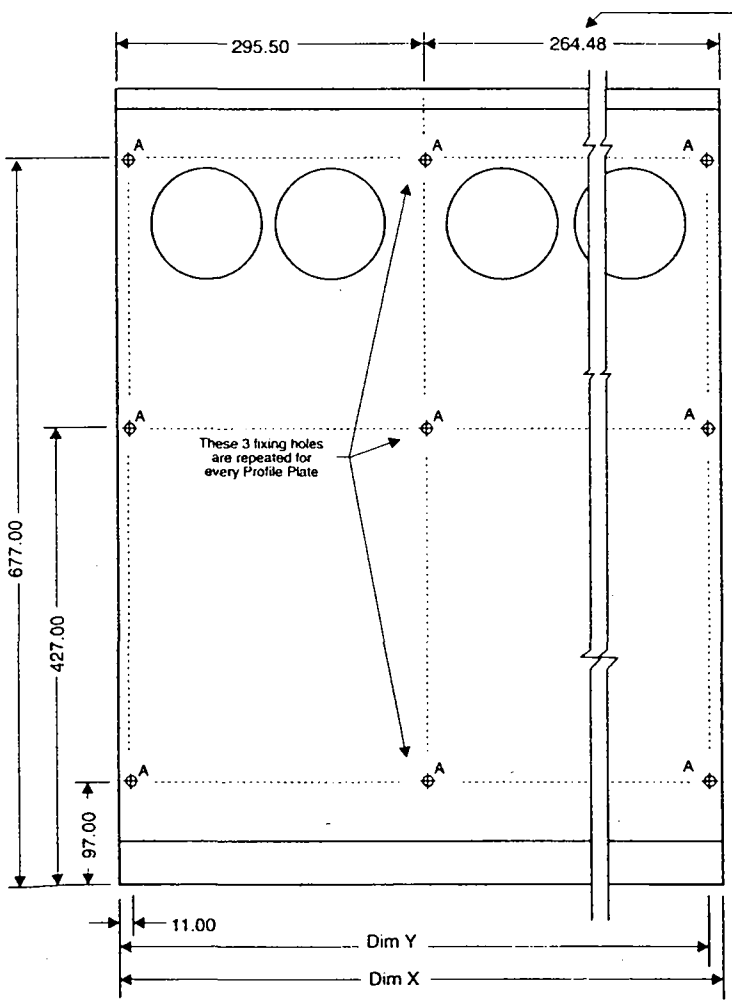
Power Supply

Type CPS450M	19" 2u rack mounted unit
AC Input:	110V : 120V : 220V : 240V 50/60Hz
Power Inlet Connector:	IEC 6 amp
DC Outputs:	±17V @ 3 amp audio
	+15V @ 3 amp logic + indicators
	+48V 200mA phantom power
DC Outlet Connector:	10 pole SRC

Dimensions



All dimensions refer to the chassis with trim



Number of Input Positions	16	24	32	40	48
Dimension X	570.96	855.44	1139.92	1424.40	1708.88
Dimension Y	559.96	844.44	1128.92	1413.40	1697.88

All "A" holes refer to M6 mounting studs which are recommended for supporting the console. These dimensions refer to a bare chassis without trim.

Configurations

The Series 20 framework is made up from standard 8 module wide extruded aluminium sections, side and divider plates. The extrusions and steel plates are mounted on a full console-width base plate. The chassis assembly is thus available in 8 module sections varying the console size from 16 to 48 module widths.

Channel modules

Channel modules are 35mm wide and 485mm long.

Scriptspaces

Scriptspaces are available in two standard widths:

- 8 modules width (8 x 35mm)
- 10 modules width (10 x 35mm)

Scriptspaces may be located alongside channel modules in any position of the console mainframe.

Meterbridge Modules

The meterbridge module widths vary in multiples of 35mm width. Meter modules are 4 modules wide (single meters) and 8 modules wide (dual meters and bargraphs). The additional meterbridge modules, e.g. Reverse Talkback/Pre-fade MBS is 3 modules wide, Talkback module, 8 way Selector and Timer are 2 modules wide, Control Line interfaces ICL and UCL are 1 module wide.

Warranty

1 **Soundcraft** means Soundcraft Electronics Ltd.

End User means the person who first puts the equipment into regular operation.

Dealer means the person other than Soundcraft (if any) from whom the End User purchased the Equipment, provided such a person is authorised for this purpose by Soundcraft or its accredited Distributor.

Equipment means the equipment supplied with this manual.

2 If within the period of twelve months from the date of delivery of the Equipment to the End User it shall prove defective by reason only of faulty materials and/or workmanship to such an extent that the effectiveness and/or usability thereof is materially affected the Equipment or the defective component should be returned to the Dealer or to Soundcraft and subject to the following conditions the Dealer or Soundcraft will repair or replace the defective components. Any components replaced will become the property of Soundcraft.

3 Any Equipment or component returned will be at the risk of the End User whilst in transit (both to and from the Dealer or Soundcraft) and postage must be prepaid.

4 This warranty shall only be available if:

a) the Equipment has been properly installed in accordance with instructions contained in Soundcraft's manual; and

b) the End User has notified Soundcraft or the Dealer within 14 days of the defect appearing; and

c) no persons other than authorised representatives of Soundcraft or the Dealer have effected any replacement of parts maintenance adjustments or repairs to the Equipment; and

d) the End User has used the Equipment only for such purposes as Soundcraft recommends, with only such operating supplies as meet Soundcraft's specifications and otherwise in all respects in accordance Soundcraft's recommendations.

5 Defects arising as a result of the following are not covered by this Warranty: faulty or negligent handling, chemical or electro-chemical or electrical influences, accidental damage, Acts of God, neglect, deficiency in electrical power, air-conditioning or humidity control.

6. The benefit of this Warranty may not be assigned by the End User.

7. End Users who are consumers should note their rights under this Warranty are in addition to and do not affect any other rights to which they may be entitled against the seller of the Equipment.