FSM-400

PRODUCTION MIXER

USERS MANUAL

FSM-400 INTRODUCTION

The FSM-400 is a compact fixed format stereo production mixer. The design allows the unit to accept one microphone input and seven stereo music inputs.

The FSM-400 is essentially a four channel mixer with each channel switchable to two inputs. Channel 1 is switchable between low impedance microphone and a stereo line input. Phantom power is available for microphones (internal selection). Channels 2 to 4 are switchable between A and B stereo line inputs. The A input may be internally selected to RIAA or normal line. These channels are fully assignable to the crossfader. Three band equalisation is fitted to all channels with a range of +5dB to -20dB. The large amount of cut eliminates the need for frequency cut switches. A gain control is also fitted to all channels. Channels 2 to 4 have internal jumpers to provide 2 gain settings per input, the gain range is:- normal +/- 15dB or low setting +2dB to -19dB. Illuminated push button switches are used for input selection, PFL (pre fade listen), routing, etc. A smooth 60mm fader, which is arranged to eliminate the ingress of dirt, complete the channel controls.

The output section provides plenty of facilities to cope with most applications. It includes a new design of crossfade circuitry that places less demand on the fader to ensure exemplary attenuation and extended life. A punch button facility is also included.

Unlike the majority of fixed format mixers on the market all connectors are fitted to the back face which allows unrestricted access when the mixer is fitted through a work top or console.

Although the FSM-400 is a fixed format design the use of individual circuit cards per channel improve reliability and aid servicing should the need arise. Construction and audio quality are to Formula Sound's usual highest standards.

Power

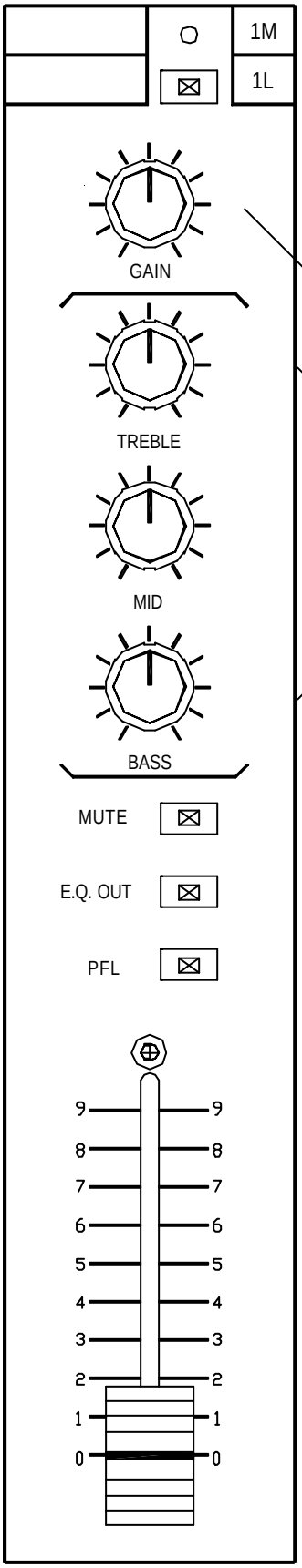
The mixer features a fully regulated internal power supply that is designed to operate on 220-240Vac or 110-120Vac. The selection is by an internal switch mounted on the power supply circuit board and is accessed by removing the front cover.
DAMAGE MAY RESULT IF THE UNIT IS CONNECTED TO THE WRONG SUPPLY VOLTAGE

Fuses

Mains fuse sizes are 315mA anti surge for 220-240V operation and 800mA anti surge for 110-120V operation. **It is important for safety reasons that the correct fuse sizes are always used.**

N.B. Internal settings should only be undertaken by skilled personnel

Always remove the power cord before removing any covers.



INPUT CHANNEL 1

Input selector switch selects input used. M = microphone (XLR connector). L = stereo line (phono connectors). 2 parallel pairs of phono sockets allow easy parallel of source to a second input if required.

L.e.d.s and label area clearly show which input is in use.

Gain control sets input gain level. Check by selecting PFL and adjusting so that V.U. meter just peaks into red.

3 band equalisation provides +5dB -20dB control.

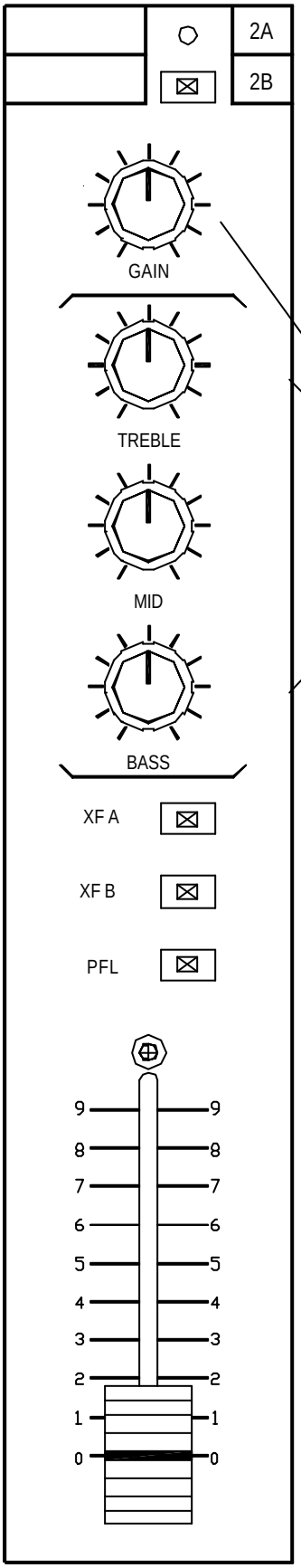
Mute push button cuts the channel signal when depressed (switch illuminated).

E.Q. OUT
This push button bypasses the equaliser section.
This is a useful function to either switch e.q. in or out for effect or for bypassing mic e.q. when using the line input.

PFL (pre-fade listen) routes the channel signal to the monitoring system (V.U. meter and phones). If more than 1 PFL is selected the sum is routed to the monitoring system. If no PFL is selected the monitoring system reads main output.

60mm channel fader.

Note
For normal microphone operation the fader should not be holding much gain. Set the fader to No. 7 and adjust the gain for normal volume. If the fader is below No. 7 during normal operation turn down the gain control and turn up the fader. This gives the best performance.



INPUT CHANNELS 2 TO 4

Input selector switch selects input used. A = input A B = input B. Input B is always a stereo line input (internal jumpers selects input A to be either RIAA magnetic cartridge or a standard line input. (phono connectors)).

L.e.d.s and label area clearly show which input is in use.

Gain control sets the input gain level. Check by selecting PFL and adjusting so that V.U. meter just peaks into the red.

3 band equalisation provides +5dB -20dB control.

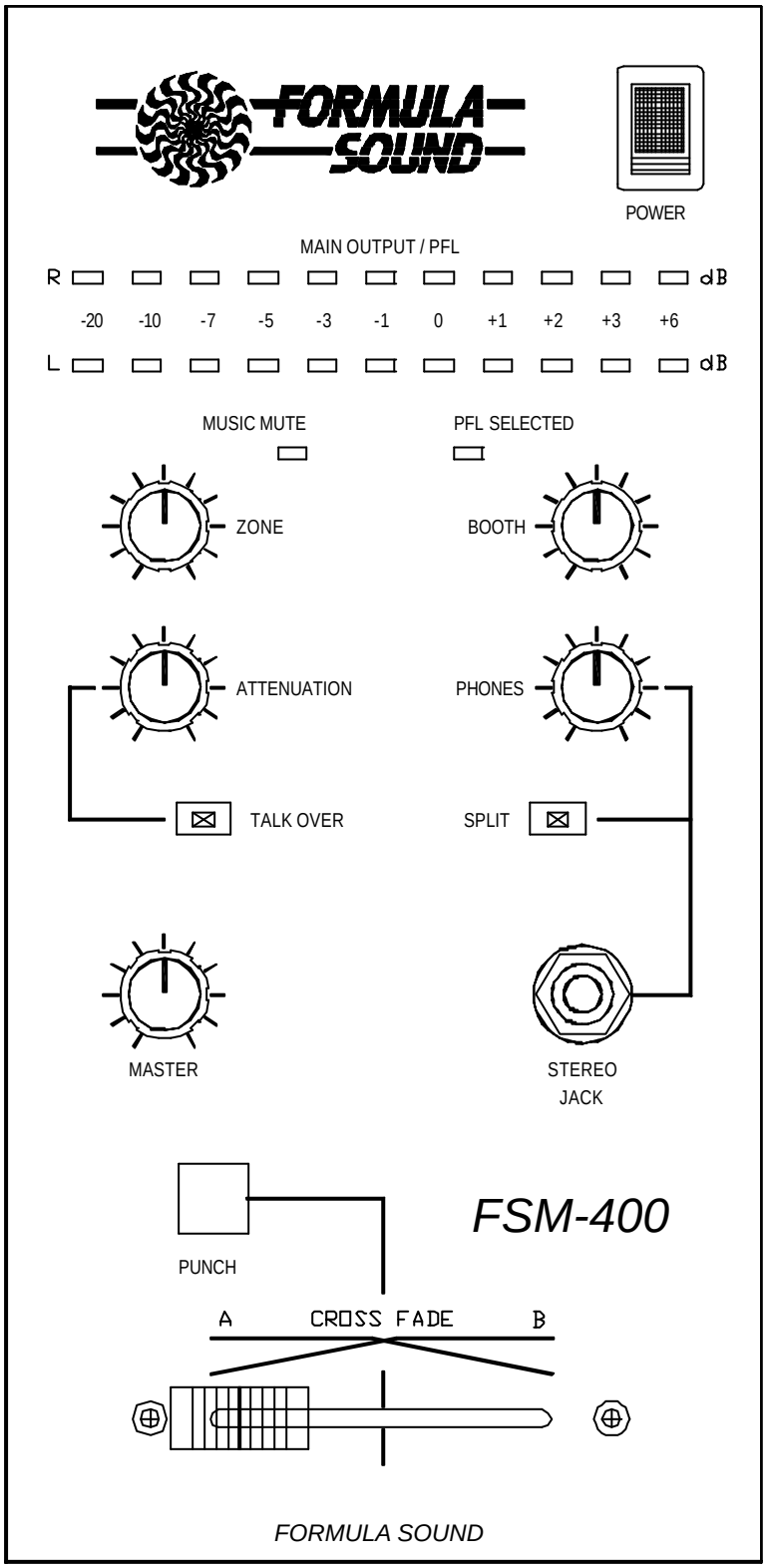
XF A and XF B (Illuminated push buttons) assign the channel to the crossfader. If neither button is pressed the channel is fed via the stereo buss to the output and the crossfader will have no effect on this channel. If both buttons are pressed the channel will be assigned to A only

PFL (pre-fade listen) routes the channel signal to the monitoring system (V.U. meter and phones). If more than 1 PFL is selected the sum is routed to the monitoring system. If no PFL is selected the monitoring system reads main output.

60mm channel fader.

Note

For normal operation the fader would normally be used at maximum and the gain control adjusted for normal volume. If the fader is set below No. 7 during normal operation turn down the gain control and turn up the



Output Section

Power switch switches the mains feed to the mixer power supply. N.B. to avoid switch on thrumps audio systems need powering up in sequence. A good rule to remember is - power amps on last and off first.

MONITORING

Twin l.e.d. bargraph V.U. meters show the main output signal or PFL signals. The changeover is by selecting PFL on any channel. Any number of PFL sources may be selected and the sum of these will be monitored. This provides a very versatile monitoring facility. Depressing the SPLIT button allows both main output and PFL signals to be monitored simultaneously. This function is often preferred when mixing tracks in synchronisation. The two signals are summed to mono and presented to the monitor section with the main output fed to left and PFL fed to right sections. The phones output always follows the metering so what you see is what you hear.

As an extra aid an adjacent l.e.d. illuminates to indicate when any PFL source is selected.

BOOTH - controls the booth output level. This output may be used to provide a local monitor output. To eliminate any possibility of feedback no microphones are fed to this output. Stereo or mono outputs are available via the 0.25" jacks on the rear panel.

PHONES - the master volume control for the headphone monitoring system. Two stereo jacks are provided, one on the front panel and one on the rear. STEREO jacks must be used - a mono two circuit jack will present a short to one half of the phones amplifier and although current limiting protection is included, prolonged use should be avoided. The phones amplifier is very powerful and capable of delivering over 1 Watt per channel into the optimum load of 30 ohms.

MASTER - controls the level of the main output and features balanced outputs on XLR connectors as well as a separate mono output on a 0.25" jack.

CROSSFADE - A 45mm fader is featured that can be used to smoothly fade between the XF-A buss and XF-B buss. To improve crossfader life and also ensure good attenuation at the ends of travel, studio quality VCA circuits have been used. The use of VCA's over conventional faders give superior crossfade performance.

PUNCH - A momentary action push button is fitted, which when pressed, switches both XF-A and XF-B signals on. Wherever the crossfader is set pressing the punch button will always add the opposite side. The Punch circuit action is click free, and provides the creative operator with a useful facility.

ZONE - controls a further output similar to the master output but without the balanced output driver. Stereo or mono outputs are available via the 0.25" jacks on the rear panel.

TALK OVER - circuitry is included that is selected via an illuminated push button. The action of this circuit is to attenuate the music when the switch is pressed. The attenuation level of the music is variable - turning the pot clockwise turns up the music.

RECORD OUTPUTS - Two sets of stereo record outputs are available via phono connectors. One is a complete programme mix, the other is music sources only (similar to the booth output). All record outputs are unaffected by the master controls.

SUB BASS OUTPUT - a mono output via 0.25" jack is provided for driving a sub bass loudspeaker system to enhance low frequency performance. The filter allows frequencies below 70Hz to pass through. An internal jumper allows higher bass output if required.

SOUND TO LIGHT (TRIG) - a fully floating transformer isolated trigger output is available on a 0.25" jack to provide safe connection to lighting equipment.

REMOTE MUSIC MUTE - To cater for the increasing requirement to mute music signals in entertainment venues when the fire alarm is activated the FSM-400 has provision to remotely mute all music sources by linking two pins on the connector provided. The fire alarm panel needs to provide a fully floating pair of contacts which close when the alarm is activated. An l.e.d. positioned below the V.U. meter clearly shows if the music mute is activated

Service and Configuration

Several internal options are available on the FSM-400. These should only be undertaken by qualified personnel.

Always remove the power cord before removing covers.

To gain access to the internal parts of the FSM-400 remove 4 screws from each of the two side covers which surround the FSM-400. This will give access to the internal jumpers and adjustments.

Channel options (remove top cover).

Channel 1. One jumper fitted towards the top of the channel pcb provides microphone phantom power selection. Pcb notation shows positions.

Channels 2-4 - **N.B 2 jumpers per channel must be moved**
4 jumpers located behind the input selector switch provide selection for input A and B to be set to low gain. They are labelled AR (chan A right) BR (chan B right) AL & BL etc. The low gain setting is with the jumper positioned away from the switch.
Ensure that the correct jumpers are moved and they are correctly located on the pins.
Removing all the jumpers will set inputs A and B to the low gain settings.

2 jumpers provide selection for the A input to be a flat line input or an RIAA magnetic cartridge input. Pcb notation shows the position for the jumpers. **Ensure that both jumpers are moved to the correct positions and located correctly on the pins.**

MAINS VOLTAGE SELECTION - The FSM-400 can be switched to operate on 220-240Vac or 110-120Vac. The selection is by a slide switch mounted on the power supply pcb at the mains transformer end. Notation on the pcb and switch clearly show the switch position. If you need to change the mains operating voltage you will also need to change the main fuse. The fuse is located in a slide out drawer which is part of the mains connector. The connector is mounted on the mixer rear panel.
Fuse sizes 220-240v operation = 315mA anti surge 5 X 20mm fuse
110-120V operation = 800mA anti surge 5 X 20mm fuse

Removing the top cover also exposes the right end output pcb. The sub bass adjustment is located on this board - and is controlled by 1 jumper located above the sub bass jack socket. Adjacent notation shows the positions.

Fader Replacement
Should fader replacement become necessary any of the faders can be replaced by removing the bottom side cover. Remove the 2 screws securing the fader and disconnect the connector. Replace with a new fader assembly.

Mixer Dimensions

Width	382mm	(15”)
Height	283mm	(11.125”)
Depth	110mm	(4.33”)

Installation cut out for mounting the FSM-400 through a work surface.
330mm wide X 270mm height

Formula Sound Ltd
Ashton Road
Bredbury
Stockport
Cheshire
England
SK6 2SR Tel +44 (0)161 494 5650 Fax +44 (0)161 494 5651

INSTALLATION, CONNECTIONS AND GOOD WIRING PRACTICE

The installation of professional audio systems should be left to experienced engineers wherever possible. The interconnection of audio systems can be fairly complex depending on the type and size of system and obviously well outside the scope of this handbook. We have included a few basic points for information for anyone who is new to audio systems.

Good wiring practice should be observed when connecting any audio equipment. Good quality connectors and screened cable should be used for all audio connections .
Twin screened cable should be used for all balanced lines particularly microphone connections.
Always ensure cable clamps in connectors are fully tightened and gripping the outer sheath. Good strain relief and mechanically sound connections will increase reliability at virtually no extra cost.

GROUND LOOPS

In our experience this is the most common problem encountered when connecting together different items of audio equipment. It is the most common cause of hum (50Hz noise) on a system and is caused by incorrect system grounding.

When several items of audio equipment are connected together with unbalanced connections (i.e. 2 connections, single screened cable, etc.) the signal common connection is the screen and this will be connected to mains earth at some point. If several items of equipment have their signal common connected to mains earth this will form a loop (hence ground loop). Current will flow in this loop and appear in the form of hum (50Hz mains frequency) added to the audio signal. The problem is aggravated if the equipment is located a distance apart as the loop is larger. It is possible to have several ground loops within a system. The solution is to connect the system to mains ground only once. This is usually done at the mixer. You will need to investigate the various items of equipment you are using and isolate their signal common from mains earth. Many manufacturers fit a ground lift switch for this purpose. On some equipment this is in the form of a removable link. Unfortunately with some equipment you have to get inside to identify where the connection is and remove it.

YOU MUST NOT DISCONNECT THE MAINS EARTH WIRE FROM THE MAINS PLUG OF ANY EQUIPMENT. THIS IS FITTED FOR SAFETY REASONS AND MUST BE CONNECTED TO ENSURE THE CASE IS EARTHED.