



PM - 80R

MODULAR PRODUCTION MIXER



USERS MANUAL

Formula Sound Direct
UK

<http://formulasounddirect.com>

PM-80R Introduction.

To celebrate 25 years since we manufactured the first PM-80 and in response to requests to remanufacture it, Formula Sound has introduced a limited edition PM-80R production mixer.

The PM-80R incorporates all the loved features of the original PM-80 with the benefits which modern components and manufacturing techniques can add to the original design. The PM-80R modules are therefore not interchangeable with the original PM-80 modules.

The PM-80 was manufactured for over 13 years and in that time many mixers were modified and features added for specific applications. We have captured the simplicity of the PM-80 making the PM-80R as easy to use as the original, whilst also introducing some of these features.

The signal chain is as pure as the original PM-80 and will provide the same outstanding audio quality.

The PM-80R will appeal to all sectors of the industry due to the modular construction and versatility that the universal input module offers. This product is unique and suitable for many types of application.

The use of custom aluminium extrusions and flexible computer grade ribbon cable, which is used for the connection to the various modules, plus gold plated connectors for all internal signal connections make this unit equally at home in a static or mobile environment.

Like the original mixer 4, 8, (19" rack mount) and 12 channel input chassis are available. Special sizes could also be catered for.

General Description

The Input module has been designed to be universal and is internally configurable to accept all types of input source.

Internal gold plated jumper links are used to configure the input module - these provide a simple and reliable way of configuring the various options available.

Concealed switches for routing to a stereo Aux buss are also featured, with the option to select pre or post fader.

The 3 band equaliser section has been designed to perform like the original PM-80 but we have also provided for the possibility of special E.Q versions to be supplied (more cut than boost etc.)

The equaliser section may also be disabled if required.

Internal selection of input routing to a choice of 2 stereo mix busses is also possible, which adds to the flexibility of the design. For example Microphone inputs could be sent to the output section via the mic buss. Insert sockets have been provided so that any input routed via the mic buss could be connected to external equipment, compressors, limiters, etc if required. Or the insert sockets could simply provide an output of these sources.

The Output module contains the power supply which is internally switchable to operate from 220-240V AC or 110-120V AC. All the mixing and output circuitry are also in this module.

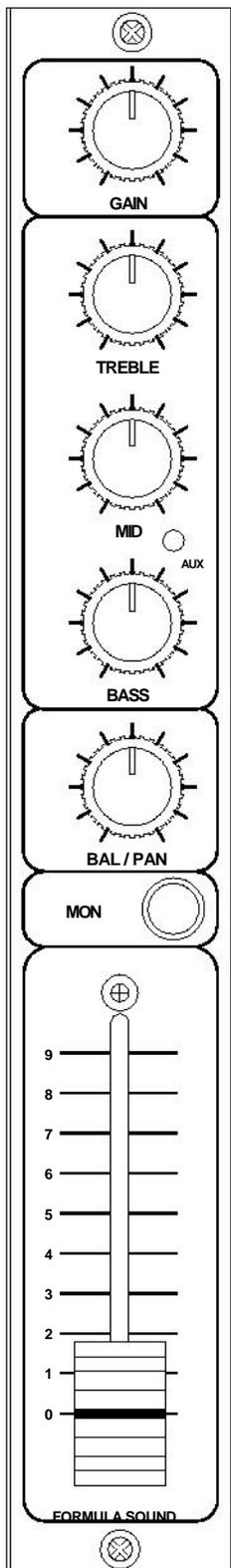
The Main outputs are balanced. The mixer also has Zone, Booth, and Auxiliary outputs available in mono or stereo. Record, Sub Bass, and Mono outputs are also provided.

A powerful stereo headphone amplifier designed to drive headphones of 32 ohms or greater is incorporated.

Visual monitoring is provided by a stereo 24 segment led bargraph meter. The meter and phones are connected to the same signal so what you see is what you hear.

External music mute has been added to help comply with modern fire regulations.

PM - 80R UNIVERSAL INPUT MODULE



Input Sources. The design of this module allows almost any input source to be used. This is achieved by providing a balanced low impedance low noise microphone pre-amplifier; a stereo RIAA equalised pre-amplifier (phono cartridge input); a stereo balanced line level input stage and a stereo unbalanced line level input stage.

Configuration - Internal jumper links fitted to pin headers select the input types available. (Similar jumpers provide selection of other options.) See later section on configuration Drg-1008.

Input Connectors - Rear panel mounted 2 - XLR input sockets, 2 - gold plated RCA phono sockets, 1 - 1/4" - 3 pole jack socket (provides a connection to pick up the microphone signal only, or connect external equipment into the microphone channel).

Gain control allows the operator to compensate for variations in programme material or signal level. (See later section on gain)

HF (High Frequency or Treble)

This control provides +10dB boost & -10dB cut @ 10KHz with a shelving response.

Mid (Middle Frequencies)

This control provides +10dB boost & -10dB @ 1KHz cut with a broad bell response.

LF (Low Frequency or Bass)

This control provides +10dB boost -10dB cut @ 100Hz with a bell response.

This response has been chosen so that sub sonic frequencies are not boosted by this control.

All E.Q. controls have a centre detent at the (E.Q flat) centre position.

The E.Q. function may be disabled by the setting of internal jumpers. See later section on configuration.

AUX - Aux send. A concealed push button with led illumination has been added. When depressed the signal in this module is mixed with any other source selected. The resulting mix is available at the Aux outputs on the master module. Internal jumpers allow the source to be selected pre of post (before or after) the channel fader.

Bal /Pan (Stereo balance & Pan)

With a stereo source selected this control provides adjustment to balance stereo signals. With a microphone selected this control allows the source to be positioned anywhere in the stereo image. A centre detent is provided at the control centre position.

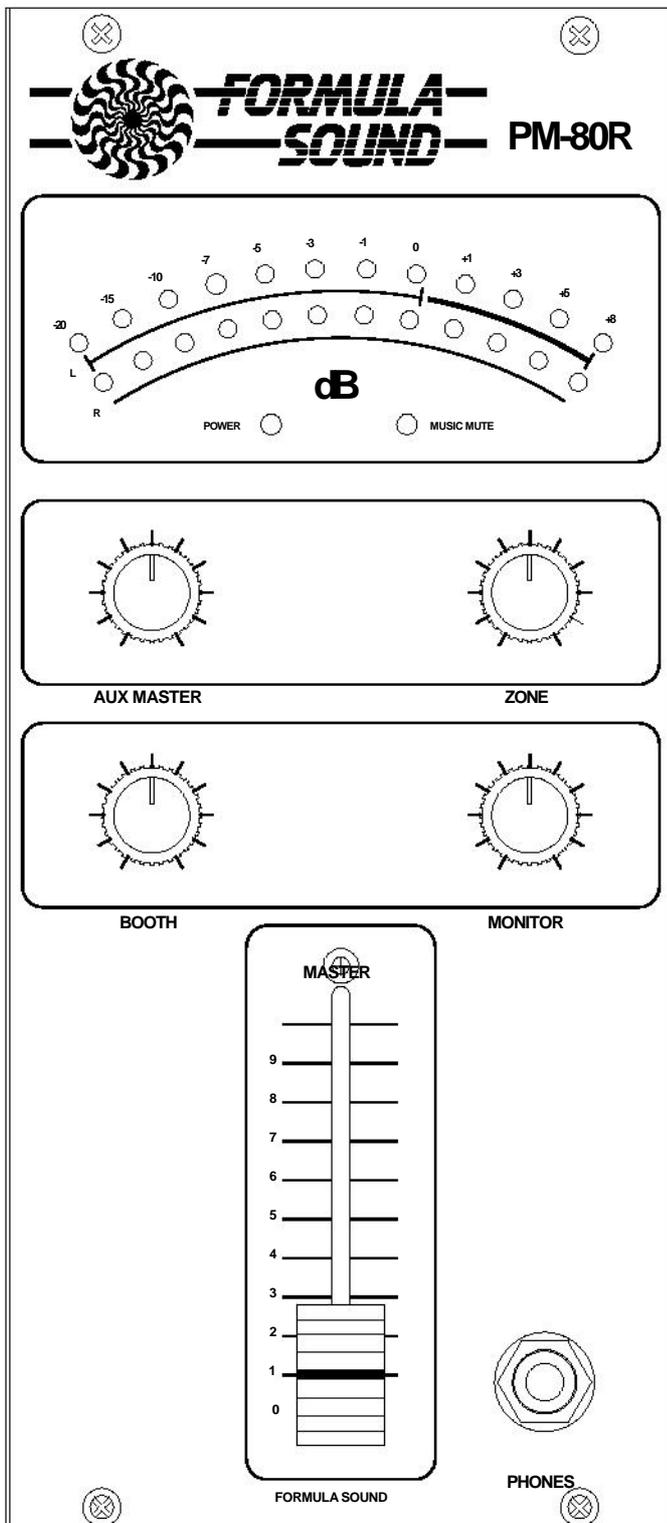
MON (Monitor sometimes called Cue or PFL Pre Fade Listen)

Push button with red led illumination.

When depressed the signal in this module is connected to the Monitor mix buss. Any number of channels may be selected simultaneously, the sum of which will be monitored in the master module by the meter and headphone amplifier.

MASTER fader - A 60mm studio quality linear fader is fitted to fade up and down the volume of the channel. For normal production operation the fader should be set at the top (No.9) and the gain control adjusted for normal volume. The fader should be used to fade in the signal at the required time taking the fader to the top. This lets you concentrate on the timing confident that the volume will be correct. If you want to operate with some gain in hand (e.g. mic mixing) operate with the fader set at No.7.

Always operate with the gain set as low as possible to achieve the desired results.
(See the later section on gain)



PM - 80R Master Module

The master module contains all the electronics required for the various summing amplifiers, output stages, VU meters, etc. The majority of connections are on the rear of the unit.

The monitoring section is very easy to understand. Visual monitoring is provided by the led bar graph meter. Audio monitoring is via a powerful stereo headphone amplifier designed to drive phones of 32 ohms or greater. Connection is via the 3 pole jack socket labelled PHONES. The meter and the

phones output are both connected to the same signal so what you see is what you hear.

If any channel MON switched is depressed the Monitor buss is connected to the phones amp and meter. If no MON switch is depressed the main output is monitored.

AUX MASTER - This master control adjusts the output level of the signals derived from the Aux sends on the input modules. The outputs are via 2 1/4" jack sockets. A mono signal may be obtained by using the left output socket only.

BOOTH - This control adjusts the level of the booth output which is a mix of the channels routed via the music buss. The outputs are via 2 1/4" jack sockets. A mono signal may be obtained by using the left output socket only.

ZONE - The zone output is almost identical to the main except that the output is unbalanced and not available to the monitoring section. The outputs are via 2 1/4" jack sockets. A mono signal may be obtained by using the left output socket .

MASTER - The fader sets the output level of the main balanced output available via 3 pole XLR connectors on the rear panel. A mono output is also available via a 1/4" jack socket.

RECORD OUTPUTS 2 - gold plated phono sockets are provided for the connection of stereo recording equipment. Record outputs are unaffected by the master fader.

SUB BASS OUTPUT - A mono output via a 1/4" 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 located on PC-396 allows higher bass output if required.

MUSIC MUTE - To help comply with fire regulations a music mute facility has been included. The fire alarm panel needs to provide a fully floating pair of contacts to join the two pins on the control connector.

INSERTS MIC MIX - Insert sockets in the form of 3 pole 1/4" jacks are provided for the connection of external signal processing equipment to any combination of channels routed via the Mic buss. Internal jumpers allow the inserts to be disabled. Located on the rear panel the connections are:-

Tip = send (mixer output) Ring = return (mixer input) Body = common (ground)

Gain

In an audio mixer different signal levels from various items of equipment need to be amplified or attenuated to a common level so that they can be added or mixed together. These signal levels may differ considerably depending on the equipment. The signal from a microphone for example may be 1000 times smaller than that from a CD player. For a mixer to be as flexible as possible and to accept signals from a variety of equipment it is necessary for the first or early stage in the input circuit to be a variable gain amplifier. The gain of this amplifier is set by the gain control.

The PM-80R universal input module has a combination of variable gain amplifiers to get the input signals to the required operating level. 2 gain trim presets are fitted - 1 for each input. These are accessible through holes on the rear of the module and are labelled accordingly. The stereo input gain trim is a conventional single turn control. The Mic preset is a multi-turn trimmer. These trims should be adjusted to set the maximum gain available for any input. The front panel gain control works in conjunction with these presets. The system may be considered as coarse gain control on the rear presets and fine adjustment on the front gain control.

When amplifier gain is introduced in a circuit noise is also introduced (this is a fact, you cannot have one without the other). The PM-80R has been designed to keep this noise as low as possible by using the latest technology. For the best performance set the gain control as low as possible to achieve the desired output level. Gain introduced into the system and then held on the channel fader is a waste of performance. Too much gain could result in overloading the first stage causing distortion and clipping.

The level can be checked by selecting MON and observing the output meter. Normal operating level is with the meter just illuminating into the red section.

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 that the case is earthed.

PM-80R Specifications

Frequency Response

E.Q. set flat 20Hz - 20 kHz +/-0.5dB

Maximum output level

Main, Zone, Booth, Aux. +22dBu

Record output. +16dBu

Main output active balanced.

For unbalanced operation strap pins 1&3 to ground and use pin 2 hot.

This will result in no loss of output level or performance

Distortion

Any output @ max level < 0.01% typically <0.005%

Noise measured 20Hz-20 kHz

Stereo inputs e.q. flat gain set to max EIN < -98dB

RIAA stage ref. 5mV 1kHz Input shorted -80dBV "A" weighted

Microphone input (ref 150R) EIN < -124dBu

Gain

(Master Fader @ unity -6dB)

Stereo inputs rear trim @ max +/- 12dB

Microphone input max + 68dB

Maximum input level

Stereo input (Balanced) +22dBu

Stereo input unbalanced Adjustable

Stereo input (RIAA) -8dBV 400mV

Microphone +4 dBu

Input Impedances

Stereo input balanced (XLR) > 20k ohms

Stereo input unbalanced (Phono) > 15 k ohms

Riaa (Phono) > 47k ohms

Microphone input > 2k ohms active balanced

Equalisation

3 band e.q. per channel +10dB -10 dB @ HF 10 kHz

Mid 1kHz,

LF 100Hz

Internal channel jumpers allow the e.q. stage to be disabled if required.

Other E.Q options available.

Dimensions

(Exc. Knobs & connectors):

8 Channel Width 483mm (19")

4 Channel Width 330mm (13")

12 Channel Width 635mm (25")

Height 267mm (10.5"-6RU)

Depth 110mm (4.33")

Installation Cut-out

Height 267mm Width:- 4 channel 280mm. 8 channel 433mm. 12 channel 585mm

Removing and Refitting Modules.

A removable cover on the rear of the mixer provides access to the ribbon cable which connects to all the modules. This cover is secured by 2 screws. Although modules can be removed and replaced from the mixer front when necessary, removing the rear connector cover makes disconnecting modules easier particularly if more than one module is being removed.

To remove an input module from the chassis first disconnect all connections from the module and ensure that the power cord is disconnected. Input modules are secured by 2 screws, removing the screws will release the module. Carefully ease the module out of the chassis and disconnect the ribbon cable connector.

The output module is secured by 4 screws and connected by 3 connectors to the ribbon cable assembly. We recommend that the rear connector cover is removed to facilitate disconnection of the ribbon cable if this module is removed.

The master module is normally factory fitted to the right hand end of the chassis although the design of the ribbon cable allows modules to be fitted into the chassis in any position. We would recommend that if any blank modules are fitted, that one be fitted between the master module and channel modules. We would also recommend that input modules configured for Microphone or phono cartridge are not fitted adjacent to the master module. This avoids any stray hum pick up from the mains transformer. The output module is the width of 3 input modules and uses 2 of the connectors for its operation. Ensure that the connectors are fully mated before refitting the rear cover.

The modules have a clearance of approx. 0.25mm. This is deliberate to allow the modules to be easily removed and refitted to the chassis. Use a strip of thin card (postcard) to set the spacing between the modules when reassembling. Do not push all the modules tightly together as this will make them difficult to remove and leave an unsightly space. Remember 0.25mm is only 1/100". This is the normal spacing clearance but in an 8 channel chassis, if you push the modules tightly together the resulting space will be 2.5mm which is 1/10" and looks unsightly.

Formula Sound reserve the right to alter specifications at any time without notice.

All Formula Sound products are designed and manufactured in our own factory which enables us to maintain strict quality at every stage of manufacture. This attention to detail has helped to win us 14 industry awards to date and has earned us a worldwide reputation for the high quality and reliability of our products.

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E.U. CERTIFICATE OF CONFORMITY

We declare that the products listed conform to the following directives and standards

89/336/EEC amended by 92/31/EEC and 93/68/EEC

BS EN 50082-1 BS EN 50081-1

PRODUCT TYPE

PM 80R

The CE mark was first applied in 1995

Signed

B. J. Penaligon General Manager

Attention

The attention of the specifier, purchaser, installer, or user is drawn to the fact that good wiring practice must be observed when connecting the above equipment. Good quality connectors and screened cables must be used for all audio connections. Twin screened cables should be used for all balanced lines.

THIS EQUIPMENT MUST BE EARTHED

CONSULT THE USERS MANUAL FOR TECHNICAL DETAILS