



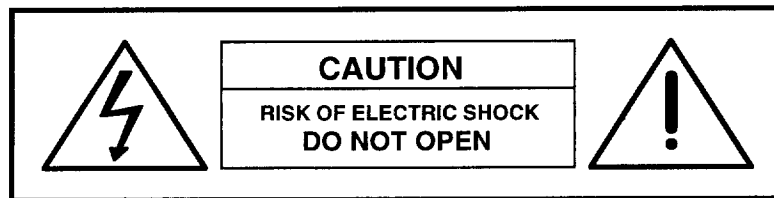
OPERATING AND SERVICE INSTRUCTIONS

SAFETY FIRST!

WARNING - TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

WATER AND ELECTRICITY DO NOT MIX. Keep this unit away from water. If water or other liquids are spilled on or into this unit, unplug the power cord immediately from the wall socket (with DRY HANDS) and get a qualified service technician to check it out before using. Keep this unit away from heaters, radiators and other heat producing devices.

DO NOT ATTEMPT TO SERVICE THIS UNIT. ONLY A QUALIFIED SERVICE TECHNICIAN SHOULD OPEN THIS UNIT FOR SERVICING.



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated 'dangerous voltage' within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

The exclamation point within an equilateral triangle is intended to alert the user to presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

KEEP IT CLEAN: Dust, dirt and debris can interfere with the performance of this product. Make a special effort to keep this unit away from dusty, dirty environments. Cover the unit when not in use. Dust it regularly with a soft, clean brush. Careful attention to these details will be time well spent, and this product will reward you with years of trouble free operation.

Front-Panel Description

Channel Strip

1. Peak LED

This light indicates that the level coming into the mixer is too high, which will result in distorted sound. It works in conjunction with the GAIN control (2).

2. Gain control

This controls the level coming into the mixer from the instrument or microphone. It is used to bring the incoming signal to the optimum internal operating level of the console. Setting up a channel is very simple: plug the instrument/mic into the mixer, and play/sing at the sort of level you would during a performance. Adjust the gain control until the light flashes only occasionally during the loudest parts of the program. The adjustment ensures the best sound to noise ratio possible. If the gain is too low, the ratio drops; if the gain is too high there will be distortion.

Some instruments, such as keyboards and guitars, have their own output level control. In some cases it may be desirable to leave the output and input gain of the mixer with room to spare, so that you can crank up the instrument if necessary.

3. High EQ

The DM Series has a three-band EQ. This control sets the level of the high frequency portion of the sound. In technical terms it is a 15dB boost/cut shelving at 10kHz. This is useful for reducing sibilance or adding brightness to cymbals.

4. Mid EQ

This boosts/cuts the middle frequencies, which is useful for improving guitar tones or reducing nasal vocals, among other things. This is a peaking/dipping control giving 15dB boost/cut centered around 1000Hz.

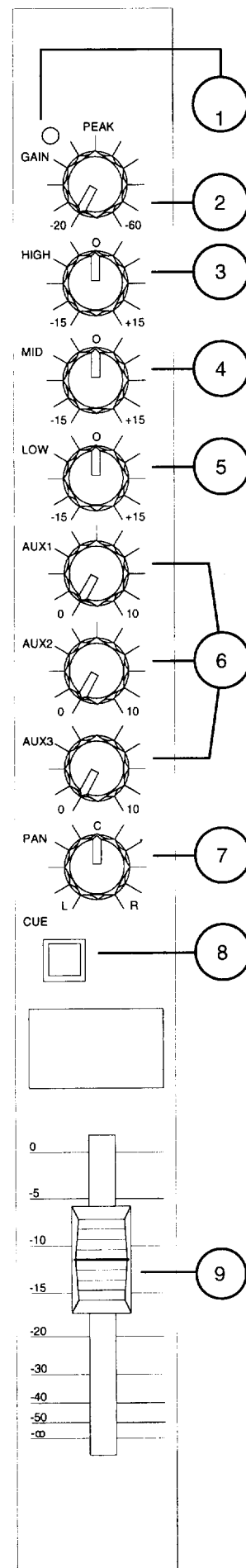
5. Low EQ

This gives 15dB of boost/cut shelving at 100Hz. It can help reduce mic rumble or boost kickdrums. The key with EQ is to use it sparingly - too many large boosts everywhere can result in a mushy sound. Remember that you can cut as well as boost. It is possible to emphasize bass sounds by cutting the high and mid instead of just boosting the lows. Too many boosts can also overload the circuitry and result in distortion.

6. AUXes 1,2 and 3

These three knobs allow you to create three separate mixes for monitoring or for outboard effects. AUX 1 is pre-fader, which means that the signal is tapped before the channel fader, and is therefore unaffected by any changes to the fader level. This is typically used as a monitor send in a live show; the musicians hear a different mix than the audience. The monitor mix is constructed to allow the musicians to stay in time and therefore the definition of individual instruments is critical. Effects which can sound nice but 'mask' the sound are not present in the monitor mix, and cues and count-ins can still be heard by the musicians when the main outputs are faded down.

AUXes 2 and 3 are post-fader. These types of AUX sends are typically used for reverb, delay and other effects. All the instruments which require a particular treatment are mixed together and sent to the outboard effect. The effected sound is then returned to the mixer using the AUX returns or input channels. The reason for using a post-fade AUX send is that the sound going to the reverb is then dependent on the various channel fader levels. When the lead guitar is faded down, its accompanying reverb is reduced proportionally.



7. Pan

The pan control sets the stereo placement of each channel. All the channels on the DM Series are mono. With the pan control, each instrument can be placed at any location from hard left to hard right and anywhere in between. If you need to input stereo instruments into the DM Series, such as keyboards and drum machines, use two channels, adjacent ones if possible. Pan the left channel hard left and the right channel hard right to get the full stereo image from the instrument. Ensure that the EQ on both channels is set the same. The center position is at 12 o'clock and can be found by feel, due to the center detent (notch).

8. Cue

This button allows the soundperson to listen to any number of channels (pre-fader, pre-EQ) through the headphones without affecting the main mix or the AUX sends. If the main faders are down and you need to hear a count-in from the musicians before fading the instruments up, this is the way to do it. Without this feature you would have to read the singer's lips for your cue.

9. Channel fader

This is the channel's output level control. With the fader all the way down, the channel is 'off'. If the peak light comes on, or you hear some distortion, reduce the level at the input gain: this will reduce the level of the instrument responsible through the whole mixer.

Front-Panel Description Master Section

1. Power switch

It is a good idea to get into the habit of turning on the mixer before the power amps to avoid loud thumps which can damage speakers.

2. LED display and meter switch

The two LED 'ladders' display the levels of the main L/R outputs. It's generally OK if the levels jump into the red occasionally (>1.23V output), but if the red LEDs are all lit, you may be overloading the input of the power amp connected to the mixer. The meter is switchable to monitor the AUX 2 and 3 levels using the small button below. Keep an eye on levels to digital effects, which have little headroom.

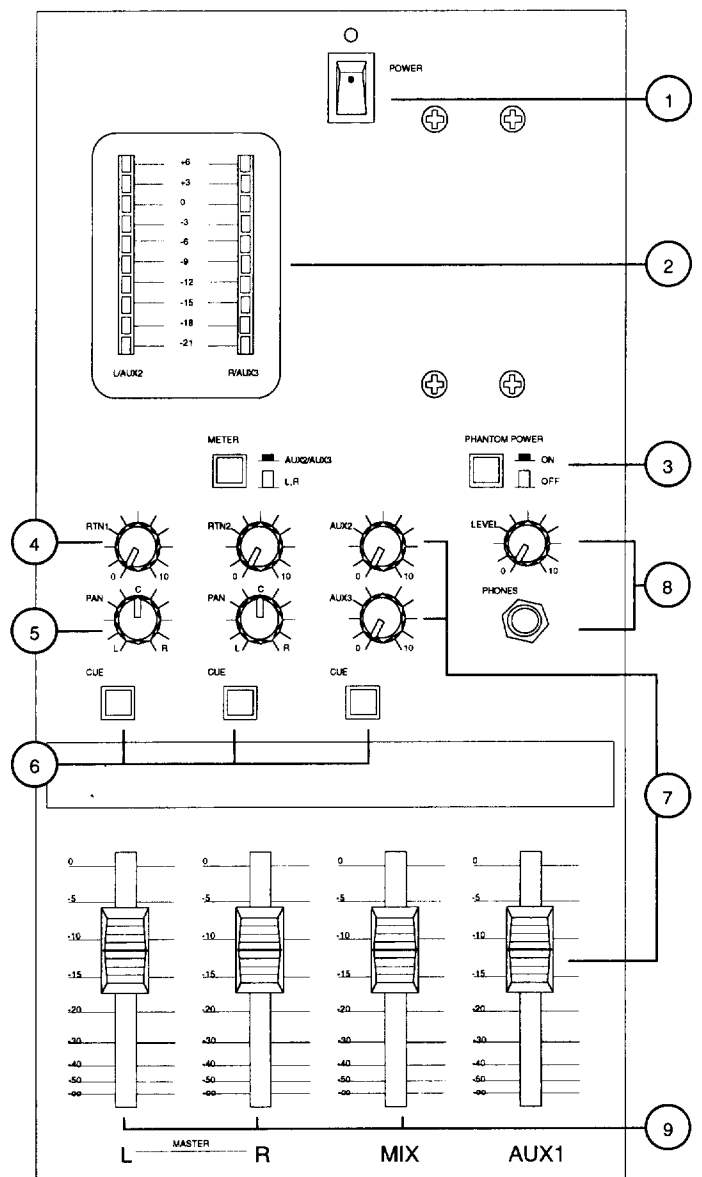
3. Phantom power

Some professional condenser mics require a 48 V DC power source for their electronics. This switch applies such a source to all of the XLR-type connectors on the input channels, but not the 1/4" high-impedance jacks.

IMPORTANT: ALWAYS MAKE SURE THIS SWITCH IS OFF WHEN NO MICROPHONES ARE CONNECTED. TO USE A MIC WHICH REQUIRES PHANTOM POWER, MAKE SURE THE PHANTOM POWER IS OFF, CONNECT THE MIC AND ONLY THEN APPLY THE PHANTOM POWER. BEFORE SWITCHING ON PHANTOM POWER ALWAYS CHECK THAT THERE IS NO EQUIPMENT THAT COULD BE DAMAGED BY 48 V DC PLUGGED INTO THE XLRs, ie ANYTHING OTHER THAN MICS. CONNECT INSTRUMENTS TO THE 1/4" JACKS ONLY. IF YOU ARE IN ANY DOUBT ABOUT WHETHER EQUIPMENT IS SUITABLE FOR PHANTOM POWER, CHECK THE MANUAL OR CONTACT THE MANUFACTURER.

4. RTN 1 and RTN 2

These knobs control the incoming level of the devices connected to the jacks of the same name on the back-panel. Typically they are used as AUX returns, bringing back the 'wet' sound from external effects.



5. Pan

These pans work in a similar fashion to the channel pans, but they effect the signal coming into the respective RTN jacks.

6. Cue

These buttons allow you to listen to either the left, right and/or mix signals. The cue is tapped pre-master fader, and is therefore independent of master fader levels.

7. AUX1/AUX2/AUX3

These knobs control the send level of the three AUX mixes. The AUX 1 control is on a slider fader; it is the monitor level control. The other two knobs control the effect send levels. Remember that the individual levels of the AUXes on each channel also effect the main send level, and that AUX 2 and 3 levels are also dependent on the channel fader positions.

8. Headphone output and level

The 'phones' output accepts a 1/4" stereo phone plug from stereo headphones. With headphones, you can listen to the main left and right outputs in stereo or individual channel cues.

9. Master channel fader

With these controls, you can vary the overall volume of the signal applied to the left, right and mix outputs on the back-panel.

Jack-Panel Description

1. Low-Z mic inputs

Each channel offers an XLR-type mic input for connection of low impedance microphones. As mentioned before, these are equipped with phantom power.

IMPORTANT: ONLY USE THE XLR INPUTS FOR MICROPHONES. OTHER INSTRUMENTS ARE NOT DESIGNED FOR PHANTOM POWER AND WILL BE DAMAGED BY IT. SUCH INSTRUMENTS ARE MORE SAFELY ACCOMMODATED ON THE 1/4" INPUTS WHICH DO NOT HAVE ANY PHANTOM POWER CONNECTIONS.

2. High-Z 1/4" inputs

Synthesizers, guitars, drum machines, CD players and other instruments and devices can be safely connected to these inputs. Each will accept balanced or unbalanced signals. Since each channel has both a mic input and a 1/4" input, care should be taken to connect only one input device to each channel. Both inputs are affected by the same gain control.

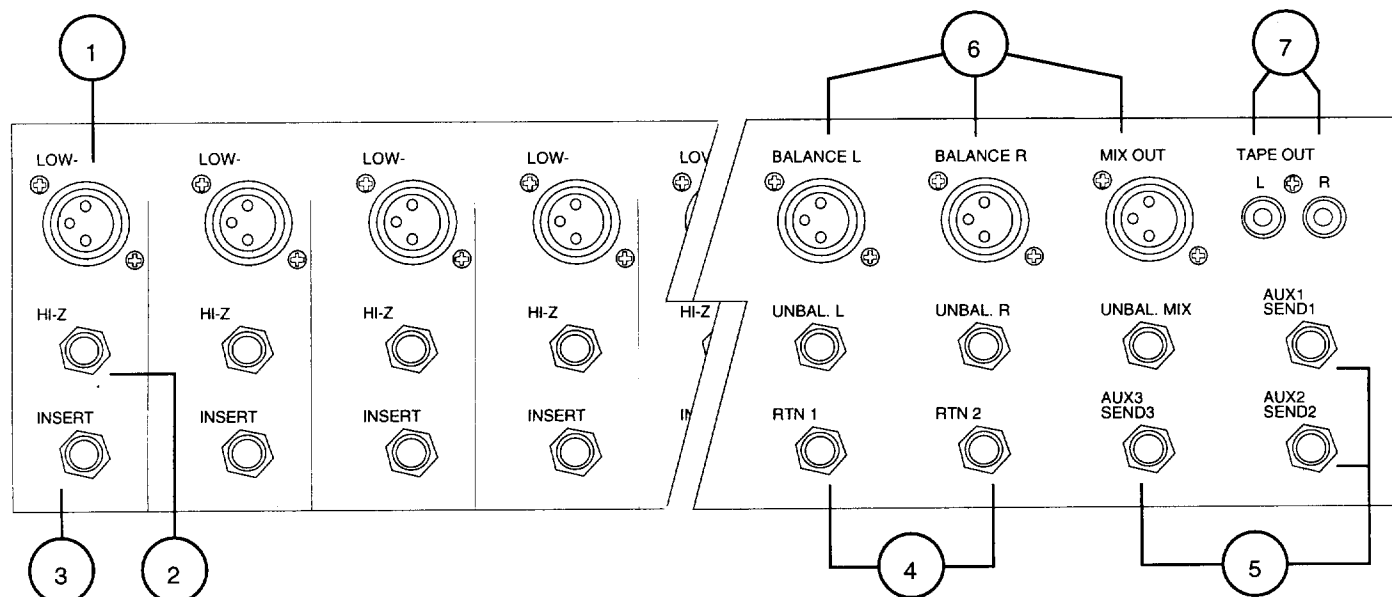
3. Insert jack

Many audio signals can be improved by processing. The DM Series provides a jack on each channel for connection of various processors. This jack is after the input gain (trim) but before the fader and EQ. Typical processors include dynamic controllers like compressor/limiters and additional equalisation like a graphic EQ or parametric EQ. This processing is applied only to one channel input. Sometimes, a pre-fade feed is taken from certain channels and sent to a second console which is used to mix individual monitors for each musician.

The jack is a stereo TRS plug, but is used in mono to send and return the signal through just one jack. Since most processors have separate inputs and outputs, you will require a special 'send & return' cable for each insert processor (see 'Connections' section).

4. RTN 1 and RTN 2

These are 1/4" unbalanced mono inputs used for bringing line level signals into the DM Series such as reverb and delay returns, or tape decks and CD players.



5. AUX sends 1,2 and 3

These three are unbalanced outputs. AUX send 1 is the monitor send should be connected to the input of the monitor amp. Sends 2 and 3 should be connected to the external effects.

6. Main outputs

Both balanced and unbalanced outputs are provided. The male XLR-type connectors are for connection to power amps with balanced XLR-input connectors. If your power amp does not provide for such connections, use the 1/4" output jacks.

7. Tape out

These are RCA type jacks, as used on most home audio gear as well as 'semi-pro' recording gear (much of which now has specs matching 'pro' gear). The output is the same as the main L and R outputs, but is unaffected by the main L and R faders. The level should be controlled by the 'record level' controls on the tape deck.

8. Fuse receptacle

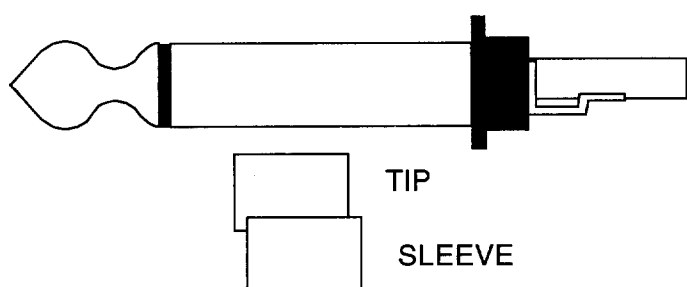
The DM Series is protected against faults by the fuse in this holder. If the unit's power appears to fail then a blown fuse is the most likely cause. If this is suspected, unplug the console from the electricity, unscrew the fuse holder with a slotted screw driver, and replace the fuse with one of identical value. These are easily obtained from hardware or electrical supply stores.

WARNING: SHOCK HAZARD! NEVER ATTEMPT TO REPLACE A FUSE WHEN THE MIXER IS CONNECTED TO THE ELECTRICAL SUPPLY. ONLY REPLACE THE FUSE WITH ONE OF IDENTICAL SIZE AND VALUE. NEVER REPLACE THE FUSE WITH A WIRE BRIDGE OR INCORRECT FUSE, EVEN TEMPORARILY. THE FUSE IS FOR YOUR OWN PROTECTION AGAINST THE RISK OF ELECTRIC SHOCK OR FIRE AND ALSO PROTECTS THE MIXER'S ELECTRONICS.

Connections

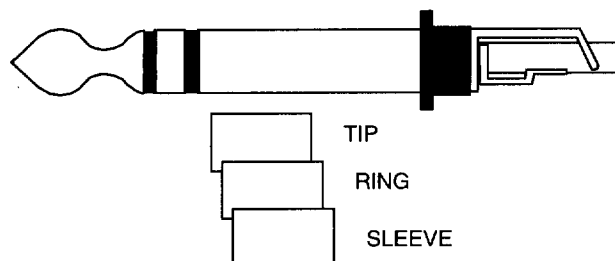
The DM Series uses both female XLR connectors (mic inputs) and male XLR connectors (L,R and MIX outputs), 1/4" 'phone' plugs and RCA jacks.

A standard TS mono 1/4" plug



1/4" connectors come in several varieties. The simple mono kind is not balanced, neither is the stereo kind. However, a stereo 1/4" jack has three connectors, the tip, ring and shield (TRS) which can be wired to take a balanced signal.

A standard TRS stereo 1/4" plug



The stereo TRS 1/4" plug also has another application - it is used for both the send and return on the inserts. This is unbalanced, and sends a mono signal out through the tip and brings it back (after processing) through the ring.

The tape outputs on the mixer use RCA-type jacks, which are standard on many tape decks. These are always mono and unbalanced, although they normally come in red and white stereo pairs.

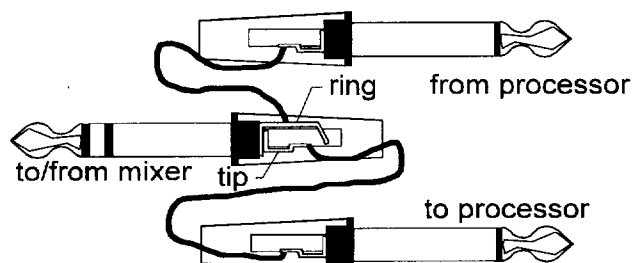
Connection cables

Best performance is achieved using high quality cables which should be shielded to prevent interference from radio frequencies.

Channel inserts

For the channel inserts, a special cable will be needed. This should have a TRS 1/4" stereo phone plug at one end (which connects to the mixer's insert jack), and twin mono plugs at the other end. The type of mono plug will depend on the processor, but most have mono 1/4" jacks which are unbalanced. The cable should be wired as follows:

Wiring of an 'Insert Y-cord'



Note that this insert Y-cord isn't the same as a widespread "splitter". That is simply 3 mono plugs wired together to send an output signal to two inputs.

As you may have gathered from the above, it is fine to split an output into two and feed it to two different places, although sometimes the level of the signal will drop. However, it is not possible to connect two inputs to one jack, or use a Y-cable to 'mix' the inputs.

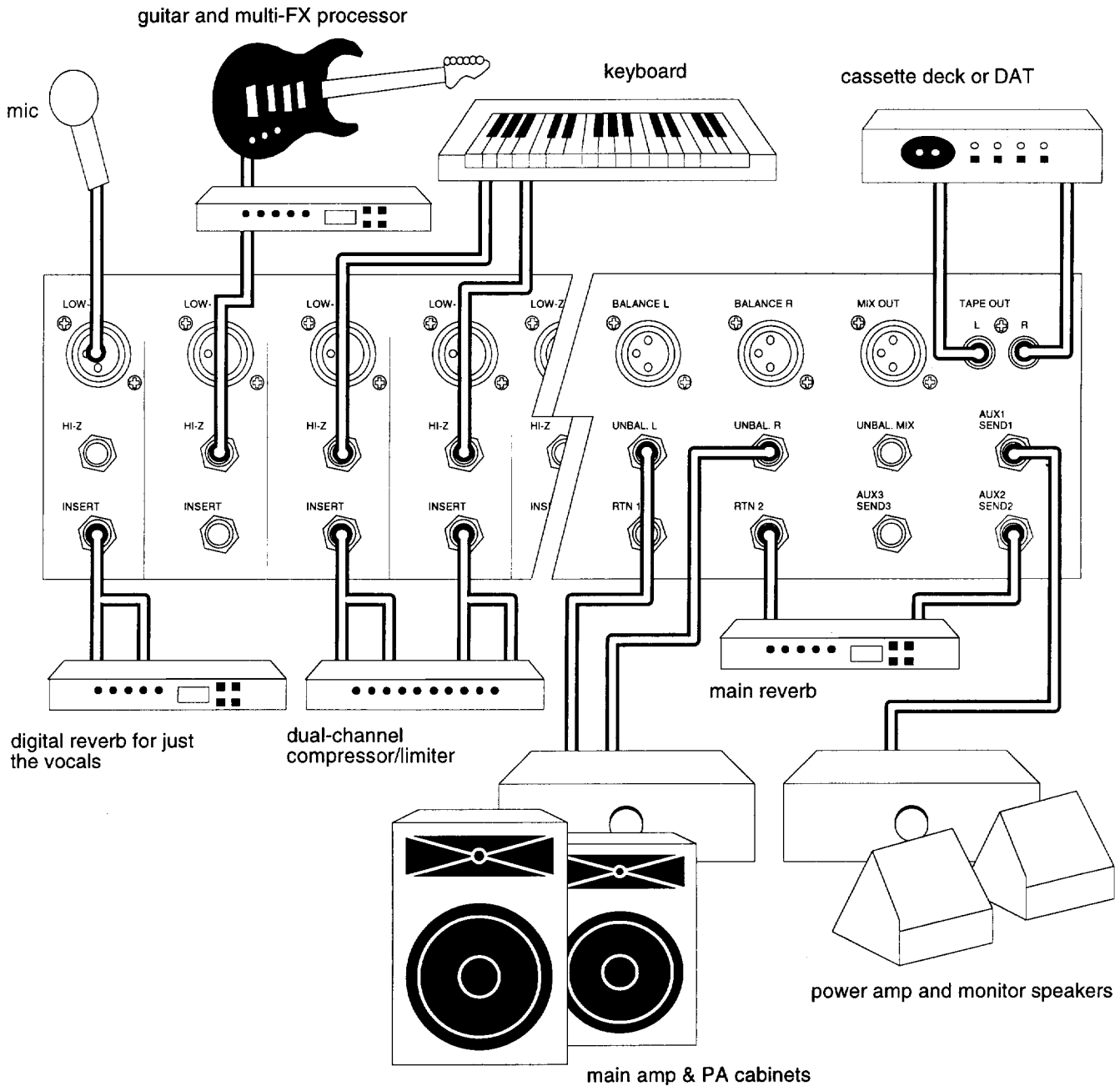
Sample Hook-up

The following is an example of how a DM Series console may be connected in a typical system.

The connections made will depend on the type of equipment that needs to be plugged in. For long cable runs, balanced lines should be used where possible. Typically the mixer is some distance in front of the stage, and the outputs to the amps and speakers

(which are generally by the stage) must stretch some distance. In these situations, balanced lines are more immune to noise and RF interference.

When patching into the mixer, try to arrange the instruments in a logical and intuitive order. Remember to pan stereo inputs like keyboards hard left and right for the full stereo effect. Keep effects within reach of the mixing position where possible.



Specifications

1. THD	less than 0.1%, 20Hz to 20kHz (+14dB output into 600 ohms)	
2. Frequency response	20Hz to 20kHz, +4dBu output into 600 ohms (+1 to -3dB)	
3. Maximum gain	66dB mic channel in to stereo out 66dB mic channel in to AUX send 2 & 3 (AUX 1 to AUX sen, pre-fader, pre-EQ, gain = 60dB) 26dB AUX RTN 1 & 2 to stereo out 67dB mic channel in to stereo unbalanced out 46dB line channel in to stereo out 54dB mic channel in to channel insert 60dB mic channel in to phones out 76dB mic channel in to mix out	
4. Hum & noise (RS = 150 ohms input gain = max input sensitivity = -60dB measured with IHF-A normal position: max level attenuation 10dB)	-126dBu equivalent input noise -94dBu residual output noise -80dBu stereo out (master fader at nominal level) faders at minimum level) -70dBu stereo out (master fader and one channel fader at nominal level) -68dBu mix out (mix fader at nominal level and all channel faders at minimum level) -76dBu AUX send (AUX master level at nominal and all channel AUX controls at minimum) -64dBu AUX send master level control and one channel AUX control at nominal level	
5. Gain range	-60 to -20dB (input channel gain control)	
6. EQ	+/-15dB in three bands centered as follows: high = 10kHz shelving mid = 1kHz peaking low = 100Hz shelving	
7. Crosstalk	-70dB (1kHz) adjacent input channels -70dB (1kHz) input to output	
8. Peak indicators	light when channel signal is 3dB below clipping	
9. LED display	0 VU = 1.23V (+4dBu)	
10. Input impedance	150 ohms to 47k ohms	
11. Output impedance	600 ohms to 10k ohms	
12. Power consumption	DM12	50W
	DM16	60W
	DM24	80W
13. Dimensions	DM12	640 x 423 x 105mm
	DM16	772 x 423 x 105mm
	DM24	1036 x 423 x 105mm

Component Parts List

Reference Designator	Ordering Number	Name and Description
POWER (MASTER)	51-02-050641	PUSH BUTTON SPUJ19A603-PJ
	51-02-050642	SAA/SW SDDJA1037U-PJ
CHANNELS	27-01-050643	PCB-A ASSEMBLY
	27-01-050644	PCB-B ASSEMBLY
	27-01-050645	PCB-C ASSEMBLY
	27-01-050646	PCB-D ASSEMBLY
	27-01-050647	PCB-E ASSEMBLY
	27-01-050648	PCB-F ASSEMBLY
	27-01-050649	PCB-G ASSEMBLY
	27-01-050650	PCB-H ASSEMBLY
TRANSFORMER	56-11-050651	X'MER 230V/115V
DM12, DM16, DM24 DM12, DM16, DM24	14-02-050652	FRONT PANEL DM12, EV
	14-02-050653	FRONT PANEL DM16, EV
	14-02-050654	FRONT PANEL DM24, EV
	14-02-050655	RIGHT SIDE PANEL, EV
	14-02-050656	LEFT SIDE PANEL, EV
GAIN, RTN 1/2 (MASTER) LEVEL	24-04-050657	ROTARY KNOB D14*19 GRY/RED
HIGH, MID, LOW	24-04-050658	ROTARY KNOB D14*19 GRY/YLW
AUX 1/2/3, AUX 1/2 (MASTER)	24-04-050659	ROTARY KNOB D14*19 CYAN/BLK
PAN, PAN 1/2 (MASTER)	24-04-050660	ROTARY KNOB D14*19 GRY/BLU
CHANNEL 1 - 12	24-04-050661	SLIDE KNOB 25*13*12 GRY/BLK
AUX 1 (MASTER)	24-04-050662	SLIDE KNOB 25*13*12 BLU/WHT
L - R (MASTER)	24-04-050663	SLIDE KNOB 25*13*12 RED/WHT
MIX (MASTER)	24-04-050664	SLIDE KNOB 25*13*12 YLW/WHT
CUE (CHANNEL 1-12 & MASTER), METER, PHAN- TOM POWER (MASTER)	24-04-050665	SLIDE KNOB 5.5*5.5*9 GRY
VR101	47-06-050666	S.R /VR 10 KC 15MM P
VR107, 108, 109, 201, 321, 331	47-06-050667	S.R / VR 25K A*1 15MM P
VR102, 103, 105, 106, 203	47-06-050668	S.R / VR 50K B C.C 15MM
VR401	47-06-050669	D.R / VR 25K A 15MM P
VR110	47-06-050670	S.S / VR 10K A 60MM