

**YAMAHA**

**DMR8 V.3.0**

***DIGITAL MIXER/RECORDER***

**Owner's Manual**

## FCC INFORMATION (U.S.A.)

### 1. IMPORTANT NOTICE: DO NOT MODIFY THIS UNIT!

This product, when installed as indicated in the instructions contained in this manual, meets FCC requirements. Modifications not expressly approved by Yamaha may void your authority, granted by the FCC, to use the product.

### 2. IMPORTANT: When connecting this product to accessories and/or another product use only high quality shielded cables. Cable/s supplied with this product MUST be used. Follow all installation instructions. Failure to follow instructions could void your FCC authorization to use this product in the USA.

### 3. NOTE: This product has been tested and found to comply with the requirements listed in FCC Regulations, Part 15 for Class "B" digital devices. Compliance with these requirements provides a reasonable level of assurance that your use of this product in a residential environment will not result in harmful interference with other electronic devices. This equipment generates/uses radio frequencies and, if not installed and used according to the instructions found in the users manual, may cause interference harmful to the operation of other electronic devices. Compliance with FCC regulations does not guarantee that interference will not occur in all installations. If this product is found to be the source of interference, which can be determined by turning the unit "OFF" and "ON", please try to eliminate the problem by using one of the following measures:

Relocate either this product or the device that is being affected by the interference.

Utilize power outlets that are on different branch (circuit breaker or fuse) circuits or install AC line filter/s.

In the case of radio or TV interference, relocate/reorient the antenna. If the antenna lead-in is 300 ohm ribbon lead, change the lead-in to co-axial type cable.

If these corrective measures do not produce satisfactory results, please contact the local retailer authorized to distribute this type of product. If you can not locate the appropriate retailer, please contact Yamaha Corporation of America, Electronic Service Division, 6600 Orangethorpe Ave, Buena Park, CA 90620

The above statements apply ONLY to those products distributed by Yamaha Corporation of America or its subsidiaries.

## IMPORTANT NOTICE FOR THE UNITED KINGDOM

### Connecting the Plug and Cord

IMPORTANT: The wires in this mains lead are coloured in accordance with the following code:

GREEN-AND-YELLOW : EARTH  
BLUE : NEUTRAL  
BROWN : LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

The wire which is coloured GREEN and YELLOW must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol or coloured GREEN and YELLOW.

The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

Dette apparat overholder det gældende EF-direktiv vedrørende radiostøj.

Cet appareil est conforme aux prescriptions de la directive communautaire 87/308/CEE.

Diese Geräte entsprechen der EG-Richtlinie 82/499/EWG und/oder 87/308/EWG.

This product complies with the radio frequency interference requirements of the Council Directive 82/499/EEC and/or 87/308/EEC.

Questo apparecchio è conforme al D.M.13 aprile 1989 (Direttiva CEE/87/308) sulla soppressione dei radiodisturbi.

Este producto está de acuerdo con los requisitos sobre interferencias de radio frecuencia fijados por el Consejo Directivo 87/308/CEE.

**YAMAHA CORPORATION**

## CANADA

THIS DIGITAL APPARATUS DOES NOT EXCEED THE "CLASS B" LIMITS FOR RADIO NOISE EMISSIONS FROM DIGITAL APPARATUS SET OUT IN THE RADIO INTERFERENCE REGULATION OF THE CANADIAN DEPARTMENT OF COMMUNICATIONS.

LE PRESENT APPAREIL NUMERIQUE N'EMET PAS DE BRUITS RADIOELECTRIQUES DEPASSANT LES LIMITES APPLICABLES AUX APPAREILS NUMERIQUES DE LA "CLASSE B" PRESCRITES DANS LE REGLEMENT SUR LE BROUILLAGE RADIOELECTRIQUE EDCITE PAR LE MINISTERE DES COMMUNICATIONS DU CANADA.

Litiumbatteri!

Bör endast bytas av servicepersonal.  
Explosionsfara vid felaktig hantering.

VAROITUS!

Lithiumparisto, Räjähdyksvaara.  
Pariston saa vaihtaa ainoastaan alan ammattimies.

ADVARSEL!

Lithiumbatteri!  
Eksplosionsfare. Udskiftning må kun foretages af en sagkyndig, — og som beskrevet i servicemanualen.

## 1 Directory

## 2 Introduction

2.1 Features .....	3
2.2 A brief tour of the front panel .....	7
2.3 Other equipment .....	14
2.4 Glossary of DMR8 terms .....	14
2.5 Glossary of digital audio terms .....	19
2.6 The front panel .....	21
Front panel diagram	

## 3 Unpacking and basic care

3.1 Unpacking and siting .....	29
3.2 Making power connections .....	29
3.3 Initializing the DMR8 .....	30
3.4 Connections .....	31
3.5 Everyday care .....	31
3.6 Digital recording .....	32

## 4 Connections

4.1 Audio connections .....	35
4.2 Sync and word clock connections .....	39
4.3 Other connections .....	40
Rear panel diagram	

## 5 System setup

5.1 System Diagrams .....	43
5.2 Setting the word clock .....	47
5.3 INITIAL SET .....	48
5.4 Inserts and Cascade .....	48
5.5 The <b>HELP</b> key .....	49

## 6 Mixing console

6.1 Channels and controls .....	57
6.2 Fader modes .....	61
6.3 General operation .....	62
6.4 Track assignments .....	70
6.5 C-R monitoring .....	71
6.6 CUE .....	74
6.7 Oscillator .....	76
6.8 Channel assignment in MIXDOWN .....	77
6.9 Memories (F1 - F3) .....	78
6.10 Patching and inserts .....	86
6.11 <b>UTILITY</b> key .....	86
6.12 Fader modes .....	89
6.13 Controls in RECMIX modes .....	89
6.14 Controls in MIXDOWN mode .....	96

## 7 Effects

7.1 Effect selection .....	105
7.2 Editing an effect .....	106

## A brief table of contents

---

7.3 Effects 1 & 2 in RECMIX .....	109
7.4 Effect 3 in RECMIX .....	111
7.5 Mixdown .....	113
7.6 Effects and parameters .....	116
<b>8 Automix computer</b>	
8.1 Automix memory structure .....	129
8.2 AUTO/MANUAL key .....	130
8.3 EDIT keys .....	130
8.4 The soft key automix menu .....	130
8.5 Automix menus .....	134
8.6 Recording automix .....	136
8.7 Playback of automix .....	138
8.8 Editing automix data .....	138
8.9 Saving data .....	146
<b>9 Recorder</b>	
9.1 Features of the recorder .....	147
9.2 Tape handling and insertion .....	147
9.3 Transport controls .....	149
9.4 Autolocator .....	152
9.5 INITIAL SET .....	156
9.6 ALL REC .....	158
9.7 SYNC DUB .....	165
9.8 PING-PONG .....	168
9.9 PUNCH IN .....	170
9.10 TRACK EDIT .....	176
9.11 MIXDOWN .....	176
9.12 ALL ERASE .....	178
9.13 ALL SAFE .....	178
9.14 AUX tracks .....	179
9.15 Varispeed (Vari pitch) .....	179
<b>10 Synchronization</b>	
10.1 Timecode keys .....	181
10.2 HELP page .....	186
10.3 DMR8 as master (parallel) .....	186
10.4 DMR8 as slave (parallel DMR) .....	189
10.5 DMR8 as master (serial) .....	190
10.6 DMR8 as slave (serial DMR) .....	192
10.7 DMR8 as slave (timecode or MTR) .....	192
10.8 Timestripping from an external generator .....	194
10.9 MIDI timecode .....	194
<b>11 Data storage and copying</b>	
11.1 Card data .....	197
11.2 Tape data storage ( <b>TOC</b> ) .....	200
11.3 Copying data ( <b>COPY</b> ) .....	204
<b>12 MIDI</b>	
12.1 I/O .....	211

12.2 ASSIGN .....	212
12.3 SYNC .....	213
12.4 BULK .....	215
12.5 MIDI Events .....	217
<b>13 Technical information</b>	
13.1 Specifications .....	221
13.2 Connector pinouts .....	226
13.3 Digital audio formats .....	228
13.4 MIDI .....	229
13.5 Character chart .....	255
13.6 "F" Memory lists .....	256
13.7 RECMIX initial data .....	257
13.8 MIXDOWN initial data .....	260
13.9 Preset style settings .....	263
13.10 Warning messages .....	275
Block diagrams	
Level diagrams	

### 1 Directory

1.1 This directory .....	1
1.2 Introduction .....	1
1.3 Unpacking and basic care .....	1
1.4 Connections .....	1
1.5 System setup .....	1
1.6 Mixing console .....	1
1.7 Effects .....	1
1.8 Automix computer .....	2
1.9 Recorder .....	2
1.10 Synchronization .....	2
1.11 Data storage .....	2
1.12 MIDI .....	2
1.13 Reference and specifications .....	2

# **1 Directory**

This section serves as a "road-map" to this manual for the DMR8/

## **1.1 This directory**

## **1.2 Introduction**

Introducing the features of the DMR8, providing a quick guide to the front panel, a glossary of DMR8 and digital audio terms, and a detailed guide to features of the front panel (with diagram).

## **1.3 Unpacking and basic care**

A brief guide to unpacking and siting the DMR8 for the first time, together with a few hints on digital recording

## **1.4 Connections**

Essentially a guide to the connectors on the rear panel - what they are used for, and the sort of equipment they should be connected to, together with a rear panel diagram.

## **1.5 System setup**

A note on word clock settings and the cascade and insert facilities.

## **1.6 Mixing console**

A guide to the use of the mixing console section of the DMR8, including a description of the controls which are found on each channel of the DMR8 console, an explanation of the DMR8's multi-purpose faders, and how the mixing console is operated in normal use. There are also sections on how the DMR8 assigns input channels to recording tracks, how monitoring is carried out in the control room, the studio artists' monitoring system, and operation of the console's built-in oscillator.

The DMR8 is capable of storing and recalling mixer "scenes" as well as other data. This section explains how they are used. The DMR8 controls may change function when in different recording and fader modes. This above section provides a reference guide to these control assignments.

## **1.7 Effects**

The DMR8 includes three digital signal processors. This section gives details of assigning and editing them and the parameters available for each effect.

### 1.8 Automix computer

The DMR8 incorporates mix automation. This section explains the structure of the memory, and the steps needed to work the automation process (recording, playback and editing).

### 1.9 Recorder

The section gives a description of the transport and autolocation functions. Detailed descriptions of the options available in the different recording modes are given, together with details of track arming, channel-to-track assignment, monitoring and the use of the analog tracks.

### 1.10 Synchronization

Use of the timecode keys, and the use of the DMR8 as a master or slave unit with another DMR8, with SMPTE/EBU timecode or with MIDI timecode with various chase options are described in this section. The use of YAMAHA and third-party remote control units is also discussed.

### 1.11 Data storage

The DMR8 is capable of storing data on tape (TOC), via MIDI or to RAM card. In addition to these features, copying and editing of tapes to another DMR8/DRU8 are covered.

### 1.12 MIDI

The use of MIDI for controller change, program change, and SMPTE-to-MIDI synchronization is covered here.

### 1.13 Reference and specifications

Specifications, MIDI formats, digital audio formats and parameter tables, etc are included in this section.

**NOTE:** Due to typographical limitations, certain special characters on the DMR8's display are not represented completely accurately in this manual.

- the cursor, which on the screen is represented by a solid (filled) triangle.
- a filled circle, which on the DMR8 is larger relative to the other characters than shown in this manual.
- ★ the asterisk character, which is a different shape on the DMR8 screen to the shape displayed here.
- ¶ this character is sometimes used to represent characters specific to the DMR8 (such as the "Tape Loading" symbol).

Occasionally, the look of the displays here may vary slightly in other ways from those on the DMR8. We apologize for this, but trust it will prove to be only a minor inconvenience.



## 2 Introduction

2.1 Features .....	3
2.1.1 Mixing Console	3
2.1.2 8-track recorder	4
About the tape cassettes	4
2.1.3 Mix automation	6
2.1.4 Effects	6
2.1.5 Locator	6
2.2 A brief tour of the front panel .....	7
2.2.1 General operation	7
Cursor keys	7
The numeric keypad	7
2.2.2 Mixing console	8
2.2.3 8-track recorder	11
2.2.4 Effects	12
2.2.5 Locator	13
2.2.6 System setup	13
2.3 Other equipment .....	14
2.4 Glossary of DMR8 terms .....	14
RECMIX modes	14
ALL REC	15
SYNC DUB	15
PING-PONG	16
PUNCH IN	16
TRACK EDIT	17
MIXDOWN mode	17
CUE	18
C2 flag	18
Fader scrolling	18
MIX track	18
MONITOR or C-R	18
REC track	18
RELATIVE fader mode	18
Soft keys	18
2.5 Glossary of digital audio terms .....	19
AES/EBU	19
Dither	19
Reed-Solomon error correction	19
Sample	19
Sample length	19
Sigma-delta conversion	20
S/P-DIF	20
V-sync	20
Word clock	20
2.6 The front panel .....	21
1 Cassette slot	21
2 Tape movement indicators	21
3 Master/slave indicators	21
4 Sampling frequency indicators	21
5 Tape transport keys	21
6 Special function keys	21
7 RECORD-MIX keys	22
8 ASSIGN-EDIT keys	22
9 Numeric keypad	22
10 Timecode keys	22
11 Locator keys	23
12 Mixing parameter keys	23
13 Effect control	23
14 Mixing parameter keys	23
15 Data entry slider	23

## Introduction - Table of contents

---

■ Faders	23
■ EDIT key	24
■ ON key	24
■ SELECT key	24
■ GROUP keys	24
■ Pan keys	24
■ Pan indicators	24
■ Fader control keys	24
■ Memory function keys	25
■ Memory keys	25
■ Direct memory keys	25
■ C-R monitor section	25
■ CUE monitor section	25
■ Talkback microphone	25
■ Meters (i)	25
■ Meter selection (i)	25
■ Meters (ii)	26
■ Meter selection (ii)	26
■ Peak hold	26
■ Meters (iii)	26
■ Meters (iv)	26
■ Display function	26
■ Subdisplay control	26
■ Main display	27
■ Subdisplay	27
■ Memory indicators	27
■ Fader status	27
■ SOFT menu keys	27
■ Oscillator	28
■ HELP key	28
Front panel diagram	

## **2 Introduction**

This section describes the basic concepts of the DMR8, explaining some of the features and capabilities of the unit.

### **2.1 Features**

We'd like to take this opportunity of thanking you for purchasing the YAMAHA DMR8, the latest advance in audio recording technology.

The DMR8 is a recording mixing console with automation facilities, 8-track digital tape recorder, a locator and synchronizing unit, and three stereo digital signal processors in one unit. The following sections give a guide to the basic capabilities of each unit.

#### **2.1.1 Mixing Console**

Essentially an all-digital 8-channel mixing console when recording, the DMR8 features flexible track/channel assignment and routing.

In mixdown mode, the console is capable of accepting an additional sixteen channels (from additional Yamaha tape units and/or AD convertors) added to the previously-recorded eight tape tracks, resulting in a full 24-2 configuration.

In addition to the 8 digital channels which are input through the DMR8's DIGITAL A/D port, stereo digital inputs from external devices (such as the YAMAHA DMP7D or DRU8) are possible (assignable to any digital recorder track or tracks), as are two analog inputs (which may be recorded on the two additional analog tracks of the recorder section as click tracks, etc).

Attenuation, phase switching and individually-programmable delay (allowing exact phase synchronization of sources) comprise each channel's input section. 3-band fully parametric equalization ( $\pm 15\text{dB}$ ) is available on each input channel. The high and low bands may be selected as peaking or shelving filters.

Two effect sends to the internal digital signal processors or external devices are provided when recording. In addition to these, individual channel effects, such as doubling, flanging, compression, etc are available. In recording modes, a third digital effect return may be added to the cue and control room monitor mixes. Full 3-band equalization is provided on all effects returns.

In mixdown mode, effect 3 may be used as a third mixdown effect in addition to the other two effects.

Digital panning is available directly on each channel, with 33 pan positions available. Indicators show the pan position of individual channels.

Two groups are provided for easy grouping of channels - faders are electronically linked, so that moving one fader in a group will automatically move the other faders assigned to that group.

Faders may be used for a variety of purposes, and will move to the appropriate positions when a fader mode is selected. A relative fader mode allows fine adjustment of mix parameters.

## 2 • Features - 8-track recorder

---

Comprehensive studio monitor facilities are provided, as well as a separate control room mix. Both the studio and control room monitor mixes may be output digitally (AES/EBU or SPDIF) or as balanced analog signals.

Mixer settings can be stored and transported between DMR8s on card, as well as being stored internally.

### 2.1.2 8-track recorder

As well providing eight PCM audio tracks, the DMR8 recorder also features four other tracks: two are reserved for timecode and internal control, and two analog tracks are available for use as click tracks. Stationary heads are used, reducing the complexity of the mechanical design, and wear on the head, thereby reducing the need for and simplifying service operations.

All recording is carried out at a resolution of 20 bits, resulting in a dynamic range of 120dB. Double RSC (Reed-Solomon coding) error correction is built in, together with interpolation algorithms if data has been corrupted.

Sampling is carried out at either 48kHz, 44.1kHz or 32kHz - the tape speed is adjusted accordingly. Wow and flutter figures are unmeasurable. A varispeed function allows these speeds to be adjusted by a factor of  $\pm 10\%$ .

All transport functions are logic-controlled, and almost any transport function can be selected while any other transport function is in operation. An end-to-end fast forward or rewind takes only about 100 seconds.

A REHEARSE key is provided for rehearsing take, setting punch points, and as an extra locate key. Index points may be recorded and subsequently used as location points.

Synchronization to another DMR8 or DRU8 is possible, to sample (1/48k second at 48kHz) accuracy, allowing the effective use of a DMR8 and DRU8 together as a 16-track digital tape recorder. A "serial" chase mode is also available, allowing a second unit to start recording automatically when the first unit's tape ends.

Track bouncing ("ping-pong") is carried out in the digital domain, meaning that no loss of signal quality is incurred in bounce operations. Either a whole track may be bounced, or selected portions may be copied. A unique feature of the DMR8 (thanks to the positioning of the heads, and the use of an internal delay circuit) is the ability to bounce a track to itself.

A variety of recorder modes is provided, including automated punch-in (with rehearsal facilities and adjustable pre- and post-roll timings). To allow smooth joins and avoid digital "glitches" between original and punched-in material, a variable length crossfade facility is provided.

### About the tape cassettes

The DMR8 (in common with the DRU8) uses YAMAHA M20P tape cassettes for recording and playback. These cassettes currently offer about 20 minutes of recording time (at 48kHz, but more time is available if a lower sampling frequency is selected).

The tape itself is 8mm metal particle tape, as used in 8mm video cameras and recorders, but the cassette itself is larger than the cassettes used in these units. This is because the DMR8 uses a stationary-head mechanism, rather than the rotating head used in R-DAT or 8mm video equipment, and the tape path accordingly must be different from the tape path used in video.

In ALL REC mode (the basic starting procedure), a tape may be formatted by the DMR8, using the first twenty seconds or so as a data storage area, and the rest may be timestriped.

The tape itself is covered by a locking flap, similar to that on video cassettes.

**DO NOT** open this flap or touch the tape. Dust and grease can cause dropouts and damage the tape and/or heads of the DMR8.

**DO NOT** expose the tape to extremes of temperature or humidity, or store tapes in a dusty or dirty environment.

**DO NOT** store tapes near strong magnetic fields (eg electric motors, transformers, video monitors, TVs, etc)

The tape package itself contains more detailed instructions on storage and handling (on the reverse side of the self-adhesive label sheet). Read these for full information.

Though the DMR8 is a reliable system, Yamaha will in no way accept responsibility for damage caused to tapes or to information stored on tapes (including consequential damage) which is caused by the tape cassette being used under any of the following conditions:

- the tape has been used in a DMR8 or DRU8 unit which is not being operated in accordance with the manufacturer's instructions
- the tape has been used in a DMR8 or DRU8 unit which has not been properly maintained according to the manufacturer's instructions and is consequently or otherwise not in a suitable condition for use, regardless of whether or not such a condition has been caused by the user
- any tape cassette other than of a kind recommended by Yamaha has been used
- the cassette and/or the tape enclosed in the cassette has been handled or stored in a manner contrary to the manufacturer's instructions included with the cassette

The above does not constitute the complete terms and limitations of Yamaha's warranty.

The tape cassette includes two yellow write-protect sliders as part of its design. Open and close these write-protect sliders with the end of a ball-point pen or similar. One slider (to the left as you look at the cassette in the insertion position) protects tracks 1-4, and the other (right) protects tracks 5-8. When the sliders are closed, signals may be recorded on the appropriate tracks. The use

## **2 • Features - Mix automation**

---

of two write-protect sliders allows you, for example, to protect the dialog and effects of a video soundtrack on four tracks, while allowing you to record accompanying music on the other four.

### **2.1.3 Mix automation**

Mix moves (either when recording or mixing down) memorized and stored (on the M20P tape, on memory card, or via MIDI to a bulk storage device) for later editing, etc. The automation process is flexible and allows for editing of individual mix parameters in real time, so that a final mix can be easily achieved.

A number of non-realtime editing and data management facilities are also provided for the manipulation of automation data.

There are a number of different memory areas which may be used for mixdown, any of which may be recalled for replaying the final mix. In this way, a number of different mixes may be performed and compared before a final decision is made.

### **2.1.4 Effects**

In addition to the channel effects mentioned above, three separate digital signal processors are available, offering such facilities as reverb, delay and echo, phasing, flanging, etc. The quality of these effects is equivalent to the YAMAHA SPX1000 and SPX900 models, and since all data is sent, processed and returned in the digital domain, no loss of quality is incurred in A/D and D/A conversion.

### **2.1.5 Locator**

The locator allows the specification of up to 32 memory points for punch-in, etc, in addition to a basic locate memory and start and return points for repeated play. All times are given in minutes, seconds and frames and may be specified to the nearest frame (1/24, 1/25, 1/29.97 or 1/30 second). Full SMPTE/EBU compatibility is provided, allowing the audio track of a film or video production to be perfectly synchronized with the visual images, or frame synchronization to be made to other audio tape decks with SMPTE/EBU compatibility.

Location points may be entered in real time, or through the numeric keypad, and may be used as start and return points of a repeat loop.

MIDI Time Code can also be output to MIDI devices (external mixing consoles, event processors, etc).

### 2.2 A brief tour of the front panel

The DMR8 may be regarded as a number of different units, packaged together. The following gives a brief description of the keys used to control the functions of each section.

#### 2.2.1 General operation

Most keys on the DMR8 are fitted with LED indicators. When lit, these indicate that the selected operation is active.

Many keys are cross-referenced to each other - for instance, using the FADER CONTROL keys to change the fader function to one of the effect sends will also automatically select the corresponding effect on the EFFECT CONTROL key block.

As a general rule, the options regarding functions connected with the recorder section of the DMR8 are usually displayed on the subdisplay, and other options are displayed on the main display.

#### Cursor keys

When using the DMR8, commonly-used keys are the ASSIGN-EDIT cursor keys and the MIXING PARAMETER cursor keys. Usually, the left (←) and right (→) keys are used to move the cursor on either the main or the subdisplay, and the up and down keys (↑ and ↓) are used to change values.

When the MIXING PARAMETER CONTROL keys are used, the DATA ENTRY slider may also be used to change values.

When using the ASSIGN-EDIT keys with the subdisplay, the **SHIFT NEXT** and **SHIFT BACK** keys are used to move from menu to menu.

#### The numeric keypad

The numeric keypad may be used for direct entry of numeric values in a number of cases. When a number has been entered, it is usually necessary to confirm the entered value by pressing the **ENTER** key.

Pressing the **SHIFT** key changes the numeric keypad into an alphanumeric keypad. Each key can now input one of three characters (as marked in small letters under the number). Successive presses of the key will cycle through these characters.





For instance, when the **SHIFT** key is on, successive presses of the **1** key will produce "S", "T", "U", "S", etc. To change from uppercase to lowercase, and vice versa, press the **small** key.


Pressing another character key will automatically move the cursor to the next position.

The **BLANK** (0) key will enter a space at the current character position. Holding down the **CLEAR** key will move the cursor continuously, clearing all displayed characters.

## 2 • A brief tour of the front panel - Mixing console

---

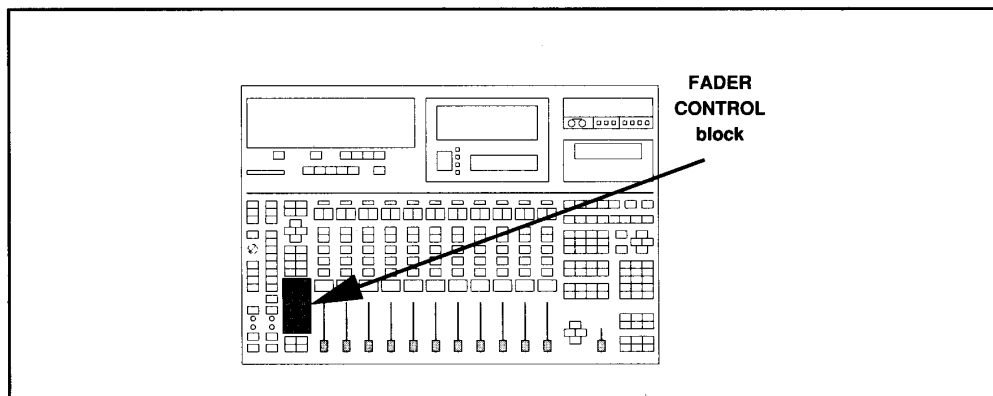
Other characters (including Japanese *katakana*) are available using the  and  keys. Enter an apostrophe ( pressed three times), and then use the  key for the other characters (punctuation, etc).

Pressing  again so that the indicator goes off will set the keypad back into numeric mode again.

### 2.2.2 Mixing console

The DMR8 is equipped with 10 faders and a number of individual channel controls. In this respect, it has some of the appearance of a traditional analog console. However, thanks to the digital nature of the DMR8's mixing console, channel controls are centralized, and the same controls can be used for each channel.

Unlike a traditional console, the faders may be made to control a number of functions: channel volume, monitor level, effect send levels, EQ settings, effect settings, etc. The current fader mode is controlled by the FADER CONTROL key block.

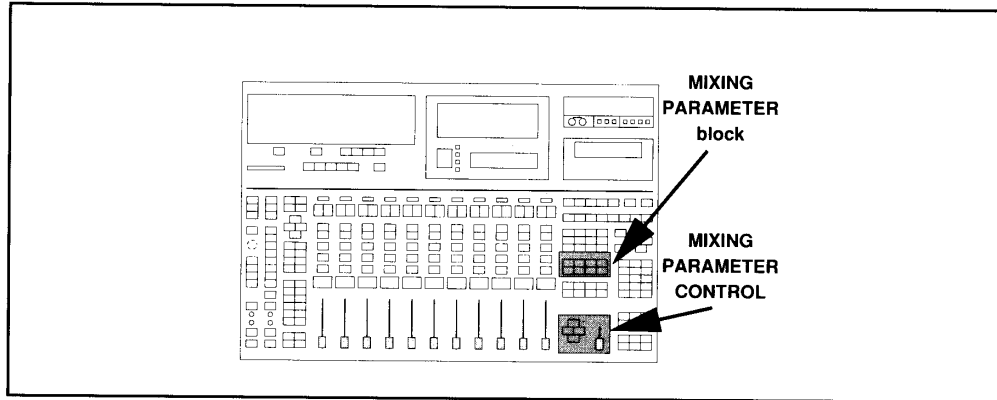




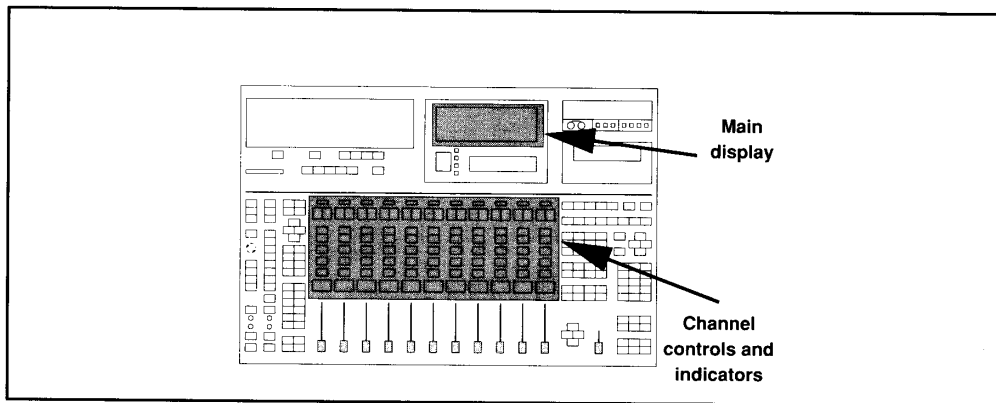
## 2 • A brief tour of the front panel - Mixing console

---

Mixer settings such as gain, EQ, channel effects, etc, are generally made using the faders and/or the MIXING PARAMETER CONTROL cursor key block and DATA ENTRY slider. The parameters to be edited are selected using the MIXING PARAMETER block.



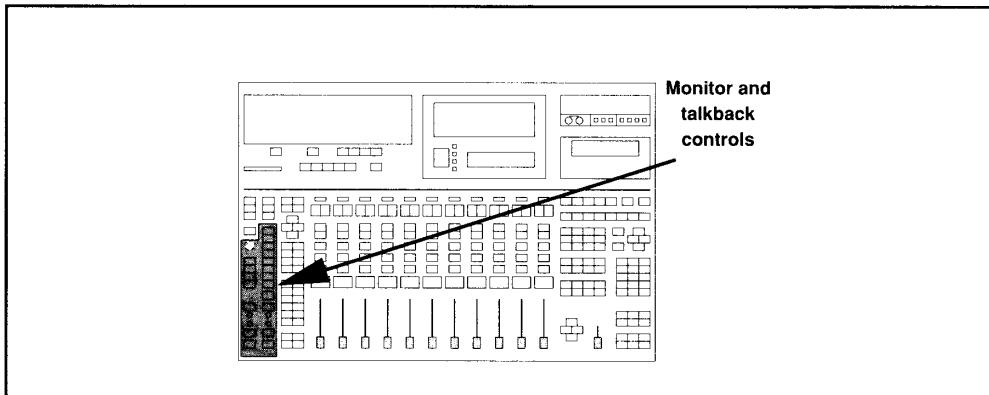
Individual channel controls comprise the "panpots" and indicators, grouping and ON/OFF keys, as well as the channel selection keys and automix edit keys. Mixer parameters and status information are displayed on the main display.



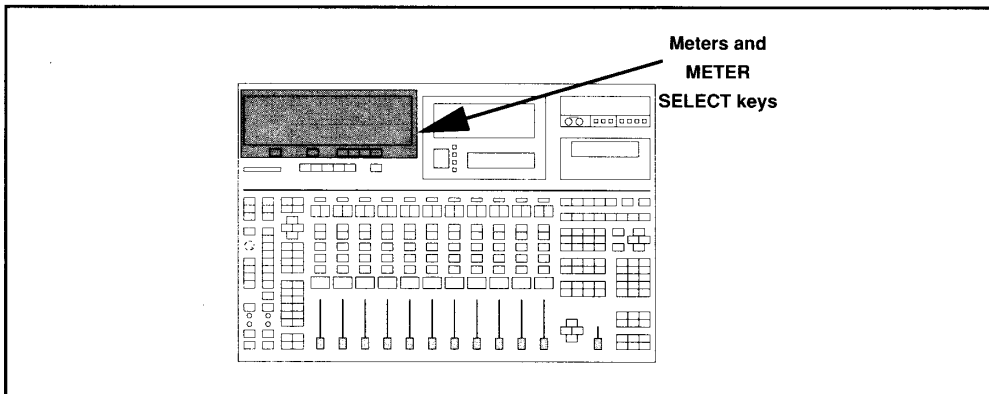
## 2 • A brief tour of the front panel - Mixing console

---

Monitoring of the tape tracks and the input channels is provided, and two separate monitor busses are provided - one for the control room, and one for the studio artists. Talkback and slate functions are also provided.



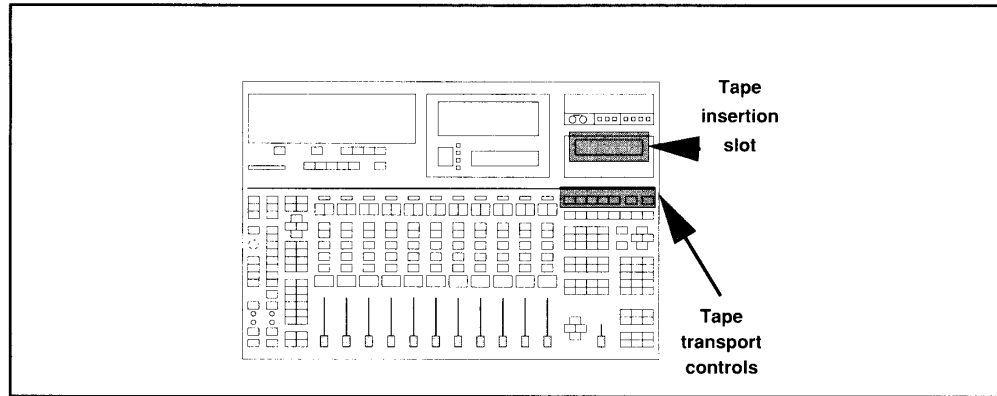
Bargraph peak metering functions are provided for track and input level monitoring, as well as for effect sends and returns and monitor levels. The functions of the meters are selectable using the METER SELECT key block.



## 2 • A brief tour of the front panel - 8-track recorder

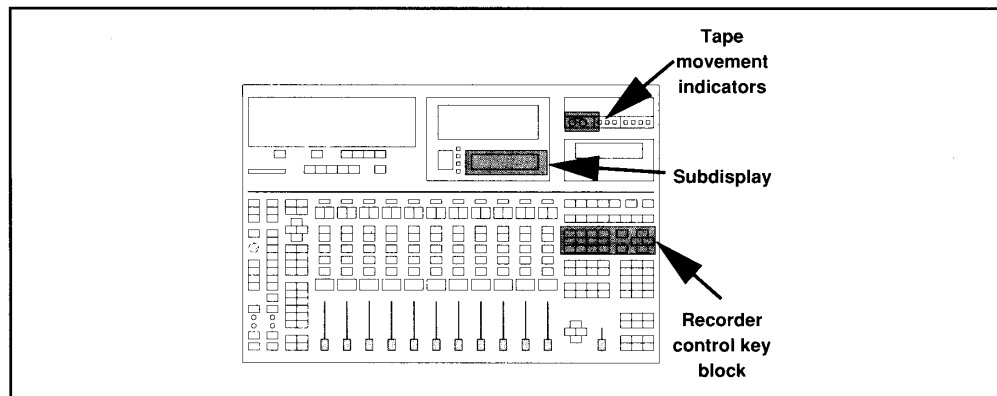
### 2.2.3 8-track recorder

The DMR8's 8-track recorder cassette is inserted into the tape insertion slot on the right of the unit. The tape transport keys are located immediately below the tape slot.



There is no dedicated tape counter, but the subdisplay may be set to show the current time, either in terms of the timecode recorded on tape, or in terms of the absolute time position from the start of the tape. Tape movement is also indicated graphically by the tape movement indicators on the front panel.

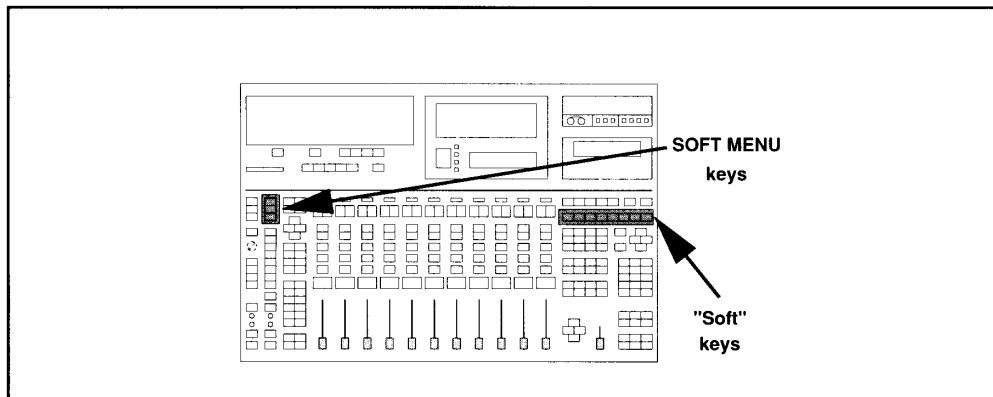
The majority of tape-based operations (eg track arming, etc) are carried out using the recorder keys together with the ASSIGN·EDIT key block. The results are shown on the subdisplay.



## 2 • A brief tour of the front panel - Effects

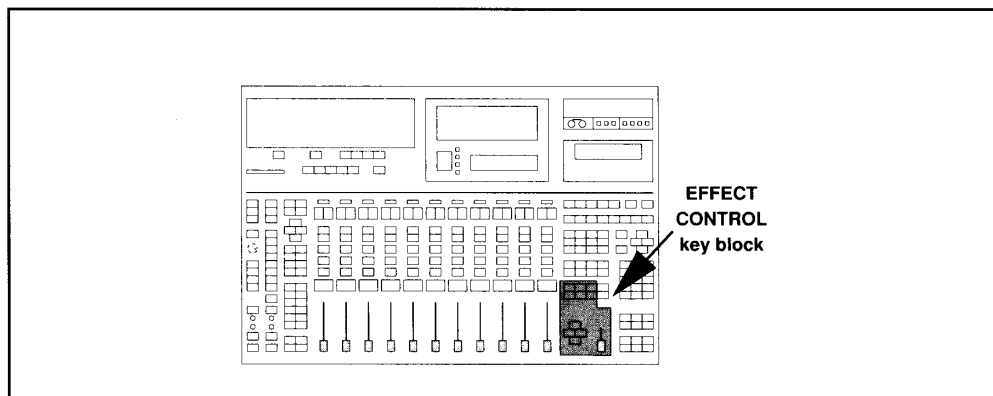
---

As an alternative to these controls, the "soft keys" may be used for operations such as track arming, channel-to-track assignment, etc.



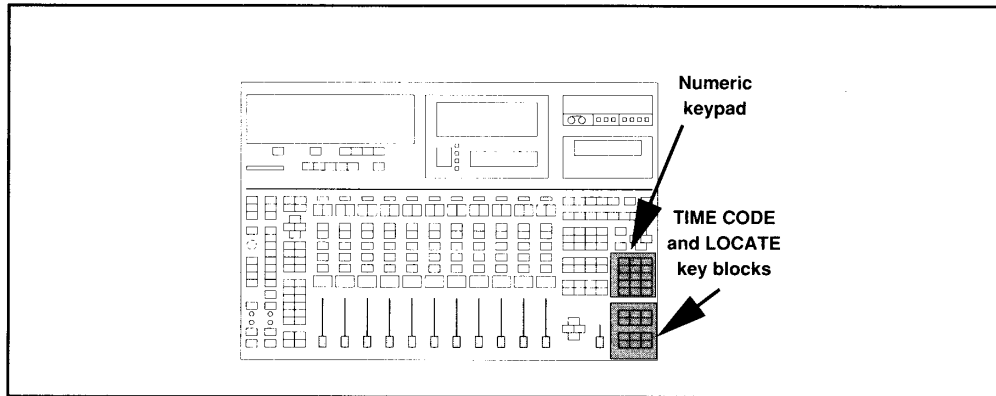
### 2.2.4 Effects

There are three digital signal processors incorporated in the DMR8 - each of SPX1000 quality. The parameters of these effects may be edited and stored, using the EFFECT CONTROL and MIXING PARAMETER CONTROL key blocks.



### 2.2.5 Locator

A locator allows automatic tape search and location. Location points can be entered and edited either in real time or using the numeric keypad. Timecode generator options are set using a menu system, and a block of keys is dedicated to timecode functions.

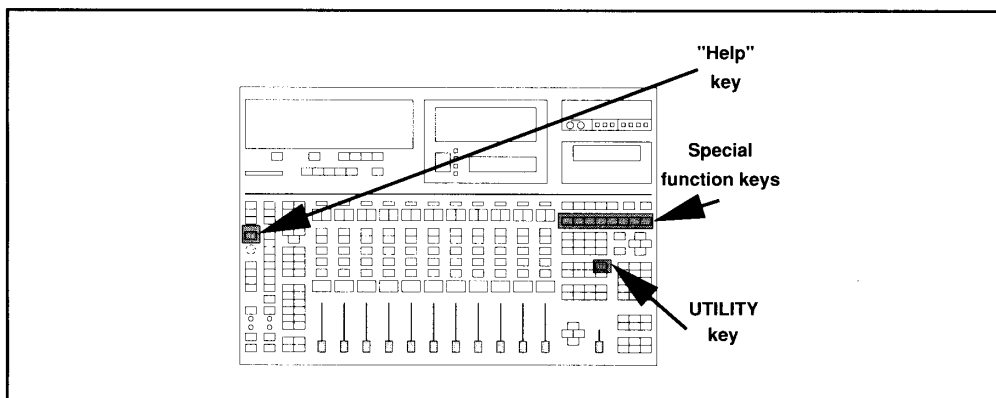


### 2.2.6 System setup

Various special functions are available for system control, MIDI parameters, automix recording and editing, etc. These are accessed using the special function keys, which also double as the "soft keys".

Various system parameters may be set using the "HELP" key and its associated menu.

Miscellaneous mixer parameters are set using the UTILITY key.



## 2 • Other equipment - RECMIX modes

---

### 2.3 Other equipment

Since many of the functions of a conventional recording studio are contained in one unit (the DMR8), there is less need for external equipment and connections than with other systems.

When recording, the only mandatory external equipment necessary is an 8-channel A-D convertor such as the Yamaha AD8X, and a monitoring system. When mixing down, the only mandatory piece of equipment is a 2-track recorder (analog or digital) and a monitoring system (digital 2-track recorders may be AES/EBU format or SPDIF (DAT) format).

However, the DMR8 has been designed to be used in a number of different environments, and may be used with a wide variety of other equipment: Yamaha digital signal processors such as the SPX1000 and/or DEQ7 may be connected at insert points or in one of the effects loops. Timecode and V-sync information may be generated by external devices and fed to the DMR8. Digital stereo sources such as the output from a DMP7D may be cascaded to the DMR8 as a sub-mixed source.

The DRU8 8-track digital recorder may be used with the DMR8 in a number of ways: to extend the recording time available (in serial chase mode), to increase the number of recording tracks available (in parallel chase mode), to act as the destination for edited data, or to act as a backup device for archiving data. The DRU8 can be operated independently, or using the DMR8's controls.

MIDI equipment can also be used with the DMR8, which is capable of transmitting MIDI sequencer control data, program and parameter changes. In addition, time-based MIDI data can be transmitted to trigger samplers, etc at specific timecode points for the purpose of "spinning in" effects. The DMR8 is capable of receiving program and controller change data from a sequencer or MIDI controller, as well as MIDI timecode.

The DMR8 can also be connected to a video monitor, superimposing the contents of the subdisplay over any video signal received at the video signal source.

### 2.4 Glossary of DMR8 terms

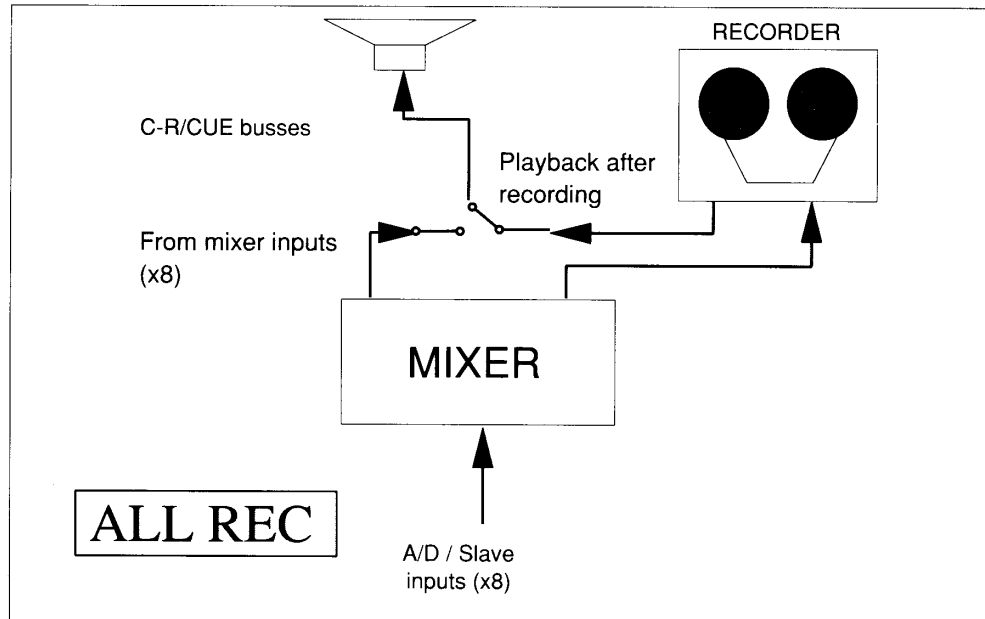
Since the DMR8 involves some new concepts, an explanation of a few terms used in this manual and by the DMR8 may prove useful.

#### RECMIX modes

The term *RECMIX mode* applies to all recorder modes of the DMR8 in which recording is possible: ALL REC, SYNC DUB, PING-PONG, PUNCH IN, TRACK EDIT, ALL ERASE.

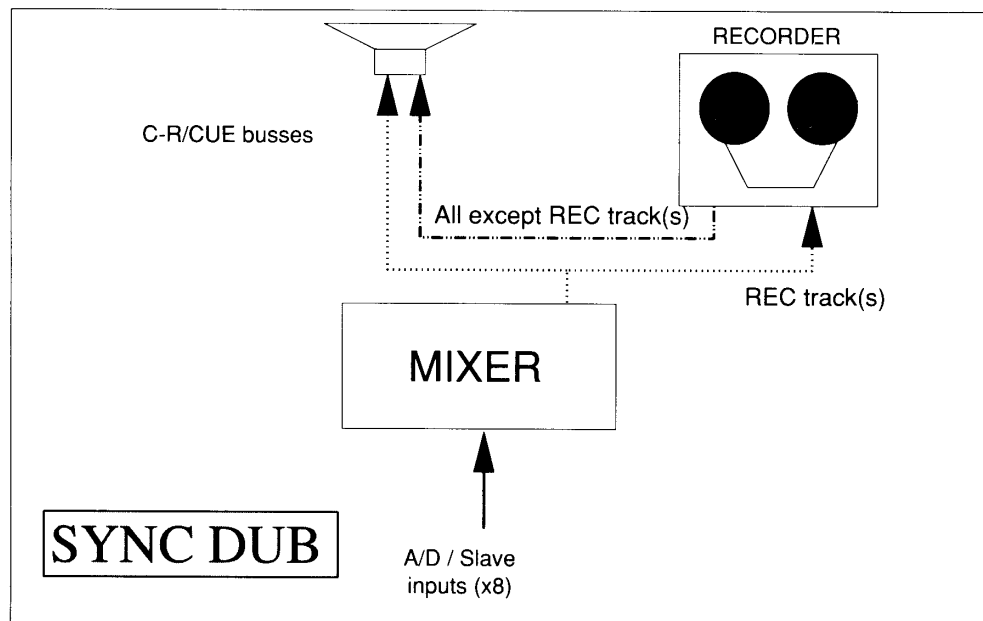
## ALL REC

The recording mode in which all tracks are armed for recording, including the timecode tracks and the analog AUX tracks.



## SYNC DUB

The recording mode in which previously-recorded tracks may be replayed, and signals may be recorded on other tracks.

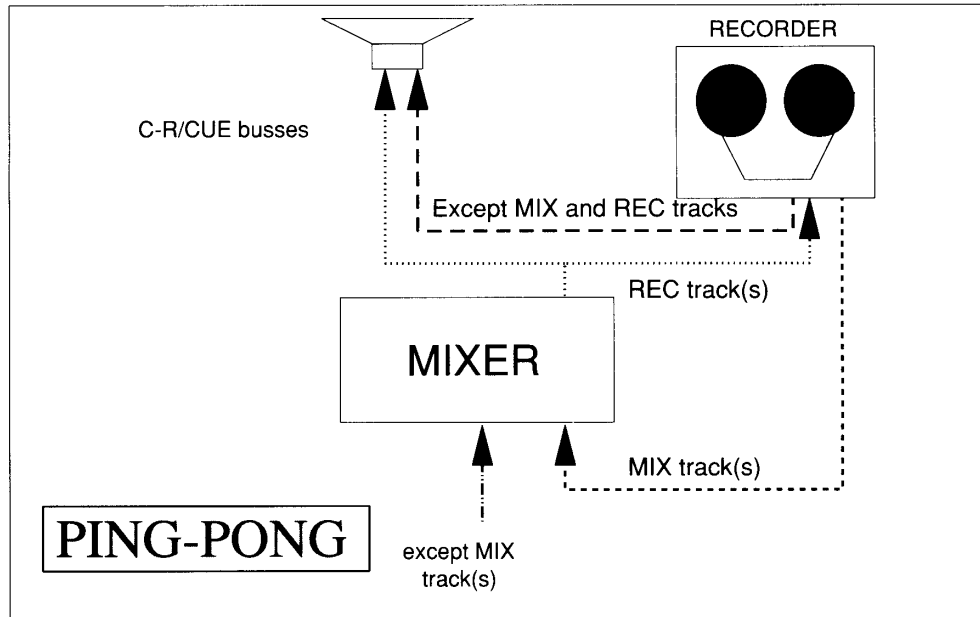


## 2 • Glossary of DMR8 terms - PING-PONG

---

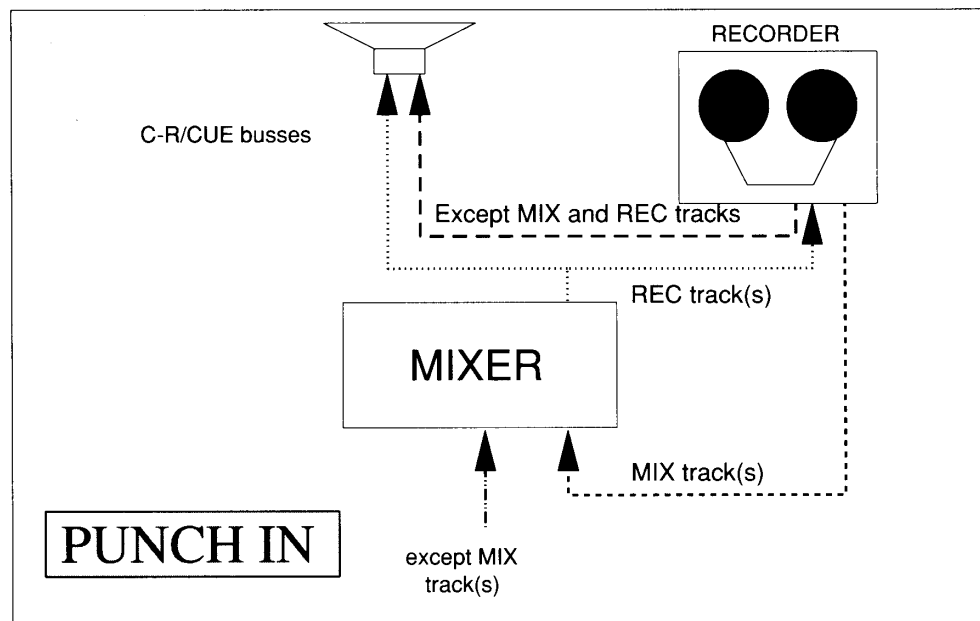
### PING-PONG

The recording mode in which tracks may be assigned as *mix tracks*, for recording on other tracks, assigned as *Rec tracks*.



### PUNCH IN

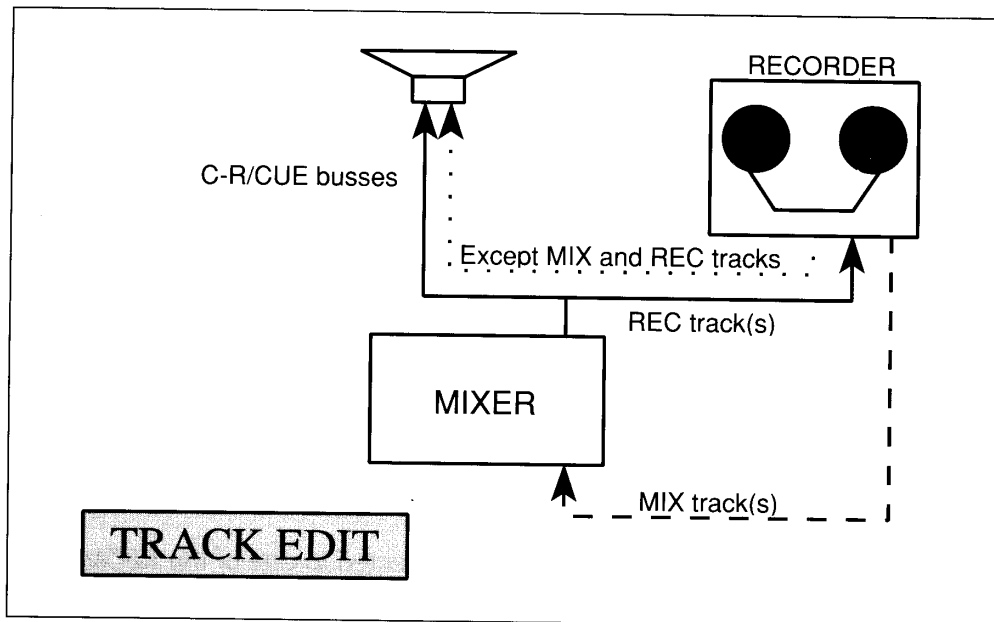
The recording mode in which inputs and *mix tracks* may be recorded with precise punch-in and punch-out times. A digital crossfade facility is provided for seamless punch operations.





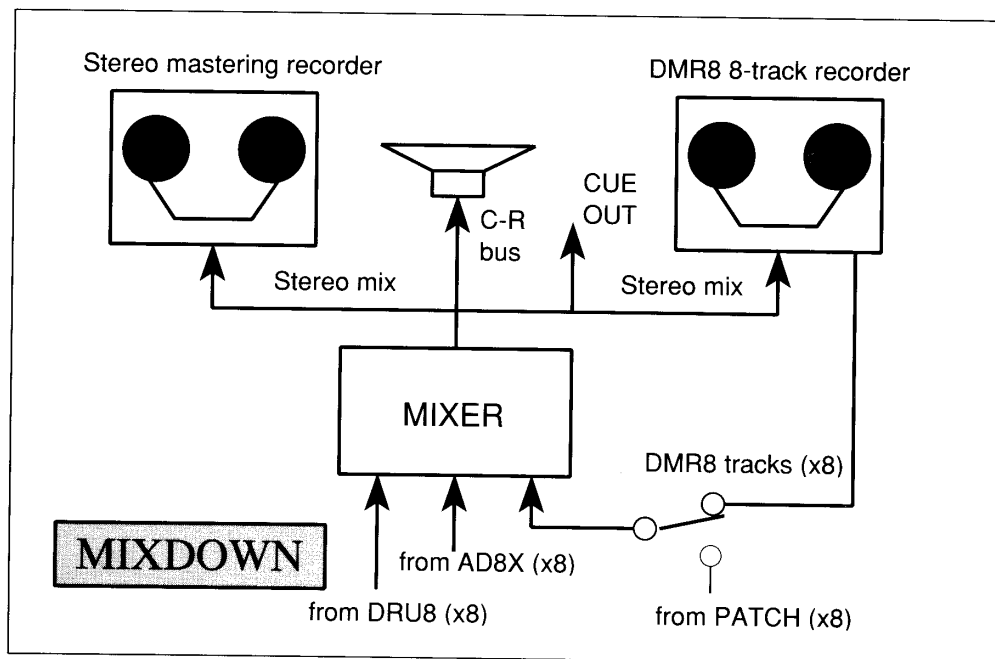
## TRACK EDIT

Similar to *PUNCH IN* mode, but no external input sources may be added.



## MIXDOWN mode

In MIXDOWN mode, the eight recorded tracks can be mixed down to a stereo mastering machine or, alternatively, to a pair of DMR8 tracks. Up to 16 other inputs may also be combined, for 24-into-2 mixdown, from another synchronized tape deck or from AD sources.



## 2 • Glossary of DMR8 terms - CUE

---

### CUE

The output bus usually used to drive the studio artists' foldback monitoring system (usually headphones).

### C2 flag

A C2 flag is one set internally in the DMR8 to show that interpolation of lost data has taken place. The occurrence of C2 flags can be viewed on the main display when in METER mode, when PEAK HOLD is switched on.

### Fader scrolling

In various modes, notably *MIXDOWN* mode, the DMR8 is capable of accepting and mixing more than eight input signals. The fader scroll keys (◀ and ▶ beside the bottom of fader 1), are used to select the inputs which will be controlled by the faders.

### MIX track

A *MIX track* is a track which has been selected in one of the *RECMIX* modes to replace an input channel, i.e. as a source for track bouncing.

### MONITOR or C-R

On the DMR8, the output bus used to drive the control room monitoring system. In *RECMIX* modes, this may be a mixture of input signals and signals from tape. In *MIXDOWN* mode, this will be the same as the signal sent to the 2-track mixdown recorder.

### REC track

A *REC track* is a track which has been armed for recording.

### RELATIVE fader mode

To allow greater precision of fader operation, the DMR8 is provided with a *relative fader mode*, in which the faders automatically move to a central position with a different resolution than the *absolute* mode, and may be used to make fine adjustments.

### Soft keys

The row of eight keys immediately under the tape transport keys are referred to as *soft keys* [S1] through [S8]. These have a variety of functions when used in conjunction with the green SOFT MENU keys immediately under the memory card slot.

### 2.5 Glossary of digital audio terms

Digital audio uses some terms which may not be familiar. This is a list of some of the generic digital audio terms which may be encountered in conjunction with the DMR8.

This brief section cannot, obviously, serve as a complete course on the theory of digital audio. The reader is directed to a reference work on the subject<sup>1</sup> for further details.

#### AES/EBU

A digital self-clocking digital audio standard, allowing the transmission of a stereo signal at RS-422 level down a single balanced cable. Connections are made using XLR connectors. The DMR8 is able to output AES/EBU data from the C-R and/or CUE busses in *RECMIX* modes, and to the C-R and 2-track busses in *MIXDOWN* mode, and receive AES/EBU from appropriately-equipped 2-track recorders.

#### Dither

A method of avoiding rounding and/or quantization errors, by applying a pseudorandom bit sequence to attenuated signals. In this way, the low-order bits are constantly changing, which might not otherwise be the case. The DMR8 implements dither in one of the HELP pages.

#### Reed-Solomon error correction

A method of error correction employing polynomial algorithms for burst error correction. This method of error correction is used extensively in professional and domestic audio applications, and is used in the DMR8 tape transport.

#### Sample

In digital audio, a "snapshot" of sound, lasting for a period related to the *sampling frequency*. If the sampling frequency is set 48kHz, for instance, the sample time will be  $\frac{1}{48000}$ . Standard sampling frequencies are 48kHz, 44.1kHz (the standard for CDs), and 32kHz, suitable for broadcast where the upper audio frequency is 15kHz.

#### Sample length

The number of bits which go to make up one sample, and hence the dynamic range of the audio device. Each bit is roughly equivalent to 6dB. The CD/DAT

---

<sup>1</sup> Some suggested books are:

*The Art of Digital Audio* John Watkinson, Focal Press (Butterworth Group), 1988, 1989

*Coding for Digital Recording*, John Watkinson, Focal Press (Butterworth Group), 1990

## 2 • Glossary of digital audio terms - Sigma-delta conversion

---

standard allows for 16 bits: 96dB, and the DMR8 records at 20-bit resolution. The internal processing is either done at 28 or 32 bits. I/O is handled at a 24-bit level.

### **Sigma-delta conversion**

When converting analog data into digital data, the raw pulse-code modulated data is expressed as a stream of change of state pulses which are subsequently integrated. Yamaha A-D convertors use this principle of data encoding.

### **S/P-DIF**

A digital self-clocking digital audio standard, which may be regarded as a domestic version of *AES/EBU*. The DMR8 is able to output S/P-DIF data from the C-R and/or CUE busses in *RECMIX modes*, and to the C-R and 2-track busses in *MIXDOWN* mode, and receive SPDIF from appropriately-equipped 2-track recorders. Stereo SPDIF is transmitted at 0.5Vp-p levels down an unbalanced cable, usually terminated in a phono (RCA) connector. Standards exist (but are not implemented on the DMR8) for fiber-optic transmission of SPDIF data.

### **V-sync**

This is sometimes known as "video sync". A clock which "ticks" once every timecode frame in order to help synchronize digital audio with video.

### **Word clock**

A clock (either internal or external to the DMR8) which "ticks" once every audio data word. In some data formats, a word consists of one sample, but in others they are paired, so that a word clock "ticks" once every stereo sample. This is necessary to keep different digital devices, for instance, A/D convertors and the DMR8, synchronized to each other at a sample level. A *word clock* is completely unrelated to timecode.

## 2.6 The front panel

The fold-out diagram of the front panel shows the important features of the DMR8 operational front panel in some detail. The following descriptions refer to this diagram

### 1 Cassette slot

The cassette slot is used to insert the YAMAHA M20P cassettes and cleaning cassettes. These are automatically loaded and ejected, in a similar fashion to a video recorder.

### 2 Tape movement indicators

The tape movement indicator LEDs show the current status of the tape. For instance, all LEDs lit steadily indicate that the tape is stopped, while all flashing indicate PAUSE mode. See the section on the "Recorder" for full details.

### 3 Master/slave indicators

These three indicators (MASTER, SLAVE and SYNC) give instant visual confirmation of the master/slave status of the DMR8. When locked to external synchronization, the SYNC indicator will light.

### 4 Sampling frequency indicators

If an external word clock has been selected and is being received, the EXT CLK indicator will light. The selected sampling frequency will be indicated by the appropriate frequency indicator, and the VARI indicator will light if varispeed has been selected.

If a pre-recorded tape is inserted with a sampling frequency different to that currently selected, these indicators will flash, and a message will be displayed on the subdisplay.

### 5 Tape transport keys

These keys are described more fully in the "Recorder" section. Most of these are fairly self-explanatory, except for the yellow **REHE** key, which acts as a rehearsal key in certain modes.

### 6 Special function keys

These keys serve two functions - they usually allow the use of special functions, described below, but also have a secondary used as "soft" keys.

**INITIAL SET** allows the setting of system parameters.

**VARI PITCH** allows the setting of speed with a variation of  $\pm 10\%$ .

**COPY** allows direct digital copying of audio data from the DMR8 to another DMR8 or a DRU8.

## 2 • The front panel - 7 RECORD-MIX keys

---

**MIDI**, as the name suggests, allows the setting of MIDI parameters (see the section on "MIDI" for full details).

**DATA SV/LD** is concerned with the setting of parameters concerned with the memory card.

**AUTO MIX EDIT** allows the recording, editing (real-time and off-line) and replay of automated mixing data.

**EVENT EDIT** allows the setting of scene memories and their association with pre-defined timecode points.

**TOC** is concerned with the Table of Contents on tape, containing details of session notes, automix data, memories, etc.

However, when the "soft" menus are activated (use the green soft keys - **43**), these keys take on the functions of track arming, channel-to-track assignment, etc, and generally speaking, the numbers above these keys **S1** through **S8** reflect track or channel names.

### 7 RECORD-MIX keys

These keys are used to configure the DMR8 into the various recording modes available (see earlier in this section for details).

The SLAVE controls are used to control the functions of another DMR8 or DRU8 linked to the master DMR8.

The **PARKING** key is used to control the function of the subdisplay.

### 8 ASSIGN-EDIT keys

These keys are used for a wide variety of parameter selection and setting (mainly on the subdisplay). The **SHIFT NEXT** and **SHIFT BACK** keys are used to choose between menu pages on the subdisplay, the **←** and **→** keys to position the cursor, and the **↑** and **↓** keys used to set values.

### 9 Numeric keypad

Used for direct numerical entry of data. When the **SHIFT** key is lit, these act as alphabetic entry keys. The **small** key changes the case of alphabetic characters. The ASSIGN-EDIT **←** and **→** keys are also used as cursor keys, and the **↑** and **↓** keys are used to enter punctuation (or Japanese *katakana* characters).

### 10 Timecode keys

These keys are used to control the DMR8's response to timecode (either internally or externally generated). The most important key in this block is probably the **MENU** key, which allows access to a variety of options. The **LOAD/HOLD** gives access to the internal generator, and the **CHASE** key is used when synchronizing to other equipment, as is the **OFFSET** key.

### 11 Locator keys

These are used to set location points (**ADDRESS IN** and **MEMORY**), and to locate to these points (**LOCATE**). The bottom row of this block is concerned with the repeat facility, setting start and end points, and shuttling the tape between these points.

### 12 Mixing parameter keys

These keys are used to select mixing parameters (EQ, delay, phase, etc, as shown on the main display). These may require more than one press to bring up the required parameters. For instance, the **DELAY/PHASE** key pressed once will bring up the screen for input delay. Pressing it again will show the pan settings.

Adjustments to the parameters selected with these keys are made with the DATA ENTRY slider, or with the MIXING PARAMETER control diamond. In certain cases, the channel faders may also be used (EQ and CH MODULE mode).

### 13 Effect control

These keys affect the selection and operation of the three digital effects units incorporated in the DMR8. The exception is the **UTILITY** key, which is used to bring up a series of general mixer setting functions.

### 14 Mixing parameter keys

These PARAMETER keys are used for most operations where the parameters are shown on the main display (EQ, effects, pan, etc). The **←** and **→** keys to position the cursor, and the **↑** and **↓** keys used to set values. Additionally, the **↶** and **↷** keys are used to recall and store effect setting parameters.

### 15 Data entry slider

This slider duplicates the function of the PARAMETER **↑** and **↓** keys, and can be used to make quick adjustments to wide-ranging parameter values.

### 16 Faders

There are 10 motorized faders on the DMR8. Generally speaking, faders 1 through 8 correspond to the eight channels or tracks, fader 9 is a return fader, and 10 acts as a master. However, using the fader control keys (**23**), these faders can perform other tasks.

Greater fader precision can be achieved by using the ABSOLUTE and RELATIVE modes. A fader which has a task currently unassigned to it cannot be moved (the motor will resist movement).

## 2 • The front panel - 17 EDIT key

---

### 17 EDIT key

Each mixer channel is equipped with an **EDIT** key. The function of this key is to allow override or editing of automix data.

### 18 ON key

These keys serve the same function as ON/OFF or MUTE buttons on a conventional mixer. ON/OFF switches can be grouped.

### 19 SELECT key

This key is used when editing mixer parameters to determine which channel's parameters are currently being edited.

### 20 GROUP keys

There are two fader groups available on the DMR8. If the fader of any one channel in a group is moved, the faders of other channels in that group will follow it. In addition, a stereo group facility is incorporated, allowing adjacent channels to be linked for EQ, ON/OFF switching, etc (the **STEREO GROUP** key in 12).

### 21 Pan keys

Each channel may be panned using these keys. Pressing both pan keys of a channel together for about a second and then releasing them will return the "panpot" to the center position.

### 22 Pan indicators

The three LEDs at the top of each channel give an instant visual confirmation of the pan position for each channel. At positions which are not hard-left, hard-right or center, two out of the three LEDs will be lit. If the channel is panned hard-left, hard-right or center, then the appropriate LED will be lit.

### 23 Fader control keys

The top twelve keys of this block allow the faders to be assigned to a number of functions (eg when the faders are in **C-R** mode, they are controlling the control-room monitor mix).

The **ABSLT** (ABSOLUTE) and **RLTV** (RELATIVE) keys allow precision setting using the faders, increasing the resolution (which may be set in the UTILITY mode).





Below this, the **←** and **→** keys allow "scrolling" of the faders, so that more channels can be controlled (in mixdown, for instance, the DMR8's console can accept 24 channels, controlled with eight faders and these scroll keys).



### 24 Memory function keys

Scene and other memories are stored on the memory card. There are four types of memory, as described in the section on the mixing console, and these keys select the type currently in use (also shown on the LEDs in 41).

### 25 Memory keys

Using the  and  keys, a memory of the currently-selected type can be selected (as shown on the 7-segment LED 41), and the  and  keys are used to recall or store these memories.

### 26 Direct memory keys

These eight keys allow quicker access to user-defined memories.

### 27 C-R monitor section

These keys allow the choice of program source to be monitored through the control-room monitoring speakers, the ability to turn a stereo source into a mono one, to turn it on or off, to affect the volume and balance, to dim the output, or to listen to a dedicated studio-to-control-room microphone input.

### 28 CUE monitor section

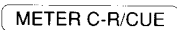
Essentially the same kinds of function are provided here as in the previous block, but here affecting the signal sent to the studio artistes (CUE bus). The talkback control and talkback-to-tape (SLATE) controls are also in this block.

### 29 Talkback microphone

This integral microphone allows communication between the control-room engineer and the studio artistes. The volume control for this microphone is on the rear panel.

### 30 Meters (i)

These eight peak meters can be selected (using 31) to monitor input channels, effect sends or returns, CUE and C-R levels, and signals input at the SLAVE input.

More precise C-R and CUE monitoring is available on the main display using the  in 37.

### 31 Meter selection (i)

These keys select the function of the right block of meters (30) as described above.

## 2 • The front panel - **32** Meters (ii)

---

### **32** Meters (ii)

These eight peak meters either monitor tape signals or input signals (at mixdown time) as selected by **33**.

### **33** Meter selection (ii)

As explained above, this key selects the function of the center meter block.

### **34** Peak hold

When on, this key will cause the meters to display permanently the value of the highest signal received. Turning this off will reset the meters. This facility also applies to the main display C-R and CUE "meters".

### **35** Meters (iii)

These two TC meters show whether timecode is being transmitted (OUT) and/or received (IN). They may be used to assist troubleshooting in timecode-based setups.

### **36** Meters (iv)

These meters show the current level status of the two analog AUX tracks, which may be used for click, cue, etc.

### **37** Display function

These keys are used to change the function of the main display. In NORMAL mode, the first two lines of the display show parameters and the bottom two display track names. However, the whole of the display may be given over to displaying parameters only, current channel-to-track assignments or fader positions. As previously mentioned, the display may also be converted to a multi-segment C-R or CUE meter.

### **38** Subdisplay control

This key is used to select the function of the subdisplay - whether it shows timecode (acts as a tape counter), or whether it shows the details of the currently-selected memory (selected using **24**, **25** and **26**).

### 39 Main display

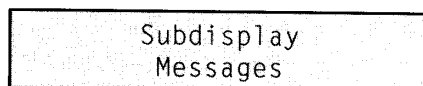
This 4 x 40 display gives information relating to the mixing console. Almost invariably, the PARAMETER keys (14) and DATA ENTRY slider (15) are used to make adjustments to parameters displayed on this screen.

In this manual, main screen displays will be shown as follows:



### 40 Subdisplay

This 2 x 24 display is used in conjunction with the ASSIGN-EDIT keys (8) in order to make settings connected with operations other than the mixing console. In this manual, subdisplay messages will be shown as follows:



Using 38, it also functions as a tape counter, giving the current position of the tape in absolute or timecode terms (selectable through the timecode MENU pages).

### 41 Memory indicators

The four LEDs indicate what kind of memory has currently been selected.

The 2-digit 7-segment LED shows the number of the memory. If the current settings vary from the last-selected memory, a dot will be displayed to the right of the number. If a memory has been selected, but not yet recalled, the number will flash until the memory **RECALL** key (25) is pressed.

### 42 Fader status

The current fader status is indicated by one of these three LEDs, as well as by the current fader status key (23) being illuminated. In addition, if a video monitor is connected to the VIDEO SUPERIMPOSE connector on the rear panel, the fader status will be shown there as well.

### 43 SOFT menu keys

Used in connection with 6, these keys allow the quick setting of channel-to-track assignments, the selection of "mix" tracks, arming of tracks, and the selection of parameters for automated mixing. The main display is used with the soft menus.

## 2 • The front panel - 44 Oscillator

---

### 44 Oscillator

A built-in oscillator allows sine-wave or pink noise generation for troubleshooting and line-up purposes, etc. These keys control the on/off and the frequency selection of this oscillator.

### 45 HELP key

This key, when pressed, allows access to a wide variety of system setup parameters. Used in conjunction with the main display, the numeric keypad (9) is used to select options, and the ASSIGN·EDIT block (8) is used to change parameters. See section 5 for details of the HELP menus.

### 46 Memory card slot

This slot holds a Yamaha MCD64 memory card, used for the storage of memories (24) and automix data.

## Unpacking and basic care - Table of contents

---

### 3 Unpacking and basic care

3.1 Unpacking and siting .....	29
3.2 Making power connections .....	29
3.3 Initializing the DMR8 .....	30
3.4 Connections .....	31
3.5 Everyday care .....	31
3.5.1 Cleaning the fan filter .....	32
3.6 Digital recording .....	32
3.6.1 Distortion .....	32
3.6.2 Tape noise .....	32
3.6.3 Sampling frequencies .....	32
3.6.4 Crossfade .....	33

### 3 Unpacking and basic care

In the packing box, the following items should be supplied (in addition to this manual):

1	DMR8 Digital Mixer/Recorder
1	soft cover
1	"Getting Started" manual (inside this manual)
1	25-way "straight" cable (for audio connection to AD8X) - "JAE" connector
1	25-way "crossed" cable (for audio connections to another DMR8 or DRU8) - "DDK" connector
1	15-way control cable (for control connections to another DMR8 or DRU8)
1	8-pin DIN YAMAHA cascade/sub-mixer cable
10	M20P tape cassettes
1	YAMAHA MCD64 RAM card
1	YAMAHA M20CL head cleaning cassette

If any of these items are missing, consult your supplier.

In addition, the YAMAHA AD8X 8-channel AD converter is required. **The DMR8 cannot accept analog audio signals for recording.** If you do not have an AD converter, you will only be able to use the DMR8 for mixdown of tapes recorded elsewhere.

#### 3.1 Unpacking and siting

- **DO NOT ATTEMPT TO UNPACK THE DMR8 ON YOUR OWN!** The DMR8 weighs over 30kg (66lbs), and is quite bulky. For your own sake, and that of the DMR8, do not attempt to unpack and install the DMR8 by yourself.
- **PREPARE A LANDING-SITE** Make sure that there is a sufficiently strong and stable level surface on which the DMR8 can be sited. The DMR8 should not be tilted more than 10° (front end down), and 35° (rear end down).
- **ALLOW SPACE FOR VENTILATION** There should be sufficient space not only for the DMR8, but also for ventilation on all sides except the front. The DMR8 should not be placed directly under a shelf – ventilation is needed on the top as well. You will need to access the rear panel, so make sure that you can reach it without too much trouble. Place the DMR8 on its intended site.

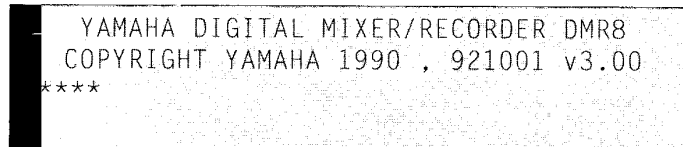
#### 3.2 Making power connections

Both the DMR8 and the AD8X need AC power. Make sure that your power supply matches the voltage requirements on the back of the DMR8 and the AD8X. Use the usual common sense rules when choosing the power supply – avoid putting these units on the same circuit as devices which generate large transients (refrigerators, copiers, etc.).

### 3 • Initializing the DMR8 - Initializing the DMR8

---

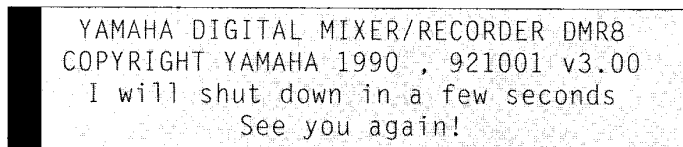
The power switch for the DMR8 is located on the rear panel, on the right side (as you look from the front). When switching on the DMR8, the main display will briefly show:



YAMAHA DIGITAL MIXER/RECORDER DMR8  
COPYRIGHT YAMAHA 1990 , 921001 v3.00  
\*\*\*\*\*

and the row of symbols will move across the bottom lines of the display for a few seconds (the ROM revision date and version number may differ from those shown here). When the symbols have cleared from the main display, the DMR8 display will revert to the last used display, and the unit is ready for use.

When switching off the DMR8, switching off the power switch will cause the main display to show:



YAMAHA DIGITAL MIXER/RECORDER DMR8  
COPYRIGHT YAMAHA 1990 , 921001 v3.00  
I will shut down in a few seconds  
See you again!

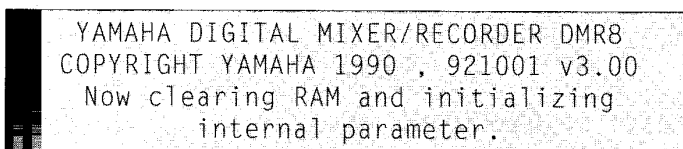
After about three seconds, the DMR8 will turn itself off. This display is not shown if the unit is switched off at the AC outlet (mains plug) or if there is a power cut.

### 3.3 Initializing the DMR8

This is a way of resetting all parameters to factory settings. If the DMR8 has been used previously, it may be preferable to start with a "clean slate". Data on card is not erased if this procedure is followed.

Make sure that any data that might be needed in the future (effect parameters, automix data, initial settings, etc.) has been saved to card, MIDI bulk device or tape before initializing the DMR8.

To initialize the DMR8, make sure the power is off, and hold down the **COMM IN** and **MONO** C-R monitor keys. Turn on the DMR8 while holding down these keys. The main display will show:



YAMAHA DIGITAL MIXER/RECORDER DMR8  
COPYRIGHT YAMAHA 1990 , 921001 v3.00  
Now clearing RAM and initializing  
internal parameter.

when the power is turned on. Press the **COMM IN**, **DIM** and **MONO** keys individually to return the C-R monitoring to its normal state.

### 3.4 Connections

When making multi-pin 'D' connections (25-pin for AD, SLAVE and PATCH, 15-pin for CONTROL and 9-pin for REMOTE) to and from the DMR8, make sure that the connectors are securely inserted, and that any retaining screws on the connectors are used to avoid accidental disconnection of the cables.

Use the same quality of cable and connectors for making digital audio connections that would be used for analog audio.

All XLR analog connections to and from the DMR8 are balanced, and have the following pinout:

1	earth
2	hot
3	cold

Since AES/EBU digital audio and analog audio both use XLR connectors, take care that the correct units are connected when making linking the DMR8 to other units using these connectors.

8-pin DIN cables (as used for CASCADE, SUB IN, etc) are available from YAMAHA dealers.

### 3.5 Everyday care

The DMR8 has been designed to be robust and to operate in normal working environments without requiring maintenance. Nonetheless, there are a few basic "dos and don'ts" which should be followed if the DMR8 is continue working at its peak level of efficiency.

- **DO** keep the supplied cover on the DMR8 when it is not in use and switched off. This will prevent dust from entering, and also prevent accidental spillage of liquids, etc, into the DMR8.
- **DO** make sure that the DMR8 is always connected to the appropriate power supply. Use of an inappropriate voltage will almost certainly damage the internal cicuitry of the DMR8.
- **DO** clean the tape heads at regular intervals, using the special YAMAHA M20CLhead cleaning cassette, and following the instructions supplied with the cassette. The "head time", ie the length of time that the DMR8 has played or recorded tapes, is available through **HELP** option 9.
- **DO** follow the usual commonsense rules about electronic appliances: do not spill liquids inside the DMR8, keep it away from extremes of temperature and humidity, clean the case only with a soft, dry cloth, and do not attempt modifications or servicing by yourself.
- **DO** always ensure that the DMR8 is firmly and securely situated when in use.
- **DO NOT** block the top, side or bottom vents of the DMR8. Though the top panel may seem ideal for track lists, cue sheets, scores, etc, try to find



### 3 • Digital recording - Distortion

---

another place to keep these. In addition, make sure that the surface on which the DMR8 rests is big enough for all four feet of the DMR8. If this is not the case, the bottom vents will be blocked, restricting the airflow.

- **DO NOT** leave tapes in the DMR8 when powering down.
- **DO NOT** subject the DMR8 to shocks or excessive vibration, whether in use or when it is being transported. The use of a foam-lined flight-case is recommended for transportation purposes.

#### 3.5.1 Cleaning the fan filter

The rear panel fan filter will need to be cleaned occasionally. The frequency of the cleaning operation will depend on the DMR8 environment. Follow the procedure below:

- Turn the DMR8 power OFF, and disconnect the AC power cable.
- Use a Phillips screwdriver to remove the four screws holding the filter retaining grille.
- Clean the filter using warm water and detergent. Allow it to dry thoroughly before replacing it.
- While the filter is removed, clean the area of the DMR8 back panel with a dry soft brush or cloth.
- Replace the filter and retaining grille. Locating the lower pair of screws first facilitates replacement of the grille.
- Reconnect the AC power.

### 3.6 Digital recording

It is assumed that before using the DMR8 you have some basic knowledge of multitrack recording procedures. The following points which are particular to digital audio should be borne in mind, however:

#### 3.6.1 Distortion

While tape saturation and meter readings over 0dB can be acceptable in analog recordings, digital distortion is unacceptable. The top LED of the meters of the DMR8 and the AD convertor (the red "CLIP" LED) should never be lit.

#### 3.6.2 Tape noise

When making microphone recordings using analog equipment, tape and mixer noise will sometimes mask background ambient noise. This is not true of digital equipment - no unwanted noises will be hidden. Make sure, therefore, that the recording environment keeps out as much unwanted noise as possible.

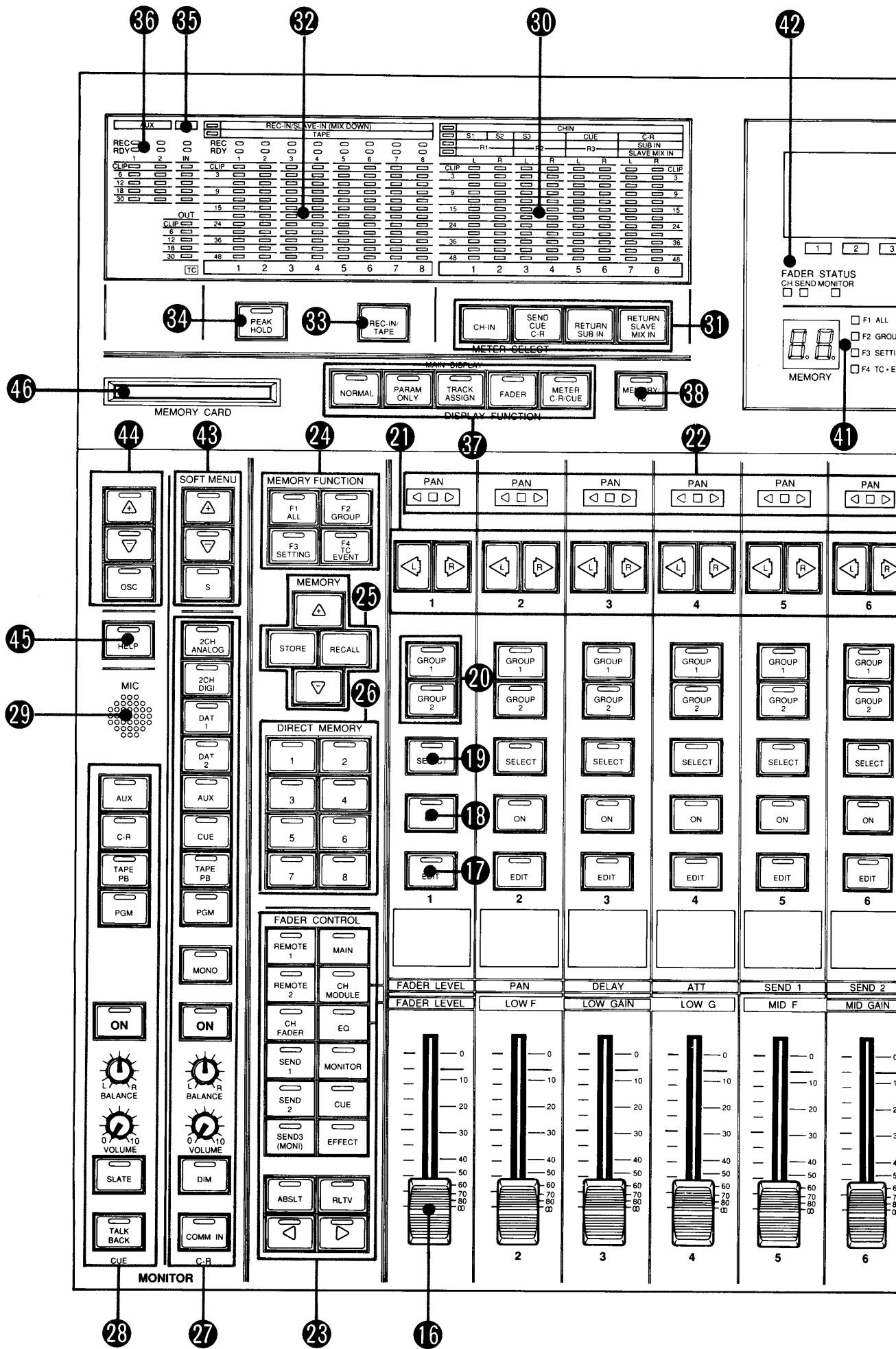
#### 3.6.3 Sampling frequencies

44.1kHz is the frequency at which CDs are mastered. Use this frequency for any material which may subsequently find its way onto CD. 32kHz gives an

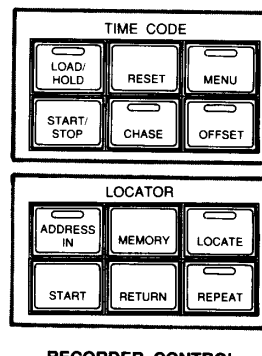
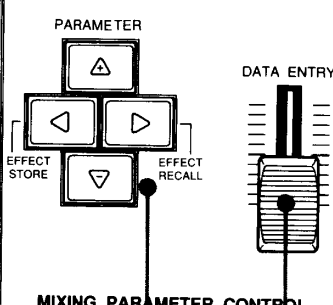
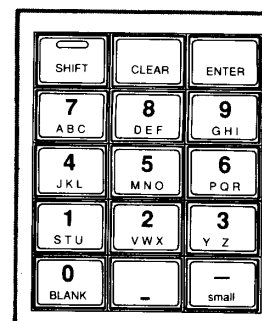
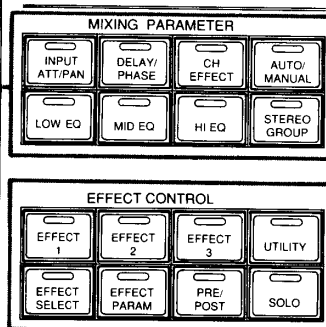
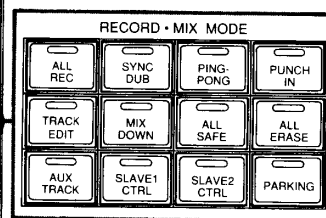
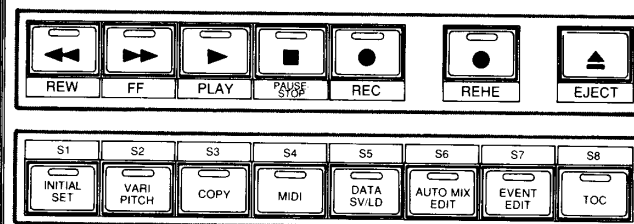
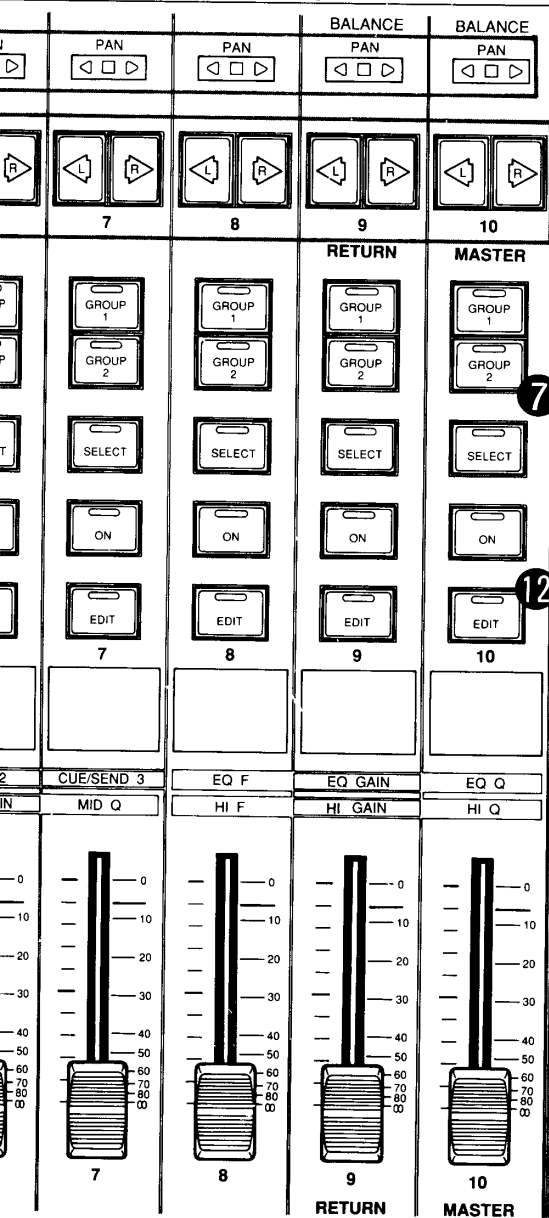
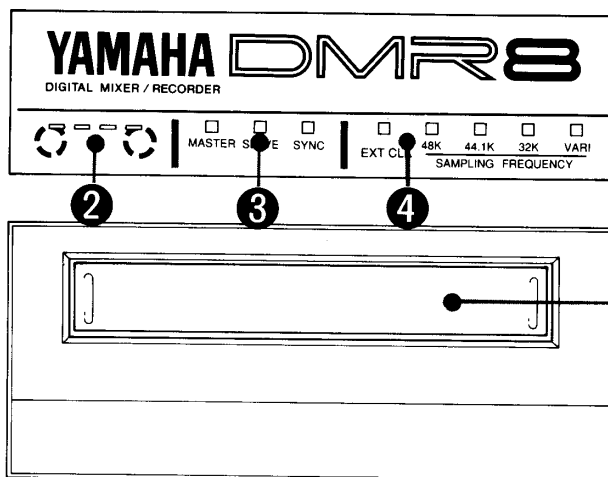
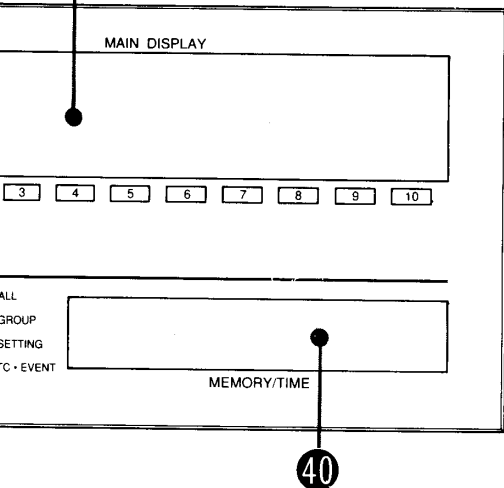
upper audio frequency of 15kHz - the upper limit for FM radio and analog TV broadcasting. 48kHz is the sampling frequency used for the audio component of some satellite TV broadcasts, and may be used in the future for pre-recorded DAT material. Select the frequency according to the final use of the recorded material.

#### **3.6.4 Crossfade**

When making analog recordings, punching in and out is limited to replacing existing portions of program material. On digital recorders, crossfading is necessary to avoid digital "blips". The DMR8 automatically performs such crossfading, and also allows variable crossfade times at punch-in and punch-out, to provide seamless recording.



39



14

15

## 4 Connections

4.1 Audio connections .....	35
4.1.1 Digital .....	35
1 DIGITAL IN/OUT AD/DA .....	35
2 DIGITAL IN/OUT SLAVE .....	35
3 DIGITAL IN/OUT PATCH BAY .....	35
4 DIGITAL STEREO (2CH STEREO) OUT/IN .....	36
5 DAT 1/2 IN/OUT .....	36
6 CASCADE IN/OUT .....	36
7 C-R MONITOR OUT .....	36
8 CUE MONITOR OUT .....	36
9 EFFECTS SEND/RETURN (1, 2, 3) .....	36
10 IN INSERT OUT/IN .....	37
11 OUT INSERT OUT/IN .....	37
12 MONITOR INSERT IN/OUT .....	37
13 SUB IN .....	37
14 SLAVE MIX IN .....	38
4.1.2 Analog .....	38
15 AUX IN/OUT (1,2) .....	38
16 ANALOG IN (L,R) .....	38
17 C-R ANALOG OUT (L, R) .....	38
18 CUE ANALOG OUT (L, R) .....	38
19 COMM IN .....	39
20 TALKBACK VOLUME .....	39
21 HEADPHONE sockets and controls (C-R and CUE) .....	39
4.2 Sync and word clock connections .....	39
22 TIME CODE IN/OUT .....	39
23 MIDI (TIME CODE) IN/OUT .....	39
24 V-SYNC IN .....	40
25 WORD CLK IN/OUT .....	40
26 CLK OUT .....	40
4.3 Other connections .....	40
27 MIDI IN/OUT .....	40
28 REMOTE .....	40
29 CONTROL IN/OUT .....	40
30 VIDEO SUPERIMPOSE IN/OUT .....	41
31 Footswitches and foot controllers .....	41
Rear panel diagram .....	

## 4 Connections

The following section describes the rear panel and the connections which should be made to incorporate the DMR8 in a system.

### 4.1 Audio connections

Audio connections to the DMR8 may be digital or analog. The digital connections are described first.

#### 4.1.1 Digital

When making digital connections, ensure that the other equipment is capable of transmitting and receiving digital data in the same format as that used by the DMR8 connector. Domestic DAT recorders, for instance, are not capable of accepting or transmitting AES/EBU signals.

##### 1 DIGITAL IN/OUT AD/DA

This connector will normally be used with a straight ("JAE") 25-way cable to the AD8X 8-channel A-D convertor.

The 25-pin 'D' connector is used to receive and transmit eight channels of audio data in Yamaha MEL2 format. Devices which may be connected to this port are: the Yamaha AD8X, another DMR8 or the DRU8 (if a DMR8 or DRU8 is to be connected, the "crossed" cable - "DDK" must be used). Wordclock information is also carried on this connector, so no word clock connection is necessary if Yamaha format equipment or self-clocking equipment only are used in the system.

##### 2 DIGITAL IN/OUT SLAVE

This connector will normally be used with a crossed ("DDK") 25-way cable to another DMR8 or DRU8 SLAVE connector.

The 25-pin 'D' connector is used to receive and transmit eight channels of audio data in Yamaha MEL2 format. Devices which may be connected to this port are: another DMR8 or a DRU8 or an AD8X (use a "straight" - "JAE" cable). Wordclock information is also carried on this connector, so no word clock connection is necessary if Yamaha format equipment or self-clocking equipment only are used in the system.

##### 3 DIGITAL IN/OUT PATCH BAY

This connector will normally be used with a crossed ("DDK") cable to connect to a digital patchbay such as the Yamaha IFU5A or IFU5B, via a format convertor (for example, the YAMAHA FMC8).

The 25-pin 'D' connector is used to receive and transmit eight channels of audio data in Yamaha MEL2 format. Patch in/out information is set using the

## 4 • Audio connections - Digital

---

**UTILITY** key. Wordclock information is also carried on this connector, so no word clock connection is necessary if Yamaha format equipment or self-clocking equipment only are used in the system.

### **4 DIGITAL STEREO (2CH STEREO) OUT/IN**

These two XLR connectors are used to make connections to a mastering 2-track recorder capable of receiving and transmitting AES/EBU audio data. This may be an audio recorder or a composite digital video recorder. Each XLR connector carries stereo information. Since AES/EBU is a self-clocking and self-synchronizing standard, no separate wordclock connection is necessary.

### **5 DAT 1/2 IN/OUT**

These phono (RCA) connectors are used to make connections to DAT recorders capable of receiving and transmitting S/P-DIF audio data. Each connector carries stereo information. Since S/P-DIF is a self-clocking and self-synchronizing standard, no separate wordclock connection is necessary.

### **6 CASCADE IN/OUT**

This pair of 8-pin DIN connectors is used for making connections to external devices, allowing the DMR8 to use a digital sub-mixer, or to be used as one. Data is transmitted and received in Yamaha MEL2 format. Each 8-pin DIN connector carries stereo audio information. Since MEL2 is self-clocking and self-synchronizing, no additional word clock connection is needed.

The cascade position (pre- or post-fader) is selected using the **UTILITY** key.

### **7 C-R MONITOR OUT**

Two connections are provided: an XLR connector for AES/EBU and a phono (RCA) connector carrying S/P-DIF format information. Either of these should be connected to a D-A convertor feeding the control-room monitor system, or to the DIGITAL IN connector (S/P-DIF) of a suitably-equipped domestic hi-fi amplifier.

### **8 CUE MONITOR OUT**

Two connections are provided: an XLR connector for AES/EBU and a phono (RCA) connector carrying S/P-DIF format information. Either of these should be connected to a D-A convertor feeding the studio artists' monitor system, or to the DIGITAL IN connector (S/P-DIF) of a suitably-equipped domestic hi-fi amplifier.

### **9 EFFECTS SEND/RETURN (1, 2, 3)**

These three pairs of 8-pin DIN connectors are used for making connections to external signal processors. Data is transmitted and received in Yamaha MEL2

format. Each 8-pin DIN connector carries stereo information. Since MEL2 is self-clocking and self-synchronizing, no additional word clock connection is needed.

The effect "[ 0] EXTERNAL" must be selected for signals to be output and received through these connectors.

### **10 IN INSERT OUT/IN**

This pair of 8-pin DIN connectors is used for making connections to external signal processors for two input channels at a post-phase, pre-pad point (REC-MIX) or post-delay, pre-pad (MIXDOWN). Data is transmitted and received in Yamaha MEL2 format. Each 8-pin DIN connector carries two mono channels of audio information. Since MEL2 is self-clocking and self-synchronizing, no additional word clock connection is needed.

The channels to which the inserts apply are selected using the **UTILITY** key.

### **11 OUT INSERT OUT/IN**

This pair of 8-pin DIN connectors is used for making connections to external signal processors for the stereo out (to 2-track) at a post-fader point. Data is transmitted and received in Yamaha MEL2 format. Each 8-pin DIN connector carries stereo audio information. Since MEL2 is self-clocking and self-synchronizing, no additional word clock connection is needed.

Out insert is selected using the **UTILITY** key.

### **12 MONITOR INSERT IN/OUT**

This pair of 8-pin DIN connectors is used for making connections to external signal processors for the monitor out at a post-fader point. Both digital and analog outputs are processed by any effector placed in this loop. Data is transmitted and received in Yamaha MEL2 format. Each 8-pin DIN connector carries stereo audio information. Since MEL2 is self-clocking and self-synchronizing, no additional word clock connection is needed.

Monitor insert is selected using the **UTILITY** key.

### **13 SUB IN**

This 8-pin DIN connector is used for the stereo signal from another digital device (DMP7D, DRU8, etc). Data is received in Yamaha MEL2 format. The 8-pin DIN connector carries stereo audio information. Though MEL2 is self-clocking and self-synchronizing, the DMR8 cannot accept word clock information from this input. The DMR8 must be the word clock master in the system, and should be used to synchronize the SUB device.

The SUB IN control is usually assigned to channel 9 on the DMR8's mixing console.



## 4 • Audio connections - Analog

---

### 14 SLAVE MIX IN

This 8-pin DIN connector is used for the stereo signal from another digital slave device (DRU8, etc). Data is received in Yamaha MEL2 format. The 8-pin DIN connector carries stereo audio information. Since MEL2 is self-clocking and self-synchronizing, the DMR8 can accept master word clock information from this source. However, if the DMR8 is to be the word clock master in the system, the DMR8 should be used to synchronize the SLAVE device.

### 4.1.2 Analog

The most important audio connections made to the DMR8 are the digital connections. Since the DMR8 does not contain its own A-D convertor for recording to tape, analog connections are auxiliary to the digital connections.

### 15 AUX IN/OUT (1,2)

The four phono connectors are used for direct input and output of analog material to be recorded on the analog tracks. The direct OUTs are provided for the input of click tracks, etc, to a synchronizing device. The AUX tracks can, however, be monitored on both the C-R and CUE busses.

Nominal 10k $\Omega$  (IN), 50k $\Omega$  (OUT), both @ -10dB

### 16 ANALOG IN (L,R)

These balanced XLR connectors are used to supply a stereo analog source which can subsequently be monitored using the **2CH ANALOG** key. Note that there is no dedicated analog output. It is, however, possible to use an external D-A convertor to convert either the AES/EBU or one of the DAT S/P-DIF format and feed an analog 2-track recorder.

Nominal 600 $\Omega$  @ +4dB

### 17 C-R ANALOG OUT (L, R)

These balanced XLR connectors are used to feed a power amplifier driving the control room monitoring system. The volume and balance of the signal coming from these connectors is controlled by the C-R VOLUME and BALANCE controls as well as by channel 10 in MONITOR mode.

Nominal 600 $\Omega$  @ +4dB (+18dB before clip)

### 18 CUE ANALOG OUT (L, R)

These balanced XLR connectors are used to feed a power amplifier driving the studio artists' monitoring system. The volume and balance of the signal coming from these connectors is controlled by the CUE VOLUME and BALANCE controls as well as by channel 10 in CUE mode.

Nominal 600 $\Omega$  @ +4dB (+18dB before clip)

### 19 COMM IN

This balanced XLR connector takes the output from a 600 $\Omega$  microphone for direct communication between the artists and the control room. The rotary control next to the connector control the volume of the signal.

The **COMM IN** key is used to route the signal from this connector through to the monitor bus.

### 20 TALKBACK VOLUME

This rotary control affects the volume of the signal output from the integral talkback microphone on the front panel.

### 21 HEADPHONE sockets and controls (C-R and CUE)

These 1/4" stereo headphone sockets are used to output the C-R and CUE busses respectively. The volumes for these headphone sockets are controlled using the rotary controls, not the front panel controls.

Both headphone sockets are for use with 8 $\Omega$  or 40 $\Omega$  headphones, and deliver a nominal 0.4mW or 1.4mW respectively.

## 4.2 Sync and word clock connections

The DMR8 can synchronize at frame or sample level. Accordingly, a range of connections is available for such synchronization.

Many of the digital audio inputs and outputs to and from the DMR8 include word clock signals as part of the audio signal. However, in some cases, it will be necessary for the DMR8 to receive or transmit word clock information separately from the signal.

### 22 TIME CODE IN/OUT

This pair of XLR connections are used to transmit and receive SMPTE/EBU timecode signals in standard format (10k $\Omega$  in, 600 $\Omega$  out). Though these connectors are balanced, appropriately-wired unbalanced connections can be used.

The OUT connector can be used to retransmit (jamsync) incoming timecode, with an offset if required.

### 23 MIDI (TIME CODE) IN/OUT

This pair of 5-pin DIN connectors wired according to the MIDI specification provides input and output facilities for MIDI timecode (MTC). As with non-MIDI timecode, the OUT can be used to provide a jamsync facility.

**NOTE** that these connectors are not used for MIDI messages such as Program Change, controller or System Exclusive. They are dedicated for use with MTC.

## 4 • Other connections - 27 MIDI IN/OUT

---

### 24 V-SYNC IN

This BNC connector accepts V-SYNC (video synchronization) signals at video signal levels in order to synchronize the DMR8 to composite digital video recorders, etc.

### 25 WORD CLK IN/OUT

This pair of BNC connectors is used for receiving (IN) and transmitting (OUT) word clock information from and to devices which need this word clock information at TTL levels.

### 26 CLK OUT

This 8-pin DIN connector outputs a YAMAHA format word clock at RS422 levels. This connector should be used when connecting a device such as the YAMAHA DMP7D to the SUB IN connector in order to synchronize the DMP7D with the DMR8.

## 4.3 Other connections

### 27 MIDI IN/OUT

This pair of 5-pin DIN connectors is used for transmitting and receiving Program Change, controller change and System Exclusive data. In addition, the DMR8 is also capable of transmitting Start, Stop, Continue, MIDI Clock, Song Select and Song Position Pointer messages.

Though no dedicated THRU connector is provided, there is a "soft THRU" function provided, allowing the OUT to echo the information received at the IN connector (merged with DMR8-generated information)..

**NOTE** These connectors are not used for MIDI timecode.

### 28 REMOTE

This 9-pin 'D' connector is used to accept control signals using one of three protocols: Type 1 for the RC8 controller/locator (YAMAHA), Type 2 for BVE-910, BVU-950, BVU-900, RM-450 (Sony) and Type 3 for CMX-300 (CMX) or ACE-200 (Ampex), enabling the DMR8 to be controlled from a wide variety of video controllers, EDL editors, etc.

All signals are at RS422 levels. The protocol used is selected in the HELP menus.

### 29 CONTROL IN/OUT

These 15-pin 'D' connectors are used to link the DMR8 to other DMR8s or DRU8s. Though it is possible to "daisy-chain" units, it is not possible to connect two units together "back-to-back", ie IN→OUT and OUT←IN.

Information received at the IN connector is echoed through to the OUT connector. All signals are YAMAHA format at RS422 levels.

### **30 VIDEO SUPERIMPOSE IN/OUT**

The DMR8 can output a 1Vpp composite video signal consisting of the subdisplay's contents and the current tape position to a video monitor from the VIDEO SUPERIMPOSE OUT connector (BNC). If a video signal in a similar format is received at the IN connector, the DMR8 can superimpose its own signal over the received signal. This facility is selectable using the HELP menu. The video format is NTSC for 100/110V models, and PAL for 220/240V models. This is a factory setting and may only be altered by YAMAHA. Contact your supplier for details.

### **31 Footswitches and foot controllers**

The 1/4" phone FOOTSWITCH A connector may be used with a YAMAHA FC4 or similar footswitch (push-to-make non-latching) in order to provide "hands-off" punching facilities.

The 1/4" phone FOOTSWITCH B connector may be used with a YAMAHA FC4 or similar footswitch (push-to-make non-latching) to provide an extra talkback microphone control.

The 1/4" phone "FOOT VOLUME A" connector may be used with a YAMAHA FC7 or similar foot controller to provide a supplementary data entry controller, duplicating the function of the DATA ENTRY slider on the front panel.

The 1/4" phone "FOOT VOLUME B" connector may be used with a YAMAHA FC7 or similar foot controller to provide a "hands-off" method of controlling the tape speed ( $\pm 10\%$ ) when the DMR8 is in VARI PITCH mode.

