



Small Format Digital Mixing Console Evaluation

Feature	Sony DMX-R100	Mackie D8B (OS Version 2)	Yamaha 02R (Version 2.0 software)
Motorized faders	25	25	21
Fader resolution	10-bit (1024 steps)	8-bit (256 steps)	7-bit (128 steps)
Fader level readout	Yes	No	Yes
Total input channels	56	48	40
Expansion card slots	4	3 + 1	4
Tape inputs	32	24	32
Analog inputs (onboard)	42	42	36
Mic preamps	12	12	8
Analog outputs (onboard)	20	30	14
Digital inputs (onboard)	6 ch AES/EBU	2 ch AES/EBU, 2 ch S/PDIF	2 ch AES/EBU, 4 ch S/PDIF
Digital outputs (onboard)	6 ch AES/EBU	2 ch AES/EBU, 2 ch S/PDIF	2 ch AES/EBU, 2 ch S/PDIF
Meter bridge	Yes	Yes	Optional
Sample rates supported	44.1, 48, 88.2, 96 kHz	44.1, 48 kHz	32, 44.1, 48 kHz
A/D converters	24-bit, 128x oversampling	24-bit, 128x oversampling	20-bit 64x oversampling
D/A converters	24-bit, 128x oversampling	24-bit, 128x oversampling	20-bit, 8x oversampling and 18-bit, 8x oversampling
Groups	8	8 <i>cut + fader</i>	8 <i>4 fader 4 cut</i>
Audio signal routing	Yes	No	Limited
Channel delay	Yes, max. 999.9 ms @ 44.1 or 48 kHz	No <i>coming @ 22ms</i>	Yes, max. 59.0 ms @ 44.1 kHz; max. 54.2 ms @ 48 kHz
Buses	8 + Stereo	8 + Stereo	8 + Stereo
Direct outs	48 (one per channel)	24	16
Inserts	12 analog channel + 8 "floating" bus	12 analog channel	8 analog channel
Cut/mute controls	Per channel	Per channel	Per channel
Pan controls	Per channel	Per channel	In "Selected Channel" section
Solo modes	AFL/PFL/Solo	AFL/PFL/Solo	AFL/PFL/Solo
Aux sends	8	12	8 (6 on jacks)
Aux send pre/post setting	Per channel	Global	Per channel
Aux returns	8	0	0
User interface	SVGA Touch-screen and Parameter Setting panel + keyboard/mouse	"Fat channel" + keyboard/mouse and external screen	Backlit 320 x 240 LCD
Equalization	4-band parametric plus dual filters per channel; can be applied to buses and Aux sends	4-band parametric per channel; cannot be applied to buses or Aux sends	4-band parametric per channel; can be applied to stereo bus and multitrack buses but not Aux sends
Dynamics processing	Independent compressor/ducking and expander/gate; can be applied to buses and Aux sends <i>(2)</i>	Independent compressor and gate per channel; cannot be applied to buses or Aux sends <i>NO Key (2) Fixed pre EQ</i>	Single dynamics processor (with companding function) per channel; can be applied to buses but not Aux sends
Onboard effects	Possible future expansion	Yes, via plug-ins	Two global effects

*by most console each design*

External Resonance needed

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Feature	Sony DMX-R100	Mackie D8B (OS Version 2)	Yamaha 02R (Version 2.0 software)
Video reference input	Yes	No	No
Word clock in/out	Yes	Yes <i>optional</i>	Yes
SMPTE time code reader	Yes	No <i>YES NO</i>	Yes
SMPTE time code generator	Yes	No	No
MTC time code reader	Yes	Yes	Yes
Transport controls	Yes	Yes	No
MMC support	Yes	Yes	No
9-pin machine control support	Yes	No	No
Boot system <i>fuse.</i>	Flash ROM <i>1min</i>	Hard drive <i>12min</i>	ROM <i>2min</i>
Floppy disk drive	Yes	Yes	No
Keyboard/mouse input	Yes	Yes	No
VGA monitor output	Yes	Yes	No
USB port	Yes	No	No
Oscillator	Yes, sweepable 20 Hz - 20 kHz	No	Yes, fixed @ 100 Hz, 1k, 10k
Snapshots/Scenes	99 <i>select Local</i>	99	96
Cue/Locate points	99	99	N/A (no machine control)
Dynamic mix automation	Yes	Yes	Yes
Touch-sensitive faders	Yes	Yes (option)	Yes (option)
Touch sensitivity control	Yes	No	No
Mix automation memory	Two 4-MB buffers, 10 mixes storable in flash ROM	Two 500 KB buffers	Two buffers, 16 mixes storable, to maximum of 2.5 MB total <i>500k Stack</i>
5.1 mix support	Yes; free panning	Yes; free panning	Yes; limited
Center channel divergence	Yes; continuous	No	Yes; off, half, on
5.1 monitoring *	Yes	No	No
"Smiley-face" talkback mic	Yes	No	No

Important

Many lacks for Surround

## **Explanatory Notes:**

### **Motorized faders**

The DMX-R100 and D8B both have twenty-four motorized channel faders plus a motorized stereo bus fader. The 02R has twenty motorized channel faders (sixteen mono and four stereo) plus a motorized stereo bus fader. The motors on the DMX-R100 and 02R respond crisply, while the D8B motors are noticeably more sluggish in response. It's also worth noting that the DMX-R100 faders are metal (as opposed to the plastic faders used on the D8B and 02R) and that they have superior weighted ballistics.

### **Fader resolution**

The DMX-R100 provides 10-bit resolution on all faders (1024 steps), while the D8B and 02R have considerably grainier 8- and 7-bit fader resolution (256 and 128 steps), respectively. Can you say "zipper noise?"

### **Fader level readout**

Need to do a "vocal-up" or "vocal-down" mix? Knowing the precise level of your channel faders makes this a much easier task, and both the DMX-R100 and 02R displays give continuous readouts, while the D8B does not, neither in the console's display nor in the onscreen display.

### **Total input channels**

The DMX-R100 provides a total of 56 input channels (24 line and/or mic-level inputs, 24 tape inputs, and 8 Aux returns), although these numbers are halved (to a total of 28 input channels) when double-speed sample rates of 88.2 or 96 kHz are used. (See "Audio signal routing" below.)

The 02R provides a total of 40 input channels, divided between line and/or mic-level inputs and up to 32 tape inputs. The situation with the D8B is obscured somewhat by what might be called "marketing channels." At various times, the D8B product literature and owners manual refers to "56 inputs," "72 channels" and even "96 channels" — but that's only if you count internal effects returns, optional "Alt" card slot returns, fader groups, MIDI controllers and bus outputs as "channels." The real answer is 48: 24 line and/or mic-level inputs plus 24 tape returns.

Each DMX-R100 input channel provides independent panpots for the stereo bus and multitrack buses, as well as dual fader control over level to the stereo and multitrack buses. This makes it possible to output multiple mixes simultaneously — for example, one mix to multitrack tape and a separate mix to two-track, as might be required for live performance. On the D8B and 02R, each line/mic input channel uses the same panpot for its stereo bus and multitrack bus assignments, significantly limiting the ability to output multiple mixes.

### **Expansion card slots**

Both the DMX-R100 and 02R provide four expansion card slots, which can be used for tape returns or other functions (such as optional plug-in support). All of the DMX-R100 expansion cards take up a single slot; in contrast, several of the 02R expansion card options require two slots (thus reducing the number of slots available). The D8B provides three general expansion slots plus a specialized "ALT I/O" slot that adds eight additional digital or analog inputs. In addition, up to four effects expansion cards can be installed in the D8B (one is provided with the purchase of the board).

### **Tape inputs**

Here, again, the situation is clear with the DMX-R100 and the 02R but not with the D8B. The DMX-R100 and 02R each provide a maximum of 32 tape inputs when all four expansion card slots are filled with I/O cards. The D8B has 24 "official" tape inputs (they come in on tape in channels) but the addition of an analog or digital "Alt" I/O card allows another 8 inputs (which could come from a tape machine). These appear, however, on specially marked "Return" channels, so they could also be construed as Aux returns (see the "Aux returns" section below).

### **Analog I/O**

The DMX-R100 provides a total of 42 analog inputs, as follows: 12 In A (XLR) for channels 1 - 12; 12 In B (TRS) for channels 1 - 12; 12 line in (Neutrik combo) for channels 13 - 24; 2 2Tr In 1 (XLR); 4 Aux return (TRS). All analog inputs are balanced, and all use identical A/D converters. (See "Converters," below.)

The DMX-R100 provides a total of 20 analog outputs, as follows: 4 Pgm (stereo bus) Out (2 XLR and 2 TRS); 8 Aux send (TRS); 6 Control Room monitor (TRS); 2 Studio Monitor (TRS). All analog outputs are balanced, and all use identical D/A converters. (See "Converters" and "5.1 monitoring," below.)

There are a total of 42 analog inputs on the D8B, as follows: 12 Mic In (XLR) for channels 1 - 12; 12 Line In (TRS) for channels 1 - 12; 12 line in (TRS) for channels 13 - 24; 6 2Tr In (A, B, C), all on TRS jacks. All analog inputs are balanced, and all use identical A/D converters. (See "Converters," below.)

There are a total of 30 analog outputs on the D8B, as follows: 4 Master (stereo bus) Out (2 XLR and 2 TRS); 12 Aux send (TRS); 8 Bus Out (DB25 connector); 4 Control Room monitor (2 Main and 2 Nearfield), all on TRS jacks; 2 Studio monitor (TRS). All analog outputs are balanced, and all use identical D/A converters. (See "Converters" below; also see "5.1 monitoring" below.)

There are a total of 36 analog inputs on the 02R, as follows: 8 In A (XLR) for channels 1 - 8; 8 In B (TRS) for channels 1 - 8; 16 line in (TRS) for channels 9 - 24; 2 Analog 2Tr In on TRS jacks; 2 Analog 2Tr In 2 on RCA-type jacks. All analog inputs except 2Tr In 2 are balanced, and all use identical A/D converters. (See "Converters" below.)

There are a total of 14 analog outputs on the 02R, as follows: 4 Stereo Out (2 on XLR and 2 on RCA-type jacks); 6 Aux send (unbalanced TS); 2 Control Room monitor (TRS); 2 Studio monitor (TRS). The XLR Stereo Out and Control Room and Studio monitor outputs are balanced; the RCA-type Stereo out and the 6 Aux sends are unbalanced. The Aux sends and Studio monitor outputs also use lower quality D/A converters than the other outputs. (See "Converters," below.)

In all three products, the number of analog I/O channels can be increased with the use of expansion cards. (See "Expansion card slots" above.)

The DMX-R100 and D8B offer 12 mic preamps, while the 02R has 8. However, while all three mixers provide +48V phantom power for each channel mic preamp, the D8B phantom power switches are inconveniently located on the rear jackfield (the DMX-R100 and 02R place them directly on the front panel channel strip).

### **Digital I/O**

Out of the box, the DMX-R100 has six channels of AES/EBU digital I/O on XLR jacks: Pgm (Stereo) master out; Aux send/return 5 - 8; and 2Tr In 2.

The D8B provides a Master L/R (stereo bus) output on both AES/EBU XLR and S/PDIF RCA-type jacks, as well as separate AES/EBU and S/PDIF digital inputs (labeled "Digital In 1" and "Digital In 2," respectively). The 02R offers stereo bus outputs on both AES/EBU XLR and S/DIF RCA-type jacks, a stereo AES/EBU input (labeled "2Tr In 1") and two stereo S/PDIF inputs ("2Tr In 2" and "2Tr In 3"). In all three products, the number of digital I/O channels can be increased with the use of expansion cards. (See "Expansion card slots," above.)

### **Meter bridge**

Included in the DMX-R100 and D8B, a meter bridge is a \$ 1,299 (list price) option for the 02R — a significant add-on to an \$ 8,899 console! Note that both the DMX-R100 and 02R can provide multitrack bus and Aux send metering during any type of operation, while the D8B only allows you to meter these when a multitrack bus or Aux send is soloed.

### **Sample rates supported**

All three mixers support the standard sample rates of 44.1 and 48 kHz; however the DMX-R100 is the only one of the three to support the newer double-speed sample rates of 88.2 and 96 kHz which will become increasingly important as new delivery formats such as DVD become available. At these higher sampling rates, the frequency response of the board increases correspondingly to 40 kHz; however, the number of available input channels, multitrack buses, Aux sends, insertion sends and direct outs is halved. The 02R also supports the lower-quality 32 kHz sampling rate used in some multimedia applications.

### **Converters**

The DMX-R100 employs the latest generation of 24-bit, 128x oversampling A/D and D/A converters throughout. The D8B utilizes converters with equivalent specifications, but the 02R employs lower-quality 18- and 20-bit converters, as follows: 20-bit, 64x oversampling A/D converters for all analog inputs; 20-bit, 8x oversampling D/A converters for the Stereo out and Control Room monitor out; and 18-bit 8x oversampling D/A converters for Aux sends and Studio monitor outputs.

## **Groups**

The DMX-R100 provides eight groups, each of which can be used as either a fader or cut (mute) group. In addition to channel faders, Aux sends, Aux returns, or multitrack or stereo bus masters can be included in these groups. There are two kinds of fader groups: Gang (where any fader can act as master, with the relative levels between the faders maintained) and VCA (where moving the designated master fader adds or subtracts from the levels of the other faders in the group). One especially useful feature allows the relative positions of faders within a Gang group to be altered simply by holding one fader in the group while simultaneously adjusting the level of another.

The D8B provides eight "virtual" groups, each of which acts as both a fader and cut (mute) group. The 02R provides four fader groups and four cut (mute) groups.

## **Audio signal routing**

The DMX-R100 is the only mixer of the three to offer completely flexible channel reassignment: any incoming signal (including mic/line inputs, tape inputs and Aux returns) can be freely assigned to any fader or faders (even mults can be created). The current D8B OS (version 2) does not support any channel reassignments—incoming signal always appears on a fixed preassigned fader—although the next OS release (version 3) is said to include "cross patching," which will allow substitutions and multing. The Input Patching feature of the 02R (added to version 2.0 software) provides a very limited version of channel reassignment within blocks of eight (where, for example, signal arriving at line input 1 can be reassigned to any or all of faders 1 - 8, but not to fader 9). This feature also allows specific faders to act as multitrack bus masters — something that was not present in the original release of the 02R.

## **Channel delay**

Channel delays are an important feature in a digital mixer; they allow the engineer to compensate for latencies in connected devices and also to easily slip individual signals in and out of the "pocket"; they also enable the construction of look-ahead transient processing and pre-echoes. Thanks to its extensive memory buffering, the DMX-R100 allows by far the greatest amount of channel delay: up to 999.9 ms at either a 44.1 or 48 kHz sampling rate. Note that these maximum delay times are halved when using double-speed sampling rates of 88.2 or 96 kHz.

The 02R offers much shorter delay times of up to 59 ms at 44.1 kHz or 54.2 ms at 48 kHz (internal effects returns can be delayed as well as channels). The current D8B OS (version 2) does not support any channel delay, although the next OS release (version 3) is said to provide delay times of up to 999 samples, which will provide even more modest delay times of less than 23 ms at 44.1 kHz or less than 21 ms at 48 kHz.

## **Buses**

All three mixers offer eight buses, plus a stereo bus (called "Program" on the DMX-R100). When double-speed sample rates of 88.2 or 96 kHz are used, the DMX-R100 has four buses available. Note that the DMX-R100 allows Aux sends to be used interchangeably with multitrack buses as needed. (See "Aux sends" below.)

Both the DMX-R100 and D8B provide master multitrack bus faders. Although the 02R does not have dedicated faders for this purpose, any input channel can be designated as any multitrack bus master; the upside of this arrangement is flexibility, but the downside is that the user loses a channel input when doing so.

## **Direct outs**

The DMX-R100 provides 48 direct outputs — one for each channel. These can be freely routed to any slot of any expansion card or to any audio output, including Aux sends and the Pgm (stereo) bus. The D8B has 24 direct ("Tape") outputs; currently, only one channel can be assigned to any one tape out; however OS version 3 is said to allow freer routing, including assigning single channels to multiple tape outs. The 02R has only 8 direct outs, and those are hard-wired to mic/line channel inputs 1 - 16 only (making it difficult if not impossible to record more than 16 discrete tracks simultaneously).

## **Inserts**

The DMX-R100 and D8B offer 12 analog inserts (on channels 1 - 12), while the 02R has 8 (on channels 1 - 8). However, the DMX-R100 also provides 8 "floating" inserts which can be freely mapped to any multitrack bus, Pgm (stereo) bus, or Aux send. The upcoming Mackie D8B OS version 3 is said to add 4 "plug-in" inserts per optional UFX card installed.

### **Cut/mute controls**

Yes, every channel's got one in all three consoles, but the response in both the DMX-R100 and 02R is crisp and virtually instantaneous, while the D8B mutes noticeably more softly, using an undetermined preset crossfade time.

### **Pan controls**

Both the DMX-R100 and the D8B have dedicated panpots on each input channel; in the 02R, the pan control is located in the "Selected Channel" section. The DMX-R100 and D8B channel panpots can alternatively be used to set Aux send levels, trim levels, or multitrack bus levels. As noted in "Total Input Channels" above, each D8B and 02R line/mic input channel uses a common panpot for its multitrack and stereo bus assignment.

### **Solo modes**

Both the DMX-R100 and D8B have dedicated solo buttons on each channel strip. The 02R requires that the user first press a master "Solo" button, after which pressing a channel's "On" button routes it to the solo bus. All three mixers provide AFL and PFL listening modes, as well as mix-destructive Solo and master solo level controls. Only the DMX-R100 provides a "Momentary" mode, where the signal is soloed only as long as the button is physically held down. The D8B offers a "solo latching" feature, which, when on, allows multiple channels to be soloed (when off, only one channel at a time can be soloed).

### **Aux sends**

The DMX-R100 provides 8 Aux sends, each of which appears as a balanced TRS analog output at the rear panel. In addition, Aux sends 5 - 8 appear as AES/EBU XLR jacks and can be used to route signal to outboard digital processors. Any Aux send can be routed to any multitrack bus or to the Pgm (stereo) bus connector, in which case it appears at all three Pgm outputs (one digital and two analog).

The D8B has 12 Aux sends, each of which appears as a balanced TRS analog output at the rear panel (these same Aux sends are internally hardwired to the optional onboard effects). The 02R has 8 Aux sends, but only the first 6 appear as analog outputs on the rear panel, and then as unbalanced TS jacks (Aux sends 7 and 8 are hardwired to the two internal effects processors). The 02R allows Aux sends to be routed to individual expansion card slot outputs as needed. As noted in the "Converters" section above, the DMX-R100 and D8B use 24-bit, 128x oversampling D/A converters for their Aux send connectors, while the 02R uses 18-bit 8x oversampling D/A converters for its Aux send connectors.

It is also worth noting that, in the DMX-R100 and 02R, each Aux send can be set to pre- or post-fader on a per-channel basis. In the D8B, the pre- or post-fader assignment for each Aux send is done on a global basis (for all channels). Also, the D8B has no dedicated master Aux send controls; instead, a single V-Pot is used for this purpose.

### **Aux returns**

The DMX-R100 provides 8 discrete Aux returns; Aux returns 1 - 4 are analog (on balanced TRS jacks), while Aux returns 5 - 8 are digital AES/EBU. When double-speed sample rates of 88.2 or 96 kHz are used, the DMX-R100 has four Aux returns available. The 02R has no Aux returns (though there are two internal Effects returns), and neither does the D8B, but you could make a case that installing an optional "Alt" I/O card in a D8B adds 8 analog or digital Aux (or tape) returns. See the "Expansion card slots" and "Tape returns" sections above for more information.

### **User interface**

The user interface of the DMX-R100 is centered around a graphic SVGA touch-screen interface (with 800 x 600 pixel resolution) that is unique among all mixer products in this price range. A centrally located Parameter Setting panel provides dedicated knobs and switches for virtually all channel-specific operations, allowing free adjustment of multiple parameters simultaneously, without ever having to leave the sweet spot. In addition, a keyboard and mouse can optionally be used for data input such as titling and parameter selection. (See "Ports" below.)

The D8B has no onboard graphic display; instead, the user must rely on a small "Fat Channel" section that shows four selected parameters at a time on a small fluorescent LED display. All editing is done with the use of just four rotary "V-Pots" and four "Select" switches. There is, however, an onscreen display that can be accessed by connecting a VGA monitor, mouse and keyboard to the CPU (see "Ports" below). This provides fairly comprehensive visual feedback, although all parameter selection and data entry in this display is done by mouse and keyboard, thus diverting attention away from the mixer itself; as a result, the user often finds himself wondering where to look next.

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The 02R data is presented on multiple pages of a fairly modest 320 x 240 pixel backlit LCD display. Following the Yamaha philosophy of menus buried beneath menus, the user has to toggle some 24 buttons to call up these pages, often requiring four, five, or six button pushes to get to the desired page. All data entry is done with the use of four cursor keys and a data entry wheel. There is no provision for connection of an external monitor, keyboard, or mouse (making titling particularly tedious), although there are a number of third-party software editing packages that provide enhanced graphics and data input using the CPU and keyboard/mouse of an external computer. (See "Ports.") A dedicated section situated beneath the display provides a number of knobs and switches that allow various parameters (i.e. Aux send level, equalization values, and panpots — which, unlike the DMX-R100 and D8B, are not located on the channel strips) to be set for the selected channel.

### Equalization

The DMX-R100 offers four bands of parametric equalization per channel, plus low cut and high cut filters (the low cut filter can also be used as a notch filter). These same equalization controls — except for the low pass and high pass filters — is available for the Pgm (stereo) bus and the multitrack buses, as well for all Aux sends. The high frequency range of the equalizer and the upper end of the high cut filter is extended to approximately 40 kHz when operating the DMX-R100 at a double-speed sampling rate of 86.2 or 96 kHz (see table below). A graphic representation of the equalization curve is presented in the touchscreen.

The D8B also provides four bands of parametric equalization per channel (depending on the preset mode selected, one or two bands may be used as low cut and/or high cut filters); however, equalization cannot be applied to the Stereo bus or multitrack buses, nor can it be applied to the Aux sends. A graphic representation of the equalization curve is presented in the onscreen display but not in the front panel of the D8B itself.

Similarly, the 02R provides four bands of parametric equalization per channel, and equalization can also be applied to the Stereo bus and multitrack buses (though input channels are lost when faders are assigned to be multitrack masters — see "Buses" above). There is no provision for applying EQ to Aux sends. Each band is full-range (21 Hz to 20.1 kHz) and the high and low bands can be used as low pass and high pass filters, respectively. The upper end of the high band is reduced to 15.1 kHz when operating the 02R at a sampling rate of 32 kHz. A graphic representation of the equalization curve is presented in the 02R LCD.

The table below shows equalization parameter ranges for each product:

Parameter	DMX-R100	D8B	02R
Cut/boost (all bands)	±20 dB	±15 dB	±18 dB
Low frequency range	27.5 Hz to 880 Hz	20 Hz to 20 kHz	21 Hz to 20.1 kHz
Low frequency type	Shelving/Peaking switchable	Peaking/HPF dependent on mode	Shelving/Peaking/HPF switchable
Low mid frequency range	77.8 Hz to 2.5 kHz	20 Hz to 20 kHz	21 Hz to 20.1 kHz
Low mid frequency type	Peaking	Peaking	Peaking
High mid frequency range	220 Hz to 7.0 kHz	20 Hz to 20 kHz	21 Hz to 20.1 kHz
High mid frequency type	Peaking	Peaking	Peaking
High frequency range	622 Hz to 19.9 kHz @ 1fs 622 Hz to 39.8 kHz @ 2fs	20 Hz to 20 kHz	21 Hz to 20.1 kHz 21 Hz to 15.1 kHz @ 32 kHz
High frequency type	Shelving/Peaking switchable	Peaking/LPF dependent on mode	Shelving/Peaking/LPF switchable
Filter rolloff	12 dB / octave	12 dB / octave	12 dB / octave
Low cut filter	27.5 Hz to 415 Hz	20 Hz to 20 kHz	21 Hz to 20.1 kHz
High cut filter	1.48 kHz to 22.35 kHz	20 Hz to 20 kHz	21 Hz to 20.1 kHz 21 Hz to 15.1 kHz @ 32 kHz

### Dynamics processing

The DMX-R100 provides two independent dynamics processors for each channel — one for compression and ducking and the other for expansion and gating. Each has its own threshold, ratio, attack time, hold time, range and release times, and dynamic processing can also be applied to multitrack buses, the Pgm (stereo) bus and Aux sends and inserted pre or post equalization. Hard and soft knee compression is available, adjacent channels can be stereo linked, and any channel or Aux send can be used as a key (sidechain) input. A graphic representation of the dynamic processing curves



and gain reduction metering (for both compression and gating) is presented in the touchscreen.

The D8B also provides two independent dynamics processors for each channel — one compressor and one gate. Each has its own threshold, attack time and release time settings; in addition, the compressor has ratio and gain control parameters, while the gate has a range parameter. In the D8B, dynamic processing cannot be applied to either the multitrack buses, stereo bus, or Aux sends, and both are at a fixed insertion point pre equalization. There are no knee options, nor is there stereo linking, nor are there any key (sidechain) inputs. A graphic representation of the dynamic processing curves and gain reduction metering (for both compression and gating) is presented in the onscreen display but not in the front panel of the D8B itself.

The 02R provides a single dynamics processor for each channel, which can be used for compression, limiting, ducking, gating, expanding, or companding (compression plus expansion). Controls are provided for threshold, ratio, attack time, release time, and output gain (the gate has a hold time and the compander has a width control), and dynamic processing can also be applied to multitrack buses and the Pgm (stereo) bus (though input channels are lost when faders are assigned to be multitrack masters — see "Buses" above) but not to Aux sends. Hard and soft knee compression is available, adjacent channels can be stereo linked, and either the channel to the immediate left or Aux sends 1 or 2 can be used as a key (sidechain) input. The dynamics processor is at a fixed insertion point post equalization; however, channel key inputs can be taken pre or post eq. A graphic representation of the dynamic processing curve and gain reduction metering is presented in the 02R LCD.

The table below shows dynamics processing parameter ranges for each product:

Parameter	DMX-R100	D8B	02R
Compressor threshold	0 dB to -60 dB	-1 dB to -60 dB	0 dB to -54 dB
Gate threshold	0 dB to -80 dB	-1 dB to -60 dB	0 dB to -54 dB
Compressor/gate attack time	20 ms to 1 sec	.31 ms to 2.6 sec (comp) .10 ms to .6 sec (gate)	0 ms to 120 ms
Compressor/gate release time	31.6 ms to 50.1 sec	10 ms to 2.5 sec	5 ms to 46 ms
Gate hold time	20 ms to 1 sec	N/A	0.02 ms to 2.13 sec

### Onboard effects

There are currently no onboard effects in the DMX-R100; however, this is an area that may be implemented in future, possibly through third-party products.

The D8B provides effects via its four DSP expansion card slots and software plug-ins. One card is shipped with the unit, and each card supports two stereo effects. The effects provided at the time of purchase include reverb, delay (mono/stereo) and chorus; IVL Vocal Studio software (which provides pitch and formant shifting, as well as harmony generation and pitch correction) is also provided. However, before they can be used, the desired effects must be manually downloaded into the DSP card(s) — a process which is somewhat tedious and time-consuming. Once downloaded, effects sends are internally hard-wired to Aux sends 1 - 8. The 02R has two onboard stereo effects processors, hardwired to Aux sends 7 and 8 (returning on two dedicated Effects returns). Effects types include reverbs, delays, phasing, flanging, chorusing, pitch shifting and autopanning. In both the D8B and 02R, effects parameters can be freely edited, and there is provision for storage of user patches (as well as recall of factory patches).

### Video reference input and word clock I/O

The DMX-R100 is the only one of the three mixers — in fact, it is the only mixer in its price class — to provide a video reference input, thus removing the need for an expensive external resolver when doing postproduction work. All three mixers can lock to incoming word clock signal and output word clock to external devices. The DMX-R100 supports pull-ups and pull-downs and is unusually tolerant of drifts in word clock, continuing to pass audio signal even when sync is slipping. Its internal clock is exceptionally stable (unlike the 02R internal clock, which is notoriously unstable) and delivers a low-jitter signal, making it suitable for use as a master clock in studios doing solely audio work. Both the DMX-R100 and the 02R have displays which show the status of incoming clock and error messages when lock is lost; however, the D8B lacks any indication (either onscreen or in the console itself) of whether or not it is locked.

### SMPTE / MTC

Both the DMX-R100 and 02R are capable of reading incoming longitudinal SMPTE time code; however, only the DMX-R100 has the capability of actually generating SMPTE (while the 02R has an "internal" clock function, the time code

is not output to external devices). All three mixers can receive time code in the form of MIDI Time Code (MTC), and that is the only format in which the D8B can receive incoming time code without the installation of an optional LTC card. Interestingly, the D8B dynamic automation functions only become operative when MTC is physically being received at the MIDI In port (there is no dedicated MTC In port, as there is in the DMX-R100 and 02R). (See "Ports" and "Dynamic mix automation" below.)

### **MMC/Machine control support**

Both the DMX-R100 and D8B provide MIDI Machine Control (MMC) support and dedicated transport controls (including a jog/shuttle wheel), allowing them to control external devices such as hard disk recorders and tape machines. However, only the DMX-R100 offers 9-pin serial machine control (up to two external devices can be controlled simultaneously). The 02R has no machine control functions other than basic MIDI controller commands and therefore has no dedicated transport controls.

### **Boot system / floppy drive**

The DMX-R100 boots from Flash ROM, while the 02R boots from an EEPROM; in both instances, booting is nearly instantaneous upon power-up. The D8B boots from hard disk, and the startup procedure takes several minutes. Both the DMX-R100 and D8B offer floppy drives for data storage and OS updates (the 02R requires a chip swap for OS updates).

### **Ports**

Both the DMX-R100 and D8B have mouse and keyboard inputs, as well as a VGA monitor output; the 02R offers none of these. In the DMX-R100, the mouse and keyboard are used for parameter selection and data entry within the board's own internal operating system and the external monitor simply parallels the touchscreen display. In contrast, in the D8B, the mouse and keyboard are used to interact with a completely separate onscreen display. The DMX-R100 is the only one of the three mixers to offer a USB port, which is reserved for future use.

### **Oscillator**

The DMX-R100 provides a sweepable sine wave oscillator, with a continuous frequency range from 20 Hz to 20 kHz. The 02R oscillator outputs sine waves at fixed frequencies of 100 Hz, 1 kHz, and 10 kHz; there is also a noise output. Both mixers enable the oscillator signal to be routed to any Aux send, multitrack bus, or Program (stereo) bus. The D8B has no oscillator.

### **Snapshots/Scenes and Cue/Locate points**

The DMX-R100 and D8B allow the storage of 99 different Snapshots (complete front panel settings, called "Scenes" in the 02R), while the 02R allows the storage of 96. However, the DMX-R100 is unique in that it provides "Function Local" and "Channel Local" parameters. The former allows the user to filter specific parameters from being recalled, while the latter exempts specific channels, buses, Aux sends or Aux returns from being recalled. Both the DMX-R100 and 02R provide a single level of Undo when creating a Snapshot; the D8B has no Undo memory. One particularly user-friendly DMX-R100 "insurance policy" is that stored Snapshots are automatically placed in the first available empty memory slot unless the user decides otherwise.

Both the DMX-R100 and D8B allow the storage of 99 different Cue/Locate points that operate in conjunction with their transport controls. The DMX-R100 Cue window allows a complete cue list to be created, with user-designated Snapshots recalled at user-specified time code points. Because the 02R has no machine control (and therefore no transport controls), it does not store Cue/Locate points.

### **Dynamic mix automation**

All three mixers provide dynamic mix automation, with both absolute and "trim" (relative level adjust) modes. However, the DMX-R100 is the only one of the three to provide fader touch sensitivity, complete with adjustable sensitivity — a feature lacking even in many considerably more expensive mixers. This system relies on galvanic skin response, so simply touching the fader — not necessarily moving it — causes punch-in recording to begin, and releasing it causes punch-out. Though the D8B and 02R provide seemingly equivalent modes — called "Auto Touch" and "Touch Sense," respectively — both require that the fader or control be physically moved before punch-in recording begins, and, since there is no sensor, recording continues until manually stopped.

The DMX-R100 provides two dynamic automation buffers of 4 MB each, while the D8B provides two buffers of 500 KB each. Both allow automated mixes to be saved to floppy disk (the DMX-R100 allows up to 10 automated mixes to be stored to flash ROM, while the D8B also allows saving to hard disk). The dynamic mix memory situation in the 02R is less clear; out of the box, the mixer comes with 480 KB of memory, which can be expanded to a maximum of 2.5 MB. However, this memory is shared by however many mixes are stored onboard (up to 16 can be stored) as well as with an undo buffer (which cannot be defeated). Thus, in practice, even assuming that the onboard storage area is left empty, the maximum memory available for any single 02R mix is 1.25 MB. It is worth noting that dynamic automated mix data is often modest in size when doing standard stereo mixes, but can increase dramatically when doing surround mixes involving numerous complex pan trajectories. (See "5.1 mix support" below.)

As noted in the "SMPTE / MTC" section above, the D8B requires incoming MTC (or LTC, if an optional expansion card is installed) in order to enter mix automation mode. In contrast, both the DMX-R100 and the 02R have internal clocks that allow the user to rehearse mix moves without actually connecting and running an external tape or hard disk recorder.

There is currently no provision in the DMX-100 for offline or event list editing; however, that is being considered for future expansion. Both the D8B and 02R do offer this option (in the D8B, via the onscreen display only); however, the 02R's CPU is much too slow to make this of any practical application for any but the most basic of mixes.

### **5.1 mix support**

All three mixers support 5.1 surround mixing; however, they all provide very different ways of doing so. The DMX-R100 offers the simplest approach: a dedicated Surround Pan window allows the user to create free pan trajectories at any speed desired simply by moving his or her finger along the touchscreen. Multitrack buses 1 - 6 are automatically assigned to the six speakers (using the standard Dolby Digital assignments) when surround mode is selected, and these buses can be individually turned on or off on a per-channel basis, allowing trajectories between selected speakers only. Nine different preset static or "starting" positions are provided. A divergence control allows full control (0 - 100%) of the relative center speaker level. There is no separate LFE level control.

The D8B requires that the user access the onscreen display in order to do surround mixing. A small control panel allows free trajectories to be drawn with the mouse, and speakers can be individually turned on or off. Specific multitrack buses are used for the surround outputs, depending upon the mode selected. Two static positions can be set, with "morphing" between them, and a "flyback" control allows for A/B/A panning. There is no center speaker divergence control and no separate LFE level control, although both features are said to be added to the upcoming OS 3 software.

Version 2.0 software for the 02R added limited 5.1 mixing capabilities. There is no true free panning, however; instead, using the data entry wheel (there is no mouse input), the user can either move the sound along a horizontal or vertical axis, or along a preset horizontal, vertical, diagonal, semicircular or circular trajectory. One nice feature is the provision for linking stereo channels for surround panning, where one channel trails or mirrors the trajectory of another. There is a center channel divergence control, but it can only be set to fully off, half on, or fully on (0%, 50%, or 100%). There is a separate LFE level control.

In all three mixers, all surround panning moves are automatically saved as part of a dynamic mix automation.

### **5.1 monitoring**

The DMX-R100 is the only one of the three mixers to provide true 5.1 monitoring. This is accomplished by having six Control Room outputs, all under the control of a single volume knob and dim/cut switches.

Despite the lack of a true surround monitoring section, both the D8B and 02R provide workable, albeit clumsy and limiting alternatives. The D8B owners manual suggests that the first 6 channels of both line/mic inputs and tape returns be reserved for surround monitoring, thus forcing the user to lose 12 channels! The 02R owners manual says nothing about the subject of 5.1 monitoring, but users have developed a workaround that involves using six channels, routing each to an Aux send at unity gain, and then assigning the six Aux sends to a card slot for output to speakers. The cost, of course, is the loss of all six Aux sends (as well as six input channels and a card slot), removing any means of sending signal to external processors other than by inserts (which only exist on line/mic channels 1 - 8).

### **"Smiley-face" talkback mic**

OK, so this isn't important. But the DMX-R100 is the only mixer of the three that's got one!