

M500
OPERATORS MANUAL

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DRAWMER M500

Dynamics Processor

CHAPTER 1

INTRODUCTION

The Drawmer M500 has been designed to handle both single or multiple dynamic control operations either in stereo or mono. A single Voltage Controlled Amplifier (VCA) is used in each channel to eliminate the signal degradation that inevitably occurs when several VCA devices are cascaded. The control interface has been designed so that, from the user's point of view, the processes are largely separate. This flexibility and sophistication is made possible by the advanced digital control system which replaces much of the conventional analogue side-chain.

For discrete mono applications, both channels may be configured independently to perform quite different functions. The only exceptions to this occur when panning or the more complex de-essing and compression options are used as these processes make use of both audio channels.

For convenience of terminology, the different processes are referred to throughout this manual as 'Effects'. The on-board Effects are: Compression, Limiting, Gating, Expansion, Auto-panning, De-Essing and Fading. Two filter sections are available which may be assigned either to the DE-ESSER or to the GATE enabling frequency-conscious gating to be implemented. Additionally, the factory presets include some special parameters which can not be adjusted by the user.

Many of the Effects have additional parameters not found on conventional units which open up new opportunities for both corrective and creative control. In particular, the GATE is able to generate MIDI information when triggered from an audio source or, conversely, it may be triggered via MIDI if required. In fact the MIDI implementation of the M500 is extensive and it is able to respond to MIDI notes, clocks, switches, program changes and controller data.

For a full description of the MIDI specification of the M500, refer to the MIDI section later in the manual.

The GATES also have the ability to record and store the envelope of a sound which can then be imposed on any other sound passing through the GATE. For example, a piano envelope could be imposed on a sustained synth sound to give a more percussive 'feel'.

The panning section is also extremely flexible and input signals may be panned using a variety of control waveforms, either free-running or related to a MIDI Clock, making it possible to sync the Effect to tempo. PAN position may also be controlled directly from MIDI note information.

Because of its powerful digital control system, the M500 is able to assist the user by largely optimising its own internal gain structure and also by disabling any Effects that cannot logically be used in combination with the ones already selected. For example, one would never follow a PANNER by a COMPRESSOR so this selection is prohibited.



HOW TO USE THIS MANUAL

The descriptions in the later sections of this manual make reference to the text that appears on the Liquid Crystal Display (LCD). All possible permutations of text is printed, actual text shown will depend on one or more parameter settings. The possible options printed here will be inside a 'drop-down' menu. Where the LCD text is shown inside a **shaded** 'drop-down' menu, this implies that the user has no direct control over this message, the M500 will decide which message to display. A small 'serpentine' between two parameters denotes the range between the minimum and maximum. The parameter obtained by rotating the encoder fully leftwards is always shown at the top of the menu list.

For easy recognition of topics, different graphical 'icons' are used. Text inside a rounded rectangle show that the text refers to a **KEY** press. For example **MISC** implies that the MISC button should be pressed to be able to perform a certain function.

A word or phrase inside a shadowed menu refers to text that will be printed on the Liquid Crystal Display (LCD). This is the name of a **Parameter**. So for instance **SysLEVEL** implies that the parameter on the display window with the flashing cursor underneath is the system level.

Text or a number marked **LIKE THIS** implies that this value or wording can be adjusted by the operator by turning the rotary data knob.

Each button lists the parameters for adjustment working from the uppermost view screen through to the lowest screen. Each parameter name can be found in the left hand margin. Screens are scrolled up and down using the  UP and  DOWN arrow keys.



A warning triangle denotes important crucial information. These points must be remembered in order to gain the best understanding of the M500 unit.

INSTALLATION PRECAUTIONS

Before switching on the unit, ensure that the voltage selector adjacent to the mains inlet is set correctly. If this requires changing, the unit should be disconnected from the mains during the operation. If a fuse blows, replace with the same type and value as the one fitted.

When installing the M500, ensure that it is allowed sufficient ventilation and avoid mounting it next to excessively hot pieces of equipment or devices emitting a strong magnetic field such as is often the case with power amplifiers. If the unit is to be used in a mobile situation, it is strongly recommended that the rear of the unit is supported in the carrying rack to avoid bending the front panel rack mounting 'ears'.

Should the unit require cleaning, use a damp cloth with a little liquid detergent; do not use thinners or spirit cleaners as these may attack the finish.

The inputs and outputs to the M500 are electronically balanced and would normally be connected to your system via a patchbay. Should unbalanced operation be required, simply ground pin 3 on all four XLR connectors. If earth loop hum problems are encountered, **do not** disconnect the mains earth but instead, try disconnecting one end of the signal screen on the cables connecting the M500 to the patchbay. If such measures are necessary, balanced operation is recommended. The side-chain insert point is configured as a stereo jack socket wired tip return, ring send. This point is unbalanced and would normally be connected to a normalised or semi-normalised pair of patchbay contacts. For more information see the section marked SIDE CHAIN INSERT ROUTEING, 5.

The key input is configured as a mono un-balanced jack socket. Connection to a patch bay would be optimum if the tip was grounded when not in use. The function of this input is restricted to the GATE.






After switching on, check the system operating level by pressing **MISC** and then using the right-facing arrow to select **SysLEVEL** in the display window. Turning the data control knob allows the value to be switched between **-10dB** and **+4dB** and the setting appropriate to your mixing desk should be selected. There is also a provision on this page to change the Liquid Crystal Display screen contrast to suit your viewing angle.

CHAPTER 2

FINDING YOUR WAY AROUND

Despite its high degree of sophistication, the M500 has been provided with a friendly and intuitive operating system which issues on-screen prompts where appropriate. Because there are so many parameters attributed to the different Effects, these have been arranged so that the most often used ones are always accessed first allowing the more complex functions to be ignored unless required.

A common operation sequence is used to select and change parameters within the M500 which is both straightforward and intuitive:

- The required Effect or edit feature is selected using the buttons located to the left of the front panel which automatically switches the display to present the appropriate parameter menu. Depending on the Effect or function selected, the display will comprise one or more pages, the most often-used parameters being found on the early pages and the more esoteric ones on progressively later pages.
- The Effects are denoted by yellow keys above which are status LEDs giving an indication that the Effects are selected for use. All other edit keys are grey with a further red key being used to select between the left and right channels. Above this red key are red and green status LEDs to show which channel is currently being accessed. It is important to remember that unless an Effect is linked for two-channel operation, any parameter editing only affects the channel currently selected. Likewise, saving and loading of patches relates only to the channel selected unless the patch is a linked, stereo pair.
- The  UP and  DOWN keys are used to scroll up or down through the display pages whereon the  LEFT and  RIGHT keys are used to move the cursor over the parameter to be edited.
- Parameter values are changed using the rotary control knob. 

IMPORTANT GLOBAL INFORMATION



If a parameter is displayed in curly braces { }, it is irrelevant in the current setting. For example, if the GATE is being triggered via MIDI, its threshold setting will have no effect. However, the value may still be edited for a later time, when perhaps other parameter changes will make the braces disappear.



The O/L 1 and O/L 2 LEDs - O/L implies overload - warn that the input or output signal is exceeding +17dB which may cause clipping or over-compression. Overload might be caused if the M500's Output Gain or GATE Peak Level is set too high. The incoming signal level should be reduced or the offending parameter adjusted if this occurs.



For consistency, all the parameter time constants are expressed in time per 10dB change. Because not all functions will be required to switch all the way from maximum to minimum gain, this method of description is more accurate. The GATE's fastest attack time is $3\mu\text{S}$ which means that with the range set to 90dB, the GATE will take $3 \times 9 = 27\mu\text{S}$ to open completely.



Each channel has one set of filters which may be used either for de-essing or frequency-selective gating, but not both simultaneously. The DE-ESSER if assigned, has highest priority and any filter option will be removed from the GATE menu.

COMBINING EFFECTS

The operating system has been designed to allow the two channels of the M500 to be used either independently, or, as linked, stereo pairs. The Effects may be assigned for use in any order with the proviso that the chosen order is logical. As Effects are selected, any remaining, unassigned Effects that it would be illogical to add are removed from the choice and their LEDs extinguished. This operation is explained in detail in **ASSIGN**

PATCH MEMORIES

The M500 has 128 patch memories which can be called up via MIDI or selected from the front panel by hitting **PATCH** and then using the rotary knob to scroll through the patches. When the desired patch is located, **YES** is used to load the patch for use.



It is important to note that unless the selected patch is stereo, it will only be loaded into one channel of the M500 as selected by the **CHAN**.

Patches 1 to 50 are available for storing user patches while patches 51 to 128 are presets. Many of these presets provide powerful effects combinations which the user may wish to copy to a user memory and then edit further. If a stereo patch is loaded, this is announced by the CHAN LED status; whichever channel is currently selected, its LED will remain lit while the other will flash.

Some of the factory presets contain 'hidden parameters' not accessible to the user. These patches may still be loaded and edited though only the conventional parameters related to that Effect will appear on the editing screen. The 'hidden parameters' remain fixed.

EFFECT EDITING

Whichever Effect is selected, a similar screen format is presented. The top page is always dedicated to metering and shows the input level, the output level and the degree of gain reduction taking place on three separate bargraphs. Note that the PAN Effect metering is slightly different and shows the input and output level on both audio channels simultaneously.

The screen page below the metering presents the parameters most commonly associated with that Effect; eg. the main GATE page gives access to Threshold, Attack, Hold, Decay and Range. Further pages are available for those wishing to use side-chain filtering, the Peak Level facility, MIDI triggering, Duck mode and so on.

CHAPTER 3

CONTROL KEY OVERVIEW

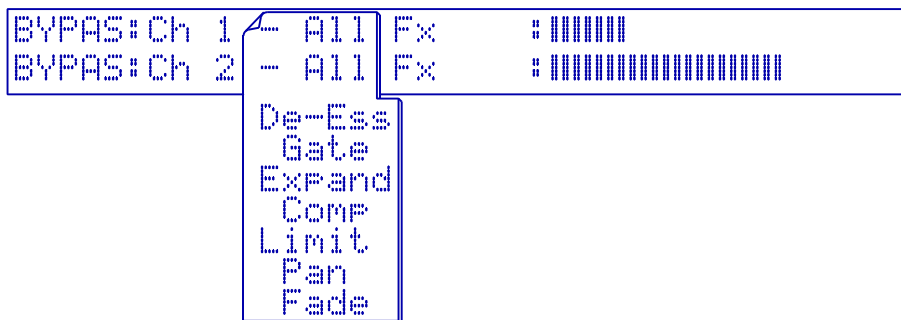
Many of the keys are self-explanatory, but because the M500 contains many enhanced features, you should read through this section at least once before getting down to any serious work.



BYPASS

Primary function: Override all or one dynamics process(es). Because the M500 is really several units in one, it would not be appropriate to have a single bypass switch which could only switch all the Effects in or out of the signal path. For example, we may be using the two channels quite independently in which case we need to be able to bypass them individually. Likewise, we may wish to bypass individual Effects within a patch to aid setting up.

THE BYPASS DISPLAY



NORMAL MODE

When the unit is configured for independent channel processing, then only the channel selected with **CHAN** will be affected by BYPASS.

STEREO BYPASS

If the two channels are linked for stereo operation, then the BYPASS key will automatically bypass both channels. For details of the linking facilities, see the notes on the **LINKS**.

SINGLE BYPASS

To bypass a single Effect, hit the appropriate yellow Effect key before BYPASS. The display will give a visual indication of the bypass status.

CANCEL BYPASS

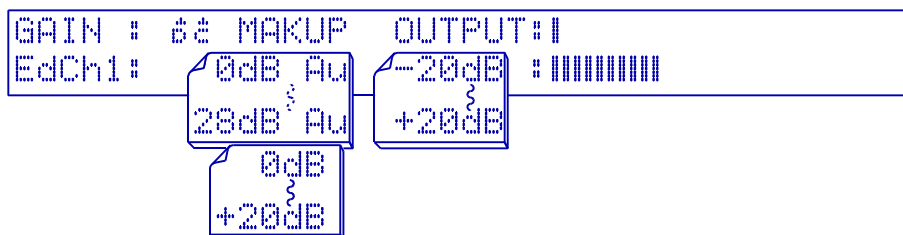
To cancel BYPASS, hit any other key, except **PATCH**. This special condition of pressing **PATCH** retains the bypass mode to permit the user to select another patch ready for loading.



OUTPUT

Primary function: Adjust and view output levels. Output functions as a master output level control located at the end of the signal path. This functions independently for whichever channel is selected unless the unit is configured for stereo operation in which case both channels will be affected.

THE OUTPUT DISPLAY



dc

This is the facility to add make-up gain to the COMPRESSOR and DE-ESSER to restore level lost during processing. This can be made automatic by selecting Au or can be set manually to a specified amount. If either the COMPRESSOR or DE-ESSER is set to its AUTO mode, then Au will automatically be selected and the optimised gain setting will be displayed.

MIDI VOLUME

The output level may also be controlled via MIDI master volume controller information, if the MIDI MASTERVOL option is set to YES. The actual output gain display in dBs is only updated when the OUTPUT page is constantly accessed, and any adjustment of the rotary controller will revert the gain range between -20db and +20db. The MIDI "master volume" data value is scaled to operate between -90dB and +20dB. The formulae for setting output gain is:

$$\text{OUTPUT GAIN (in dBs)} = \text{DATA VALUE} - 90$$



METERS

Primary function: Simultaneously view input and output levels. A dedicated METERS screen shows a bargraph meter display for the input and output levels for both channels simultaneously. The input reading is the true input level, unaffected by the filters if selected. The bargraph is constructed to have averaging characteristics with the addition of peak hold bars. To assist reading these display meters, graduations are printed above and below the display window.

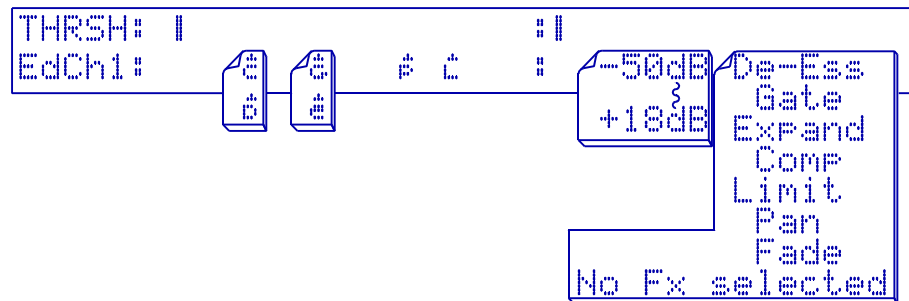
THE METERS DISPLAY



THRESH

Primary function: For visual adjustment of the threshold of dynamic processes. Though each Effect's page display system gives access to that Effect's threshold setting, it is often useful to be able to view and edit the threshold settings of all the assigned Effects from one page. On this page, the top half of the display is dedicated to the input and output level meters while the assigned thresholds are displayed on the line below.

THE THRESHold DISPLAY



Each Effect threshold is symbolised by its initial character with a small arrow head above it, listed below. This character symbol moves along beneath the meter display as the value is changed to give a visual representation of its setting. A more precise numeric value is also given in dBs. To adjust a threshold value, it is necessary only to hit the appropriate Effect key and then use the rotary controller.

- C Character symbol representing the COMPRESSOR threshold.
- D Character symbol representing the DE-ESSER threshold.
- E Character symbol representing the EXPANDER threshold.
- G Character symbol representing the GATE threshold.
- L Character symbol representing the LIMIT threshold.
- P Character symbol representing the PAN audio trigger threshold.

The following points must be considered:

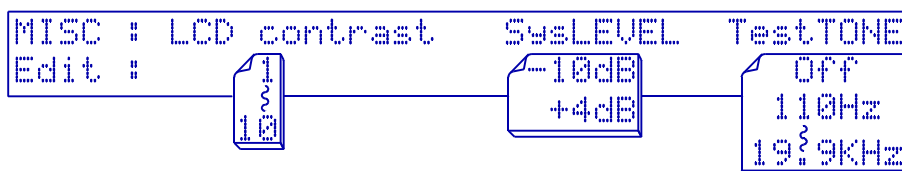
- Only Effects assigned to the current patch may be accessed.
- If two or more selected Effects have the same threshold setting, then the one selected **last** will be visible with the other(s) hidden behind it.
- Hitting an Effects key twice in succession will exit from this page and return to the Effects editing screen.
- If the M500 is in Stereo mode, then both channels will be adjusted simultaneously; if the channels are independent, then **CHAN** can be used to switch between them.
- Changing any threshold from **Auto** to manual or vice versa is prohibited when on this page.



THE MISC DISPLAY

MISC.

Primary function: Setting the system operating level.



CONTRAST

The LCD contrast can be set to suit the user viewing angle. Too pale a display might result in the bargraph meters appearing sluggish. The range is from 1 (pale) to 10 (black).

SysLEVEL

System level must be set to match that of the connect equipment. An incorrect setting will produce either a degraded signal to noise ratio, or, overdriven / clipped audio. The two possible parameter settings are -10dB or +4dB

Test TONE

The Test Tone oscillator can be set to generate a wide range of accurate frequencies. Rotating the control knob gives a range of frequencies from 110Hz to 19.9KHz in third-octave steps. Though these are stable and accurate in frequency, their amplitude and distortion specifications make them unsuitable for tape machine calibration.



The EXPAND Effect LED should be off, (ie. EXPAND unassigned) for the Test Tone oscillator to function correctly.



EDIT RECALL

Primary function: Comparison pre- and post-parameter adjustment. Whenever a patch is called up for use, a copy of the original patch is held in memory allowing comparisons to be made using the EDIT/RECALL key to toggle between the original and edited versions. The symbols **Ed..** or **Re..** are displayed in the lower left hand corner of the LCD window to identify whether Edit or Recall is being auditioned. Obviously, some display windows such as METERS, MIDI and so on have no usable Recall operation.



YES ACCEPT

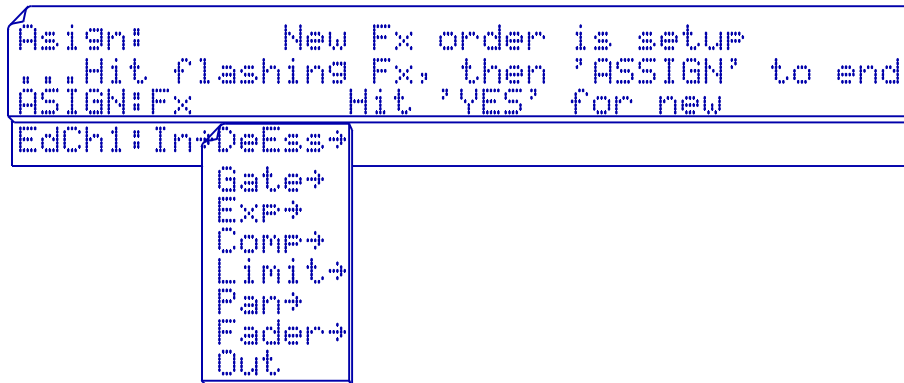
The only function of this key is in response to screen prompts to confirm or store changes.



ASSIGN

Primary function: Confirm and alter the order of dynamic processes. To set up a patch of one or more Effects, the desired Effects have to be 'assigned' before they can be used. An assignment is simply a selection of Effects that may be used together and also, if required, may be stored as a user patch for later use.

THE ASSIGN DISPLAYS



VIEW ORDER

Pressing **ASSIGN** will display the current assigned order of Effects. Pressing any key other than **YES** will not alter this order.

CHANGE ORDER

A new combination of Effects can be assembled by pressing **ASSIGN** and then hitting **YES** to confirm over-write of the current assigned order. Any other key will be taken as a **NO**. After hitting **YES** all the yellow LEDs above the Effects buttons will flash indicating that they are available for use. The Effects buttons are then hit in the order in which you want to patch the Effects, the first selected being the first Effect in the chain. Once selected, the Effect's LED will remain lit rather than flashing. Press **ASSIGN** to confirm your selection.



Selecting certain Effects will cause other LEDs to stop blinking indicating that their inclusion further down the assignment chain is illogical. e.g. It is illogical to follow a PANNER with anything other than a FADER, so if PAN is selected first, then all the other LEDs apart from the FADER will go out.

There are some other important points about the way that Effects can be assigned.

- Certain of the more complex Effects are only available in mono, but still require that both channels of the unit are assigned (eg. see DE-ESS). This is because the complex Effects require the circuitry of both audio channels in order to function.
- Neither the COMPRESSOR and DE-ESSER, nor the EXPANDER and GATE can be assigned simultaneously.
- If the GATE and COMPRESSOR are to be assigned together, the GATE has to follow the COMPRESSOR, but to optimise the performance, the GATE side-chain is fed from the input signal and not from the COMPRESSOR output. This gives a better defined threshold and makes the unit easier to set up.

- When an incorrect selection is made, it is possible to re-start by hitting **ASSIGN** followed by **YES**. Once a satisfactory order has been constructed, a prompt to hit **ASSIGN** again completes the procedure.
- If the M500 is not set in Stereo mode, then this procedure must be repeated for the other channel where a different Effect assignment may be set up if so desired. See also **LINKS**



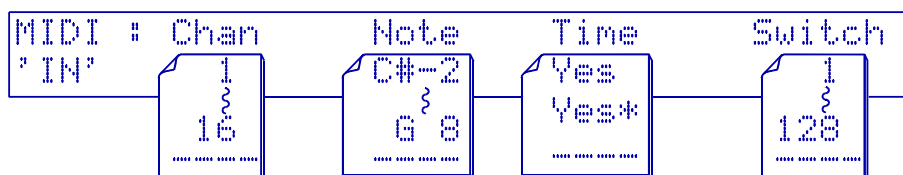
MIDI


Primary function: Controls MIDI operation and functions. In these pages, the user can set up the way in which the M500 responds to incoming MIDI data and also the way in which the M500 transmits MIDI information to either another M500 or a MIDI sequencer. MIDI can be used for remote patch selection and may also be used to control the PAN Effect if MIDI control is selected. Additionally, the very sophisticated GATE incorporated in the M500 can both generate and respond to MIDI information. Other MIDI functions include the ability to dump memory information via MIDI.

Because the MIDI side of the M500 is so flexible, this section contains several pages of parameters, though for most applications, many of the settings can be left as they are. Parameters that you may wish to change include the MIDI notes used to trigger the PAN and GATE and the MIDI channels to which you wish the two audio channels of the unit to respond. You may also wish to set the parameters for the FADE switch if you intend to use this facility under MIDI control.

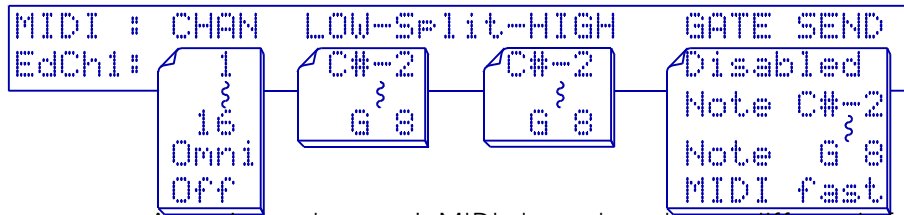
The top MIDI page functions as a basic MIDI input analyser. The main purpose of this page is to verify that the correct MIDI information is being received while setting the unit up.

THE MIDI VIEW DISPLAY



- VIEW **Chan** Displays the incoming data MIDI channel(s). Information coming from a sequencer will probably cause a blur as opposed to a static number.
 - VIEW **Note** Displays incoming MIDI note on events. If a note is being played on and off very quickly it is possible for the note number display to be invisible to the eye.
 - VIEW **Time** Displays the presence of MIDI clock events. Useful for setting the GATE or PAN timer trigger. An asterisk * denotes time frames and **Yes** indicates a MIDI Clock Start has occurred.
 - VIEW **Switch** Incoming MIDI switch numbers are displayed. Its purpose is to assist with FADE switching and REMOTE CONTROL VIA MIDI, see 3
-  DOWN The first parameter page has four parameters which are adjustable separately for each audio channel. These four parameters are stored when a User PATCH is saved.

FIRST MIDI PARAMETER DISPLAY



MIDI CHAN

A receive and transmit MIDI channel can be set differently for both audio channels, ranging from 1 to 16. Other options can be OMNI or OFF. In OMNI mode, the M500 will respond to data received on any MIDI channel but will always transmit MIDI data on channel 1. The OFF option is offered more for security, as it prevents any response to incoming MIDI and nothing will be output from events occurring on the corresponding audio channel.

Low-SPLIT-High

These two note values are applicable to the PAN and GATE functions of the M500. The parameter sets the lowest and highest MIDI note which will be accepted by the M500.

MIDI PAN

When used with PAN set to trigger from MIDI, the low note and high note correspond to the extreme left and right stereo image PAN positions. MIDI notes between these two extremes will then control the PAN position proportionally. An example is given by loading PRESET FACTORY PATCH number 124. See PATCH 13 and 3.

MIDI GATE

When used with the GATE, the note range selected will fire the GATE envelope when GATE TRIGGER is set to MIDI note. Any notes outside the split range are ignored.

ONE NOTE ONLY

If the GATE needs to be set so as only to respond to a single MIDI note, then the low and high split points should be set to the same note value. See PATCH 13 and 3.

DEAD ZONE SPLIT

One interesting feature is that if the high note split point is set to a lower note value than the low split point, a new situation is created in which the notes bounded by the split values are inactive while notes outside this zone are still active. This 'dead-zone' is not applied to the PAN as it would be impractical.

ALL NOTES TRIG

There are two ways to make the M500 respond to all MIDI note values; one is the obvious solution of setting the split points to cover the whole MIDI note range C<-2 to G8, but the same result may be achieved by setting the high split point just one semitone below the low split point which is often quicker.

GATE SEND

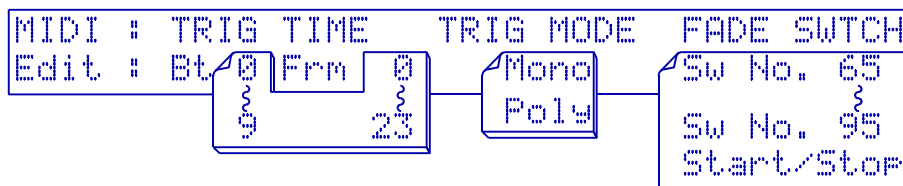
GATE SEND allows a MIDI note value to be selected which will be transmitted whenever the GATE is triggered. The velocity associated with the MIDI note is related to the GATE PEAK LEVEL parameter. The note on time will correspond to the opening time of the GATE envelope. This may be set to any MIDI note or Disabled. If the MIDI notes are scrolled all the way through, another possible setting called MIDI FAST appears. This should only be used when two or more M500s are linked and allows GATE trigger information to be transmitted from one unit to the other approximately three times faster than is normally possible over MIDI.



DOWN

The second display page contains the MIDI triggering parameters.

SECOND MIDI PARAMETER DISPLAY

**TRIG TIME**

The TRIGger TIME relates to the way in which the unit responds to incoming MIDI clock in either the triggered GATE or PAN modes. The adjustment range goes up to a maximum of 9 beats and 23 frames where frames represent individual MIDI Clock pulses. In a song running 4/4 time, this is one frame less than 2 whole bars and 2 beats. For details on how this feature is used, see the sections on the GATE and PAN Effects. A MIDI Start instruction restarts the counter to zero.

TRIG MODE

TRIGger MODE has only two options which may be set to either MONO or POLY and again relates to the GATE and PAN affects when triggered from MIDI notes. In POLY mode, each new note-on will retrigger the Effect while in MONO mode, no new trigger will be accepted until all previously received MIDI notes have been turned off. Remember that only notes within the current high and low split range will be recognised.

FADE SWITCH

The FADE SWITCH parameter relates to the way in which the autofade function responds to incoming MIDI information. The M500 is capable of both fade-ins and fade-outs and these may be triggered manually from the keypad, or from either a MIDI Start/Stop command, or from MIDI switches, often called controllers.

MIDI START/STOP

Providing that FADE SWITCH is set to Stop/Start and the FADER is assigned and set to trigger from MIDI, then a MIDI Start instruction will cause a fade-in at the selected fade-up speed and a MIDI Stop instruction will trigger a fade-out at the selected fade down speed.

SWITCH NUMBER

A valid FADE SWITCH (or controller number) will be within the range 65 to 95 inclusive (decimal). Controller data will need to be in the range 64 to 127 to be accepted, values below this being ignored. If MIDI switches are used, these cause the FADER to change states, in other words, if the FADER is open, the signal will be faded out, but if the FADER is closed, a valid switch will cause the signal will be faded in. An example of a legitimate MIDI instruction to operate a FADE event would be:

Controller Status + Channel Number	B0 hex
Switch (Controller) Number	50 hex 80 dec
Switch (Controller) Data	7F hex 127 dec



DOWN

The third page covers MIDI PATCH CHANGES and MASTER VOLUME.

THIRD MIDI PARAMETER DISPLAY



PATCH CHANGES

When set to YES, allows the M500's 128 patches to be remotely selected and loaded ready for use over MIDI using standard MIDI program change messages. When the NO option is selected, the M500 will not respond to incoming program changes, but all other relevant MIDI information will still be accepted. This parameter setting is also repeated within the PATCH screens, which is another obvious location to need to adjust this parameter.

MASTER VOLUME

MASTER VOLUME set to YES enables the output gain of the M500 to be controlled by MIDI controller 7, "master volume". The actual output gain display in dBs is only updated when the OUTPUT page is constantly accessed, and any adjustment of the rotary controller will revert the gain between -20db and +20dB. The MIDI "master volume" data value is scaled to operate between -90dB and +20dB. A data value of 110 (06E hex) or above, will set the output gain to +20dB and a value of 0 will set the gain to -90dB. The formulae for setting output gain is:

OUTPUT GAIN (in dBs) = DATA VALUE - 90

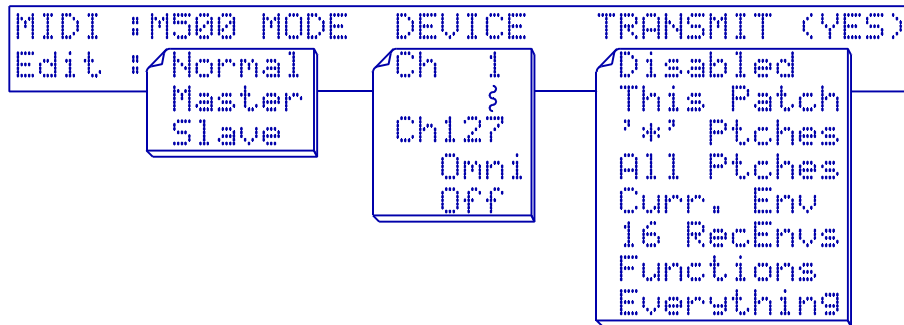
An example of a valid MIDI instruction to alter the output gain would be:

- Controller Status + Channel Number B0 hex
- Master volume (Controller) Number 07
- Controller Data (eg set 0dB) 5A hex 90 dec



The fourth (bottom) page covers M500 MODE, DEVICE and TRANSMIT.

THE FOURTH MIDI PARAMETER DISPLAY



M500 MODE

M500 MODE section enables more than one M500 to be used in the same MIDI system; if only a single M500 is in use, this should be left set to NORMAL. The other options are MASTER and SLAVE. In a multiple M500 setup keypad and rotary control on a master unit can be echoed on other slave units. Within one MIDI connection circuit, only one unit should be configured as MASTER with all other units wishing to be communicated with being set to SLAVE. It is important that all communicating M500's be set so that matching audio channels have to identical MIDI channels for both audio channels. For example, if the MASTER unit has the left audio channel set to MIDI channel 4, then so should all the SLAVE units. The right audio channels should be set to a different MIDI channel.

DEVICE NUMBER

DEVICE parameter selects the 'Exclusive data' channel number

which may be in the range 1 to 127, OMNI or OFF. Selecting OFF makes the unit ignore any Sysex data received and disables the Transmit function though other MIDI data is handled as usual. In order to dump data to either another M500 or to a MIDI sequencer, the send and receive device numbers must be set the same, or the receive device set to ChOmni in which case the send channel is irrelevant.

TRANSMIT

The TRANSMIT option is used to select exactly what data will be transferred during a dump. When not in use, the parameter should be set to DISABLED to avoid unintentional operation. To initiate a data dump, the desired data type should be selected and then YES will start the data dump. The data to be transmitted may be:

- 1: The current Patch,
- 2: * Patches (41-50),
- 3: All 50 User Patches,
- 4: The current recorded Envelope (selected on the RECORDED envelope page, or the GATE user envelope parameter)
- 5: All 16 recorded Envelope memories,
- 6: The M500 Panel Functions (eg MIDI parameters. etc)
- 7: or Everything.

In the latter mode, the entire memory of the M500 is transmitted. This setting is useful for configuring a new M500 from scratch making it a clone of the master unit. Additional information on 2 , 2, 3

TRANSMIT PROBLEMS

When large amounts of data are being sent or received a short time delay is required between every second data block. The DATA ERROR message will be displayed if this time delay is not included.



LINKS

Primary function: Joins both channels or Effect modules for stereo operation. This is an extremely important area of the M500 and determines which Effects are to be linked between the two channels.

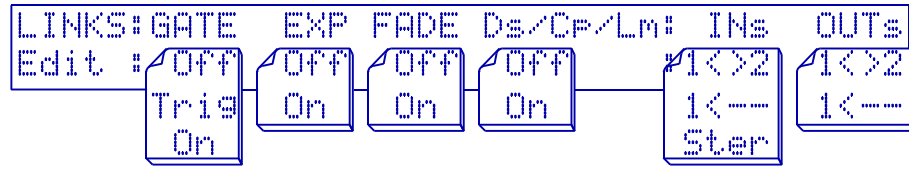
There are three important and distinct areas covered by Linking listed on the following pages:

- The four discrete Effects links.
- The Stereo link.
- The setup of the Inputs and Outputs of the M500.

The individual Effects Links should not be confused with stereo operation. Linked Effects will always have the same parameters on **both** channels and any adjustments to the selected channel will be emulated on the other channel - but the two channels' side-chains still operate **independently** unless the master Stereo link is turned on.

This is a convenient method of setting up two channels, as it is only necessary to edit one channel and all changes will be duplicated in the other. Links may then be turned off again if further editing to one channel or the other is required.

THE LINKS DISPLAY



GATE

GATE link has three possible options. **On** will copy the current channel's parameters to the other channel. Any further GATE parameter adjustments will be duplicated on the other channel. **Off** reverts to normal single channel operation. GATE link also has a **TRIG** option. This forces channel 2 to follow the triggering of channel 1 and it should be noted that though the GATE gain reduction metering on channel 2 is still valid, the GATE signal meters are irrelevant.

EXP

EXPAND link has only two options, **On** or **Off**. **On** will copy the current channel's parameters to the other channel. Any further EXPANDER parameter adjustments will be duplicated on the other channel. **Off** reverts to normal single channel operation.

FADE

FADE link has only two options, **On** or **Off**. **On** will copy the current channel's parameters to the other channel. Any further FADER parameter adjustments will be duplicated on the other channel. **Off** reverts to normal single channel operation.

Ds/Cp/Lm

DE-ESS / COMPRESS / LIMIT link has only two options, **On** or **Off**. **On** will copy the current channel's parameters to the other channel. Any further COMPRESSOR or LIMITER or DE-ESSER parameter adjustments will be duplicated on the other channel. **Off** reverts to normal single channel operation.

NO PAN LINK

PAN is a two-channel Effect, so no linking option is offered.



Although the DE-ESSER and LIMITER may be Linked, in most cases, it is desirable to turn Links **Off** as these two processes produce better results if the two channels are processed independently.

M500 IN STEREO

Select **INs Ster** when the M500 is to be used for processing a stereo signal and it influences several important operational areas. Because switching to stereo has several implications, it is worth reading this section thoroughly.

STEREO LINKS

Stereo is a master setting for the current patch assignment and will automatically switch **On** all of the Links for the individual Effects assigned, and set both channels' parameters the same. If it is required to set up a stereo Effect where both channels are not the same, or where one or more Effects need to be used independently rather than as a stereo pair, then the appropriate Stereo Link or Links should be disabled **after** selecting **Stereo** and before further adjusting the parameters. There is no obligation to leave the individual Effects linked after selecting **Stereo** and any Effects that are linked when Stereo is selected will function as true stereo pairs.

STEREO GLOBAL

Other relevant parameters are also linked such as OUTPUT GAIN, COMPRESSOR DC MAKEUP and the function of the BYPASS button. This ensures that the user has not accidentally overlooked any parameters that might otherwise cause the channels to behave differently. However, the user must ensure that the **OUTs** parameter is set to $1 \ll \gg 2$ to allow dual-channel output operation.

STEREO SIDE-CHAIN When in stereo mode, the side-chain sensing of the different sections is automatically switched to be appropriate for the treatment of a stereo source. For example, the compression-based Effects use an average of the left and right channel signals to prevent unwanted image shifts when one channel has significantly different dynamics to the other.

Any non-symmetrical stereo patch is stored as a stereo patch pair and occupies two patch memory locations. The M500 automatically registers any difference between the two channels' parameters so no decision need be made on the part of the user. If both channels are identical in all respects, then a stereo patch will be saved in a single patch location (saving memory space). Recalling one patch of a stereo pair will automatically load the other.

It is also possible to set up the way in which the input and output connections are handled for a particular sequence of Effects as explained below.

INs $1 \ll \gg 2$

Located in the LINK menu, INs is used to set up the input mode of the M500. The setting of $1 \ll \gg 2$ configures two inputs for channels that are to have independent Effect assignments. This can be thought of as dual-mono operation.

INs $1 \ll \text{--}$

Selects channel one as the mono input for Effects requiring only a mono input such as the DE-ESSER or the PANNER if a mono source is to be PANned between the two outputs. It may also be used when two chains of Effects are needed but where the side chain signals derived in channel 1 are required to control channel 2 also.

INs Ster

Stereo switches the M500 to a stereo input, stereo output unit with all the implications discussed in the STEREO section.

OUTs

As with the inputs, the outputs may be set in different modes for different applications. The M500 has two possible modes allowing for dual channel operation or summed into mono where both channels are summed at the output and routed to output 1.

OUTs $1 \ll \gg 2$

Setting OUTs to $1 \ll \gg 2$ is the normal setting and must be selected either for dual-mono or conventional two channel operation.

OUTs $1 \ll \text{--}$

By selecting OUTs to $1 \ll \text{--}$, the two channel signals are mixed at the output to form a mono signal available at the output of channel 1. This facility is necessary for some of the more advanced Effects such as split-band compression and complex DE-ESSing.



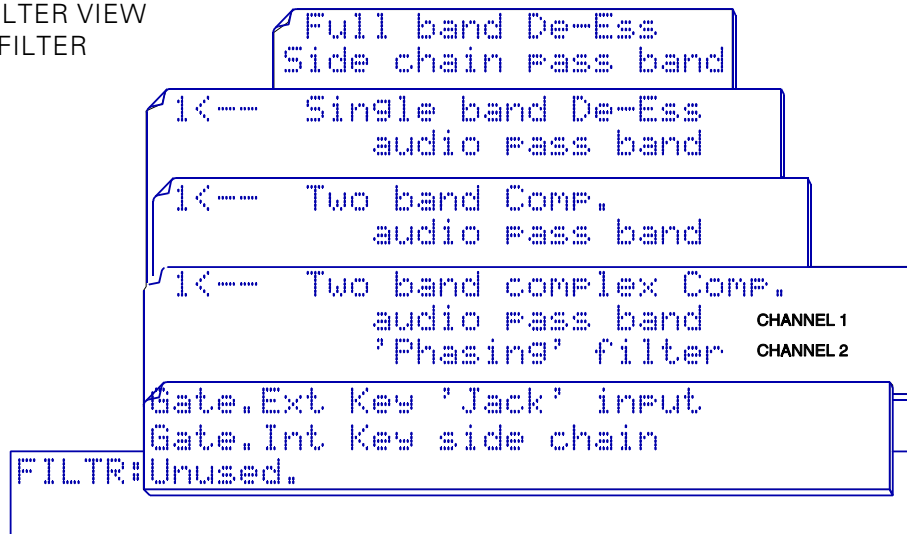
To avoid possible confusion as regards the LINK settings, especially in the cases of the more advanced Effects, it is recommended that the user experiment with a preset patch which includes the desired linked Effect and make tiny adjustments, rather than attempting 'Linked Effects' from scratch.



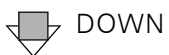
FILTER

Primary function: Side chain filter for GATE and DE-ESSER. If the FILTER is assigned to either the DE-ESSER or the GATE, the top display page will show where the filter is 'patched' (ie. where it is placed in the chain) and how it its functioning, otherwise the display will read: **Unused**. For the more complex DE-ESSING functions, the display alters for each channel depending on whether the pass-band or stop-band is being veiled/edited.

THE MANY POSSIBLE FILTER VIEW DISPLAYS EXPLAINING FILTER USAGE AND FUNCTION



The method of display of filter pass band is a bargraph beneath a frequency scale showing the upper and lower cutoff limits of the filter. More filter cut-off frequencies are present than are shown on the upper scale due to the limitations of the LCD.



THE FILTER DISPLAY



FILTER Low Frequency

To adjust pass-band frequency, it is necessary only to hit LEFT and then use the rotary controller.

FILTER High Frequency

Hit RIGHT arrow and use the controller to adjust the upper frequency setting.



Notice the lefthand word **FILTR** in UPPER case. This page and the page below are identical except that the signal monitored at the output of the M500 is different. On this page, the monitor signal is the filter output which functions in much the same way as the 'side-chain listen' facility used on traditional frequency-conscious gates. eg *DRAWMER DS201*.



DOWN

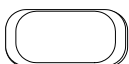
Makes a change only in signal monitoring



The lefthand word **Filter** in lower case. Functions in exactly the same way as above but the monitor signal is now the output of the GATE or DE-ESSER to which the filter has been assigned, and not the actual signal passing through the filter.



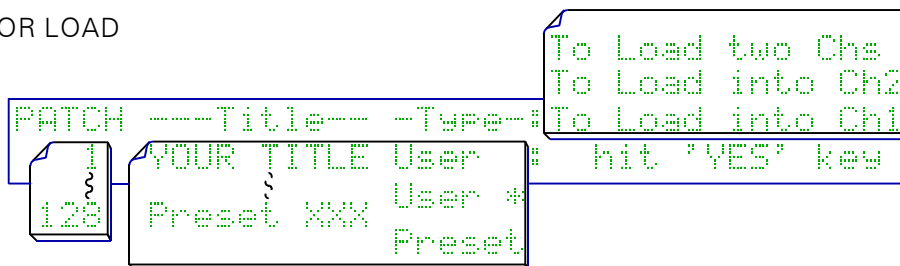
Assigning the filter to the DE-ESSER takes priority over the GATE as the DE-ESSER is not able to function in any mode without use of the filter, where as the GATE can.



PATCH

Primary function: Store and retrieve, preset and user patches. This function button accesses three screens, the top of which is used to select the patch number you wish to load a program from, or the patch number in which you want to save the program on which you have been working. Keep in mind that unless stereo linked Effects are in use, loading and saving applies only to the audio channel currently selected. Remember that patches 51 to 128 are presets and cannot be changed, erased or overwritten. Patch titles are also shown on this screen.

THE PATCH DISPLAY FOR LOAD



LOAD PATCH

Patches can be loaded by rotating the encoder knob until the desired patch number is reached and then hit **YES**. The patch will be loaded into the current channel.

USER PATCH

A **User** patch is in the number range 1 to 50. This type of patch can be modified, overwritten and erased.

USER * PATCH

A **User *** patch is in the number range 41 to 50. This type of patch can be modified, overwritten and erased. The * asterisk denotes that they can be dumped as a 'short' block of data via MIDI. It is recommended that the most popular patches be stored in this 41 to 50 band.

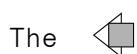
PRESET PATCH

A **Preset** patch is in the number range 51 to 128. These types of patch can be modified, but never overwritten or erased.



DOWN

To the Save patch screen where it is possible to name and save patches being stored in User locations 1 to 50. This page will **not** be shown if presets are in use.

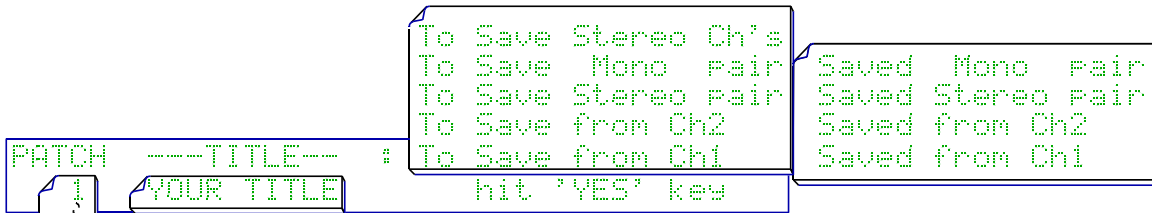


LEFT and



RIGHT buttons are used to move through the ten possible characters of the title and the rotary controller used to scroll through the alphabet. Upper and lower case letters, numbers and some symbols may also be used. The user is not prevented from giving two different patches the same name but this may give rise to confusion!

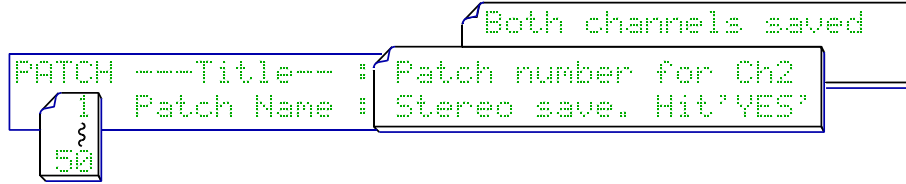
THE PATCH DISPLAY FOR SAVE



SAVE PATCH(es)

YES will save the current patch from the current channel. The SAVE Patch option will automatically detect which LINK mode (eg. Stereo) is in operation and will offer various suitable save methods. If dissimilar stereo patches are being saved, the following display will be seen.

SECONDARY PATCH DISPLAY FOR A STEREO SAVE



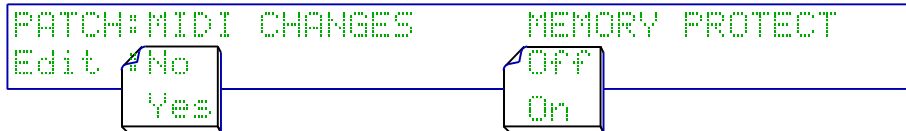
DOWN

The last (bottom) screen encompasses MIDI CHANGES and MEMORY PROTECTION.

MIDI CHANGES

When set to **YES**, enables the M500 to utilise MIDI patch changes and also to transmit them. These MIDI commands will be on the corresponding MIDI channel set on the MIDI screen). This parameter adjustment is replicated on the MIDI pages.

LAST PATCH DISPLAY



MEMORY PROTECTION

This will prevent the user patches from being overwritten and should be disabled if you wish to store a patch you have edited. Attempting to store a patch with the protection turned on will cause an immediate jump to this parameter to warn you that the protection mode is set.



If PATCH CHANGES is set to **YES** on this screen or the MIDI page, then a MIDI patch change command will be output whenever a patch is down-loaded from the front panel.



RECORD

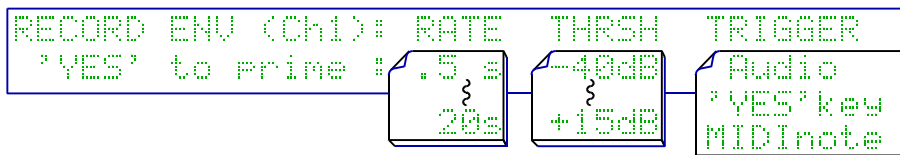
Primary function: Generate User Envelopes for the GATE Effect. This page is used exclusively with the GATE Effect when it is required to make use of the GATE's ability to super-impose recorded sound envelopes. This offers far more complexity than the standard 'Peak-Attack-Hold-Release' envelope characteristics.

For trouble free use, the following points must be considered:

- GATE **TYPE** will need to be set to **RECORDED**.
- Only audio envelopes present on channel one will be accepted.

- The white graduation above the display window can be used to maximise the input envelope amplitude.
- When the envelope is later used with the GATE Effect, for it to respond as a **true noise gate envelope** the following should apply: The input level during record should reach 0dB at least once. Any input level above 0dB will react similar to GATE PEAK. The final input level of the envelope must be as close to -90dB as possible for the GATE to fully close.

FIRST RECORD DISPLAY



RECORD **RATE**

To maximise the storage rate and resolution of a recorded envelope it is necessary to approximate the duration of the sound about to be recorded. This rate can be re-adjusted later at replay time, but should be set to just longer than the sound envelope being recorded. This time ranges from 0.5 second to 20 seconds.

RECORD **THRS**

The THRS (threshold) is only applicable if the recording process is going to be triggered from an Audio source on channel 1. The parameter ranges from -40dB to +15dB. For easy operation, this level can be considered as a noise-gate threshold.

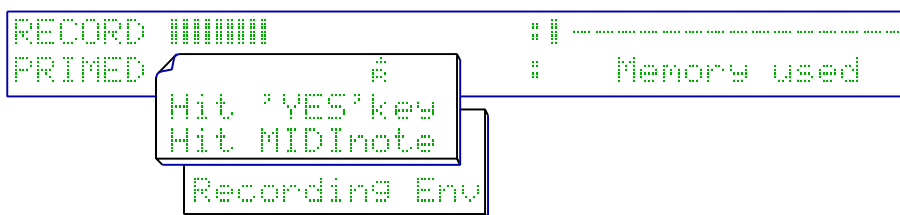
TRIGGER **SOURC**

The envelope recording process can be set to start from one of three events. If Audio is selected then the audio threshold level must be adjusted and recording will commence automatically when channel one's input signal exceeds the set threshold. YES can be used to start the process. Alternatively, any valid MIDI note on the correct MIDI channel **and** within the Hi-Low split range of audio channel one will start the record process.

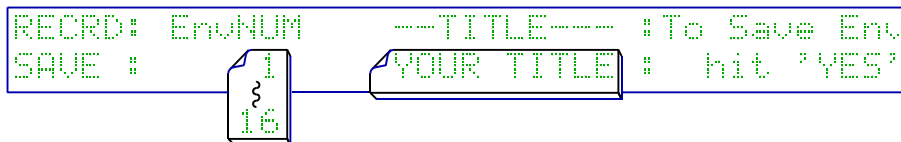
READY TO RECORD

The screen prompts with YES to prime, and on hitting YES a new screen is displayed which shows the input signal relative to the threshold and also the memory available for envelope storage as a dotted line which 'fills' in the form of a bargraph once recording starts.

SECOND RECORD DISPLAY



FINISHED RECORD DISPLAY



ENVELOPE NUMBER Once recording is complete, the envelope number is displayed and may be changed, ranging from 1 to 16. If a previously recorded number is selected, this will be overwritten.

RECORD NAME The envelope may be given a title of up to ten characters. If a previously recorded envelope is selected, this will be overwritten.

RE-START RECORD If the recording is unsuccessful or not the required envelope shape, it is necessary to press **RECORD** again to return to the initial page.

CANCEL RECORD Envelope recording can be aborted at any time by pressing any key.



CHAN 1 / 2

This key selects the left or right audio channel to be edited or viewed. The left channel is denoted by a red status LED and the right by a green LED. If a stereo linked patch is accessed, the selected channel LED will remain lit and the other will flash.

CHAPTER 4

BASIC EFFECT OPERATION

The Effects are accessed via the seven yellow keys on the bottom row of the keypad, and an Effect may be selected for experiment by hitting **ASSIGN** then **YES** and then your choice of Effect. Confirm your selection. Then hit the Effect key again to access the parameters on the appropriate screen display. If you are new to the M500, it is certainly worthwhile setting some time aside to explore the Effects in isolation before attempting to combine them.

Most of the Effects behave in a similar manner to their discrete, all-analogue counterparts, the main difference being the additional parameters and features available plus the ability to store Effects settings as patches for recall at some future time. In order to present the Effects in a more understandable order, they will be introduced in a different order to that in which their buttons appear on the front panel.

As stated earlier, the top page of each Effect is given over to metering while the next page gives access to the most often used parameters. More advanced features are located on lower display pages and these may be conveniently ignored if they are not required.

This section is intended as an introduction to the Effects and covers only their basic operation. For details of the advanced parameters and facilities, refer to the advanced section. Having said that, many of the advanced functions are self explanatory, so feel free to experiment without further in depth reading. Very often, just knowing that a feature exists provides enough clues to get it to work.



BASIC GATE

The GATE can perform all the functions of a stand-alone GATE such as the *DRAWMER* DS201. However, the most common application of a GATE is to turn off the signal path when the input signal falls below a threshold set by the user in order to remove noise during pauses. Full envelope control is provided to enable gating to be performed with the minimum side-effects to the wanted signal.



For basic operation, the GATE TYPE should be set to **NORMAL** and this parameter is to be found on the last (bottom) GATE display page. If this parameter is set to **RECORDED**, then different GATE parameter pages will be displayed.



DOWN one screen from the meter page gives direct access to all the parameters necessary for conventional gating purposes. The Threshold level may be set by the user and this is normally set as low as is possible without allowing noise and crosstalk to cause false triggering.

The Attack should initially be set to the shortest time possible, though if a click is audible when the GATE opens, the attack time should be lengthened until the click no longer occurs. In practice, the fastest attack times are only necessary for drums and percussive sounds.

The Hold time is designed to prevent the GATE from opening and closing rapidly if the decay characteristic of the signal being processed is erratic and for most applications, a value of 50mS or so will prevent chattering, even on low bass notes.

The Release time determines how quickly the GATE closes once the input has fallen below the threshold and should be set long enough so as not to truncate sounds having a naturally slow decay.

Range sets the amount of attenuation which occurs when the GATE is closed. This control is necessary because it is not always desirable to have the signal fully turned off; sometimes a sufficient degree of noise reduction can be achieved by setting a Range of only 10dB or so and in difficult circumstances, this might reduce any audible side-effects. Additionally, in situations where fast GATE opening is required, the GATE will open more rapidly, the smaller the range

setting in dBs.

In other applications such as separating dialogue from background noise, it is often more natural to merely attenuate the background noise rather than attempt to remove it completely.

Side-chain filtering is available though the access to this is via a page further down the menu. The filter is set up using the FILTER key on the front panel and it is used exactly like the filter on a DS201 GATE. The Key Listen facility is also accessed by means of the FILTER key.

Features on later pages give access to the 'Peak' facility unique to the M500. This allows the GATE to actually add a degree of level boost to the front of a transient sound giving it more impact and one of the main applications is in processing drum and percussion sounds. The available parameters are very simple and mainly self-explanatory:

The more advanced features include: Selection of Audio or MIDI GATE triggering, Predelay, Side-Chain filtering, use of Recorded Envelopes and GATE/DUCK selection.



The GATE cannot be selected for use at the same time as the EXPANDER, and if a DE-ESSER is assigned, then the filters will have been commandeered by the DE-ESSER and will not be available for use in the GATE's side-chain.



BASIC EXPAND

The EXPANDER may be set up in a similar way to a GATE in order to remove or attenuate low level noise, but by selecting a mild expansion ratio, it can also be used to increase the dynamic range of programme material. For noise removal work, the threshold should be set as low as possible with a ratio of 1:2 or greater while for dynamic range expansion, the threshold may be set at or close to 0dB with a suggested ratio of 1:1.5 or less.

There is only one display page relating to the EXPANDER all of which comes under the brief of Basic Operation.

The parameters are exactly the same as for the basic GATE (Threshold, Attack, Hold, Release and Range) with the addition of Ratio. This sets the relationship between the input signal and the output signal for levels falling below the threshold. A 1:2 ratio, for example, means that for signals falling below the threshold, a 1dB reduction in input level will result in a 2dB reduction in output level.



The EXPANDER cannot be assigned at the same time as the GATE.



BASIC COMP

The COMPRESSOR may be set to NORMAL, in which case it functions as a conventional ratio-type COMPRESSOR, or it may be set to SOFT whereupon it functions as a soft-knee device. The available parameters are the same as for the EXPANDER and there is the option of selecting AUTO attack and release times as well as setting these manually. It must be understood, though, that while an EXPANDER attenuates signals that fall below the threshold, a COMPRESSOR attenuates only those signals exceeding the threshold.

COMPRESSORS are generally used to reduce the dynamic range of a signal in order to minimise level fluctuations and it is invariably necessary to compress pop vocals to some degree. For signals with varying characteristics such as vocals or complex mixes, the Auto settings often produce the best result.

Creative Effects can be achieved by setting a deliberately long attack time when working with percussive or plucked sounds as this allows more of the attack portion of the sound to pass through un-attenuated giving a degree of punch.



BASIC LIMIT

LIMITERS are used to impose more firm control over signal dynamics than a COMPRESSOR and are often used to set an absolute maximum level that the signal being processed must not exceed. Technically, the function of a LIMITER is identical to that of a COMPRESSOR but the ratio is higher. This Effect has the same user-adjustable parameters as the COMPRESSOR. There is a choice of manual or auto (programme dependent) release time.

The lowest ratio that can be selected is 2:1 whereas the maximum is 90:1 which, for all practical purposes, sets an absolute preventing the input from exceeding the threshold by more than a fraction of a dB. It is commonplace to assign a LIMITER following a COMPRESSOR, especially where the COMPRESSOR is set to a low ratio or has a long attack time. In these circumstances, the COMPRESSOR can still pass very high peak levels and it is useful to employ a LIMITER as a second line of defence.

The LIMITER attack time is variable up to a maximum of 5mS allowing the user to decide what duration of clipping or overload is tolerable. For most material, badly clipped signal peaks of less than 2mS in duration are imperceptible. However, for applications where instant control is vital, the LIMITER attack time may be set as low as 20 μ S.



BASIC PAN

The M500 can be used to PAN a mono signal between the two channels with a choice of eight modulation waveshapes. For conventional PANning, either the Sine wave or Triangle wave will give the most natural result, but other waveforms are included for special Effects.

Because of the sophistication and diversity of the PANNER, only its more basic options will be described in any detail, though a full description of the features is available in the main manual.

The first page gives access to the most important parameters, these being RATE, RANGE, WAVE and PHASE. RATE sets the speed of the PAN Effect while RANGE determines the stereo width of the Effect. The maximum value of 60dB will give the widest possible PAN. Of course the M500 will need to feed a pair of mixer channels PANned hard left and right for this to be achieved.

WAVE gives a choice of eight control waveforms starting with Sine while Phase determines whether the unit functions as a PANNER or a tremolo unit. If PHASE is set to in, then the level of both channel changes together rather than alternating.

The advanced features of the PANNER give a choice of Audio, MIDI Note or MIDI Beat triggering and it is possible to set the PAN start position to any point between the extreme left and right PAN positions. There is also an envelope function which allows the PAN width to increase with time after triggering. A similar facility is available to add 'decay' to the PAN width after triggering if so desired.



Because the PANNER generates a stereo output, it requires both audio channels of the M500 to be assigned to the PANNER. A single channel may be used to create a tremolo effect.



BASIC FADER

In the FADER mode, the M500 can be used to fade in or out either a stereo signal or two mono signals. In the mono mode, the two channels can be given different fade in and out times though the same trigger source is automatically selected for both channels.

There are three possible trigger modes which may be selected from the FADER menu: View, MIDI and Timer. The fade up and down times may be set independently as may the attenuation range which should be set to 90dB if a complete fade to silence is required. Remember that the times are 'per 10dB' so, setting a 1 second fade time and a 90dB range will mean the fade takes 9 seconds to complete.

In View trigger mode, a fade is initiated by moving to the meter (top) screen of the FADE menu and then hitting either the right or left arrow buttons. The left arrow initiates a fade down whereas the right arrow initiates a fade up.



Though the FADER levels are shown on the gain meter, this has a range of only 40dB and so the fade may not immediately register on the meters until it comes into range. This is especially true of long fade-ups from maximum attenuation.

If the fader is closed and it is required to open it, the FADE key should be hit twice in succession.

In MIDI trigger mode, the triggering event is as selected on the MIDI menu under the FADE SWITCH option.

When TIMER is selected, the final screen is used to set the necessary parameters. In principle, the FADER is programmed to start a set time after it is triggered by the arrival of an audio input exceeding -10dB. This is useful when setting up a fadeout at the end of a song as the timer can be triggered by the first beat of the song and the timer set so as to commence the fadeout at the appropriate point towards the end of the song.

Once the song has ended and the audio input has fallen below -30dB for a period exceeding 5 seconds, the timer automatically resets.

The easiest way to set up the timer is to set the timer MINUTES parameter below 0 which arms the system. Playing the desired program material will trigger the counter as soon as the level exceeds -10dB and this will continue to count until the YES key is hit to signify that the FADE should start. This allows the fade start point to be set during a dry run after which the mix can be run as many times as is necessary and the fade will always start at the same point.



BASIC DE-ESS

Though the first Effect as regards front panel layout, the DE-ESSER has been left until last as it helps to have an understanding of the other Effects before using it.

DE-ESSing is basically frequency conscious compression used to 'pull down' the gain of a vocal track when loud, sibilant "S" sounds occur. This is done by placing a filter or equaliser in the detector side-chain making the COMPRESSOR more sensitive to sounds in the area of the audio spectrum where sibilance occurs which is normally between 3KHz and 8KHz depending on the characteristics of the vocalist.



The DE-ESSER uses both the COMPRESSOR section and the FILTER which means that the COMPRESSOR cannot be assigned to the same patch as the DE-ESSER and also, the GATE is unable to use the filter.

It is necessary to set up the filter via the FILTER key and menu so that only the most sibilant sounds are passed. This is best done by monitoring the filter output while the offending signal is present and then tuning the filter so that it captures as much as possible of the sibilant sound and as little as possible of the rest of the material.

Back on the DE-ESS page, the parameters can be set up in a similar way to setting up the COMPRESSOR. It is important to set the threshold value carefully while monitoring the processed signal as over-processing can cause noticeable dips or dulling in the sound. As with the COMPRESSOR, both NORMAL (ratio) and SOFT (soft-knee) modes are available, SOFT generally being least obtrusive but NORMAL being more positive in difficult situations.

Most regular jobs can be tackled with the basic DE-ESSER but more complex DE-ESSing systems are available amongst the advanced features in later menu pages. The other options are: Single-band De-ess, Two-band Compression and Two-band Complex Compression. These more complex systems require both audio channels in order to function, though the basic Full-band de-esser may be assigned as a dual-channel Effect.

For a more detailed discussion of the more advanced parameters, refer to the DE-ESS advanced section of the manual.

CHAPTER 5

ADVANCED EFFECT OPERATION

The Effect modules described fully in this chapter are listed as they appear on the M500 front panel, working left-to-right. The format for each effect is similar describing each parameter's function and capabilities. The descriptions end with a list of suitable factory patches, which can be loaded and tried with the suggested material or programme.



ADVANCED DE-ESS

De-essing is essentially frequency conscious compression and is generally used to attenuate the sibilant components of speech to an acceptable level. In operation, the side chain filters are used to tune to the undesirable aspect of the sound, usually sibilants and this signal is then used to control the 'Compressor' section so that more gain reduction is applied at this frequency.

Four different types of DE-ESSER are offered within the M500. Only the most basic, single-band DE-ESSER can be used as a single channel Effect, other types of DE-ESSER require the electronic circuitry of both audio channels, effectively making the M500 unit a mono device.

Changing from one type of DE-ESSER to another is prohibited when a DE-ESSER is already assigned to **either** channel. This is because the other channel may already be using a simple DE-ESSER or COMPRESSOR, and the changes to the internal routing of the M500 are very drastic. Selecting the bottom screen page permits a DE-ESS TYPE change. There are four configurations of the De-Esser.



DOWN



DOWN

DE-ESS TYPES
DISPLAY BOTTOM
PAGE

```

DeEss#          TYPE
EdCh1#
1<-- Full band De-Ess
1<-- Single band De-Ess
1<-- Two band Comp.
1<-- Two band complex Comp.
  
```

Full band De-Ess

The standard, Full band De-Esser which uses a filtered side chain signal to control the dynamics of the whole audio spectrum. This is the most commonly used type of De-Esser and suffers the limitation that non-sibilant, low frequency sounds will also be attenuated if they occur at the same time as sibilant ones. With this TYPE of DE-ESSER, the THRESHOLD 'sees' the audio signal after it has passed through the FILTER.

1<-- Single band De-Ess

A more sophisticated De-Esser where the audio input is split into two bands and only the dynamics of the upper band are controlled. This mode prevents the unwanted attenuation of low frequency sounds. Because of the increased complexity, this mode is available only on channel 1. The filter setting determines both the side chain response and the band to be ducked. The audio filter of channel 2 is 'Anti-phased' to split the audio input into two frequency bands.

1<-- Two band Comp

Not just a De-Esser, but offering **two** programmable frequency dependant compressors. Both filters are used to determine the side chain response and the band being compressed. Again, this mode may only be used by channel 1 input and the output will normally appear at channel 1 output. It is however possible to unlink the two bands so that each appears at a separate output if the need arises. See LINKS

If one filter is set for low frequencies and the other for highs, then the middle frequencies will be lost!

1<-- Two band complex comp.

Finally, the Two Band Complex Compressor is a mono in (1<--), stereo out (1<=>2) process designed specifically as a special Effect and is most useful used in conjunction with the PANner where it can create a wide range of spatial type sounds. Channel 1 output is the audio input filtered through the Channel 1 filter while the Channel 2 output is the output of Channel 2's filter added to the 'reject' band of channel 1. The result is a signal with two peaks and a notch in the response which simulates phasing.

This TYPE of DE-ESSER is basically a combination of Single band DE-ESS and Two band Comp, where the audio input from channel 1 is split into two internal channels with the filter of channel 1. Then, the signal passed to channel 2 is re-filtered using the filter of channel 2.

DE-ESS FREQUENCY BAND

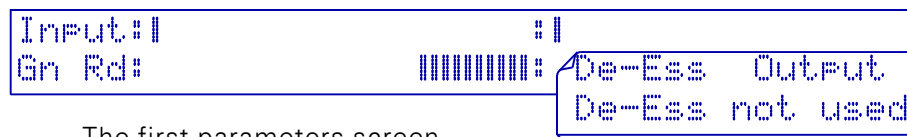
The frequency characteristics of the De-Esser are modified by hitting 'FILTER' and then setting the upper and lower cut-off frequencies accordingly. The actual placement of the filters in the side chain, can be seen by viewing the uppermost FILTER screen page.



When 1<-- **Single band De-Ess** is selected the FILTER of channel 2 takes on an inverted display bargraph, this is normal, and should aid the understanding of what effect the filter is having. This is the **stop** band, audio is being filter out.

The DE-ESS menu consists of three screens, the top being the View or metering screen.

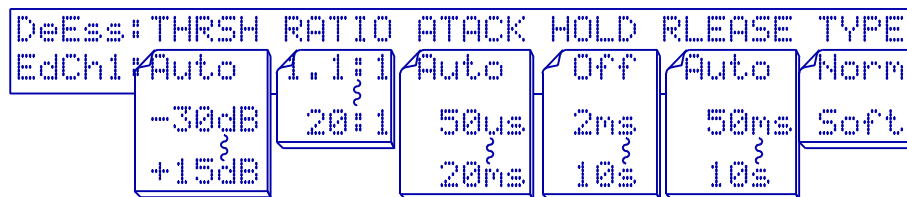
DE-ESS VIEW METERS



DOWN

The first parameters screen.

DE-ESS PARAMETERS DISPLAY



This sets the signal input level over which Gain Reduction will start to occur. The manual threshold ranges from **-30dB** to **+15dB** (a setting of +15dB will cause very little audible change).

For details of the **Auto** setting see above.

RATIO This determines how much Gain Reduction occurs when the input signal goes above THRESHold. The parameter range covers from 1.1:1 to 20:1, with TYPE set to Norm, or, from Sft:0 to Sft:9 with TYPE set to Soft Knee. The amount of Gain reduction, or Compression, depends upon the THRESHold, RATIO and TYPE settings **and** the input signal level. eg. An input signal within the filter pass-band, of 0dB with a THRESHOLD setting of -20dB with RATIO set to 2:1 will give 10dB of compression.

ATTACK ATTACK is the rate at which the Gain Reduction increases once the input signal exceeds THRESHold. Longer attack times allow more transients through unprocessed. The manual range of this parameter is 50µs (letting no transients through) to 20ms (which allows most transients to pass through). When **ATTACK** is set to Auto the attack time is programme dependant which works well on most material causing the compressor to be 'Transparent'. eg. if a fast transient appears the attack rate will be fast, slowly changing levels will have a very slow attack rate.

HOLD The time Gain Reduction holds each time the signal causes an increase in Gain Reduction. Useful for low frequency sounds to prevent 'Rattle'. HOLD time can be disabled,(Off), or set from 2mS through to 10Seconds.

RELEASE RELEASE is the rate at which the Gain Reduction falls back to [RANGE] amount of Gain Reduction. Very short release times give maximum effect but can cause severe 'Pumping' or 'Breathing'. This parameter ranges from 50ms through to 10Seconds. Auto release is a programme dependent release time which works well on most material causing the compressor to be 'Transparent'

TYPE Norm Normal is a 'Linear' compressor with which gives the user greater control of compression with fixed RATIO relationship applying to all signals above the THRESHOLD.

TYPE Soft This being a Soft-Knee type compressor which is very transparent. In Soft-Knee mode however, the compression ratio increases as the signal level increases and so there is no hard and fast threshold as such. In Soft-Knee, the THRESHOLD parameter is used to adjust the amount of compression, and RATIO alters the curve of the knee, making it softer or harder on a scale of 0 to 9.



The audio outputs of the 1<=> type Effect can be sent to both channels by selecting **LINKS** **OUTs** option to display 1<=>2



Because the DE-ESSER is effectually the COMPRESSOR with the FILTER in the side-chain, changing any of the DE-ESSER parameters will also cause the COMPRESSOR parameters to change and vice versa.



The De-Esser requires the **Ds/Cp/Lm** link to be Off to allow different THRESHold RATIO etc parameter settings for each channel. Also select **OUTPUT** **DC MAKUP** to be 0dB to reduce the undesirable signal components.

DE-ESS EXAMPLES

To do simple vocal DE-ESSing, select the desired channel to be DE-ESSed, load the patch number 83 called De S Vocal. Hit THRESH and reduce the sibilance to the required level by rotating the knob anti-clockwise. Adjust the De-essing frequency hit FILTER and select the lowest (bottom) screen page, adjust the filter to display the audio band that you wish to compress.

For De-essing that does not attenuate the low frequencies that may be present, load patch number 85 De S Music into Channel 1. Apply a signal to Channel 1 only. Hit THRESH and select Channel 1, the D indicator under the input meter shows the maximum audio level that will pass through the Channel 1 FILTER. Select Channel 2, the indicator is at +15dB showing that the Ch2 audio is not compressed.

The De S Music patch 83 can also be very effective as a two band compressor. Set Channel 1 OUTPUT DC MAKUP to Auto and adjust the Channel 1 THRESH indicator to -30dB. Set Channel 1's FILTER by using the LEFT and RIGHT arrow keys to adjust the filtered band while listening to some audio music source, adjust the DE-ESS RELEASE parameter to 50ms for drastic effect !

DE-ESS PATCHES

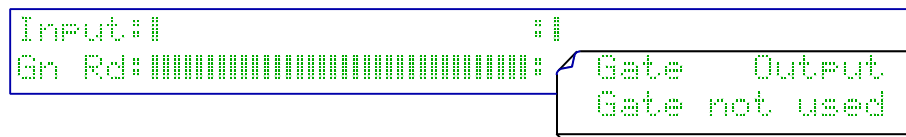
Patches numbered 81 through and including 89. Only patch number 83 can process two audio channels, all others are 1<= input and 1<= output, (i.e. Mono input and Mono output). See LINKS



ADVANCED GATE

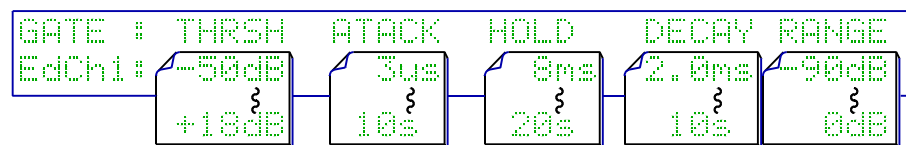
Because the GATE incorporates several innovative features, the menu occupies five screens in normal operation, the top one being as always the View Meters screen. The first screen page down gives access to the more usual parameters of Threshold, Attack, Hold, Decay and Range. This screen of parameters will be different if RECORDED envelope TYPE is selected, to confirm this see the last (bottom) screen page.

GATE VIEW METERS



DOWN

GATE PARAMETERS FOR NORMAL TYPE



THRESH

Sets a signal input level above which the GATE opens. The GATE THRESHOLD and the input level meter reads the level after the Filter if the GATE KeySOURCE is set to IntFilter or ExtFilter. The THRESHOLD parameter ranges from -50dB to +18dB

ATTACK

ATTACK is the rate at which the GATE opens from the RANGE setting. Too fast an attack coupled with too high a threshold will cause 'clicks' (square edges) onto low-frequency programme material. The fastest attack setting is $3\mu\text{s}$, the slowest being 10Seconds

HOLD

HOLD is the time GATE remains open, after any Peak Envelope has finished. The minimum HOLD time is 8mS and the maximum is 20Seconds. HOLD also effects the note-on length if the MIDI GATE SEND is enabled.

DECAY

DECAY is the rate at which gate closes once the HOLD time has elapsed. The fastest decay rate is 2mS, the slowest being 10Seconds.

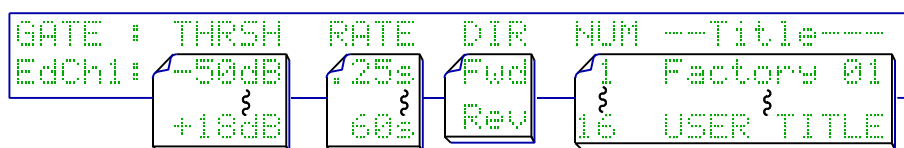
RANGE

RANGE is the maximum amount of Gain Reduction applied when the gate is closed. Normally this will be the maximum of -90dB. If the RANGE is set to nothing, ie. 0dB, MIDI notes will still be sent when the GATE fires, and only the PEAK envelope will affect the audio signal. This latter suggestion can produce dynamic improvements to percussion tracks, especially if they have been previously recorded onto tape.



These parameters will be very different when GATE TYPE is set to RECORDED.

GATE PARAMETERS FOR RECORDED TYPE

**THRESH**

Sets a signal input level above which the GATE opens. The GATE THRESHold and the input level meter reads the level after the Filter if the GATE **KeySOURCE** is set to **IntFilter** or **ExtFilter**. The THRESHold parameter ranges from -50dB to +18dB. Care must be taken when setting the THRESHold and RETRIGger parameters if the complete recorded envelope is to be replayed. Every time THRESHold is exceeded the envelope starts to play again unless prevented by some RETRIGger time or mask.

RATE

When the RECORDED envelope is first selected this RATE parameter will always be the rate that the envelope was recorded initially. However this replay time can be adjusted to fit the sound being 'gated'. The recorded envelope facility is best optimised when a wave shape was recorded slowly and replayed at the correct speed, similar in method to the use of Vari-speed on a tape recorder.

DIR

The DIRection of the envelope can be as it was recorded, **Fwd** (forward), or **Rev** (reversed) for creative effects.

NUM

This is the number of the RECORDED envelope, 1 to 16. The titles will scroll through accordingly. The envelopes shown in the section FACTORY RECORDED GATE ENVELOPES will be available, if these have not been over-written.



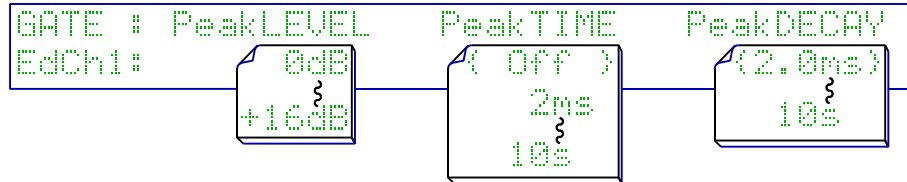
DOWN

Screen 3 introduces a new parameter, Peak Level, which may be used to actually increase the level of the processed sound for a short time immediately after the Gate has opened. This has its own Level, Peak Time and Decay times which allow transients such as drums to be given extra attack. Once the decay time has elapsed, the Gate completes its envelope conventionally.



This screen of parameters will **not** be available if **RECORDED** envelope **TYPE** is selected.

GATE PEAK PARAMETERS FOR NORMAL TYPE



PeakLEVEL

This level is the amount of gain that is added to the signal after the initial ATTACK time has elapsed. Peak level also determines the note velocity of the MIDI **GATE SEND**. A maximum of **+16dB** is available.

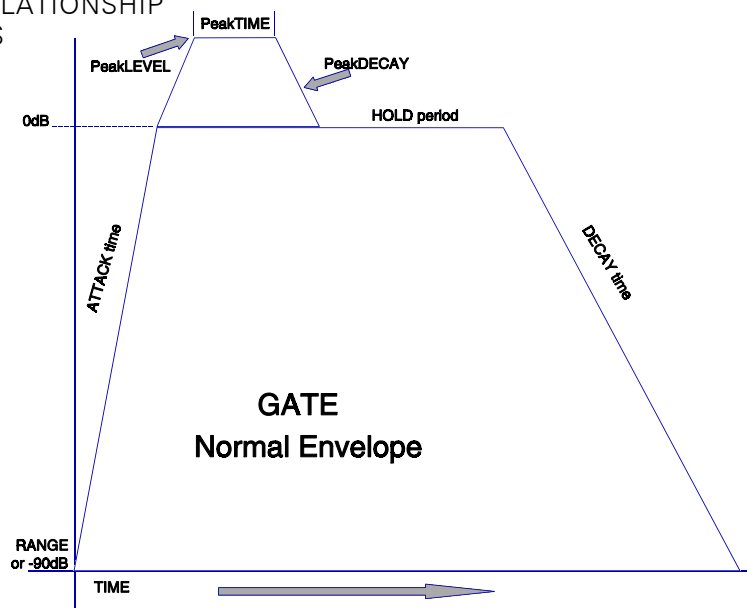
PeakTIME

This parameter is very similar to HOLD and controls the time of the PeakLEVEL. If this parameter is set to **Off** then no Peak Envelope will be heard. The maximum of **10Seconds** will probably never be used.

PeakDECA

This rate is the time taken for the PeakLEVEL to fall back to 0dB, at which point the HOLD time takes over. The fastest decay rate is **2mS**, the slowest being **10Seconds**.

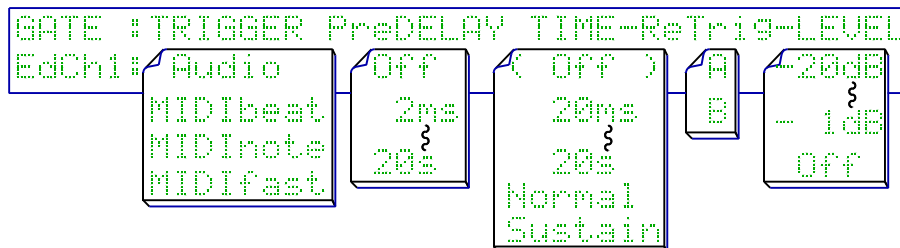
DIAGRAM SHOWING THE RELATIONSHIP OF ENVELOPE PARAMETERS FOR THE GATE EFFECT



DOWN

Screen 4 is used to select the trigger source for the Gate. A Pre-delay is available so that the Gate envelope can be delayed by up to 20 seconds after the Gate has been triggered. It is also possible to set a re-trigger time to prevent the Gate from re-triggering too soon. Two different styles of re-trigger mode are offered, A or B. The user can control the Re-trigger Level which is virtually a second threshold, below which the audio triggering signal must fall before a re-triggering is possible.

GATE TRIGGER PARAMETERS FOR BOTH TYPES

**TRIGGER**

Selects the source information that will trigger the gate. There are four possible options. The standard choice will be **Audio**, but sophisticated MIDI options are also offered:

MIDibeat - where MIDI time information will fire the GATE. The time information can be divided down using the **(MID)** **TRIG TIME** parameter.

MIDInote - where one note, those within the split, or all MIDI notes (on the correct MIDI channel) will act as a valid trigger for the GATE. See **(MID)**

MIDIfast - which is a special case to be used when one M500 is triggering one or more M500s via MIDI.

PreDELAY

Normally **Off**, this parameter can be set between **2mS** and **20Seconds** so that the GATE will wait before opening after receiving any valid trigger. For example: Pre-delay is useful when the GATE is being triggered from a kick drum that has pedal rattle before the drum sound, with a fast attack and a few milliseconds of Pre-Delay the GATE will open fast but the rattle will be missed. Another example might be where the GATE is being used to clean up the start of a piece of recorded music but where there may be a count-in or other undesired noise on tape which would cause premature triggering of a conventional gate.

TIME-ReTRIG

This is the time after the GATE closes that normally valid triggers will be ignored. The parameter display varies depending on what trigger source is selected. If GATE TRIGGER is set to **Audio**, **MIDibeat** or **MIDIfast** then the Re-trigger time can vary from **Off**, or **20mS** to **20Seconds**. The re-trigger time will often have parentheses around the display parameter at low values, this is because the GATE HOLD time (on the first parameter screen) is greater than the selected re-trigger time and hence has no relevance.

If GATE TRIGGER is set to **MIDInote**, then the TIME-ReTrig will only display two options. These are **Normal** where the GATE envelope follows the MIDI key up and down action decaying quickly, or **Sustain**, where the gate will close at the DECAY rate. These can also be selected by MIDI 'sustain footswitch' data (Controller #64 on the correct MIDI channel). An example of this facility is when the triggering event is closely followed by sounds that may cause unwanted re-triggering such as the individual beats within a drumfill or double beats where only single ones are wanted. By setting the appropriate re-trigger time, the GATE could be made to open on the first beat of the drum fill and then ignore everything else until, say, two bars later.

ReTrig

Where the Gate stays open for the duration of the sound, then retrigger TIME prevents further triggering until the time has elapsed. For example: ReTrig set to **A** is useful when gating a snare drum every other beat to ensure that the gate stays closed until the next snare hit after the gated snare sound has finished.

ReTrig

Where the Gate envelope is forced to finish regardless of the envelope of the triggering sound and will then trigger on the next sound after the re-trigger time has elapsed. Type **B** will cause repeating envelopes on a continuous valid trigger, whereas type **A** would remain open.

ReTRIG-LEVEL

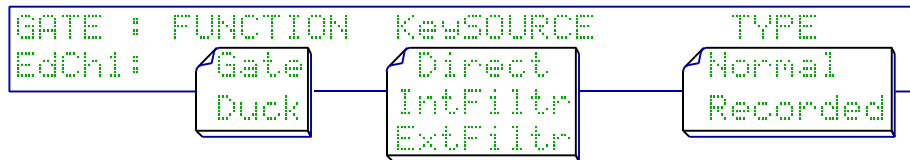
There is a secondary threshold that the audio signal has to fall below to permit the GATE to close, it is very effective in 'Latching on' to a sound once triggered. The parameter has an **Off** option, and ranges from **-1dB** to either **-20dB**, or the difference between the current GATE THRESHOLD and **-50dB**, eg **-5dB** if the THRESHOLD is at **-45dB**.



DOWN

The last (bottom) screen is used to select the GATE function, Key source and the Gate Type. Gate function may be used to configure the GATE as a conventional Gate or as a Ducker. In Duck mode, signals in excess of the threshold cause the GATE to close rather than open. Key source permits the re-routing of the filter section. As mentioned in the DE-ESSER section the filter is only available if the De-Esser, which has higher priority, is not assigned. TYPE allows the GATE to be used normally or in conjunction with one of the 16 possible RECORDED envelopes.

GATE FUNCTION PARAMETERS FOR BOTH TYPES



FUNCTION

Normally set to **Gate**, **opens** the audio path when the gate is triggered. If set to **Duck** the GATE **closes** the audio path when the gate is triggered. For example, **Duck** can be used for 'voice-overs' to control the level of music. Load factory PATCH number 62 **VoxOvrDuck**, feed the voice over microphone to the KEY INPUT jack socket and route the music through the INPUT / OUTPUT XLR sockets.

KeySOURCE

When set to **Direct** routes the XLR audio signal to trigger the gate. Set to **IntFilter** the XLR audio signal is routed through the FILTER section. Set to **ExtFilter** the KEY INPUT jack socket audio signal is fed through the FILTER section.



If the DE-ESS Effect is assigned on the same audio channel, (ie. its yellow LED is lit), then the Filter will not be available to the GATE. Therefore the only possible option is **Direct**.

TYPE

This parameter has only two options. They control many other GATE functions and facilities. Only users conversant with the finer points of the M500 should work with the Recorded envelopes.

- Normal** 2pages GATE: THRSH ATTACK HOLD DECAY RANGE
- GATE: PeakLEVEL PeakTIME PeakDECAY
- Recorded** page GATE: THRSH RATE DIR NUM --Title---

GATE PATCHES

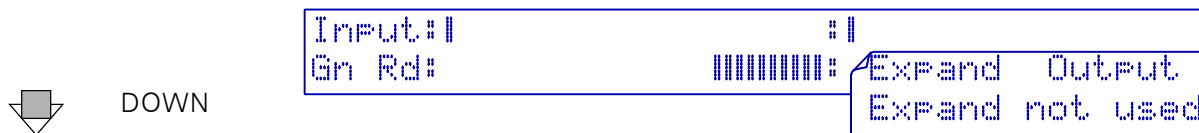
Patches numbered 51 through and including 64 are standard GATE configurations. Patch number 65 uses the Recorded envelope. Patches 114 through to and including 123 are GATE patches preset to be controlled by MIDI.



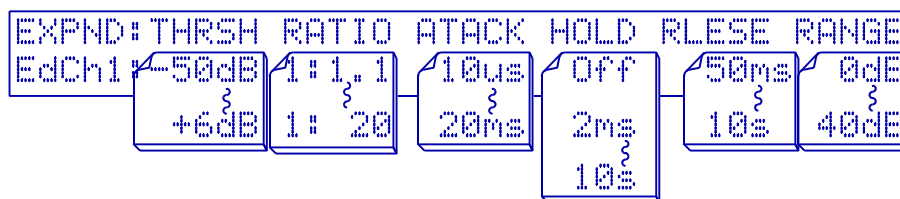
ADVANCED EXPAND

The Expander section may be used as a low level or downwards Expander in much the same way as a noise Gate, or it may be used to increase the dynamic range of a signal by setting a higher threshold but selecting a low expansion ratio and applying some Output gain. Aside from the View screen, there is only one screen needed to set up the Expander parameters. The user variable parameters are:- Threshold, Ratio, Attack, Hold, Release and Range. These operate in much the same way as their Compressor counterparts, the difference being that only signals below the threshold are subject to gain modification. Signals in excess of the threshold level pass through unprocessed. Note that the M500 will override the Range setting if the selected value is outside a maximum sensible value.

EXPAND VIEW METERS



EXPAND PARAMETERS DISPLAY



THRESH

This parameter sets the signal input level under which Gain Reduction will start to occur depending on the RATIO setting. As the threshold is lowered towards **-50dB** then the maximum amount of Range that can be applied will also be reduced. The highest threshold of **+6dB** will be useful for 'upward' expansion.

RATIO

This determines how much Gain Reduction occurs when the input signal falls below THRESHold. With the lowest Ratio setting of **1:1.1** it is impossible to achieve an EXPAND Range greater than 6dB. The maximum ratio offered is **1:20** at which point the EXPAND effect will behave similarly to the GATE module.

ATAK

This is the rate at which the Gain Reduction increases once the input signal is below the THRESH. Long attack times remove transients. ATTACK has some degree of automatic ranging. eg. if a fast transient appears with a slow attack selected, then the actual attack rate will become faster, although the panel value will not change. The parameter ranges from **10µS** to **20mS**

HOLD

This is the 'time' that Gain Reduction holds each time the signal causes a new level to be output. Useful when applied to low frequency sounds to prevent 'Rattle'. This can be adjusted from **Off** (only really useful for percussive sounds), up to **10Seconds**

RLESE

RELEASE is the rate at which the Gain Reduction falls back to the RANGE amount of Gain Reduction. Short release times give the maximum of effect but can cause severe 'Pumping'. The parameter can be set between **50mS** and **10Seconds**. RELEASE has some degree of automatic ranging. eg. If a fast transient appears with a slow release selected, then the actual release rate will become faster, although the panel value will not change.

RANGE

The range parameter can be set so that the EXPAND effect is operational but not too severe. The maximum range of 40dB is only available with higher RATIO and THRESHOLD settings.

EXPAND PATCHES Patches numbered 66 to 71. Combinations with other Effect modules patches can be found at patch 101 and patch 103

**ADVANCED COMPRESS**

The Compressor is relatively simple to set up and uses only one parameter screen in addition to the View screen. The variable parameters are; Threshold, Ratio, Attack, Hold and Release and there is also the option to switch the Compressor type from Normal (linear) to Soft Knee.

AUTO COMPRESSOR

Auto THRESHOLD is available on the Compressor by turning the threshold fully anti-clockwise. For this, it relies on the threshold of the LIMITer, **whether or not the Limiter is assigned**. It functions by automatically adjusting the Compressor threshold so that peaks are 6dB below the Limiter threshold. The update of this floating threshold follows time constants loaded with patch numbers 73 to 80.

Each patch having separate:

Attack - time to wait before re-adjustment.

Hold - time to remain at this level

Decay - how quickly to change to another level.

The 'amount' of auto threshold adjustment ranges between 0dB and the Expander threshold, **even if the Expander is not assigned**. Any signal level below the Expander threshold will cause the auto gain make up to 'freeze' at its current level. This is done to prevent massive re-adjustment of gain make-up and auto parameters when more than one track is processed and the gap of silence between tracks would be classed as very low level program.

The default is for the Compressor auto threshold to force the Expander threshold down to the maximum range of -31dB. In most cases the Expander threshold will not need further adjustment.

AUTO GAIN MAKE-UP

Gain make-up is also automatic in this mode, and is calculated to put back any level drop caused by the compression, making the overall output level remain more constant. This amount can be seen by observing the OUTPUT page. (The display is not updated in real time and so may be changing far more often than appears). Manual override of automatic gain make-up is always possible, but not recommended.

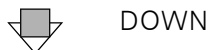
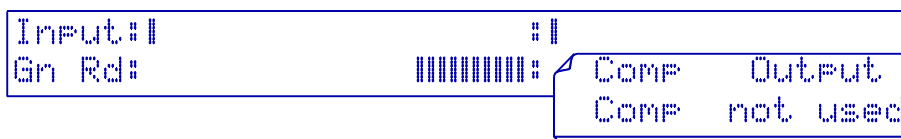
AUTO ATTACK / RELEASE

The Attack and Release times also have Auto settings which vary the attack and release times automatically depending on the nature of the program material being processed. This is a useful option for signals that vary dramatically in attack and release times, alternately slapped and plucked bass guitar being one example.

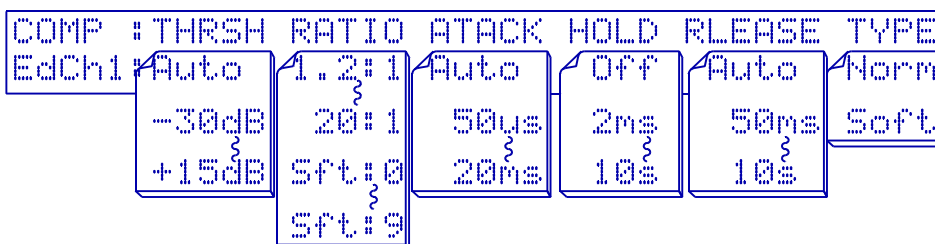
HIDDEN PARAMETERS

The AUTO time constants are not offered for user editing. Different response and time characteristics can be produced simply by using a different preset factory patch as a starting point. See the Factory Patches section, patches numbered 73 to 80, for more details.

COMPRESS VIEW METERS



COMPRESS PARAMETERS DISPLAY



THRESH

This sets the signal input level over which Gain Reduction will start to occur. The manual threshold ranges from **-30dB** to **+15dB** (a setting of +15dB will cause very little audible change). For details of the **Auto** setting see above.

RATIO

This determines how much Gain Reduction occurs when the input signal goes above THRESHold. The parameter range covers from **1.1:1** to **20:1**, with TYPE set to **Norm**, or, from **Sft:0** to **Sft:9** with TYPE set to **Soft** Knee. The amount of Gain reduction (Compression) depends upon the THRESHold, RATIO and TYPE settings **and** the signal level. eg. A signal of 0dB with a THRESHold setting of -20dB with RATIO set to 2:1 will give 10dB of compression.

ATTACK

ATTACK is the rate at which the Gain Reduction increases once the input signal exceeds THRESH. Longer attack times allow more transients through unprocessed. The manual range of this parameter is **50us** (letting no transients through) to **20ms** (which allows most transients to pass through). When [ATTACK] is set to **Auto** the attack time is programme dependant which woks well on most material causing the compressor to be 'Transparent'. e.g. if a fast transient appears the attack rate will be fast, slowly changing levels will have a very slow attack rate.

HOLD

HOLD is the time Gain Reduction holds each time the signal causes a increase in Gain Reduction. Useful for low frequency sounds to prevent 'Rattle'. It can be disabled, (**Off**), or set from **2ms** through to **10Seconds**.

RELEASE

RELEASE is the rate at which the Gain Reduction falls back to RANGE amount of Gain Reduction. Very short release times give maximum effect but can cause severe 'Pumping' or 'Breathing'. This parameter ranges from **50ms** through to **10Seconds**. **Auto** release is a programme dependent release time which works well on most material causing the compressor to be 'Transparent'

TYPE Norm

Normal is a 'Linear' compressor which gives the user greater control of compression with fixed RATIO relationship applying to all signals above the THRESHOLD.

TYPE

Soft

This being a **Soft-Knee** type compressor which is very transparent. In Soft-Knee mode however, the compression ratio increases as the signal level increases and so there is no hard and fast threshold as such. In Soft-Knee, the THRESHOLD parameter is used to adjust the amount of compression, and RATIO alters the curve of the knee, making it softer or harder on a scale of 0 to 9.

COMPRESS PATCHES

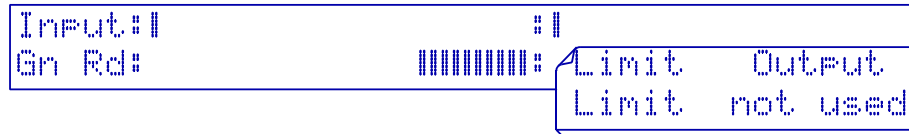
Patches numbered 73 through and including 80. These patches have different time constants associated with the 'hidden' AUTO-Attack, AUTO-Hold, and AUTO-Release. These times are available for different programme material, eg. patch 80 would be good on dynamic classical music mixdown, patches 76 or 77 would be good on a dance, high-energy type mixdown.



ADVANCED LIMIT

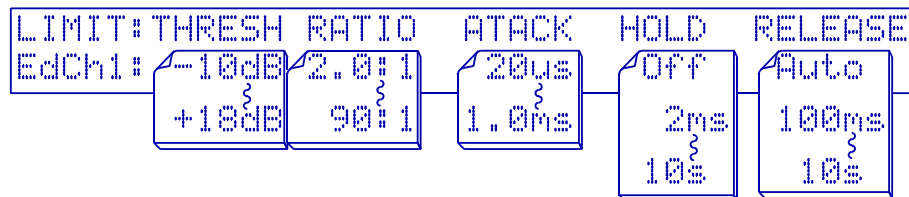
Again requiring only one parameter screen, the Limiter has variable Threshold, Ratio, Attack, Hold and Release. The principle is similar to that of the Compressor except that the Ratio range is greater. Limiting is useful in conjunction with a Compressor which may be set up with a long attack time. In these circumstances, the Compressor may allow short transients through unchecked, but a fast attack Limiter following the Compressor will prevent these transients from exceeding the desired amplitude. The Threshold parameter will effect the operation of the Compressor auto threshold feature, even if the Limiter is not assigned.

LIMIT VIEW METERS



DOWN

LIMIT PARAMETERS DISPLAY



THRESH

THRESHOLD is the level of input signal over which Gain Reduction will start to occur. Often this parameter will be set to just below the maximum recording level or maximum system level depending on M500 implementation. The parameter range has been logically restricted to -10dB through to +18dB

The LIMIT THRESHOLD parameter will also effect the operation of the COMPRESSOR Auto THRESHOLD feature, even if the LIMITER is not assigned.

RATIO

The RATIO setting determines how much Gain Reduction occurs when the input signal goes above THRESHold. The parameter range covers from 2:1 to 90:1

The amount of Gain reduction (Limiting) depends upon the THRESHold and RATIO settings and the signal level. eg. A signal of +10dB with a THRESHold setting of 0dB with RATIO set to 90:1 will give an output level of 0dB.

ATAACK

This is the rate at which the Gain Reduction increases once the input signal exceeds THRESHold. This parameter should be kept fairly short if it is desired to prevent any peaks passing through unprocessed. The manual range of this parameter is 20µs (letting no peaks through) to 5.0ms (which allows some peaks to pass through).

HOLD

Length of time that Gain Reduction holds for when signal causes an increase. Useful for low frequency sounds to prevent 'Rattle'. Can be disabled,(Off) but more often set between 2ms through to 10Seconds.

RELEASE

RELEASE is the rate at which the Gain Reduction falls back to the 0dB. Long release times or Auto are generally used to make the Limiter 'Transparent'. This parameter ranges from 100ms through to 10Seconds. Auto release is a programme dependant release time which works well on most material.

LIMIT PATCHES

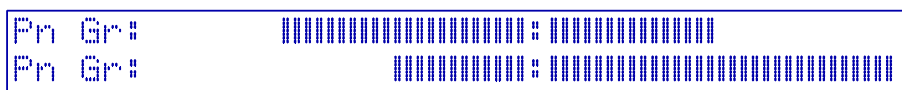
Patches numbered 90 and 91. Other combination patches are 99, 100 102 and 103 although the LIMIT Effect can be assigned quickly to almost every patch and still be very usable.



ADVANCED PAN

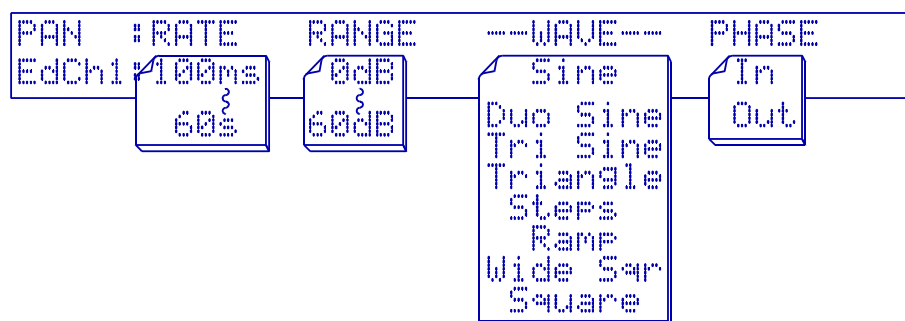
The panner incorporated in the M500 is extremely sophisticated yet is still very simple to set up and use. It can be free-running or synchronised to various triggers. The Pan meter screen is slightly different from other effect modules in that it displays both channel signal outputs and both channel pan gain-reduction amounts, simultaneously.

PAN VIEW METERS



DOWN

PAN PRIMARY PARAMETERS DISPLAY



Both channels of the M500 need to be assigned for a PAN Effect. If only one channel is assigned a 'Tremolo' type modulation will be heard.

RATE

Rate sets the frequency of the pan oscillator, whether free-running or triggered. A fast rate will often be un-musical. Ranges from 50ms to 60Seconds.

RANGE

The RANGE sets the depth of amplitude modulation, in other words, how far left or right of centre the signal is panned. The parameter ranges from 0dB (no panning at all) to 60dB (very severe panning).

--WAVE--

Displays the name of the currently selected factory preset PAN waves. Eight waves are offered with 'Sine' being the PAN wave conventionally used. The variety of waveforms include:

- Sine
- Tri Sine
- Steps
- Wide Sqr
- Duo Sine
- Triangle
- Ramp
- Square.

PHASE

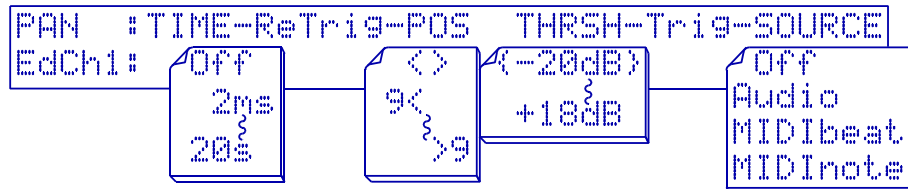
Out gives the standard PAN Effect which sweeps from one channel to the other, ie. the amplitude of one channel increases as the other decreases. PHASE set to In results in a tremolo type effect where the gains of both channels are varied together. If PAN is only assigned to one channel this parameter will have no perceivable function.



DOWN

The second parameter screen has four further parameters which **only** take effect if the PAN TRIGGER SOURCE is set to a parameter other than Off.

PAN TRIGGER PARAMETERS DISPLAY



TIME-ReTRIG

Once PAN is triggered this allows the pan to continue for the time set. Normally to hear the full PAN sweep, this time would be equal-to, or just greater than the sweep RATE set on the page above. It can be set to Off or set between 2ms through to 20Seconds.

ReTRIG-POS

This permits the setting of the PAN start position, of course for the effect to be heard RANGE will need to be set to some value. The parameter ranges from 9< being fully Left to >9 fully Right with <> being Dead centre.

THRSH-Trig

Sets the signal level THRESHOLD to trigger the PAN, but **only** valid when TrigSOURCE is set to Audio. This can be more easily done using the facilities on (THRESH) A correct threshold setting would be just below the peak signal input level. The parameter range has been restricted from -20dB through to +18dB

Trig-SOURCE Off

Permits PAN to free-run, hence TIME-ReTrig-POS, THRSH-Trig parameters and EnvATTACK/DECAY (on the page below) have no effect.

Trig-SOURCE Audio

Enables the THRESHold parameter. A correct threshold setting would be just below the peak signal input level.

Trig-SOURCE MIDIbeat

This option uses the (MIDI) TRIG TIME setting to select the trigger pulse frequency, usually a setting of several beats would be used. A very fast time count eg. 0 Bts and 2 Frms would be inaudible under most conditions.

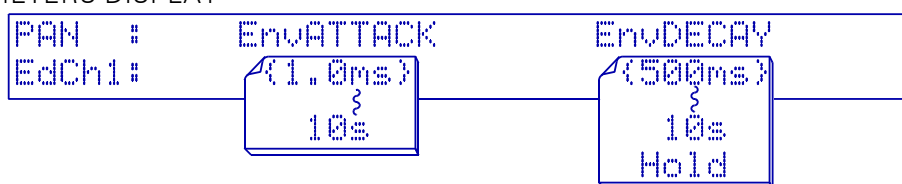
Trig-SOURCE MIDInote

MIDInote triggering is not actually *triggering* of the pan envelope at all, but literally MIDI notes set the PAN position with respect to the Low and High key split points currently selected for audio channel 1, (see the MIDI screen). An easy demonstration of this is Factory patch number 124 named **M Pan pos** where any MIDI note event on the correct MIDI channel between key C1 (panned fully Left) and key C5 (panned fully right) will set a pan position, ie. key C3 is dead centre. If the upper and lower split-points overlap, the pan still operates between the highest and lowest notes set, (and not in Dead-Zone mode).



A third parameter screen allows an envelope to be imposed on the modulating waveform so that the PAN width can, for example, be made to start off very narrow, expand to full width over a pre-determined time, and then narrow down again.

PAN ENVELOPE PARAMETERS DISPLAY



EnvATTACK

The Envelope ATTACK is the time - once **triggered** - for the PAN to 'swell' from no perceivable width to the selected [RANGE] width / depth.

EnvDECAY

After the EnvATTACK time has completed, this takes effect to either **Hold** at the **RANGE** setting, or to decay at the selected rate. A DECAY setting equal to the ATTACK setting gives a smooth 'in and out' swelling of PAN depth.

PANNER PATCHES

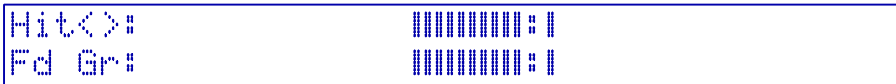
Patches numbered 104 through to 113 show the ranges of effects available with the PANner. Patches 123 ,124 and 125 are PAN patches preset to be controlled by MIDI.



ADVANCED FADER

The FADER for each channel has a separate fade Up and Down time. It can be triggered to fade up or down by the left and right arrow buttons when on the View meter screen, shown symbolically as < > The meter screen has both channels' signal outputs shown and Fade gain reduction.

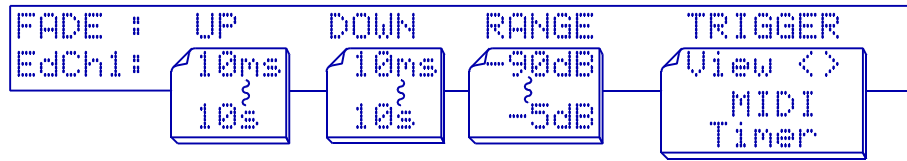
FADER VIEW METERS



The Fade 'Timer' is triggered to start timing when the M500 receives an audio signal above -10dB. The 'Fade-out' time can be set by selecting the timer 'Minutes' value to below 0. Then, once the timer has been triggered by audio, the time will count until the 'YES' button is hit. The time is then displayed ready to do a 'Fade-out'. This is useful in a studio mix-down environment where one 'dry run' is needed to locate a suitable fade point after which the fade will automatically start at the same point each time the tape is run. The fader automatically resets itself after 5 seconds of signal below -30db once the 'Fade-out' is complete.



FADER PRIMARY PARAMETERS DISPLAY



Fade UP

This time is the **time per 10dB** of gain increase. So a setting of **10ms** (the minimum) will take 90ms to rise and **10Seconds** (the maximum) will take 90 seconds to rise from a floor of -90dB.

Fade DOWN

This time is the **time per 10dB** of gain decrease. So a setting of **10Seconds** will take 90 seconds to fall to a floor of -90dB, although little change might be perceived once the signal has fallen below 60dB or so.

RANGE

RANGE is the amount of Gain Reduction where fade stops. This is analogous to the GATE RANGE behaviour. The parameter has a minimum of **5dB** and a maximum of **90dB**

EXAMPLE

With a Fade DOWN time set to **1s** and RANGE set to **50dB** total fade down time will be 5 seconds, stopping at -50dB Gain Reduction.

Fade events can be caused by MIDI. FADE Outs can be by a presettable 'Timer' which can have its 'Fade-out' time set between 1 second and 99 minutes. A MIDI fade event will normally be used to fade-in when a MIDI clock start command is received and fade-out when a clock stop instruction is received. (MIDI clock instructions are 'System real time' instructions therefore the MIDI channel setting is immaterial). However, this fade via MIDI can be re-assigned on the MIDI screen to occur when a specific MIDI controller switch number is received. If this is desired, then the fader status will flip status (e.g. fade-up becomes fade-down) at the selected up and down rates when the corresponding switch number is received. A further matching MIDI switch number will flip the FADE state back. The range of switch numbers has been confined to the undefined MIDI switch numbers, but all of these should be obtainable on most current sequencers and mother keyboards.

TRIGGER

Selects which event will cause a Fade UP or DOWN. **View <>** is manual control using the LEFT and RIGHT arrow keys, this is always available on the FADE view-meters screen when the FADER is assigned.

TRIGGER

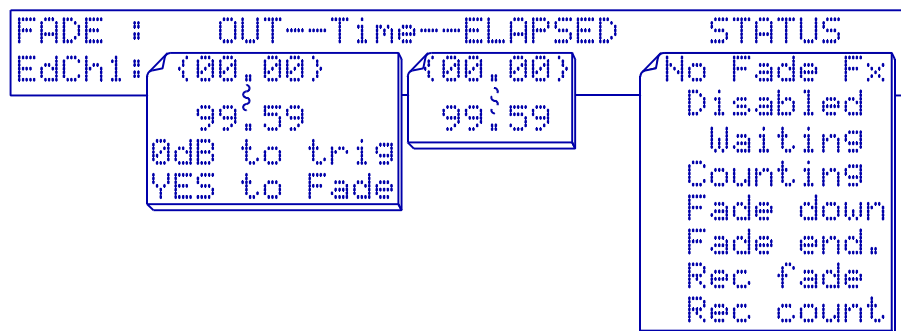
MIDI The will trigger on receipt of MIDI data as determined by the MIDI screen FADE SWITCH parameter. Remember, this can be MIDI Stop/Start or a Switch number (often called 'Controller'). For an alternate FADE method see MIDI MASTER VOLUME.

TRIGGER

Timer FADER will trigger with reference to the parameters on the page below (bottom page) OUT--Time--ELAPSED STATUS.



FADER TIMER PARAMETERS DISPLAY

**OUT--Time**

Either programmable by the user to a precise time, or previously set with a 'dry-run' of the material to be FADED. It is the time when the FADE down will commence, at the set FADE DOWN rate.

The OUT--Time can be set automatically by selecting the timer Minutes value to below 0. Then, once the audio has exceeded the first hidden threshold the timer will count until YES is hit.

The time is then remembered and displayed ready to do a FADE-out. This is useful in a studio mix-down environment where one 'dry run' is needed to locate a suitable fade point, after which the FADE will automatically start at the same point each time the tape is run. The FADER automatically resets itself after 5 seconds of signal below the 'hidden' threshold (normally when the tape is re-wound). See FACTORY PRESET PATCHES 126,127 & 128.

Time--ELAPSED

Shows the current time that the track has been running and is not adjustable. The counter will not start until signal has exceeded the 'hidden' threshold.

HIDDEN PARAMETERS

The timer starts counting when the TRIGGER is set to 'Timer' and the audio source exceeds a hidden threshold. This is normally a -10dB signal level. The timer automatically resets and a fade-up occurs when the signal drops below a second threshold of -30dB for at least 5 seconds. These two hidden parameters can be changed by loading the following FACTORY PRESETS

126 - M Clk Fade, with start to count threshold of -20dB

127 - M Pan/Fade, with start to count threshold of -30dB

128 - M Key=Fade, with start to count threshold of -40dB

STATUS

Displays the current status of the auto FADE down timer, it is not adjustable by the user.

CHAPTER 6

PRESET 'Factory' PATCHES

PATCH #	TITLE	TYPE	DESCRIPTION
51	Gate Snare	1Chan	Standard Gate using a suitable filter for snare drum.
52	Gate Kick	1Chan	Gate with Peak using a suitable filter for kick drum.
53	Gate Tom	1Chan	Longer Gate with some re-trigger, using filter for tom-tom.
54	Gate Cymb1	1Chan	Fast Attack Gate with long envelope and Peak using suitable filter.
55	Gt Rev Cym	1Chan	Use with crash cymbal (or noise) for reverse envelope effect.
56	Gate Bass	1Chan	Kick drum into External Key Jack. Bass guitar through Gate.
57	Gate Peak	1Chan	Gate with lots of Peak using suitable filter. (Adds punch).
58	Gate Flam	1Chan	Double hit flam effect for drums, using suitable filter.
59	Gt Repeat	1Chan	Repeating Gate for long sounds, using suitable filter.
60	GateEchoL	Stereo	Gate sweeps from Channel 1 to Channel 2 - not using Pan.
61	GateEchoR	Stereo	Other half of patch 61 above. (See Note 1)
62	VoxOvrDuck	2Chan	Vocal signal at External Key Jack ducks stereo program on both audio channels.
63	Gate Short	1Chan	Gate with very short envelope 'burst'
64	Gate Once	1Chan	Gates only once every 600mS (adjusted by re-trigger time)
65	Rec Gate	1Chan	Use with a factory, or one of your recorded Gate envelopes
66	Exp Speech	1Chan	Expander for removing background noise from speech.
67	Exp Vocal	1Chan	Expander for removing background noise from vocals.
68	Expand Up	1Chan	Equivalent to "De-Compress", puts dynamic range back where audio program has been over-compressed.
69	Exp Drums	1Chan	Gate type Expander suitable for drums.
70	Exp Guitar	1Chan	Expander for removing guitar Fx pedal noise from vocals.
71	Exp Long	1Chan	Long Release gentle Expander.
72	Exp - Gate	1Chan	Expander set as a 'Gate' (without a key filter).
73	CompAu 60s	1Chan	Automatic Comp, long hold & decay, +6dB threshold. Hidden Auto presets : 100ms attack / 60sec hold / 10sec decay
74	CompAu 10s	1Chan	As above, but with short decay. Hidden Auto presets : 50ms attack / 10sec hold / 10sec decay
75	CompAu 2s	1Chan	As above, but with short hold also. Hidden Auto presets : 25ms attack / 2sec hold / 5sec decay
76	CmpLimAu1s	1Chan	Slow Attack, fast Release, puts punch into drums. Hidden Auto presets : 5ms attack / 1sec hold / 1sec decay

PATCH #	TITLE	TYPE	DESCRIPTION
77	Comp Soft	1Chan	Soft knee Compressor with fast Release. Hidden Auto presets : 10ms attack / no hold / 2sec decay; but not invoked (2)
78	CmpSloSoft	1Chan	Soft knee Comp with long Attack and auto Release. (2) Hidden Auto presets : 50ms attack / 10sec hold / 20sec decay; but not invoked
79	Auto level	2Chan	Very long release Comp with auto gain make-up. (2) Hidden Auto presets : 25ms attack / 10sec hold / 30sec decay; but not invoked
80	Comp Ster	2Chan	Gentle stereo Compressor for use at mixdown. (2) Hidden Auto presets : 100ms attack / 5sec hold / 5sec decay; but not invoked
81	Comp 2 Bnd	Stereo	2 Band Compressor (Ch1 input only). For split band operation select '1 <> 2' on LINKS page
82	Comp 2 Bnd	Stereo	Other half of above patch. (See note 1)
83	De S Vocal	1Chan	Full band De-Essing. For stereo: switch 'Stereo' LINK to 'On'.
84	De S Music	Stereo	High-band De-Essing (Channel 1 only)
85	De S Music	Stereo	Other half of above patch. (See note 1)
86	De-Middle	Stereo	Removal of excess mid-band frequencies.
87	De-Middle	Stereo	Other half of above patch. (See note 1)
88	De - Pop	Stereo	Removal of excess low frequency content.
89	De - Pop	Stereo	Other half of above patch.
90	Limit Auto	1Chan	+6dB Limiting with auto Release.
91	Limit Hold	1Chan	As above, with medium Release and Hold.
92	Pan Sine	2Chan	Gentle sine wave Pan from Channel 1 input only.
93	Pan Trig 1	2Chan	Synchronised Duo-sine Pan.
94	Pan Trig 2	2Chan	Synchronised Sine wave Pan.
95	Pan Zoom	2Chan	Triggered Pan gets wider, then narrower.
96	Pan Echo	2Chan	Very wide triggered Pan.
97	Fade 2:45	2Chan	Automatic Fade at 2 minutes 45 seconds from first audio signal above -10dB.
98	Fade Rec'd	2Chan	Signal above -10dB starts time counter. Hit 'YES' to Fade when required. This stores Fade Down start time. Re-wind and replay the track. Fader operation will then be automatic.
99	Comp Limit	1Chan	2:1 Compressor with Limit at +6dB
100	SftCompLim	1Chan	Soft knee Compressor with +6dB Limiter.
101	Exp Comp	1Chan	Expander and Compressor suitable for vocal.
102	CompLimGte	1Chan	Gated Compressor Limiter for snare or kick drum.
103	ExpCmpLim	2Chan	Stereo Expand Compress Limit for noisy track.
104	SterCmpPan	2Chan	Gentle Pan with stereo Compressor.
105	PanDuoSine	2Chan	Ch1 input, Stereo output, Duo Sine Pan.
106	PanTriSine	2Chan	Ch1 input, Stereo output, Tri Sine Pan

PATCH #	TITLE	TYPE	DESCRIPTION
107	Shimmer	Stereo	Triggered modulation on HF band (Chan 1 only)
108	Shimmer	Stereo	Linked patch pair 107 / 108
109	Piano Pan	2Chan	Ch1 input, Stereo output, for electric piano type sounds.
110	Filter Pan	Stereo	Low frequencies to Ch1 and High frequencies to Ch2
111	Filter Pan	Stereo	Linked patch pair 110 / 111
112	FiltrPhaze	Stereo	Ch1 output Phasing effect.
113	FiltrPhaze	Stereo	Linked patch pair 112 / 113
114	M C3 Gate	2Chan	MIDI Note C3 (only) will trigger Gate, with Peak.
115	M Slo Gate	2Chan	MIDI Notes C3 to C4 will trigger standard long Gate.
116	M Rec Gate	2Chan	MIDI Notes C3 to C4 will trigger User Envelope Gate.
117	M Clk Gate	2Chan	Normal Gate with Peak will open every Beat.
118	M GateEcho	2Chan	Fast, clock-generated echo from Gate, using Peak.
119	M Rhythm 1	2Chan	Gate and Pan Effect, every 2 Beats.
120	M Rhythm 2	2Chan	Gate every Beat, Slow gentle un-synchronised Pan.
121	M Rhythm 3	2Chan	Pan across image every 4 Beats.
122	M Rhythm 4	2Chan	Gate and Pan effect every 4 Beats.
123	M Pan/Gate	2Chan	MIDI Notes from C3 to C5 open Gate and position Pan.
124	M Pan pos	2Chan	MIDI Notes from C1 to C5 will position Pan Ch1 to Ch2.
125	M Pan env	2Chan	Pan will start new sweep every 2 MIDI Beats.
126	M Clk Fade	2Chan	Start will Fade up, Stop will Fade down. Hidden Fade timer start threshold is -20dB
127	M Pan/Fade	2Chan	Clock will Fade up/down, Pan every 4 Beats. Hidden Fade timer start threshold is -30dB
128	MKey=Fade	2Chan	MIDI Notes from C2 to C6 set fade level using PAN. Hidden Fade timer start threshold is -40dB

PATCH TYPE **1Chan** Patches marked **1Chan** are single channel patches. They can be copied to both channels by the following method:

Hit **(YES)** to load the patch to the current audio channel,
Swop to the other channel using the **(CHAN)** key,
Hit **(YES)** again.

PATCH TYPE **2Chan** Patches marked **2Chan** are pairs of patches 'joined together' so that loading one of the patches to the current audio channel, will always load the other patch to the other channel. It is possible to have a maximum of 25 User patches of type **2Chan**

PATCH TYPE **Stereo** A Patch marked **Stereo** is a single patch that is loaded into both channels simultaneously. This saves memory storage space when compared to a **2Chan** type of patch. Space for 50 User patch of this type is available.



All the MIDI patches (numbers 114 to 128) have the MIDI receive channel set to '1'. This might have to be changed to suit your MIDI set-up. The MIDI patches that depend on clock timing information are best demonstrated with a tempo of about 112 to 120 B.P.M.



The COMPRESSOR patches (numbers 73 to 80) have the **Auto** threshold COMPRESSOR preset times hidden in the patch, these affect the **Auto** COMPRESSOR threshold parameter.



The FADER patches (numbers 126 to 128) have fade timer audio trigger thresholds embedded in the patch. These are invoked by setting fade trigger to timer.

FACTORY RECORDED ENVELOPES for GATE

Num	TITLE	DESCRIPTION
1	Faster pf	Decay steps getting louder and faster (pianissimo to forte)
2	Faster fp	Decay steps getting softer and faster (forte to pianissimo)
3	Slower pf	Decay steps getting louder and slower (pianissimo to forte)
4	Slower fp	Decay steps getting softer and slower (forte to pianissimo)
5	Growl	Very fast, 'open & closing' GATE at start of decay envelope
6	Flutter	Decay envelope with delayed fluttering Fx.
7	Noise	Normal decay envelope with random noise spikes.
8	Piano	Piano envelope.
9	Violin	Slow attack & delayed tremolo.
10	Echo	Initial loud decay then smaller much quieter decays.
11	Up-Down-Up	Loud, quiet and then loud.
12	Backwards	Reverse sounding envelope.
13	Rhythm 1	Repeating rhythmical envelope pattern.
14	Rhythm 2	As above, but a different pattern.
15	Rhythm 3	As above, but a different pattern.
16	Rhythm 4	As above, but a different pattern.



The envelopes are volatile and will be permanently overwritten if an attempt is made to record and store an envelope.



The envelope should be 'replayed' using the GATE with the TYPE parameter set to **Recorded**. The envelopes can be played starting at the front, Forward or Reverse from the end. The play duration RATE can be changed at any future replay.



The envelope will start playing every time the GATE is triggered, set the TIME-ReTrig to the same value as the RATE if all of the envelope is to be replayed.

SIDE CHAIN INSERT JACK

The side chain insert jack, (called S/C jack), on the rear panel of the M500 has several positions in the control circuit dependent on the Effect assignment.

EFFECT MODULE	SIDE CHAIN JACK USE
None assigned	S/C Jack has no use, although input signal is present at the 'send' contact.
GATE (direct source)	S/C Jack has input signal for GATE detection. Breaking the jack will stop the GATE operating.
GATE (internal filter)	S/C Jack has input signal post filter for GATE detection. Breaking the jack stops the GATE operating.
GATE (external filter)	S/C Jack has key input signal post filter for GATE detection. Breaking the jack stops the GATE operating.
EXPAND	S/C Jack has input signal for EXPANDER detection. Breaking the jack will stop the EXPANDER operating.
COMPRESS	S/C Jack has input signal for COMPRESS detection. Breaking the jack will stop the COMPRESSOR operating.
LIMIT	S/C Jack has input signal for LIMIT detection. Breaking the jack will stop the LIMITER operating.
De-Ess	S/C Jack has no use, although input signal is present at the 'send' contact. Breaking the jack has no effect.
Pan	S/C Jack is in signal path of the PAN audio trigger and the PAN output display meters.
Fader	S/C Jack is in signal path of the FADE timer trigger and FADE output display meters. Either side chain will trigger the FADE timer.
For other combinations of Effects the S/C jack signal route description can be assumed to be similar to the following examples:-	
GATE & De-Ess	S/C Jack is used for the GATE only. Of course if the side-chain-jack is broken then no signal will be output. So it could be said that the S/C jack does effect both the assigned modules.
EXPAND, COMPRESS & LIMIT	All modules are routed through the side chain.



When LINK INs is set to On the De-Ess, Comp, EXPAND, LIMIT Fx signals passing through the S/C jack are averaged. Hence, when a side chain insert is necessary both S/C jack insert points must be used, otherwise only a maximum change of 6dB signal level will be noticed.

INTERNAL BATTERY

Inside the M500 is a Nickel-Cadmium battery. This is kept charged whenever power is applied to the unit. It is expected to last a minimum of five years, but extreme power conditions can shorten this period. Symptoms of the battery failing are varied but will manifest itself as incorrect meter level displays, 'ERROR 4' messages and irregular threshold response, especially on the GATE Effect. Battery failure can also corrupt the USER PATCH titles and RECORDED ENVELOPES preventing them from loading.

The battery is NOT a user-serviceable component and no attempt should be made to change this. Furthermore, any tampering with the battery will destroy the internal calibrations and User Patch memories. If the battery is suspected of failing please return the M500 to your *DRAWMER* dealer for service.

CHAPTER 7

M500 MIDI IMPLEMENTATION CHART

FUNCTION	TRANSMITTED	RECOGNISED	REMARKS
Basic Channel	1 - 16	1 - 16, & Omni	'Off' option disables MIDI
Mode Default Messages Altered	Mode 3 No No	Mode 3 No No	Mode 2 & 4 are not applicable
Note Number Velocity Note On Velocity Note Off Aftertouch Keys	1 - 127 Yes No No	1 - 127 No No No	GATE Peak Level relates to velocity
Channel Pressure	No	No	
Pitch Bender	No	No	
Control Changes #6 #7 #64 #65-95 #70-94 #96,97	Yes No No No No Yes	Yes Yes Yes Yes Yes Yes	See MIDI MODE, rotary value When MIDI MASTER VOL is enabled GATE ReTrig Time, GATE envelope plays sustained or normally FADE Effect if matching number MIDI MODE front panel number MIDI MODE data inc / dec
Program Change	0 - 127	0 - 127	See MIDI or PATCH CONTROL CHANGES Yes
System Exclusive	Yes	Yes	See System Exclusive chart page
System Common Song Pos Song Num Tune Req	No No No	No No No	
System Real Time Clock Start Continue Stop	No No No No	Yes Yes Yes Yes	See MIDI Trig Time See MIDI Trig Time and FADER Switch See MIDI Trig Time and FADER Switch See MIDI Trig Time and FADER Switch
Aux Messages Local On/Off All Notes Off Active Sense Reset	No No No No	No Yes No No	Closes any open GATE or PAN Effect

SYSTEM EXCLUSIVE DATA FORMAT

The format of MIDI Exclusive data dumps for M500 is as follows:-

MIDI DESCRIPTION	DATA BYTE	HEX	EXPLANATION
SYSTEM EXCLUSIVE	11110000	0F0	Standard MIDI spec.
MANUFACTURERS ID	00110010	032	"Drawmer Electronics"
DEVICE NUMBER	0xxxxxxx	0 to 07F	See MIDI device channel number
FORMAT NUMBER	0000xxxx	0 to 7	See EXCLUSIVE DUMP NUMBERS below
MSB DATA COUNT	0000000x 0xxxxxxx	0 or 1 0 to 07F	MSB of data size to follow. Sent as two bytes.
LSB DATA COUNT	0000000x 0xxxxxxx	0 or 1 0 to 07F	LSB of data size to follow. Sent as two bytes.
Data blocks are now sent in maximum packet sizes of 256 bytes			
DATA #1	0000000x 0xxxxxxx		All DATA is in two byte format.
DATA #2, #3, #4,... etc up to DATA #256	0000000x 0xxxxxxx		
BLOCK CHECKSUM	0000000x 0xxxxxxx		The CHECKSUM byte is calculated by:- Adding negated data values and ignoring any mathematical overflow. Sent as two bytes.
Additional data blocks are now sent until all data is sent. A short time delay between every second block will be noticed during data transmission. This delay must be included when attempting to restore large data dumps from a librarian MIDI package or sequencer. The message DATA ERROR will be displayed if this time delay is not included.			
END OF EXCLUSIVE	11110111	0F7	Standard MIDI spec.

When a valid MIDI Exclusive Data dump is received, a message will be displayed on the LCD with the same title as the MIDI transmit option. This message will remain until any key is hit.

EXCLUSIVE FORMAT NUMBERS

FORMAT #	TRANSMIT NAME	DATA SIZE	DESCRIPTION
1	This Patch	80 Hex, [128 Dec], (0.5 block)	Channel dependant dump of this patch
2	'* Patches	500 Hex, [1280 Dec], (5 blocks)	User Patches memories from 41 to 50
3	All Patches	1900 Hex, [6400 Dec], (19 blocks)	All user Patches memories from 1 to 50
4	Curr. Env	80 Hex, [128 Dec], (0.5 block)	Selected recorded envelope on either GATE or Record page. See also format #8.
5	16 RecEnvs	860 Hex, [2224 Dec], (8.7 blocks)	All recorded envelopes, titles and record rates.
6	Functions	80 Hex, [128 Dec], (0.5 block)	Common screen parameters
7	Everything	2260 Hex, [8800 Dec], (28.7 blocks)	All M500 programmable data. Transmits Formats #1, #3, #5 and #6 in four separate transmit data dumps.
8		0B Hex, [11 Dec], (0.1 block)	Not a separate Format number. Used to send the current selected envelope title and record rate. It is appended to Format #4

EXCLUSIVE FORMAT REQUEST

The procedure to remotely request a specific Format of MIDI Exclusive data dump for M500 is as follows:-

MIDI DESCRIPTION	DATA BYTE	HEX	EXPLANATION
SYSTEM EXCLUSIVE	11110000	0F0	Standard MIDI spec.
MANUFACTURERS ID	00110010	032	"Drawmer Electronics"
DEVICE NUMBER	0xxxxxxx	0 to 07F	See MIDI device channel number
FORMAT NUMBER	0100xxxx	0 to 7 + 64	See EXCLUSIVE DUMP NUMBERS above
END OF EXCLUSIVE	11110111	0F7	Standard MIDI spec.

Upon receipt of this short MIDI message, the requested data will be sent via the MIDI output.

REMOTE CONTROL VIA MIDI

It is important to note that individual parameter adjustment from MIDI is only possible if the target M500 is set to 'Slave' Mode. The procedure basically involves sending MIDI information to select the edit screen and then further MIDI information to remotely adjust the parameter. The M500 screen can be selected by sending MIDI Controller with the key number in the range 70 to 94 Decimal (046 to 05E Hex) and controller amount of 127 Decimal (07F Hex) which will be interpreted as a front panel key press. eg. If the MIDI message '0B0 047 07F' (hex) was received in the 'Slave' mode then this will select the OUTPUT page on the left channel of the unit.

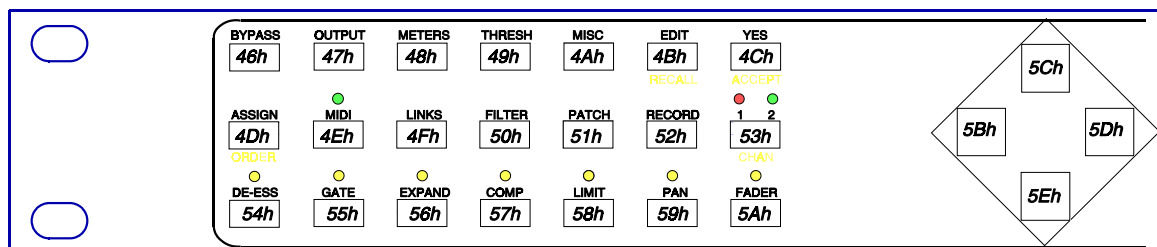
The parameter adjustment can be achieved by two slightly different methods which are Data increment ie. Controller + MIDI channel then 96 Decimal (060 Hex), or Data decrement ie. Controller + MIDI channel then 97 Decimal (061 Hex). These will cause adjustment of one step (where parameter limitations permit).

Alternately MIDI Knob can be used ie. Controller + MIDI channel then 06 and the amount of adjustment ranging 0 to 127 Decimal (07F Hex). An adjustment amount of 1 to 63 Decimal (03F Hex) will increment the parameter by the same number of steps (where parameter limitations permit). Adjustment of 65 to 127 Decimal (041 to 07F Hex) will be interpreted as a negative value in the range of -63 Decimal (-1 to -03F Hex). The decrement values are 1 to 03F Hex with the addition of having binary bit 6 set. A value of 0 or 64 decimal are interpreted as no change.

The reason that direct memory modification using specific system exclusive messages is not permitted is that most of the parameters directly affect other hidden variables and often involve multiple computation and table building. The mathematical processes are performed whilst on the parameter screen, hence you are forced to remotely select each screen before adjustment.

A useful tip when communicating remotely via MIDI is to always start with a PATCH LOAD instruction. The MIDI PROGRAM CHANGE parameter should be enabled, or use the long hand method of duplicating the keyboard presses of PATCH, then MIDI Knob value until correct patch is found, then YES key. Either method ensures that the keyboard emulation always starts from the same parameter screen(s).

MIDI keyboard numbers (in Hexadecimal).



CHAPTER 8

SAFETY CONSIDERATIONS

CAUTION - MAINS FUSE

TO REDUCE THE RISK OF FIRE REPLACE THE MAINS FUSE ONLY WITH THE SAME TYPE, WHICH MUST BE A CLASS 3, 240 VOLT, SLO-BLO TYPE, RATED AT 80mA WHERE THE MAINS INPUT VOLTAGE SWITCH IS SET TO 240 VOLTS AC. AND 160mA WHERE THE MAINS INPUT VOLTAGE IS 110 VOLTS AC. THE FUSE BODY SIZE IS 20mm x 5mm.

For units with serial numbers 100 to 400. The fuse rating printed on the rear panel was incorrect. Fit a fuse as rated above.

CAUTION - SERVICING

THIS UNIT CONTAINS NO USER SERVICEABLE PARTS. REFER ALL SERVICING TO QUALIFIED SERVICE PERSONNEL. DO NOT PERFORM ANY SERVICING UNLESS YOU ARE QUALIFIED TO DO SO.

WARNING

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.

TECHNICAL SPECIFICATIONS

(Where applicable, measurements taken at +4dBu operating level)

KEY INPUT	Balanced XLR at -10dBu or +4dBu signal levels.
INPUT IMPEDANCE	47K S
MAXIMUM INPUT LEVEL	+17dB above reference.
OUTPUT IMPEDANCE	50 S (balanced)
MAXIMUM OUTPUT LEVEL	+17dB above reference.
KEY INPUT	¼" jack at -10dBu or +4dBu signal levels.
SIDE CHAIN INPUT / OUTPUT	¼" stereo jack at -10dBu signal level only. Ring Send; Tip Return.
BANDWIDTH	20Hz to 22KHz ±1dB
CROSSTALK	-80dB @ 10KHz

NOISE AT UNITY GAIN with no effects assigned and 'OUTPUT' page selected.

	Wideband	22Hz - 22KHz	CCIR ARM	IEC A	Q-Pk CCIR
AV	-84dB	-92dB	-92dB	-95dB	-81dB
RMS	-82dB	-91dB	-91dB	-94dB	

DISTORTION	100Hz	1KHz	10KHz
Unity Gain, +4dBu input	< 0.03%	< 0.03%	<0.03%

POWER REQUIREMENTS	115Volt or 230Volt at 50-60Hz, 25 Watts
FUSE RATING	80mA for 240Volt, 160mA for 120Volt
FUSE TYPE	20mm x 5mm, Class 3 Slo-Blo, 250Volt working
CASE SIZE	482mm (w) x 44mm (h) x 300mm (d)
WEIGHT (incl packaging)	5.0 Kgs

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